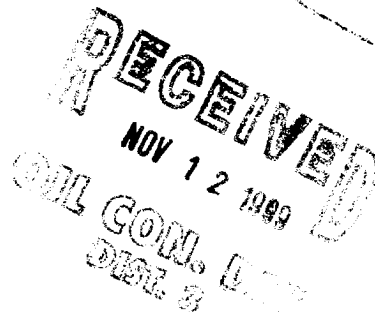




November 12, 1999

Ms. Lori Wrotenberry
New Mexico Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505



RE: Administrative Approval to Inject
Energen Resources Corporation
Eul Canyon SWD #1
1105' FSL, 780' FWL, Sec. 24, T32N, R6W, N.M.P.M.
Rio Arriba County, New Mexico
API #30-039-26214

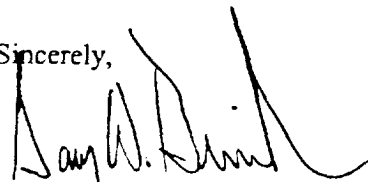
Dear Ms. Wrotenberry:

Energen Resources Corporation requests administrative approval to inject produced water in its recently drilled Salt Water Disposal Well. Attached is Form C-108 with the required data for application.

In accordance to New Mexico Oil Conservation Division Rules, the surface landowner has been furnished a copy of this application by certified mail. Proof of legal notice has been requested for publication in both San Juan and Rio Arriba counties.

If additional information is needed, please contact me.

Sincerely,



Gary W. Brink
Production Superintendent

GWB/mt

cc: NMOCD - Aztec, Surface Owner
F:\MONICA\PRODUCT\OCD\EUL CANYON SWD 111-99 INJECT.DOC

APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: Secondary Recovery Pressure Maintenance X Disposal Storage
Application qualifies for administrative approval? X Yes No
- II. OPERATOR: ENERGEN RESOURCES CORPORATION
ADDRESS: 2198 Bloomfield Highway, Farmington, New Mexico 87401
CONTACT PARTY: Gary Brink PHONE: 505-325-6800
- III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection.
Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? Yes X No
If yes, give the Division order number authorizing the project: _____
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
 2. Whether the system is open or closed;
 3. Proposed average and maximum injection pressure;
 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
 5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- *VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- *X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).
- *XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- NAME: Gary Brink TITLE: Production Superintendent
SIGNATURE: [Signature] DATE: November 12, 1999
- * If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

III. WELL DATA

- A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:
- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
 - (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
 - (3) A description of the tubing to be used including its size, lining material, and setting depth.
 - (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

- B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.
- (1) The name of the injection formation and, if applicable, the field or pool name.
 - (2) The injection interval and whether it is perforated or open-hole.
 - (3) State if the well was drilled for injection or, if not, the original purpose of the well.
 - (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
 - (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

Attachment Data for C-108

V. See attached Map

VI. No other wells in the area have penetrated the injection zone.

VII. Initially it is anticipated to inject about 2500 bbls. per day of produced water from the Fruitland Coal formation with a maximum anticipated rate of 3000 bbls. per day. The system is a closed system with 8.5 miles of water gathering pipeline and 500 bbl storage time. The injection facility has enough capacity to store two days of production. It is anticipated to inject at 2 BPM at 1500 psi with a maximum injection pressure of 2000 psi. Rates and pressures will be confirmed by step rate tests at time of completion. Attached are relative water samples of Fruitland coal production and a representative water sample from the Bluff and Entrada..

VIII. Entrada: 8890-9125', Massive sandstone, moderately sorted white to gray to pale orange, fine grained to medium grained, sub-angular to angular to occasionally rounded, weakly cemented with silica and calcite. Porosity is typically very low (2-4%), although the top 50' has greater porosity (4-10%). Underlying unit is the Chinle formation and overlying unit is Todictio formation.

Bluff: 8625-8768', Massive sandstone, white to off white to clear, moderately well sorted, fine to medium grained, moderately cemented with silica, most sub-angular grains. Porosity is 5-6%. Underlying unit is the Todictio formation and overlying unit is Morrison formation.

Overlying aquifers are the Ojo Alamo, Animas, San Jose and Nacimiento. The deepest in this wellbore is the Ojo Alamo from 2240-2510'

IX. It is anticipated following perforating to acidize each zone with 50 gallons of 15% HCL per foot of pay. Based on treating pressures and other wells completed in this formation, a fracture stimulation will be performed.

