STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES CEPARTMENT
OIL CONSERVATION COMMISSION

DISSENTING OPINION REGARDING FINDINGS AND ORDERS CONTAINED IN NEW MEXICO OIL AND GAS CONSERVATION COMMISSION CASES AND ORDERS:

CASE NO. 9412
ORDER NO. R-8712;

CASES NOS. ~~7890~~ 7980, 8946 and 8950
ORDER NO. R-7407-F
ORDER NO. R-6469-F

CASE NO. 9111
ORDER NO. R-3401-B

AS APPROVED AND SIGNED BY NEW MEXICO OIL CONSERVATION COMMISSIONERS WILLIAM J. LEMAY, CHAIRMAN, AND WILLIAM R. HUMPHRIES, MEMBER, DATED AUGUST 4, 1988 AND AUGUST 5, 1988.

The above described cases and orders are all closely related. They affect the West Puerto Chiquito Mancos Pool and the Galivan Mancos Pool both located in Rio Arriba County, New Mexico.

Central to all issues in the above cases and orders is the determination of the existence of a permeability barrier or permeability restriction, and the effectiveness thereof, separating the two pools. By Order No. R-8711 in Case No. 9412, dated August 4, 1988, Commission Members LeMay and Humphries have determined that there was not substantial evidence presented to show that two separate sources of supply exist. As dissenting Commission Member, I take the position that the preponderence of the evidence demonstratesthat the Gavilan Mancos Pool and the West Puerto Chiquito Mancos Pools are separate sources of supply.

In the findings and orders issued in the above cases, there are areas of concurrence and non-concurrence between Commission Members LeMay and Humphries and myself. The cases will be discussed below in the order presented above with areas of concurrence noted and areas of non-concurrence indicated with reasons therefore.

CASE NO. 9412
ORDER NO. R-8712

FINDINGS:

(1), (2), (3). I concur.

(4) I do not concur. The preponderence of evidence demonstrates that the Gavilan Mancos Pool and the West Puerto Chiquito Mancos Pool are two separate sources of supply that are effectively separated by a permeability restriction or barrier approximately two miles east of the line separating Range 1 West from Range 2 West, the present common boundary between the two pools.

Compelling evidence of the presence of the barrier include:

- The lack of well interference and frac pulse response between wells on either side of the barrier. Opponents to Mesa Grande Resources request and the consultant to the Commission from the New Mexico Petroleum Recovery Research Center discussed such well interference and frac pulse response evidence, however, the only communication demonstrated between wells was limited to wells on either side of the barrier and communication was not demonstrated between wells across the barrier. The opponents attempted to demonstrate communication by frac pulse response between the COU B-32 and the COU C-34 wells, the COU B-29 and the COU C-34 wells, the COU B-32 and the COU A-16 wells, and the COU A-20 and the COU D-17 wells by Horner Plot analysis. The proponents effectively demonstrated, utilizing accepted petroleum engineering practices, that the opponents were in error and that in fact proper analysis indicated the presence of and distance from the postulated barrier. The calculated distances to the barrier very closely approximated the scaled distances between the wells and the barrier. See proponents exhibits 42 and 43.

- The isobaric contouring of pressure gradients presented in proponents exhibits demonstrated the presence of the barrier and two separate sources of supply. See proponents exhibits 48, 49 and 50.

° Proponents exhibit 20 consisting of a comparison of Canada Ojitos Unit field pressure history and Gavilan Mancos Pool field pressure history over a 25 year period clearly demonstrates the lack of communication between the two pools. Initial static reservoir pressure in Canado Ojitos Unit was approximately 1900 psi corrected to +370 feet. The initial static reservoir pressure for Gavilan Mancos Pool nearly 20 years following the discovery of production in Canada Ojitos Unit was approximately 1800 psi corrected to +370 feet. Pressure declines for the two pools show no relationship in the five years following discovery of Gavilan Mancos Pool. The 25 year interference test shows no communication between the two pools.

° The presence of non-productive wells along the barrier. In properly developed pools, pool boundaries are commonly delineated by the presence of dry holes. Wells which do not exhibit the presence of economically recoverable reserves are commonly plugged and abandoned as dry holes. Benson, Montin, Greer Drilling Corp. is the operator of the COU F-20 and the COU G-32 wells located in Sections 20 and 32 respectively in Township 26 North Range 1 West, the COU J-8 well in Section 8, Township 25 North, Range 1 West, and the COU D-17 well in Section 17, Township 25 North Range 1 West. These wells are non-productive and do not exhibit the presence of economically recoverable reserves. They are located on or adjacent to the postulated barrier and are further evidence of the barriers existence and effectiveness. The COU K-8 well located in Section 8, Township 24 North, Range 1 West is also located on or adjacent to the barrier and as of April 1988 was capable of producing less than 2 barrels of oil per day.

