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October 4, 2002

HAND-DELIVERED

Michael E. Stogner, Examiner
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
1220 South Saint Francis Drive
Santa Fe, New Mexico 87505

Re: Application of Mallon Oil Company for approval of a pilot project including unorthodox well locations and exceptions to Division Rule 104.C(3) for the purpose of establishing a pilot program in the Pictured Cliffs and Tertiary formations to determine proper well density requirements for Pictured Cliffs and Tertiary formation wells, Rio Arriba County, New Mexico.

Dear Mr. Stogner:

Enclosed in hardcopy and on disc is the Proposed Order of Mallon Oil Company in the above-referenced case granting its application for an infill pilot project in four proposed project areas in Rio Arriba County, New Mexico.

If you need additional information from Mallon to proceed with your consideration of this application, please advise.

Very truly yours,

William F. Carr

Enclosures

cc: Mr. Robert Blaylock
Ms. Patti Davis
Mallon Oil Company

Mr. Reed Ferrill
Ferrill and Associates

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE 12892
ORDER NO. R-_____

APPLICATION OF MALLON OIL COMPANY FOR APPROVAL OF A PILOT PROJECT INCLUDING UNORTHODOX WELL LOCATIONS AND EXCEPTIONS TO DIVISION RULE 104.C(3) FOR THE PURPOSE OF ESTABLISHING A PILOT PROGRAM IN THE PICTURED CLIFFS AND TERTIARY FORMATIONS TO DETERMINE PROPER WELL DENSITY REQUIREMENTS FOR PICTURED CLIFFS AND TERTIARY FORMATION WELLS, RIO ARRIBA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 8:15 a.m. on July 11, 2002, at Aztec, New Mexico before Examiner Michael E. Stogner.

NOW, on this ____ day of _____, 2002, the Division Director, having considered the testimony, the record and the recommendations of the Examiner,

FINDS THAT:

(1) Due public notice has been given and the Division has jurisdiction of this case and its subject matter.

(2) The East Blanco-Pictured Cliffs Pool, and the Cabresto Canyon-Tertiary Pool and La Jara Canyon-Tertiary Pools are "unprorated gas pool(s)" not subject to Part H of the Division's statewide rules and regulations entitled "*Gas Proration and Allocation*" (Rules 601 through 605). However, the East Blanco-Pictured Cliffs Pool and the Cabresto Canyon-Tertiary Pool are subject to: (**a**) Division Rule 104.D (3), which restricts the number of producing wells within a single gas spacing unit within non-prorated pools to only one (see official notice to all operators issued by the Division Director on October 25, 1999), and which allows producing wells within this pool to produce at capacity; and (**b**) Division Rules 104.C(3), which rule provides for 160-acre spacing units with wells to be located no closer than 660 feet to any outer boundary of such unit and no closer than 10 feet to any quarter-quarter section or subdivision inner boundary.

(3) The applicant, Mallon Oil Company ("Mallon"), pursuant to the Division Rule 104.D(C) seeks approval to establish a pilot infill drilling program, including exceptions to Division Rule 104.C(3) to drill infill wells at unorthodox (off-pattern)

well locations, in four separate areas in the East Blanco-Pictured Cliffs Pool and the Cabresto Canyon-Tertiary Pool (covering lands in Township 29 and 30 North, Range 3 West) or the La Jara Canyon-Tertiary Pool (covering lands in Township 29 North, Range 2 West) in Rio Arriba County, New Mexico for the purpose of drilling up to 25 additional wells to gather information on the complex geology and reservoir characteristics of each of the producing intervals in the Pictured Cliffs formation and the Ojo Alamo, Nacimiento and San Jose intervals of the consolidated Tertiary pools to determine proper well density and further to determine if regulatory changes are needed to efficiently develop these pools. Mallon also seeks flexibility in locating wells within the pilot project spacing units to allow for topographic, cultural and archeological considerations in the pilot areas. (Testimony of Erickson at 13)

(4) Representatives of the Oil Conservation Division's Aztec District Office and the U. S. Bureau of Land Management, appeared at the hearing, questioned witnesses and made statements but did not present evidence. (Tr. 72-77)

(5) By Order No. R-11445 dated September 5, 2000, the Division combined the Cabresto Canyon-Ojo Alamo Pool, the Cabresto Canyon-Nacimiento Pool and the Cabresto Canyon-San Jose Pool into the Cabresto Canyon-Tertiary Pool covering lands in Townships 29 and 30 North, Range 3 West. Mallon operated wells which produced from each of these Tertiary formation pools and, after pool consolidation, had certain spacing units in the new Cabresto Canyon-Tertiary Pool on which there was more than one well, although producing from separate zones, producing from this pool. At the hearing, Mallon was directed to file appropriate applications to obtain administrative authorizations to bring these wells into compliance with Division Rules. (Transcript at 66-67) By Administrative Order No. SD-02-03 entered by the Division On September 23, 2002, the Division approved Mallon's application for the simultaneous dedication of multiple wells on 17 spacing units in the Cabresto-Canyon Tertiary Pool.

