

BW - _____033_____

**PERMITS,
RENEWALS &
MODS**

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

John Bemis
Cabinet Secretary

Brett F. Woods, Ph.D.
Deputy Cabinet Secretary

Jami Bailey
Division Director
Oil Conservation Division



March 15, 2012

Daniel K. Gibson, P.G.
Corporate Environmental Director
Key Energy Services
6 Desta Drive, Suite 4300
Midland, Texas 79705

RE: Discharge Permit BW-33 for Brine Well in Unit E of Section 31, Township 22 South, Range 27 East NMPM; Eddy County, New Mexico

Dear Mr. Gibson,

Pursuant to applicable parts of the Water Quality Control Commission regulations 20.6.2 NMAC, specifically 20.6.2.3104 thru 3999 Discharge Permit and 20.6.2.5000 thru 5299 Underground Injection Control, the Oil Conservation Division hereby approves discharge permit BW-33 and authorizes operation and injection for the Key Energy Services LLC (owner/operator) brine well. The proposed Carlsbad Brine Well #2 with API number yet to be assigned will be developed and operated at the location described above under the conditions specified in the attached Discharge Permit Approval Conditions.

Enclosed are two copies of the conditions of approval. Please sign and date both, then return one copy of the Conditions to the Oil Conservation Division office in Santa Fe within 30 working days of receipt of this letter, including the required permit fee of \$1,700.00.

Be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, groundwater, or the environment. Nor does this permit relieve the owner/operator of any responsibility or consequences associated with subsidence or cavern failure. This permit does not relieve the owner/operator of its responsibility to comply with any other applicable governmental rules, regulations, or agreements.

If you have any questions, please contact Jim Griswold of my staff at (505) 476-3465 or by email at jim.griswold@state.nm.us. On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation during this permit review.

Respectfully,

A handwritten signature in blue ink, appearing to read "Jami Bailey", is written over a horizontal line.

Jami Bailey
Director

JB/JG/jg
Attachment – Discharge Permit Approval Conditions

cc: OCD District II, Artesia

DISCHARGE PERMIT APPROVAL CONDITIONS
Key Energy Services LLC Carlsbad Brine Well #2 (BW-33)
Unit E of Section 31, Township 22 South, Range 27 East NMPM
(API # to be assigned)

March 15, 2012

All discharge permits are subject to Water Quality Control Commission regulations.

1. Payment of Fees. Every facility that submits a discharge permit application is assessed a filing fee of \$100.00. The Oil Conservation Division (OCD) has received the required filing fee from Key Energy Services LLC (hereafter referred to as the "owner/operator"). The owner/operator is now required to submit the required permit fee for a Class III brine well. Please remit a check in the amount of \$1,700.00 made payable to:

Water Quality Management Fund
C/O: Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

2. Permit Expiration and Renewal. This permit is valid for a period of five years and will expire on March 15, 2017. If the owner/operator desires to continue operation of the brine well beyond the expiration date, an application for renewal should be submitted to the OCD no later than 120 calendar days before the expiration date. If a renewal application is submitted in a timely fashion as described above and the owner/operator is otherwise in compliance with the conditions of this permit and all pertinent regulations, then the permit will not expire until the application for renewal has been approved or denied. The maximum permitted operational life of this brine well will be 20 years, following appropriate renewals after 2017. Continued operation with an expired permit is a violation of the Water Quality Act and civil penalties may be assessed.

3. Owner/Operator Commitments. Once a permit is issued, the owner/operator must ensure all operations are consistent with the terms and conditions of the permit and in conformance with all pertinent rules and regulations under both the Water Quality Act and the Oil & Gas Act. The owner/operator shall abide by all commitments submitted in its discharge permit application including any attachments and/or amendments along with these approval conditions. Applications which reference previously approved plans on file with the OCD will be incorporated into this permit and the owner/operator will abide by all commitments of such plans.

4. Modifications. The owner/operator must notify the OCD in advance of any facility expansion, production increase, or change in process. As a result, the OCD Director may require a modification in the permit conditions.

5. Waste Disposal and Storage. The owner/operator will dispose of all waste at an OCD-approved facility. Oilfield RCRA-exempt liquid or gaseous waste may only be disposed in a permitted Class II injection well. RCRA non-hazardous, non-exempt oilfield wastes may be disposed at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Generation and disposal of any waste stream not listed in the discharge permit application must be approved by the OCD on a case-by-case basis. Disposal of certain non-domestic waste without notification to the OCD is allowed at New Mexico Environment Department (NMED) permitted solid waste facilities if the waste stream has been identified in the discharge permit application and existing process knowledge of the waste stream does not change. The owner/operator must store all waste in an impermeable and bermed area, except waste generated during an emergency response operation and then only for less than 72 hours. All waste storage areas must be identified in the permit application. The owner/operator must not store oilfield waste on-site for more than 180 days unless approved by the OCD.

