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 THE:

APPLICATION OF CANO PETRO OF NEW MEXICO, INC. FOR A WATERFLOOD PROJECT, CHAVES COUNTY, NEW MEXICO

CASE NO. 14128
ORDER NO. R-9029-A

## ORDER OF THE DIVISION

**BY THE DIVISION:**

This case came on for hearing at 8:15 a.m. on May 15, 2008, at Santa Fe, New Mexico before Examiners David K. Brooks, Terry G. Warnell, and William V. Jones.

NOW, on this 3rd day of September, 2008, the Division Director, having considered the testimony, the record and the recommendations of the Examiners,

**FINDS THAT:**

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

(2) Cano Petro of New Mexico, Inc. ("Cano" or "applicant"), seeks approval for a major modification of the Cato San Andres Unit Waterflood Project. This modification would include developing the waterflood on denser (20-acre) well spacing; focusing injection on the P-1, P-2, and P-3 intervals of the San Andres formation; and expanding the waterflood in phases over the next several years, initially with the addition of 43 injection wells, configured in 40-acre 5-spot patterns, and concentrated in the northeastern portion of the unit.

(3) The Cato San Andres Unit is located near Elida, New Mexico and is contained within the undesignated and defined areas of the Cato San Andres Pool. The last nearby drilling activity and resulting Pool expansion was in 1992, immediately to the northeast of the Cato San Andres Unit. The Unit was statutorily unitized, approved by the Division on October 30, 1989, in Order No R-9028 in Case 9738. The vertical limits of this Unit as defined in Ordering Paragraph (3) of that order extends only to the base of the San Andres P-3 Anhydrite.

(4) The Cato San Andres Unit Waterflood Project was approved by the Division on October 30, 1989, in Order No R-9029 in Case 9739. Said order consolidated previous approvals for injection within this Unit and added four additional injection wells. The Division on February 13, 1990, approved WFX-593 administratively, permitting injection into Well No. 94. The 16 previously permitted injection wells are shown in Exhibit A attached to this order.

(5) The Division approved SWD-319, on June 1, 1987, granting San Andres formation injection for disposal purposes into Well No. 200, located in the southwest portion of this Unit. This well has had no reported disposal volumes for several years, therefore its disposal authority expired as per Division Rule 705C.(1).

(6) Cano provided proper notice of this hearing and notice of the intended injection to all affected parties as per Rule 701B.(2). Mr. Buford Preston Berry III from Dallas, Texas, entered an appearance in this case but did not appear at the hearing. No other affected party entered an appearance in this case.

(7) At the hearing, Cano presented numerous exhibits and testimony from two engineers and the vice-president of operations. Cano did not bring a geologist or landman to the hearing but presented land and geology related exhibits. The testimony can be summarized as follows:

(a) Cano Petro of New Mexico, Inc. purchased approximately 97 percent working interest in this Unit in 2007 and has taken over as Unit operator.

(b) The previously approved Unit Agreement remains in place. The mineral interests in this Unit are divided almost equally by Fee, State, and Federal owners.

(c) Cano testified that the differences in the proposed mode of operation with Cano as the operator do not prompt a need to modify the unit or the tract ownership.

(d) Cano hired a firm from Roswell which has researched ownership within the collective area(s) of review and determined "affected" parties as defined in Rule 701B.(2).

(e) Since approval for waterflooding in 1989, the previous operators had not chosen to scale up this project and it remains as one of the largest non-waterflooded San Andres reservoirs in New Mexico.

(f) Cano has multiyear plans for implementing secondary recovery in this reservoir and initially intends to focus its waterflooding efforts in and around Section 11 located in the northeastern portion of the Unit. Cano plans to convert 33 wells to injection and drill 10 additional wells for purposes of injection. Previous wells permitted for injection within Section 11 will also be used as injectors in this first major waterflooding effort.