(6) Division Administrative Order NSL-4355 dated September 7, 1999:

(a) identified 60,167.64 acres of Jicarilla Apache lands of which Mallon is the operator of the oil and gas mineral rights ("Mallon/Jicarilla Consolidated Contract Area");

(b) recognized that as gas exploration and development on these lands progressed unorthodox gas well locations would be necessary to **(i)** avoid archeological sites; **(ii)** minimize disturbance to forested and wildlife habitats; **(iii)** minimize construction of wellpads by avoiding rugged terrain when practical; and **(iv)** position wellbores within geologically more favorable locations in order to maximize the likelihood of obtaining commercial gas production; and

(c) authorized Mallon to recomplete existing wells and drill new wells on the Mallon/Jicarilla Consolidated Contract Area to any and all formations and/pools developed on 160-acre spacing from the surface to the base of the Pictured Cliffs formation, which presently includes the East Blanco-Pictured Cliffs Pool and the Cabresto Canyon-Tertiary Pool (as to Townships 29 and 30 North, Range 3 West), and presently includes the East Blanco-Pictured Cliffs Pool and the La Jara Canyon-Tertiary Pool (as to Township 29, North, Range 2 West) at locations that are unorthodox based on the location requirements of Division Rule 104.C(3), provided that any such unorthodox well location is no closer than the required minimum orthodox distance (330 feet) from the outer boundary of the Mallon/Jicarilla Consolidated Contract Area nor closer than 10 feet to any quarter-quarter section line or subdivision inner boundary. (Mallon Exhibit 2, Testimony of Erickson at 59).

(7) Because of the surface topography, cultural and archeological concerns and geological considerations addressed by Administrative Order NSL-4355, the exact location for each of the pilot wells has not been identified and flexibility in locating the pilot wells is needed (Testimony of Erickson at 58).

(8) The four pilot areas which are the subject of this application are located within the Mallon/Jicarilla Consolidated Contract Area and there has been no significant change in the oil and gas mineral ownership since Administrative Order NSL-4355 was entered. (Testimony of Erickson at 59).

(9) The provisions of Administrative Order NSL-4355 governing unorthodox gas well locations govern the pilot infill wells proposed by Mallon within the Mallon/Jicarilla Consolidated Contract Area and the portions of this application which relate to unorthodox gas well locations are therefore unnecessary and should be dismissed.

(10) Mallon operates all acreage in and contiguous to the proposed pilot areas and all producing wells in the areas covered by this application and offsetting tracts. Mallon proposes to drill and operate the proposed infill pilot wells on the following tracts as part of an effort to gather information on the appropriate well density for the East Blanco-Pictured Cliffs Pool and each of the separate producing zones in the Cabresto Canyon-Tertiary Pool or La Jara Canyon-Tertiary Pool in four separate areas in Rio Arriba County, New Mexico as follows:

PILOT AREA NO. 1:
TOWNSHIP 30 NORTH, RANGE 3 WEST, NMPM
Sections 6, 8, 17 and 18

Section 6: NE/4 SW/4
Section 8: NW/4 NE/4
Section 8: NW/4 SE/4
Section 17: NE/4 NE/4
Section 17: NW/4 SW/4
Section 18: NE/4 NE/4

PILOT AREA NO. 2:
TOWNSHIP 30 NORTH, RANGE 3 WEST, NMPM
Sections 19, 20, 29 and 30

Section 19: SE/4 NE/4
Section 20: NE/4 SE/4
Section 20: SW/4 SW/4
Section 29: NE/4 NE/4
Section 29: NE/4 NW/4
Section 29: SW/4 SW/4
Section 30: NW/4 NE/4

PILOT AREA NO. 3:
TOWNSHIP 30 NORTH, RANGE 3 WEST, NMPM
Sections 33, 34 and 35

Section 33: NW/4 NE/4
Section 34: SE/4 NW/4
Section 34: SE/4 SE/4
Section 35: SE/4 SW/4
Section 35: NW/4 SE/4
Section 35: SE/4 NE/4

PILOT AREA NO. 4:
TOWNSHIP 29 NORTH, RANGE 2 WEST, NMPM
Sections 4, 5, 8 and 9

Section 4: SE/4 SW/4
Section 5: NE/4 SE/4
Section 5: SE/4 SW/4
Section 8: SE/4 SW/4

