STATEMENT OF BASIS
CLASS IID PERMIT APPLICATION
RESOLUTE NATURAL RESOURCES COMPANY

U.S. Environmental Protection Agency, Region IX (EPA)
Underground Injection Control (UIC) Permit NN208000005
Aneth Unit E-221 SE Class IID Injection Well
San Juan County, Utah
Lease No. I-149-IND-8836
API No. 4303731882

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BACKGROUND INFORMATION

Resolute Natural Resources Company (Resolute) has applied for a permit to construct and operate a horizontal Class II disposal well. The vertical portion of the well will be located 2,520 feet from the south line (FSL) and 1,640 feet from the west line (FWL) in Section 21 Township 40 South, Range 24 East (S21, T40S, R24E). The four lateral wellbores will be located totally under Navajo Nation trust land. Three of the four lateral wellbores will be located in S21, T40S, R24E and the fourth lateral will be located in the west half of S21, T40S, R24E and the east half of S20, T40S, R24E in San Juan County, Utah, and are subject to federal EPA UIC permitting authority. The well is identified as the Aneth Unit E-221 SE. The Permittee has applied to Navajo Nation EPA and US EPA Region IX for UIC permits to allow well construction and operation at an average maximum injection rate of 40,000 barrels per day, in combination with the C-113 LDVL Class IID injection well, and a maximum injection rate of 35,000 barrels per day at a maximum wellhead injection pressure of 4,000 psig in the E-221 SE well. The cumulative injection volume in both wells will be limited to 70,201,000 barrels over the ten-year term of the two permits.

Resolute's permit application is administratively complete and EPA has completed its technical review of the application. Based on our review, the EPA has decided to approve this permit, pending public review and comment, and is now issuing a Draft Permit. If approved, the permit will be issued for a period of ten (10) years, unless the permit is terminated or modified for reasonable cause (40 CFR §§144.39, 144.40, and 144.41). The permit will be reviewed by EPA every five (5) years.

The source of injection fluids will be saltwater produced in association with oil and gas production from current and future Paradox Formation oil wells operated by Resolute in the Greater Aneth Field. The average total dissolved solids (TDS) content of injection fluids is approximately 91,000 ppm based on fluid analyses of water from the Aneth Unit water injection plant. The water will be injected into the Mississippian Leadville Formation at a depth of approximately 6,575 to 7,100 feet. The exact depths will be determined from wireline log analysis after drilling is completed. The Leadville Formation water contain TDS of approximately 44,000 ppm, based on the analysis of formation water produced from the Leadville Formation in the C-113 SWD well.

The Applicant has notified all interested parties within the Area of Review, which includes the local landowners, land-users, Navajo Nation, Bureau of Land Management, Bureau of Indian Affairs, and the State of Utah.

This Statement of Basis describes the specific permit conditions and the basis for those conditions under authority of the Underground Injection Control (UIC) regulations and the UIC provisions of the Safe Drinking Water Act.

BRIEF SUMMARY OF PART II. SPECIFIC PERMIT CONDITIONS

SECTION A. WELL CONSTRUCTION

1. Casing and Cementing

Surface casing will be 13-3/8 inches in diameter and will be set at 82 feet and cemented to the surface. Intermediate casing will be 11-3/4 inches in diameter and will be set to a depth of at least 50 feet below the Chinle Formation top (base of underground sources of drinking water {USDW}s at approximately 1,500 feet) and cemented to the surface. Long string casing will be 7-5/8 inches in diameter and will be set at total depth and cemented to the surface with a DV (staging) tool set at 3,200 feet. Injection tubing will be 4-1/2 inches in diameter and will be set with an injection packer assembly within 50 feet above the kick-off point (KOP) of the uppermost lateral borehole, or at 6,525 feet or deeper based on the proposed KOP depth of 6,575 feet.

Based on correlation of wireline log run in wells that penetrate the Leadville Formation in the area, the injection zone is overlain by approximately 300 feet of tight limestone and shale in the Molas Shale and Pinkerton Trail formations, and the 600 feet-thick impervious Paradox Salt section above the Molas Shale, and underlain by at least 190 feet of tight limestone and shales in the Ouray and Elbert formations, providing more than adequate confining layers to the injection zone. USDWs will be protected from the inflow of fluids by surface, intermediate, and long string casing and cement placement in the casing/wellbore annulus of all casing strings, from the casing shoe to the surface. The tubing/packer assembly will also provide another layer of protection from inflow of injected fluids into the USDWs.

2. Formation Logging and Testing

The static fluid level and/or injection zone pressure shall be measured and reported to the EPA on an annual basis. A Dual Laterolog, Gamma Ray/Compensated Neutron Log/Compensated Density Logs, Caliper, and Sonic logs, will be run in the open-hole from total depth (TD) to the surface casing shoe and a Cement Bond Log/Gamma Ray log will be run in the long string casing from plug back total depth to the intermediate casing shoe. Step-rate injectivity and pressure fall-off tests will be conducted in the vertical wellbore for the determination of the Leadville Formation injectivity, fracture gradient, permeability, and static fluid pressure of the injection zone. A new Step-rate injectivity test will be required for any subsequent request by the applicant to exceed the maximum allowable injection pressure during the life of the well. A fall-off test will also be conducted after the four lateral boreholes are drilled and annually for the evaluation of reservoir pressure build-up and the re-evaluation of the zone of endangering influence (ZEI).