(5) I do not concur. Approval of the requested change in field boundaries should be granted. The tracts in question are in communication with the Gavilan Mancos Pool, and are not in commuication with the West Puerto Chiquito Mancos Pool. Approval of the requested action would protect the correlative rights of any working interest owner or royalty interest owner that may have been included in the Canada Ojitos Unit through the New Mexico Statutory Unitization Act, 70-7-1 NMSA 1978.

ORDER:

(1) I do not concur. The application in Case No. 9412 should be approved.

(2) I concur. Jurisdiction in this matter should be retained by the Commission.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Erling A Brostuen

ERLING A. BROSTUEN, Member

CASES NOS. 7890, 8946 and 8950
ORDER NO. R-7405-F
ORDER NO. R-6469-F

FINDINGS:

(1), (2), (3), (4) I concur. Typographical error in (4), line 3, "provide" should be changed to "prevent".

(5) I concur. The incorporation of "to prevent waste and protect correlative rights" in the finding would be proper.

(6), (7), (8), (9), (10), (11), (12) I concur.

(13) I do not concur. The preponderence of evidence demonstrates that Gavilan Mancos Pool and West Puerto Chiquito Mancos Pool are separate sources of supply and are separate and distinct pools. For reasons for non-concurrence, I refer you to my comments on finding (4), Case No. 9412, Order No. R-8712 above.

(14), (15) I concur.

(16) I concur in part. I concur in that wells within the two individual pools exhibit a high degree of communication between wells, particularly in a north-south direction, however, communication between wells is not exhibited across pool boundaries. It is also my position that the two rows of sections immediately to the east of the present common boundary separating the pools are in communication with the Gavilan Mancos pool, are not in communication with the West Puerto Chiquito Mancos Pool and are by definition of a pool, part of the Gavilan Mancos Pool. I concur that 72 hour shut in periods for the purpose of static reservoir pressure testing are insufficient. The dual porosity nature of the pools require a longer shut in period. Pressures taken during the previous testing periods were related essentially to the high capacity fracture system. Longer shut in periods are necessary to stabilize reservoir pressures due to the decreased build up rate of the low capacity matrix system. The lower capacity matrix system

has been attested to by the proponents in testimony and by exhibit. It has also been attested to by Benson, Montin, Greer Drilling Corp. through a paper co-authored by Albert R. Greer. The paper "Fracture Permability in Cretaceous Rocks of the San Juan Basin" by Frank D. Gorham, Jr, Lee A. Woodward, J. F. Callender, and Albert R. Greer; New Mexico Geol. Soc. Guidebook, 28th Field Conf., San Juan Basin III, 1977, discusses the contribution of the lower capacity matrix system. The paper states that Benson, Montin, Greer Drilling Corp. continued to produce a suitable well (Canada Ojitos Unit C-34) after the high-capacity system was essentially swept (gas to oil ratio increased from an initial ratio of 300 to about 10,000). The paper continues that after reaching the 10,000 to 1 GOR, the well continued to produce at a rate of approximately 100 BOPD for 3 years with no further increase in GOR. The subject well reached a 10,000 to 1 GOR in May, 1974. Cumulative production at that time was 296.0 MBO. Cumulative production to May, 1988 is 609.5 MBO. It follows that the lower capacity matrix porosity system has contributed 313.5 MBO of production to the well. It is also probable that the lower capacity matrix system was contributing to production prior to the well reaching a 10,000 to 1 GOR. It is apparent that the tight blocks or lower capacity matrix system play a major role in production from the Gavilan Mancos Pool and the West Puerto Chiquito Pool. It is also apparent that pressures recorded following a 72 hour shut in period are not representative of reservoir static pressures and that evaluations and calculations based thereon will be erroneous.

(17) I concur.

(18) I concur with the first sentence. I do not concur with the remainder of the finding. Evidence presented by the opponents based upon pressures and production recorded during the testing periods indicate a higher production per pound pressure drop at the lower production allowable rate. The consultant to the Commission also calculated a higher production per pound pressure drop at the lower production allowable rate. Proponents, however, contend that the opponents and the consultant to the Commission erred in their analysis due to invalid reservoir pressure data.

The proponents utilized field wide average pressure differential rather than the 72 hour shut in pressures. Their analysis indicated that higher produciton per pound pressure drop was achieved during the higher production allowable rate. In view of my discussion of the relative importance of the lower capacity matrix contribution to cumulative production in finding (16) above, it is my opinion that a top oil allowable and limiting gas oil ratio will have little or no effect in the prevention of waste and the protection of correlative rights.

(19) I concur in part. I concur that a higher top oil allowable and a higher limiting gas oil ratio will enable high productivity wells to produce at more efficient rates without significantly impairing correlative rights. I am concerned that the recommended top oil allowable of 800 barrels per day with a limiting gas oil ratio of 2000 to 1 may be achieved in some better wells without the desired effect of increasing the pressure differential between the high capacity fracture system and the lower capacity matrix system.

ORDERS:

(1) I concur.

(2) I concur in part. I am in agreement that the top oil allowable and limiting gas oil ratio must be increased for reasons stated in comments on finding (19) above. No conclusive evidence was presented that would justify a top oil allowable or limiting gas oil ratio.