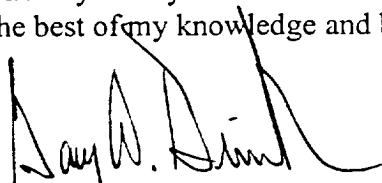
X. Previously submitted by Haliburton wireline services.

XI. No fresh water wells exist within one mile of this well.

XII. I, Gary W. Brink P.E., have examined all available geological and engineering data and find no evidence of open faults or any other hydrologic connection between the anticipated disposal zones and any underground sources of drinking water.

XIII. Proof of legal notice has been sent to the Rio Grande Sun, Espanola, N.M. and the Farmington Daily Times, Farmington, N.M.. for advertisement. In addition, the surface land owner has been furnished a copy of this application by certified mail. Energen Resources is the operator of all leases in the San Juan 32-5 Unit.

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

A handwritten signature in black ink, appearing to read "Gary W. Brink", with a long horizontal flourish extending to the right.

Gary W. Brink P.E.
Production Superintendent

2605
DURANGO, CO 81302
(303) 247-4220

ATTEN: BILL CLARK
PO BOX 1237
DURANGO, CO 81302
(303) 247-0728

DATE SAMPLED: 8/1/88
WELL NAME: NEBU UNIT 501
LOCATION: 10-32N-7W
FORMATION: ENTRADA WATER
SAMPLED FROM:
WELL ON/OFF:

CDS ID #: 1119

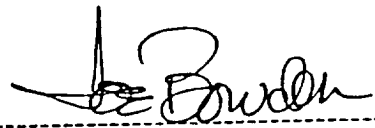
| CONSTITUENT | | ppm | ppm | |
|-------------|--------------|------|-------|---------|
| Sodium | Na + | 4760 | 207.1 | |
| Potassium | K + | 169 | 4.3 | Item 2A |
| Calcium | Ca ++ | 1310 | 65.4 | SWD-339 |
| Magnesium | Mg ++ | 29.4 | 2.4 | |
| Iron Total | Fe++ & Fe+++ | 164 | 8.8 | |

POSITIVE SUB-TOTAL 6432.4 287.9779

| | | | |
|-------------|-------|------|-------|
| Chloride | Cl - | 8280 | 233.5 |
| Carbonate | CO3 = | 0 | 0.0 |
| Bicarbonate | HCO3- | 152 | 2.5 |
| Hydroxide | OH - | 0 | 0.0 |
| Sulfate | SO4 = | 2100 | 43.7 |

NEGATIVE SUB-TOTAL 10532 279.70928

Total Dissolved Solids 19000 ppm
pH 5.07 units
Specific Gravity 1.01 @ 73 F.
Resistivity 45 ohm-m

APPROVED BY: 
DR. JOE BOWDEN, DIRECTOR

This Laboratory report may not be published or used for advertising or in connection with advertising of any kind without prior written permission from CDS Laboratories.
Results are based on analysis made at the time samples are received at the laboratory.

Water Analysis Report

To: Energen

Submitted by: Halliburton Energy Services

Attention: Doug Thomas

Well Name: S J 32-5 #108

Date: 9/20/99

Date Rec: 9/16/99

Report #: WF-990-0218

Formation: Produced Water *FRUITLAND*

Typical of formation water

| | | |
|----------------------------------|-------|---------|
| Specific Gravity | 1.000 | |
| pH | 10.08 | |
| Resistivity | 0.89 | @ 70° F |
| Iron (Fe) | 0 | Mg / L |
| Potassium (K) | 100 | Mg / L |
| Sodium (Na) | 1884 | Mg / L |
| Calcium (Ca) | 20 | Mg / L |
| Magnesium (Mg) | -12 | Mg / L |
| Chlorides (Cl) | 1800 | Mg / L |
| Sulfates (SO ₄) | 1600 | Mg / L |
| Carbonates (CO ₃) | 8.6 | Mg / L |
| Bicarbonates (HCO ₃) | 22 | Mg / L |
| Total Dissolved Solids | 5422 | Mg / L |

Respectfully: Barbara Martin

Title: Procedure Analyst

Location: Farmington, NM

NOTICE: This report is limited to the described sample tested. Any person using or relying on this report agrees that Halliburton shall not be liable for any loss or damage whether due to act or omission resulting from such report or its use