3. Monitoring Devices

The Applicant is required to install pressure gauges or FIP (female) fittings with cut-off valves to allow an inspector to obtain injection pressure measurements. A flowmeter shall be installed for measuring flow rates and cumulative volumes injected and a sampling tap shall be installed on the injection pump discharge line for the purpose of periodically obtaining representative samples of the injection fluid. Casing and tubing pressures will be monitored at the surface on a weekly basis by means of pressure/vacuum gauges.

SECTION B. CORRECTIVE ACTION

A pseudo-circular Area of Review (AOR) with an average 8.0 miles radius, measured from the surface location of the well, has been proposed by the Applicant. The radius is based on a computer simulation of the increase in reservoir pressure in the Leadville formation resulting from the injection of a cumulative volume of 70,210,000 barrels of produced water in the C-113 LDVL and E-221 SE wells over the ten-year term of the permits. The zone of endangering influence is defined as the distance at which the reservoir pressure increase, after ten years of injection, will equal the difference in current hydrostatic pressure (310 psig) between the Navajo Aquifer and the underpressured Leadville formation. The average initial reservoir pressure in the Leadville formation is 2,850 psig, based on fall-off test results in the C-113 LDVL well, and the initial hydrostatic pressure of the Navajo Aquifer at estimated Leadville depth of 7,300 in the C-113 LDVL wells feet is 3,160 psig, assuming a normal fresh water gradient of 0.433 psi per foot. Adjustments may be made to these data after reviewing the results of logging and fall-off testing in the E-221 SE well.

The shape of the AOR is circular and somewhat larger than the ZEI determined when the sealing faults that penetrate the Leadville formation are included in the computer model. The AOR is based on an overlay of four computer simulations including the effects of simultaneous injection in both wells and with and without the faults present in the simulations. This approach provides the most conservative approach to the determination of the ZEI and AOR and would more accurately represent the reservoir pressure behavior if the faults were non-sealing, which at this depth and age is not likely. The faults were located by means of interpretation of 3-D seismic data obtained in recent surveys conducted for Resolute. The faults terminate in the overlying impermeable salt layer within the Pennsylvanian interval, according to the seismic data and Resolute geologists, but since the faults are most probably sealed, they would not provide a pathway for fluid migration out of the injection zone and would restrict lateral migration within the Leadville formation. In the unlikely event that the faults are not sealed, injection fluids would likely not migrate through the salt beds located approximately 400 feet above the upper Leadville formation. If leakage were to occur vertically, the injected fluids would most likely be captured in the Paradox producing zone, the source of the injection fluids.

The applicant reports that there are thirteen (13) wellbore penetrations of the Leadville Formation within the AOR of the subject well. Most of the required drilling and construction information was provided by the applicant and was reviewed by EPA to assess the risk of fluid movement into USDWs resulting from injection into the C-113 LDVL and E-221 SE wells. Much of the missing information was accessed and found in the Utah Division of Oil, Gas, and Mining online database. We have determined that all of the wells were constructed and/or plugged and abandoned in accordance with current UIC requirements or are otherwise protective of USDWs. Nine of the wells were plugged and abandoned and the active wells were plugged back to the Paradox Formation as producers or injectors. The Leadville Formation is isolated from USDWs in all of those wells by cement plugs. In addition, fluid movement will be restricted by the probable presence of sealing faults in the Leadville Formation located between the C-113 LDVL well and E-221 SE wells and most of the other wells that penetrate the Leadville zone in the AOR. We therefore believe that there is minimal risk of endangerment to USDWs resulting from pressure increases and fluid movement into the wells that penetrate the injection zone in the AOR.

The permit will be issued based on corrective action considerations associated with the proposed AOR; however, the AOR will be subject to review and possible enlargement based on annual monitoring of static reservoir pressure in the E-221 SE and C-113 LDVL wells and re-evaluation of the ZEI. The extent of reservoir pressure buildup will be monitored annually during the term of the permit and corrective actions will be required to minimize pressure buildup over the permit term if it may endanger USDWs.

SECTION C. WELL OPERATION

1. Mechanical Integrity

   A mechanical integrity test (MIT) of the casing, tubing, and packer will be conducted prior to commencement of injection operations in the well. The purpose of this test is to ensure there are no significant leaks in the tubing, packer, and casing. The standard MIT procedure requires applying a pressure at least equal to the maximum allowable injection pressure in the tubing/casing annulus for thirty (30) minutes with no more than 5% change in pressure. A differential of at least three-hundred (300) psig between the tubing and tubing/casing annulus will be maintained throughout the test. Demonstrations of mechanical integrity of the injection tubing and casing will be required every five (5) years and within thirty (30) days after any workovers or alterations of the wellbore, prior to resuming injection. An alternative to the standard MIT is to apply a pressure of at least 1,000 psig and perform the MIT every three (3) years.