(g) Injection will be focused in the P-1, P-2, and P-3 intervals of the San Andres formation and will be confined to the vertical extent of the Unit. The San Andres formation strikes northeast to southwest and is approximately 3280 feet to the top. The initial focus area in Section 11 is down-dip on structure and less apt to be "gassy" as is the northwestern portion of this Unit.

(h) Cano has cored one well as part of the evaluation of this Unit. The initial reservoir pressure of 1118 psi was approximately the same as the bubble point pressure. Currently reservoir pressure is approximately 150 psi and the wells are in a state of extreme depletion and with the low production rates, can be considered "stripper".

(i) The testimony during the 1989 hearing was that 40-acre well development was adequate to develop this reservoir. Cano now believes that 20-acre well development, and 40-acre 5-spot waterflood patterns, can be justified and has already drilled approximately 30 wells and has plans for a total of approximately 220 new-drills. The reservoir is contiguous across the unit, but closer spaced wells will encounter some additional reservoir rock and will also shorten the time needed to achieve "fillup" and the subsequent waterflood response.

(j) The cumulative production to date is approximately 16 million barrels of oil. This first waterflooding phase as proposed in this case, will cost approximately 35 million dollars and result in up to 3.5 million barrels of incremental oil.

(k) There are no reported fresh water wells in this area, but the Santa Rosa formation is a potential aquifer. Existing and planned wells will be cased and cemented so as to prevent movement of injection water into any protectable water interval.

(l) There are approximately 135 total wells located within the half-mile area(s) of review surrounding these proposed injection wells, and 12 of these wells are plugged. Cano has demonstrated that all wells have been cased and cemented and/or plugged in a manner ensuring injection fluids will remain in the intended injection intervals. There are no faults or conduits which could transport injected waters out of the injection interval.

(m) Cano intends to run fully cemented 3-1/2 inch casing into the wells to be converted to injection and will use 2-1/16$^{th}$ inch tubing for injection. Newly drilled injection wells will have 5-1/2 inch casing and 2-3/8 inch tubing.

(n) Cano is willing to limit injection pressures to 650 psi which is approximately equivalent to 0.20 psi per foot.

(o) Cano does not at this time estimate the need to use fresh water for

waterflooding this reservoir.

The Division director finds that:

(8) Cano has provided proper notice of its intent to implement major waterflood operations on 20-acre well spacing and of its intent to inject into 43 additional wells, and no objection has been received.

(9) The proposed major modifications to this waterflood are feasible and should result in the recovery of additional oil and gas that would not otherwise be recovered.

(10) The estimated additional costs of the proposed waterflood operations will not exceed the estimated present value of the additional oil and gas recovered plus a reasonable profit.

(11) The Cato San Andres Unit Agreement still exists and all owners of this Unit will benefit from profitable drilling and waterflood operations.

(12) An examination of all wellbores within ½ mile of the proposed injection wells indicates that there is no Area of Review ("AOR") remedial cementing required prior to implementing this project.

(13) It is necessary to complete and equip all injection wells in a manner to ensure that the unitized interval receives injection support and to confine injection to only the unitized interval. The wells being converted to injection should be approved for smaller diameter casing and tubing as needed to ensure mechanical integrity and confined injection.

(14) Cano should be hereby approved to inject water within the unitized interval for secondary recovery purposes into all wells listed on Exhibit A attached to this order, including the 43 newly permitted wells in this application. To be consistent across this project, surface water injection pressure should be limited to 650 psi for all 59 injection wells, including the 43 new wells.

(15) To protect correlative rights, the operator should only complete production wells intended for secondary recovery within the unitized interval. Any well completed both within and beyond the unitized interval should be shut-in unless and until a permit to down-hole commingle is obtained from the Division - after providing notice and opportunity for objection to all affected parties.

(16) Provisions should be made for the operator of this Cato San Andres Unit Waterflood Project to apply administratively for additional or different injection wells as needed.

(17) The proposal as presented from Cano will prevent waste, protect correlative rights, will not endanger protectable waters, and should be approved.