Section 8: SE/4 SE/4
Section 9: SE/4 SW/4

(Mallon Exhibit 1, Figures 2 and 20; Testimony of Erickson at 17; Application, Exhibit B)

(11) Testimony presented by Mallon at this hearing indicates that:

(a) Each of the four pilot areas demonstrates different geological and reservoir characteristics in the four zones to be tested with the proposed pilot project (Testimony of Erickson at 72);

(b) That through the proposed pilot program, Mallon will gather data on the geological characteristics of the reservoirs, and pressure data and historical production information from wells therein which will enable it to study well performance and the effectiveness of current well density to efficiently drain these reservoirs in each of the pilot areas (Testimony of Erickson at 56, 73);

(c) That all proposed wells may not be drilled because the data collected from the initial wells will be used to modify the pilot project as it progresses (Testimony of Erickson at 58); and

(d) Mallon demonstrated that it had sent notice to all parties affected by this application and that none of the parties had objected to the program, well locations, or increased well density. (Mallon Exhibit No. 3, Transcript at 68-70).

(12) Mallon presented geological evidence, which demonstrates that:

(a) The Pictured Cliffs formation and the Ojo Alamo, Nacimiento and San Jose intervals of the consolidated Tertiary pool in the proposed pilot areas consist of multiple, stacked, separate sandstone reservoirs with lateral stratigraphic discontinuities and sealing faults which result in multiple no-flow boundaries in the subject formations (Mallon Exhibit 1, Figure 5, Testimony of Coryell at 25); and that the drilling of pilot wells is needed to determine the well-density requirements for optimum recovery efficiency of reserves in these producing intervals. (Mallon Exhibit 1, Figure 4, Testimony of Coryell at 23, 29).

(b) The Pictured Cliffs formation consists of a fine-grained sandstone in north-south oriented marginal marine sandbars (Mallon Exhibit 1, Figure 6, Testimony of Coryell at 26) which are unlikely to communicate without permeability enhancement from fracturing. (Testimony of Coryell at 27) Drainage areas are thought to be elongated along the primary fracture orientation. (Testimony of Coryell at 27) The areas where there is evidence of communication between wells in the Pictured Cliffs formation are where the wells are located north–south of each other and therefore parallel to the primary fracture orientation. (Mallon Exhibit 1, Figure 5, Testimony of Coryell at 25) Undrained reservoir may be encountered with east-west step-out development perpendicular to the general orientation of this formation. (Testimony of Coryell at 26-27)

(c) The Ojo Alamo interval of the Tertiary pool is comprised of fine-grained to medium-grained sandstone (Testimony of Coryell at 23) and, as a relatively tight sand, relies on permeability enhancement through fracturing for economic production. The primary north-south fracture orientation suggests the possibility of encountering undrained reservoir by step-out development east and west from the current wells in this interval. (Testimony of Coryell at 26) The formation varies in thickness from well to well and drainage areas may be irregular and limited by lateral porosity and permeability variations due to fracture orientations and depositional and lithologic discontinuities and sealing faults. (Mallon Exhibit 1, Figure 7, Testimony of Coryell at 27-28)

(d) The Nacimiento interval of the Tertiary pool is comprised of discontinuous fluvial sandstone reservoirs with limited areal extent due to rapid lateral depositional changes which suggests that increased well density may be needed to produce the reserves in this portion of the Tertiary pool. (Mallon Exhibit 1, Figure 8, Testimony of Coryell at 28)

(e) The San Jose interval of the Tertiary pool is comprised of stacked alluvial and fluvial sandstones with lateral discontinuities where additional reserves may be recoverable with increased well density. (Mallon Exhibit 1, Figure 9, Testimony of Coryell at 29)

(13) Mallon presented engineering evidence that demonstrates that:

(a) The producing intervals in the zones to be tested in the proposed pilot areas demonstrate substantial variations from zone to zone in water resistivities, clay contents and permeabilities (Mallon Exhibit No. 1, Figure 10, Testimony of Ferrill at 42-43); and the average recovery factor for wells in the all zones in the pilot project areas is approximately 25 percent of the gas in place. (Mallon Exhibit 1, Figure 19, Testimony of Ferrill at 48)

(b) The average well performance in the Pictured Cliffs formation is typical for a tight reservoir with fracturing with an early rapid decline and a very long period of shallow decline. (Mallon Exhibit 1, Figure 11, Testimony of Ferrill at 44) Wells in this formation are recovering approximately 20 percent of the gas in place. (Mallon Exhibit No. 1. Figure 15, Testimony of Ferrill at 46)

(c) There is a wide variation in well performance in the Ojo Alamo formation and the wells produce water that does not appear to be associated with a gas-water contact but instead is migrating through fractures. (Mallon Exhibit 1, Figure 12, Testimony of Ferrill at 44-45) Ojo Alamo wells demonstrate an average recovery efficiency of approximately 20 percent. (Mallon Exhibit 1, Figure 16, Testimony of Ferrill at 47)