2. Injection Interval

   Injection shall be permitted for the Leadville Formation in the gross subsurface interval of approximately 6,555 to 7,100 feet, subject to a review of the wireline log formation tops and depth to the top of the Upper Leadville Formation and the base of the deepest perforation or lateral borehole in the Lower Leadville Formation. Any proposed change of injection formation or enlargement of this interval outside of the Leadville Formation will require a permit modification, subject to public notice, comment and appeal.

3. Injection Pressure Limitation(s)

   The initial maximum allowable injection pressure is set at 3,500 psig, based on a depth of 6,555 feet to the top of the permitted injection interval and a hydrostatic pressure of 3,022 psig (0.461 psi/ft. gradient) at that depth. The maximum injection pressure may be increased only if a valid step-rate test is conducted by the operator and is witnessed and approved by the EPA. If increased, injection pressure shall not exceed the fracture pressure of the injection zone as determined by the EPA from the analysis of step-rate test results.

4. <u>Injection Volume Limitation</u>

The maximum injection rate in the E-221 SE well shall be limited to 35,000 barrels per day, subject to the maximum allowable injection pressure. The average injection rate will be limited to 40,000 barrels per day or 1,240,000 barrels per month for the E-221 SE and C-113 LDVL wells combined. The average injection rate is expected to decline to 10,000 barrels per day by 2010 due to pressure buildup and declining water production in the Aneth Unit over that period. The maximum cumulative injection volume is limited to a grand total of 70,201,000 barrels for both wells combined, for an average injection rate of 19,236 barrels per day over the ten-year term of the permits. An increase in that volume will require a major modification to the permit with an opportunity for public review, comment, and appeal.

The storage capacity of the Leadville injection zone within the proposed AOR is an estimated 7.95 billion barrels, based on Leadville Formation properties and injection zone thickness determined from analysis of wireline logs run in the C-113 LDVL well. The proposed AOR is based on the ZEI determined by a computer simulation of pressure response in the injection zone and described as a pseudo-circular area with an average radius of eight (8) miles from the wellbore. The above calculations are based on the following assumptions and formation properties: a circular homogeneous injection zone with a radius of 8 miles, average effective porosity of 10.3 %, residual water and gas saturation of 40 %, and net thickness of 129 feet. Assuming a radial flow regime, the distance to the outer perimeter of the injectate plume would be approximately 3,968 feet or 0.75 miles, which is well within the AOR boundary of 8 miles from the surface location of the well. The computer simulations and volumetric calculations will be reviewed after the E-221 SE well is drilled and fall-off tests and wireline logs are run, but are not expected to change materially.

The potential for migration of formation fluids out of the injection zone and into USDWs will be limited by the fact that none of the wells in the proposed AOR that penetrate the injection zone are constructed and/or plugged and abandoned in a manner that would provide pathways for fluid migration out of the injection zone. In addition, any faults that exist in the Leadville Formation are not likely to allow migration of fluids into USDWs because they are believed to be sealing faults and also do not extend vertically beyond a thick salt section above the injection zone and below the Paradox producing interval. Endangerment of USDWs from migration of injected and formation fluids is therefore unlikely. Pressure build-up in the injection zone will be monitored annually during the term of the permit, however, and corrective actions will be taken if pressure build-up may endanger USDWs within and/or beyond the current AOR.

SECTION D. MONITORING, RECORD KEEPING, AND REPORTING OF RESULTS

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

Measurements of the injection pressure, annulus pressure, injection rate, and cumulative volume must be observed weekly and recorded at least once per month. The Applicant is required to submit an Annual Monitoring Report to the EPA summarizing the monitoring of injection rates, volumes, pressures, and injection fluid, and any major changes in the characteristics or sources of injection fluid. Static fluid levels and/or pressures will be measured and will be reported to the EPA on an annual basis.

SECTION E - PLUGGING AND ABANDONMENT

The EPA has reviewed the plugging and abandonment (P&A) plan submitted by the applicant. The P&A plan is incorporated into the permit as Appendix A. The current estimated cost to P&A the well must be provided and approved prior to issuance of the final permit, and will be reviewed periodically to ensure that the P&A cost estimate remains current and accurate. The P&A plan and procedure will be reviewed prior to commencement of plugging operations to ensure that the well is abandoned in a manner that protects USDWs.

SECTION F - FINANCIAL RESPONSIBILITY

The Applicant must furnish an acceptable financial instrument prior to issuance of the final permit, sufficient to guarantee current costs of plugging and abandoning the subject well in the event the Applicant fails to properly P&A the well, whenever that may become necessary. The EPA is the specified beneficiary of the aforementioned surety instruments. The EPA will review and may require updating of the financial responsibility mechanism periodically as P&A costs increase, or as other circumstances may require.