**IT IS THEREFORE ORDERED THAT:**

(1) Cano Petro of New Mexico, Inc. ("Cano") is hereby approved to expand the Cato San Andres Unit Waterflood Project within the Cato San Andres Unit with the addition of 43 injection wells, configured in 40-acre 5-spot patterns, and located within and around Section 11, the northeastern portion of the unit.

(2) The 43 injection wells with API numbers and footage locations shown on Exhibit A, attached to this order, are hereby approved for injection for secondary recovery purposes within the unitized interval of the Cato San Andres Unit.

(3) The unitized interval of this Unit is defined in Division Order No R-9028. As each well is converted or drilled for injection, the operator of this Unit shall supply the Division's district office with sundry notice including data as to the actual utilized injection interval(s) and also the upper and lower boundary of the unitized interval as it occurs in that well.

(4) Injection into each of these wells shall be accomplished through (2-1/16 inch or 2-3/8 inch) plastic-lined tubing installed in a packer located within 100 feet of the uppermost injection perforation. The casing-tubing annulus shall be filled with an inert fluid, and a gauge or approved leak-detection device shall be attached to the annulus in order to determine leakage in the casing, tubing, or packer.

(5) The 43 injection wells and the 16 previously approved injection wells shall be equipped with pressure control devices or acceptable substitutes that will limit the surface injection pressure **to 650 psi**.

(6) The Division Director may administratively authorize a pressure limitation in excess of the above upon a showing by the operator that such higher pressure will not result in harmful fracturing or damage to the reservoir and waste of oil. Such demonstration shall be supported by step rate injection tests approved by the Division.

(7) The Division Director may administratively authorize additional or alternate injection wells within this waterflood project or to expand this project, while remaining within the Cato San Andres Unit, as provided in Division rules.

(8) Cano shall take all steps necessary to ensure that the injected water enters only the unitized injection interval and is not permitted to escape to other intervals or onto the surface from injection, production, or plugged and abandoned wells.

(9) The wells being converted to injection shall be equipped with smaller diameter casing and/or additional cement and smaller diameter tubing as needed to ensure injection is confined to the unitized interval of the Cato San Andres Unit.

(10) The unit operator shall give 72 hours advance notice to the supervisor of the Division's district office of the date and time (i) injection equipment will be installed, and (ii) the mechanical integrity pressure test will be conducted on each of these approved injection wells, so that these operations may be witnessed.

(11) The unit operator shall immediately notify the supervisor of the Division's district office of any failure of the tubing, casing or packer in the injection well or the leakage of water, oil or gas from or around any nearby producing or plugged and abandoned well, and shall promptly take all steps necessary to correct such failure or leakage.

(12) The unit operator shall conduct injection operations in accordance with Division Rules No. 701 through 708, and shall submit monthly progress reports in accordance with Division Rules No. 706 and 1115.

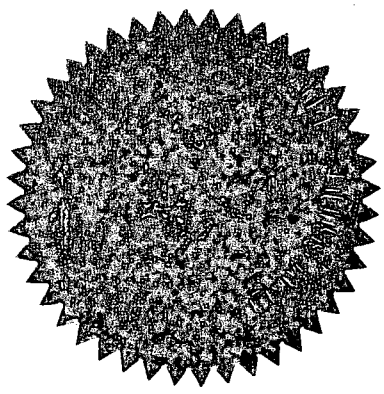
(13) The injection authority granted herein for these 43 additional wells shall terminate one year after the date of this order if the unit operator has not commenced injection operations into at least one of these wells; provided, however, the Division, upon request mailed prior to the one-year deadline, may grant an extension for good cause.

(14) The operator shall complete production wells intended for secondary recovery only within the unitized interval. Any well completed for production both within and beyond the unitized interval shall be immediately shut-in unless and until a permit to down-hole commingle is obtained from the Division - after providing notice and opportunity for objection to all affected parties.