6. Chemical Storage. The owner/operator must store all materials other than fresh water in proper containers (such as drums, totes, sacks, or buckets) on an impermeable pad with curbing to provide secondary containment.

7. Process, Maintenance, and Yard Areas. The owner/operator must either pave and curb or incorporate some type of spill collection device into the design of all loading, process, maintenance, and yard areas which otherwise have the potential for the release of water contaminants to the ground surface.

8. Aboveground Tanks and Lines. The existing water station incorporates five aboveground fiberglass tanks for the storage of brine and four aboveground fiberglass tanks for the storage of fresh water, each with a capacity of 500 barrels along with a 210 barrel aboveground fiberglass tank for the storage of precipitation and overfills from the loading area. These tanks must incorporate automated level controls and isolation valves. The owner/operator must ensure all aboveground tanks, except those containing fresh water or fluids that are gases at atmospheric pressure and temperature, have impermeable secondary containment (i.e. liners and berms) which will contain a volume of at least one and one-third the volume of the largest tank or all interconnected tanks. Accumulated rainwater may be discharged on-site if the water has been previously verified to have chloride concentrations less than 250 mg/l, a TDS of less than 1000 mg/l and no oil sheen.

9. Labeling. The owner/operator must clearly label all tanks, drums, and other containers to identify their contents along with other emergency notification information. The owner/operator may use a tank coding system if it is incorporated into their emergency response plans.

10. Below Grade Tanks, Sumps, Pits, and Ponds. All below grade tanks and sumps must be approved by the OCD prior to their installation and incorporate secondary containment with leak detection. All existing tanks and sumps without secondary containment and leak detection must be retrofitted or replaced before permit renewal and must be tested annually in the interim. Leak detection systems must be inspected monthly. Sumps must have all accumulated fluids removed automatically or within 72 hours. All pits and ponds must be designed by a registered professional engineer. Any pit or pond containing any liquid other than fresh water must incorporate a primary and secondary liner with leak detection. Monitoring plans for the leak detection and closure plans for the pit or pond must be provided to the OCD. Any pit, pond, or open top tank with a diameter of eight feet or greater which contains anything other than fresh water must be rendered non-hazardous to wildlife including migratory birds. Inspection records must be maintained at the facility and be available for review. Any system which has been found to have lost integrity must be reported to the OCD within 72 hours of discovery.

11. Underground Process and Wastewater Lines. All buried process and wastewater piping must be tested at least once every five years to demonstrate mechanical integrity, except those only containing fresh water or fluids which are gases at atmospheric pressure and temperature. Pressure-rated piping must be tested at a pressure at least 1.5 times normal operating pressure. Atmospheric drain piping must be tested at a pressure of at least three pounds per square inch. In both cases, testing pressure must hold for at least 30 minutes with no more than a one percent loss in pressure. Alternative testing methods may be used, but only with OCD approval. Underground lines may incorporate secondary containment and eliminate the need for regular pressure testing, but only with adequate means for leak detection. Schematic diagrams or plans of all underground lines must be maintained showing all drains, vents, risers, and valves along with piping type, size, and rating. The results of all integrity testing must be maintained for inspection. Any system which has been found to have lost integrity must be reported to the OCD within 72 hours of discovery. The line from the injection water source must incorporate either an air-break or check valve to prevent backflow. Any underground line normally containing brine must incorporate secondary containment.

12. Class V Wells. All Class V wells (i.e. septic systems, leach fields, dry wells) that might introduce non-hazardous industrial waste or a mixture of industrial and domestic waste must be closed unless it can

be demonstrated that groundwater will not be adversely impacted. Class V wells that handle only domestic waste must be permitted by the NMED.

13. Housekeeping. All systems designed for spill collection/prevention and leak detection must be inspected monthly to ensure proper operation. All spill collection and secondary containment must be emptied of fluids within 72 hours of discovery.

14. Spill Reporting. All discharges, spills, leaks, and releases must be reported to the OCD within 24 hours and a written report detailing the cause, estimated volume, and corrective action taken must be filed within 15 days.

15. Inspections. The OCD has the authority to inspect the facility at any time. The OCD may impose additional requirements on the owner/operator based on those inspections. The owner/operator has committed in its application to daily facility inspections by its employees, and weekly logged inspections by a safety supervisor.