(3) I concur in part. Refer to my comments in (2) above.

(4) I concur.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Erling A. Brostuen

ERLING A. BROSTUEN, Member

CASE NO. 9111
ORDER NO. R-3401-B

FINDINGS:

(1), (2), (3), (4), (5), (6) I concur.

(7) I concur in part. I concur that the area east of the proposed expansion area exhibits a significantly greater pressure than the proposed expansion area and the adjacent Gavilan Mancos Pool. While this greater pressure is no doubt related to gas injection in the structurally higher and more easterly part of the unit, it is also related to the presence of a permeability barrier which seperates the proposed expansion area and Gavilan Mancos Pool from West Puerto Chiquito Mancos Pool.

(8) I do not concur. The pressure differential discussed here in no way indicates limited pressure communication between the injection wells and the proposed expansion area. This finding is absurd.

(9) I do not concur. (1) Transmission of a pressure pulse from a hydraulically fracture well to wells across the permeability barrier has not been demonstrated. Refer to my comments in Case No. 9412, Order No. R-8712, Finding (4). (2) Failure to increase the average pressure east of the zone by overinjection of gas is not related to transmissibility across the permeability barrier. The Canada Ojitos Unit has been so poorly monitored by the operator as regards pressure measurements. From 1971 until pressure measurements were required by order of the Commission in 1987, no pressure measurements were taken or if taken were not reported to the Commission or Division. I assume that such pressure measurements if taken and if they would be beneficial to the opponents case, would have been furnished to the Division or to the Commission in hearing. (3) The variation in gas oil ratios across Gavilan Mancos Pool has no relationship to proximity to the Canada Ojitos Unit. Structural position is generally the governing factor with higher gas oil ratios in wells that are higher structurally and lower gas oil ratios in wells that are lower structurally. Variations in permeability in different areas of a pool will also affect gas oil ratios. In tighter areas gas oil ratios will generally be higher due to the preferential permeability to gas relative to oil.

(10) I concur.

(11) I do not concur. The permeability restriction is an effective barrier to any significant movement of fluids. In addition, there has been no demonstration that the pressure maintenance project in Canada Ojitos Unit has had any beneficial effect on production. To the contrary, Gavilan Mancos Pool and that area in communication therewith west of the permeability barrier in West Puerto Chiquito Field have performed far better than has the Canada Ojitos Pressure Maintenance Area. In addition, the Canada Ojitos Pressure Maintenance Area has performed more poorly than other fractured Mancos pools in spite of its pressure maintenance program. See proponents exhibits 25 and 26.

(12) I concur in part. Both pools are still being defined. Boundaries are still being delineated. Only Gavilan Mancos Pool is being developed in an orderly manner.

(13) I do not concur. There has been no evidence presented that demonstrates any movement of fluids between the present pressure maintenance unit and the proposed expansion area. There is no justification for any injection credit in the proposed expansion area. There has been no evidence presented that has demonstrated that any gas injection program has been successful in a solution gas drive fractured reservoir. The example presented in opponents exhibit 6 has no relationship to fractured Mancos reservoirs. The reservoir in the cited example consists of a sucrosic limestone with low dip, limited fractures and high porosity and permeability. If communication did exist across the permeability barrier or restriction it is highly questionable whether gas injection should be allowed to continue in Canada Ojitos Unit in view of reimbibition effects. Any gas injection credit as proposed in would seriously adversely affect the correlative rights of owners in the Gavilan Mancos Pool.

(14) I do not concur. No evidence has been presented that demonstrates that gas injection in Canada Ojitos Unit has had any beneficial effect on production, prevention of waste and the protection of correlative rights. Refer to comments under (11) above.

(15) I do not concur. There is no justification for any expansion of the pressure maintenence area or for injection credit in the proposed expansion area recommended in (15).

(16) I do not concur. The assigning of a 50% injection gas credit to the proposed expansion area is arbitrary and capricious and has no basis in any evidence demonstrated in Case No. 9111.

(17) I do not concur. No gas credit should be allowed. Refer to comments on (11), (13) and (14) above.

(18) I do not concur. The reservoir pressure testing will not provide any indication of movement of fluids across the permeability barrier or restriction the will justify injection gas credit. It has already been established that the two rows of sections immediately to the east of the common boundary of the Gavilan Mancos Pool and the West Puerto Chiquitos Mancos Pool are in communication and are one common source of supply and by definition part of the same pool.

ORDER:

(1) I do not concur. There has been no evidence presented that determines the movement of fluids across the permeability barrier or restriction into the proposed expansion area. Refer to comments on findings and orders relating to all cases discussed above.

(2) I do not concur. No evidence has been presented that would demonstrate justification of enlargment of the injection credit area.

(3) I do not concur. Refer to comments on (1) above.

(4) Omitted.

(5) I concur. This order is badly in need of modification.

(6) I concur.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Erling A. Brostuen

ERLING A. BROSTUEN, Member