(15) This order does not relieve the operator of responsibility should its operations cause any damage or threat of damage to protectable fresh water, human health or the environment, nor does it relieve the operator of responsibility for complying with applicable Division rules or other federal, state or local laws or regulations.

(16) Jurisdiction is retained by the Division for the entry of such further orders as may be necessary for the prevention of waste and/or protection of correlative rights or upon failure of the operator to conduct operations (1) to protect fresh water or (2) consistent with the requirements in this order, whereupon the Division may, after notice and hearing (or without notice and hearing in event of an emergency, subject to NMSA 1978, Section 70-2-23), terminate the injection authority granted herein.

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



STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MARK E. FESMIRE, P.E.
Director

SEAL

# EXHIBIT A

## Cato San Andres Unit (R-9028)
## Cato San Andres Unit Waterflood Project (R-9029)
## Operator: Cano Petro of New Mexico, Inc. (OGRID 248802)

| (30-005) | Well | Injection Permit | Status | NS | EW | Unit | Sec | Tsp | Rge | Top Interval | Bot Interval | TD | LND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **10 New Drills - 650 psi Maximum Surface Injection Pressure Limit** | | | | | | | | | | | | | |
| 29021 | 050R | R-9029-A | New Drill | 1980 FSL | 1922 FEL | J | 11 | 8S | 30E | 3300 | | | P |
| 28022 | 507 | R-9029-A | New Drill | 710 FSL | 1980 FEL | O | 2 | 8S | 30E | 3442 | 3598 | 3956 | S |
| 27985 | 533 | R-9029-A | New Drill | 1980 FSL | 1930 FWL | K | 11 | 8S | 30E | 3614 | | 4005 | P |
| 29028 | 822 | R-9029-A | New Drill | 659 FNL | 1922 FEL | B | 11 | 8S | 30E | 3300 | | | |
| 28032 | 824 | R-9029-A | New Drill | 2019 FNL | 529 FWL | E | 12 | 8S | 30E | 3300 | | | |
| 29029 | 826 | R-9029-A | New Drill | 1982 FNL | 1954 FEL | G | 11 | 8S | 30E | 3300 | | | |
| 29030 | 827 | R-9029-A | New Drill | 1980 FNL | 2037 FWL | F | 11 | 8S | 30E | 3300 | | | |
| 29031 | 854 | R-9029-A | New Drill | 660 FSL | 1924 FEL | O | 11 | 8S | 30E | 3300 | | | |
| 29032 | 878 | R-9029-A | New Drill | 658 FNL | 659 FWL | D | 14 | 8S | 30E | 3300 | | | |
| 28035 | 879 | R-9029-A | New Drill | 685 FNL | 1943 FWL | C | 14 | 8S | 30E | 3300 | | | |
| **33 Conversions - 650 psi Maximum Surface Injection Pressure Limit** | | | | | | | | | | | | | |
| 20001 | 006 | R-9029-A | Conversion | 660 FSL | 1980 FWL | N | 2 | 8S | 30E | 3371 | 3507 | 3540 | S |
| 10536 | 007 | R-9029-A | Conversion | 660 FSL | 660 FWL | M | 2 | 8S | 30E | 3345 | 3462 | 3498 | S |
| 20013 | 019 | R-9029-A | Conversion | 660 FNL | 660 FEL | A | 10 | 8S | 30E | 3308 | 3424 | 3850 | F |