16. Stormwater. The owner/operator must implement and maintain stormwater run-on and runoff plans and controls. No water contaminant may be discharged as part of a runoff event at a concentration in excess of WQCC standards including any oil sheen. The OCD must be notified within 24 hours of the discovery of such a discharge and the owner/operator must take immediate action to stop the discharge.

17. Unauthorized Discharges. The owner/operator must not allow or cause water pollution or discharge any contaminant that might result in groundwater contamination unless specifically listed in the permit application and approved herein. An unauthorized process discharge is a violation of this permit. Any unintended spills are not violations.

18. Vadose Zone and Water Pollution. The owner/operator must address any contamination of vadose zone soils, groundwater, or surface water. The OCD may require a modification to this permit to investigate, remediate, and monitor such pollution. Failure to perform such investigation, remediation, or monitoring is a violation of this permit.

19. Setbacks and Site Control. As recommended in the owner/operator's application, at the time of well installation a minimum 900 foot setback must be established in all directions from the brine well to any existing residence, public building, park, or public road. Thereafter, and during the life of the well, a minimum distance of 1000 feet to the west, 500 feet to the south, 300 feet to the east, and 300 feet to the north of the well shall be in the direct control of the owner/operator. This area around the well must be fenced with signs as approved by the OCD.

The owner/operator will review the ownership status of adjacent lands on a yearly basis and provide notice to those landowners, the Eddy County Commission, and the City of Carlsbad describing the brine well operations, the estimated size and extents of the solution mined cavern, as well as any anticipated issues with the status of adjacent lands. These findings will also be provided to the OCD as part of the required annual report.

Every five years during permit renewal, the owner/operator must provide an updated contingency plan which takes into consideration any changes in adjacent land use within 1000 feet of the brine well. If warranted, the OCD, Eddy County, or the City of Carlsbad may request at that time additional land be acquired by the owner/operator, the installation of warning systems where reasonably feasible, or for increased financial assurances to cover future contingencies.

20. Brine Well Installation and Completion. The owner/operator must file completed OCD Forms C-101 (*Application for Permit to Drill, Re-enter, Deepen, Plugback or Add a Zone*) and C-102 (*Well Location and Acreage Dedication Plat*) with the OCD District II office and receive approval before commencing drilling activities. Given the proximity of the proposed brine well to the Carlsbad airport, the owner/operator must obtain a special use permit from the Federal Aviation Administration along with the

issuance of a *Notice to Airmen* 60 days prior to beginning drilling operations. The owner/operator will install the single brine well (proposed name *Carlsbad Brine Well #2* with API number to be assigned) to be located in Unit E of Section 31 in Township 22 South, Range 27 East NMPM (Eddy County, outside the city limits of Carlsbad) 2160 FNL, 1000 FWL, to a total depth of between 1300 and 1500 feet beneath ground surface into a salt interval within the Castile Formation with an overbearing interval of anhydrite. The bore associated with this well must be cored and/or geophysically logged (gamma ray, caliper, resistivity, density, and sonic) to provide adequate lithologic determination of overbearing intervals and the intended solution mining zone. A minimum 40 foot length of 16 inch diameter conductor pipe will be cemented to surface by circulating a mixed cement volume of at least twice the annular volume. A water protection casing with an approximate length of 500 feet and 13-3/8 inch diameter will be fully cemented to surface by circulating a mixed cement volume of at least twice the annular volume. A 10-3/4 inch diameter casing will be installed with its shoe at least 50 feet into the salt mining interval and cemented back to surface with a salt-resistant product by circulating a mixed cement volume of at least twice the annular volume. Cement bond logging will be independently undertaken on both the 13-3/8 inch water protection casing and the 10-3/4 inch casing. Perforation and squeezing of additional cement will be required as indicated by the logs. The injection and production tubing strings will be installed concentrically, one within the other. The outer string will be seven inches in diameter, set approximately 50 feet below the 10-3/4 inch casing shoe, and initially act as the brine production tubing. The innermost tubing will be 4-1/2 inches in inner diameter, set 250 feet below the outer tubing, and initially be used to inject salt un-saturated water. The concentric tubing strings can be moved to facilitate cavern shaping. A blanket fluid will be introduced via the 10-3/4 inch casing to provide added protection by inhibiting salt removal at the cavern roof. The owner/operator must undertake pressure integrity testing of all tubing and casing before initiation of solution mining. OCD Forms C-103 (*Sundry Notices and Reports on Well*) and C-105 (*Well Completion or Recompletion Report and Log*) must also be filed with the District office at the appropriate times.

Installation of a second well to facilitate brine production via a two-well system (one well for water injection and the other for brine production) is considered a major modification to this permit. Implementation of such an approach requires pre-approval by the OCD after consideration of a detailed request from the owner/operator.

