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OFFICE OF THE STATE ENGINEER
DIVISION OF WATER RESOURCES

1313 Sherman Street-Room 818
Denver, Colorado 80203
(303) 866-3581

July 25, 1983

Mr. William R. Smith
Colorado Oil & Gas Conservation Commission
1313 Sherman Street
Denver, CO 80203

RE: Enstar Petroleum Inc., well Hamil Bros., 18-1
Hamil Ranch Field, Section 18, T9N, R52W, Logan County, Colorado
Application to convert to Water Injection (Disposal) Well

Dear Bill:

According to information furnished by the applicant, the proposed injection well was bottomed at 5014' in the Dakota Formation:

8 5/8" casing set at 174' and cemented to surface; 5 1/2" casing set at 5004' and cemented with 200 sacks poz mix with additives, top of cement at 4120'; perforated 4710' - 4712', stimulated w/500 gals. acid, squeezed with 60 sacks cement; perforated 4684' - 4688', acidized and "fraced;" plugged back total depth, 4956'.

The proposed injection zone is 4684 -4688 feet ("J" Sand). Proposed injection fluids are produced waters from a nearby well producing from the lower part of the Dakota Formation ("O" Sand). Enstar proposes to set a packer above the perforations at about 4590 feet and inject, through tubing, into the perforations in the "J" Sand at 1500+ psi. Initial breakdown pressure in the "J" Sand was 2100 psi. It is proposed to inject approximately 220 BWPD. Prior to injection, the tubing-casing annulus will be pressure tested to 2000 psi.

In respect to Enstar's application to convert well Hamil 18-1 to an injection (disposal) well, the CDWR (Colorado Division of Water Resources) has the following comments:

Overlying the Dakota Formation (top at 4558 feet) in the immediate vicinity of the proposed injection well, are approximately 4525 feet of Upper Cretaceous sediments, in ascending order (with their thicknesses) the Colorado Group (440+ feet) comprised of the Graneros Shale, Greenhorn Limestone, and

Mr. William R. Smith
Page -2-
July 25, 1983

the Carlisle Shale; the Codell Sandstone (10+ feet); the Niobrara Formation (325+ feet) including the lower Fort Hays Limestone, and the overlying Smokey Hill Member; and the Pierre Shale (3770+ feet) including about 750 feet of the Upper Transition Zone in the upper part of the Pierre.

The Colorado Group Formations and the Smokey Hill Member of the Niobrara generally yield little to no water to wells except in or near outcrop areas. The Fort Hays Member of the Niobrara Formation is an aquifer in and near the areas of its outcrop.

Water quality generally deteriorates with depth and distance from the outcrop areas of these formations, the nearest of which, including the Fort Hays Limestone, are in the Arkansas River Valley to the south.

The Pierre Shale, excepting the upper Transition Zone Member is not considered an aquifer. The Transition Zone, consisting of shale, claystone, shaley sandstone and sandy shale, is a proven aquifer in the area, yielding moderate amounts of water to wells. Overlying the Pierre Transition Zone to the north and east of the proposed injection well, the White River Group, comprised of the Lower Chadron Formation and the overlying Brule Formation, outcrops. Erosion has removed the White River Group in the immediate vicinity of the subject well. Where present the White River Group is an aquifer where saturated.

In the immediate vicinity of the proposed injection well, the Pierre Transition Zone is overlain by up to 50 feet of Older (Quaternary) Alluvium which originated during the various cycles of Pleistocene glaciation. Consisting of generally stratified clay, silt, sand, and gravel, the Older Alluvium may be an important source of ground water to shallow wells.

The CDWR has complete records for 45 drilled wells and 6 wells with incomplete records within a 2.5 mile radius of the subject well. In addition there are 11 permitted but as yet undrilled wells. Of the drilled wells, three are located within 0.5 miles radius of the subject well (depths 65 - 266 feet) and 7 additional wells within a 1.0 mile radius (depths 50 - 500 feet). The remaining 41 wells range in depth from 37 - 455 feet. Claimed production ranges from 1 - 800 GPM. Principal use is for domestic supplies and to a lesser extent for stock and irrigation purposes. Production is principally from the Pierre Transition Zone, 34 wells. There is one White River Group well and 16 dual completions in the Older Alluvium and underlying Pierre Transition Zone.

Analyses of the produced water and the proposed injection zone fluids 4235 mg/l and 9090 mg/l respectively, indicate that the produced waters are of better quality than those in the proposed injection zone. Both analyses are within the EPA limit of usable water.

Mr. William R. Smith

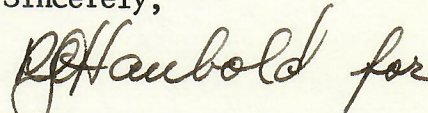
Page -3-

July 25, 1983

The cement bond log indicates a good cement bond with the top of the cement at 4120 feet, extending 574 feet above the proposed injection zone. Integrity of this cement seal must be maintained for the separation from, and the protection of, the overlying aquifers.

It should be noted that only a portion of the Pierre Transition Zone (750+ feet) is protected by the surface pipe (174 feet). Also the open, casing--hole annulus, 4120 - 174 feet, extends across the Niobrara Formation up into the Pierre Transition Zone. Information is not available for the salinities of fluids in the Fort Hays Limestone of the Niobrara Formation in this area, but in the area north of the Arkansas River Valley, salinities may be in excess of 10,000 mg/l for the Fort Hays Limestone at depth.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. Haubold for".

Robert A. Longenbaugh
Assistant State Engineer
Ground Water Section

RAL/DWF:ew

cc: J. Romero
R. Haubold
D. Schroeder

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