STATEMENT OF BASIS

CLASS II PERMIT APPLICATION

GRAND RESOURCES, INC.

NAVAJO #5

Navajo #5
UIC Permit NN291000001
SW SE Sec. 10, T32N, R18W
Navajo Lease
San Juan County, New Mexico

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BACKGROUND INFORMATION

Grand Resources is applying to the EPA for two Class II Underground Injection Control permits. They would like to convert two oil production wells to injection wells for use in an enhanced oil recovery operation. The wells are part of the Mesa Gallup Waterflood Project in San Juan county, New Mexico, and are on the Navajo Indian Reservation.

Grand Resources submitted the permit applications on December 3, 1990. They submitted additional material to complete their application on May 1, 1991, in response to the administrative review.

The EPA has decided to approve these permits, pending public review and comment, and is now issuing proposed permits. The subject of this Statement of Basis is the well Navajo #5 and its permit number is NN291000001. The permit will be issued for the remaining operating life of the existing oil recovery operation

Monitoring Devices:

We are requiring the operator to install one-half inch FIP fittings with cut-off valves on the tubing and the tubing/casing annulus of the well to allow an inspector to take injection pressure measurements.

A flow meter will be installed for measuring flow rates and cumulative volumes. The meter will be certified for at least 95% accuracy throughout the range of injection rates used.

A sampling tap will be installed on the injection pump discharge line for the purpose of periodically obtaining representative samples of the injection fluid.

SECTION B - CORRECTIVE ACTION

The applicant submitted the required one-half mile radius Area of Review (AOR) information with the permit application. There is a total of 31 wells located within the AOR - 21 producers and 10 that have been plugged and abandoned (P&A'd). The complete schematics for all of the wells within the AOR are in the permit application package on file at the EPA office in San Francisco.

No corrective action is required of the permittee because all of the wells within the AOR have been properly constructed or adequately P&A'd. Also, there are no USDW's within the AOR.

SECTION C - WELL OPERATION

Mechanical Integrity:

The construction details and cement records satisfy the requirements of 40 CFR §146.08(ii)(c)(2) for demonstrating the absence of significant fluid movement.

[redacted] of the injection casing, tubing, and packer will be conducted prior to commencement of injection operations in the proposed injection well. This test will involve increasing the pressure in the annulus to [redacted]

Demonstrations of mechanical integrity of the injection casing, tubing, and packer will also be conducted within 30 days after any workovers or alterations and prior to recommencing injection.

An MIT pressure test of the annulus will also be conducted at least once every 5 years during the life of the permit.

in the Mesa Gallup Unit unless the permit is terminated for reasonable cause (40 CFR §144.39, 144.40 and 144.41). However, the permit will be reviewed every 5 years.

The source of the water will be the Entrada formation at a depth of 3200 feet below the surface. The total dissolved solids (tds) content of this water is 28,000 parts per million (ppm).

The water will be injected into the Gallup sandstone formation at a depth of 1664 feet. The Gallup sandstone is an oil-bearing formation and currently produces no free water.

Grand Resources has notified all interested parties within the ½ mile radius area of review (AOR). In addition to the local landowners, land-users and operators, they have notified the Navajo Nation, the Bureau of Land Management, the Bureau of Indian Affairs, and the State of New Mexico.

Grand Resources has submitted all the required information and data necessary for an injection permit issuance in accordance with 40 CFR Parts 144, 146, and 147.

This Statement of Basis provides the derivation of the site specific permit conditions and the reasons for them on the basis of the direct implementation regulations promulgated for the Indian Tribal lands on the Navajo Indian Reservation under the UIC program provisions of the Safe Drinking Water Act.

SITE SPECIFIC CONDITIONS

Part II
Section A - Well Construction

Casing and Cementing:

No construction changes will be necessary to convert these wells from production to injection. The wellbore schematic diagrams can be seen in Figure 1 of the two permits.

Construction details for well Navajo #5: The 7" surface casing is set at 60' and is cemented with 10 sacks circulated to the surface. The long string casing is 4½" in diameter and is run from the surface to 1764' and cemented with 135 sacks over the interval 900'-1764'. The 2⅜" tubing is run from the surface to 1650'. The packer is set at 1550' and the perforations are between 1664' and 1678' feet below the surface.

Formation Logging and Testing:

The tubing/casing annulus will be tested for mechanical integrity before injection may commence. It will be tested at a minimum of once every five years thereafter. No additional formation logging nor testing is required.

Injection Interval:

The injection interval will be limited to the Gallup Sandstone formation between the depths of 1664 and 1678 feet below the surface.

The upper confining zones are the Gallup Silt which is between 1550 and 1664 feet below the surface and the Mancos Shale which extends from the surface to a depth of 1550 feet.

Injection Pressure Limitation:

The maximum allowable injection pressure shall be 900 psig, measured at the surface. This is slightly lower than the 1000 psig requested by the applicant, but it is necessary to stay below the formation fracture pressure.

The formation fracture pressure was calculated assuming a fracture pressure gradient of 1.0 psi/foot, which is a reasonable assumption based on step-rate tests by other operators in the area. The maximum injection pressure was calculated as follows:

$P_m = P_f - P_h$ .2 psi

$P_h = 0.433 \cdot SG \cdot d$
$P_h = 0.433 \cdot 1.02 \cdot 1664$
$P_h = 735$ psig

$P_f = FG \cdot d$
$P_f = 1.0 \cdot 1664$
$P_f = 1664$ psig

[redacted]

Where:
P_m = maximum pressure at the wellhead (psig)
P_f = fracture pressure at the top perforation (psig)
P_h = hydraulic pressure head (psig)
d = depth to top perforation (feet)
SG = specific gravity of the injection fluid (unitless)
FG = fracture pressure gradient (psi/foot)
0.433 = fresh water hydraulic pressure gradient (psi/foot)

This value may be increased if the applicant conducts a valid step-rate test demonstrating that the actual formation fracture pressure is higher.

Injection Volume (Rate) Limitation:

The maximum injection rate shall be 500 barrels per day (bpd), which is the rate requested by the applicant. The injection is also limited to a rate that will not cause the injection pressure to exceed 900 psig at the wellhead.

Injection Well Monitoring Program

The permittee is required to sample and analyze the water quality of the injected fluids at annual intervals. The water samples shall be analyzed for TDS, major ions, pH, specific conductivity, and specific gravity. Similar analyses shall be conducted whenever the source of the injection fluid changes.

Measurements of the injection pressure, annulus pressure, and injection flow rate must be observed and recorded at least once per month.

SECTION E - PLUGGING AND ABANDONMENT

We have reviewed and approved the P&A plan submitted by the applicant. The P&A plan is incorporated into the permit as Attachment A. The estimated cost of the P&A job is $5,000.

SECTION F - FINANCIAL RESPONSIBILITY

The permittee has established a Letter of Credit (LOC) and a Standby Trust Agreement at Western National Bank, naming the EPA as beneficiary. The amount of the LOC is $10,000 and it is a blanket instrument to cover the plugging and abandonment costs of the injection wells located in the Mesa Gallup Waterflood Project. The LOC expires July 30, 1992 and will be automatically renewed by the bank every year.

The permittee also has a Letter of Credit assigned to the Bureau of Indian affairs in the amount of $15,000. This Letter of Credit covers all oil and gas operations conducted by Grand Resources on the Navajo Reservation in New Mexico.