21. Brine Production Method. During the initial cavern development process, water injection will occur through the innermost tubing string and brine production through the outer string to promote cavern development at depth. Injection and production flow through the concentric tubing strings can be reversed as required to achieve optimal cavern shaping, mine salt most efficiently, and to periodically clean the tubing and annulus. Injection must only occur in the intended solution mining interval.

22. Blanket Monitoring. The pressure of the blanket fluid will be monitored continuously with fluid added as required. The depth of the blanket should be equivalent to 50 feet beneath the 10-3/4 inch casing shoe and verified at least twice annually with an interface log or when the difference between blanket and brine production pressure significantly varies. Whenever a blanket interface log is undertaken, a verification of the bottom of tubing and cavern floor depth should be completed to gauge the accumulation of insoluble materials at the bottom of the cavern. If during the running of an interface log the blanket/brine interface cannot be determined, injection of additional blanket material can be undertaken but of a volume equivalent to no more than one foot of additional depth for the estimated cavern diameter. If the interface is still not determined after the injection of additional blanket material, brine production must be suspended and cannot resume until the cause is determined and a solution implemented. The owner/operator must monitor the produced brine in the surface storage tanks for the presence of blanket fluid on a regular basis. If what appears to be blanket material appears at any time in the produced brine, the owner/operator must determine the cause and remedy the situation, including the possible removal and replacement of damaged tubing.

23. Brine Well Workovers. OCD approval must be obtained prior to the unseating of any packers, movement of any tubing strings, performing remedial work, or pressure testing using Form C-103 filed

with both the District and Santa Fe offices. Properly completed Forms C-103 and/or C-105 must be filed with the OCD upon completion of workover activities and copies included in that year's annual report.

24. Wellhead Pressure Limitation. The owner/operator must have a functioning pressure limiting device or control at all times. The operational dynamic or static wellhead pressure must not reach a level which could cause fracturing of the solution mining interval. It is recommended that the maximum fracture pressure gradient in this instance must not exceed 0.75 psi/ft. Given an anticipated minimum depth to the solution mined interval of approximately 1300 feet, the maximum downhole cavern pressure must always be less than 975 psi to minimize fracturing. The associated hydrostatic head for brine at that depth would be 650 psi (0.5 psi/ft for brine compared to 0.4 psi/ft for fresh water). Therefore, the maximum operating surface injection and/or test pressure measured at the wellhead must not exceed 325 psig unless pre-approved by the OCD.

25. Mechanical Integrity Testing. The wellhead must be equipped with gauges for the continuous monitoring of injection, production, and blanket pressures. The owner/operator stated as part of their application concern that annual integrity testing via pressurizing of the formation may inadvertently result in fracturing as well as during pressure cycling. As an alternative, the owner/operator must monitor and maintain records of the continuous applied pressure on the formation and isolated well annulus. That information will be provided as part of the owner/operator's annual reporting. At least once every five years and as part of every well workover, the owner/operator must isolate the main casing from all tubing and the mined cavern for integrity testing of the casing using either liquid or gas at a pressure of at least 350 psig for at least 30 minutes with less than 10% pressure loss.

26. Cavern Volume/Geometry. The owner/operator must annually provide information on the size and shape of the resulting solution cavern along with geologic and engineering information which demonstrates that continued salt extraction will not cause cavern collapse, surface subsidence, property damage, or otherwise threaten public health and the environment. While the anticipated cavern diameter as represented in the owner/operator's application is only 150 feet, the cavern diameter must not exceed 300 feet without prior OCD approval and in no instance will be allowed to exceed 650 feet at any depth, or one half the depth from ground surface to the top of the cavern, whichever is less. Furthermore, despite the measured or inferred cavern geometry, brine production at this facility will not be allowed to continue beyond 20 years. At least 90% of the calculated volume of salt removed based upon injection and production volumes must be accounted for by geophysical methods that determine cavern geometry. Such methods must be implemented by the owner/operator at least once every three years during the brine well's operational life.

27. Surface Subsidence Surveys. The owner/operator is required to establish multiple surface benchmarks within 100 feet of the new well. These benchmarks along with those previously established in the vicinity of the nearby historic brine well (City of Carlsbad #1, API #30-015-21842) must be surveyed on a regular basis to monitor subsidence associated with both brine caverns. If the monitored surface subsidence at any measuring point reaches 0.10 feet compared to a baseline elevation established prior to solution mining, continued operation must be terminated. If the owner/operator cannot demonstrate the integrity of the cavern and well to the satisfaction of the OCD, they will be required to shutdown brine production and implement corrective action.