(d) While there is limited data on the Nacimiento formation (Mallon Exhibit 1, Figure 13, Testimony of Ferrill at 45), a recovery factor of 80 percent or more should be obtained from wells in this formation. However, due to the lenticular nature of the sands that do not exist over full 160-acre units, recovery factors for these wells are averaging approximately 23 percent. (Mallon Exhibit 1, Figure 17, Testimony of Ferrill at 47)

(e) There is a wide variation in the well performance in the San Jose formation that appears to result from individual layers declining at different rates. Wells in this formation produce water in volumes that vary from well to well. (Mallon Exhibit 1, Figure 14, Testimony of Ferrill at 45) Recovery factors in the San Jose formation average approximately 40 percent although half of the wells recover less than this volume suggesting that there may be recoverable reserves in adjoining 80-acre tracts not being drained

by existing wellbores. (Mallon Exhibit 1, Figure 18, Testimony of Ferrill at 48)

(14) There is sufficient difference in the performance of each of the Tertiary pool producing zones for each of the intervals to be tested and studied separately. (Testimony of Ferrill at 52)

(15) Approval of the proposed pilot wells will afford an opportunity to gather the additional data to further study the reservoir and determine if increased well density is needed to efficiently produce the reserves from these formations.

(16) The geologic complexity of these formations observed in each pilot area well in each producing interval will dictate the number of wells drilled and the data needed to ultimately determine the appropriate well density needed to efficiently drain these reservoirs and other data to be obtained from the proposed pilot program is necessary to properly evaluate these formations.

(17) Approval of Mallon's application will serve to provide data for reservoir engineering and geological studies for the ultimate purposes of determining proper well density within the East Blanco-Pictured Cliffs Pool and the Cabresto Canyon-Tertiary Pool or the La Jara Canyon-Tertiary Pool, is in the best interest of conservation, and will serve to protect correlative rights and prevent waste.

IT IS THEREFORE ORDERED THAT:

(1) As an exception to (i) Division Rule 104.D (3), which restricts the number of producing wells within a single gas spacing unit within non-prorated pools to only one and (ii) Division Rules 104.C(3), which rule provides for 160-acre spacing units with wells to be located no closer than 660 feet to any outer boundary of such unit and no closer than 10 feet to any quarter-quarter section or subdivision inner boundary, the applicant, Mallon Oil Company ("Mallon"), is hereby authorized to conduct a pilot infill drilling program within four project areas in the East Blanco-Pictured Cliffs Pool and the Cabresto Canyon-Tertiary Pool or La Jara Canyon-Tertiary Pool by drilling and producing an additional wells on the following tracts:

PILOT AREA NO. 1:
TOWNSHIP 30 NORTH, RANGE 3 WEST, NMPM
Sections 6, 8, 17 and 18

Section 6: NE/4 SW/4
Section 8: NW/4 NE/4
Section 8: NW/4 SE/4

Section 17: NE/4 NE/4
Section 17: NW/4 SW/4
Section 18: NE/4 NE/4

PILOT AREA NO. 2:
TOWNSHIP 30 NORTH, RANGE 3 WEST, NMPM
Sections 19, 20, 29 and 30

Section 19: SE/4 NE/4
Section 20: NE/4 SE/4
Section 20: SW/4 SW/4
Section 29: NE/4 NE/4
Section 29: NE/4 NW/4
Section 29: SW/4 SW/4
Section 30: NW/4 NE/4

PILOT AREA NO. 3:
TOWNSHIP 30 NORTH, RANGE 3 WEST, NMPM
Sections 33, 34 and 35

Section 33: NW/4 NE/4
Section 34: SE/4 NW/4
Section 34: SE/4 SE/4
Section 35: SE/4 SW/4
Section 35: NW/4 SE/4
Section 35: SE/4 NE/4

PILOT AREA NO. 4:
TOWNSHIP 29 NORTH, RANGE 2 WEST, NMPM
Sections 4, 5, 8 and 9

Section 4: SE/4 SW/4
Section 5: NE/4 SE/4
Section 5: SE/4 SW/4
Section 8: SE/4 SW/4
Section 8: SE/4 SE/4
Section 9: SE/4 SW/4

(2) The provisions of Administrative Order NSL-4355 governing unorthodox gas well locations govern the pilot infill wells proposed by Mallon within the Mallon/Jicarilla Consolidated Contract Area and the portions of this application which relate to unorthodox gas well locations are therefore unnecessary and are dismissed.

(3) Jurisdiction of this case is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

LORI WROTENBERY
Director

S E A L