Water Analysis Report

To: Energen

Submitted by: Halliburton Energy Services

Attention: Doug Thomas

Well Name: S J 32-5 #102

Date: 9/20/99

Date Rec: 9/16/99

Report #: WF-990-0215

Formation: Produced Water *Fruitland*

Typical of formation water

| | | |
|----------------------------------|-------|---------|
| Specific Gravity | 1.005 | |
| pH | 8.02 | |
| Resistivity | 0.80 | @ 70° F |
| Iron (Fe) | 0 | Mg / L |
| Potassium (K) | 200 | Mg / L |
| Sodium (Na) | 3033 | Mg / L |
| Calcium (Ca) | 40 | Mg / L |
| Magnesium (Mg) | 29 | Mg / L |
| Chlorides (Cl) | 5000 | Mg / L |
| Sulfates (SO ₄) | 0 | Mg / L |
| Carbonates (CO ₃) | 8.6 | Mg / L |
| Bicarbonates (HCO ₃) | 22 | Mg / L |
| Total Dissolved Solids | 8332 | Mg / L |

Respectfully: Barbara Martin

Title: Procedure Analyst

Location: Farmington, NM

NOTICE: This report is limited to the described sample tested. Any person using or relying on this report agrees that Halliburton shall not be liable for any loss or damage whether due to act or omission resulting from such report or its use

Water Analysis Report

To: Energen

Submitted by: Halliburton Energy Services

Attention: Doug Thomas

Well Name: S J 32-5 #103

Date: 9/20/99

Date Rec: 9/16/99

Report #: WF-990-0214

Formation: Produced Water *Frontlands*

Typical of formation water

| | | |
|----------------------------------|-------|---------|
| Specific Gravity | 1.000 | |
| pH | 8.31 | |
| Resistivity | 1.12 | @ 70° F |
| Iron (Fe) | 0 | Mg / L |
| Potassium (K) | 0 | Mg / L |
| Sodium (Na) | 3483 | Mg / L |
| Calcium (Ca) | 40 | Mg / L |
| Magnesium (Mg) | 24 | Mg / L |
| Chlorides (Cl) | 5500 | Mg / L |
| Sulfates (SO ₄) | 0 | Mg / L |
| Carbonates (CO ₃) | 8.6 | Mg / L |
| Bicarbonates (HCO ₃) | 22 | Mg / L |
| Total Dissolved Solids | 9078 | Mg / L |

Respectfully: Barbara Martin

Title: Procedure Analyst

Location: Farmington, NM

NOTICE: This report is limited to the described sample tested. Any person using or relying on this report agrees that Halliburton shall not be liable for any loss or damage whether due to act or omission resulting from such report or its use

WELL NAME & NUMBER: EUL CANYON SWD #1

WELL LOCATION: 1105' FSL, 780' FWL
FOOTAGE LOCATION

M
UNIT LETTER

24
SECTION

32N
TOWNSHIP

5W
RANGE

WELLBORE SCHEMATIC

WELL CONSTRUCTION DATA

Surface Casing

13 3/8 @ 587' Hole Size: 17 1/2 Casing Size: 13 3/8 48# H-40
Cemented with: 700 sx. or 833 ft³
Top of Cement: Surface Method Determined: Circ.

Intermediate Casing

9 5/8 @ 5757' Hole Size: 12 1/4 Casing Size: 9 5/8 40# S-95
Cemented with: 1390 sx. or 2968 ft³
Top of Cement: Surface Method Determined: Circ.

Production Casing

Top of Liner @ 5585' Hole Size: 7 7/8 Casing Size: 5 1/2 17# K-55, N-80
Cemented with: 915 sx. or 1512 ft³
Top of Cement: 5585 Method Determined: Circ.
Total Depth: 9233'

Injection Interval

5 1/2 @ 9233'

8625 feet to 9100

(Perforated or Open Hole; indicate which)

INJECTION WELL DATA SHEET

Tubing Size: 3 1/2 9.3# N-80 Lining Material: None

Type of Packer: Baker Loc-set

Packer Setting Depth: 8525'

Other Type of Tubing/Casing Seal (if applicable):

Additional Data

1. Is this a new well drilled for injection? x Yes No
If no, for what purpose was the well originally drilled?

2. Name of the Injection Formation: Bluff & Entrada

3. Name of Field or Pool (if applicable):

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. No

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: Dakota - 7884, Mesaverde - 5069

Fruitland Coal - 2980'