28. Brine Production and Water Injection Volumes. The volumes of fluid injected and produced must be continuously metered at or near the wellhead. Monthly totals of injection and production must be reported to the OCD by the 10th of the following month. Solution mining operations must be suspended if the monthly injection volume is less than 110% or greater than 120% of associated brine production. If such an event occurs, the OCD must be notified immediately.

29. Analysis of Injection Fluid and Brine. It is understood the owner/operator intends to use either or both fresh water or treated water from otherwise non-potable sources. The owner/operator must have an analysis undertaken of both the injection fluid and produced brine each calendar quarter. The brine samples must be analyzed by a qualified third party for density and pH along with the concentrations of

hydrocarbons, total dissolved solids, chloride, and sodium using accepted methods. The injection water samples must be analyzed for density and pH along with the concentrations of total dissolved solids and chloride.

30. Area of Review. The owner/operator must report within 24 hours of discovery, any new wells, conduits, or any other device which penetrates or may penetrate the fluid injection zone anywhere within ½ mile of the brine well.

31. Loss of Mechanical Integrity. The owner/operator must report any failure of the casing, tubing, packers, or any movement of fluids outside of the injection zone within 24 hours of discovery. Operations must be terminated until proper repairs are completed and approval is received from the OCD.

32. Groundwater Monitoring. The owner/operator must install at least three groundwater monitoring wells no more than 200 feet laterally of the brine well, with at least two of the wells in the nominal downgradient direction of groundwater flow. Depth to water measurements and water samples from these wells must be taken on an annual basis and submitted to a qualified third party for analysis of total dissolved solids, diesel range hydrocarbons, chloride, sodium, potassium, calcium, and sulfate with detection limits less than the applicable WQCC groundwater standards.

33. Financial Assurance. The owner/operator must maintain a surety bond in the minimum amount of \$1,000,000.00 (One Million Dollars) to cover potential costs associated with plugging and abandonment of the well, restoration of the surface, along with five years of surface subsidence monitoring thereafter.

34. Reporting. In addition to the monthly injection and production reporting along with any incident reporting otherwise required, the owner/operator must submit an Annual Report to the OCD no later than January 31st of each year. Each Annual Report must minimally include the following:

- Owner/operator's name.
- Permit number for the facility along with the name and API number of the brine well.
- Date of the report and who prepared the report.
- A summary of operations for the year including descriptions and reasons for any remedial work.
- Monthly injection and production volumes along with a running total for both since the beginning of injection.
- The maximum and average injection and production pressures.
- Copies of the chemical analyses for both injection water and brine.
- Average blanket fluid pressure and volume of blanket material injected or removed.
- Copies of testing for mechanical integrity (formation and/or casing) including calibrations.
- Descriptions and explanation for any deviation from normal production methods.
- Copies of any spill or leak reports.
- Results of groundwater monitoring.
- Information regarding cavern volume and geometry.
- An analysis and determination of probable cavern stability
- Survey data for surface subsidence.
- A summary of any subsurface activity within ½-mile of the brine well.
- An update on the ownership of property within 1000 feet of the brine well.
- Signature by an authorized executive officer, partner, or proprietor certifying the Annual Report is accurate, and complete.

35. Permit Transfer. Both the current and any new owner/operator must provide to the OCD written notice of any transfer of the permit at least 30 days prior to any transfer of ownership, control, or possession of the facility. The new owner/operator must also provide a written commitment to the OCD of their intent to comply with all terms and conditions of the existing permit. The OCD also reserves the right to require a modification of the permit during transfer. The new owner/operator must provide adequate financial assurance before the OCD will approve a transfer.

36. Closure. The owner/operator must notify the OCD when operations at the facility are to be discontinued for more than six months. Prior to closure of the facility, the owner/operator must submit a closure plan to the OCD for approval which includes a final geophysical determination of cavern volume and geometry. Closure and waste disposal will be in accordance with the statutes, rules, and regulations in effect at the time of closure. The owner/operator has committed in its application to grading of the facility back to its original contours when closed unless the land has a future beneficial use as is and will not adversely impact the environment. The owner/operator also provided as part of their application a proposed procedure for plugging of the brine well and an option for possibly backfilling the cavern with solid wastes. The OCD is not approving either scenario within this permit. Such issues need to be reviewed at an appropriate time in the future in light of possible advances in technology and overall knowledge.

37. Certification. Key Energy Services LLC (owner/operator) by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments including the terms and conditions contained herein. The owner/operator further acknowledges the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of the permit administratively and may also order an immediate cessation of operations.

Company Name (print above)

Company Representative (print name)

Company Representative (signature)

Title

Date