| 10504 | 020 | R-9029-A | Conversion | 660 FNL | 660 FWL | D | 11 | 8S | 30E | 3368 | 3449 | 3650 | P |
| 20294 | 025 | R-9029-A | Conversion | 1650 FNL | 990 FEL | H | 11 | 8S | 30E | 3488 | 3598 | 3642 | P |
| 10503 | 028 | R-9029-A | Conversion | 1980 FNL | 660 FWL | E | 11 | 8S | 30E | 3379 | 3465 | 3618 | P |
| 10473 | 029 | R-9029-A | Conversion | 1980 FNL | 660 FEL | H | 10 | 8S | 30E | 3344 | 3444 | 3700 | F |
| 10484 | 048 | R-9029-A | Conversion | 1980 FSL | 660 FEL | I | 10 | 8S | 30E | 3386 | 3470 | 3620 | P |
| 10455 | 049 | R-9029-A | Conversion | 1980 FSL | 660 FWL | L | 11 | 8S | 30E | 3496 | 3536 | 3561 | P |
| 20009 | 052 | R-9029-A | Conversion | 660 FSL | 660 FWL | M | 12 | 8S | 30E | 3536 | 3578 | 3714 | F |
| 20293 | 053 | R-9029-A | Conversion | 330 FSL | 990 FEL | P | 11 | 8S | 30E | 3520 | 3634 | 3665 | P |
| 10560 | 055 | R-9029-A | Conversion | 660 FSL | 1980 FWL | N | 11 | 8S | 30E | 3478 | 3557 | 3600 | P |
| 10579 | 056 | R-9029-A | Conversion | 660 FSL | 660 FWL | M | 11 | 8S | 30E | 3419 | 3523 | 3523 | P |
| 10502 | 057 | R-9029-A | Conversion | 660 FSL | 660 FEL | P | 10 | 8S | 30E | 3409 | 3482 | 3600 | P |
| 10532 | 077 | R-9029-A | Conversion | 660 FNL | 660 FEL | A | 15 | 8S | 30E | 3414 | 3524 | 3560 | P |
| 20124 | 080 | R-9029-A | Conversion | 660 FNL | 1980 FEL | B | 14 | 8S | 30E | 3494 | 3612 | 3670 | P |
| 10525 | 082 | R-9029-A | Conversion | 330 FNL | 330 FWL | D | 13 | 8S | 30E | 3544 | 3614 | 3670 | F |
| 20144 | 083 | R-9029-A | Conversion | 1980 FNL | 660 FWL | E | 13 | 8S | 30E | 3538 | 3572 | 3608 | F |
| 20174 | 084 | R-9029-A | Conversion | 1980 FNL | 660 FEL | H | 14 | 8S | 30E | 3511 | 3560 | 3674 | P |
| 10588 | 085 | R-9029-A | Conversion | 1980 FNL | 1980 FEL | G | 14 | 8S | 30E | 3474 | 3520 | 3659 | P |
| 20109 | 086 | R-9029-A | Conversion | 1980 FNL | 1980 FWL | F | 14 | 8S | 30E | 3444 | 3490 | 3610 | P |
| 10561 | 087 | R-9029-A | Conversion | 1980 FNL | 660 FWL | E | 14 | 8S | 30E | 3431 | 3555 | 3570 | P |
| 20090 | 088 | R-9029-A | Conversion | 1980 FNL | 660 FEL | H | 15 | 8S | 30E | 3406 | 3515 | 3558 | P |
| 20068 | 109 | R-9029-A | Conversion | 1980 FSL | 660 FEL | I | 15 | 8S | 30E | 3425 | 3515 | 3700 | P |
| 20015 | 110 | R-9029-A | Conversion | 1980 FSL | 660 FWL | L | 14 | 8S | 30E | 3436 | 3559 | 3600 | F |
| 20115 | 111 | R-9029-A | Conversion | 1980 FSL | 1980 FWL | K | 14 | 8S | 30E | 3477 | 3518 | 3645 | F |
| 20016 | 112 | R-9029-A | Conversion | 1980 FSL | 1980 FEL | J | 14 | 8S | 30E | 3497 | 3544 | 3660 | F |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20211 | 113 | R-9029-A | Conversion | 1980 FSL | 660 FEL | I | 14 | 8S | 30E | 3524 | 3580 | 3596 | F |
| 20292 | 114 | R-9029-A | Conversion | 660 FSL | 660 FEL | P | 14 | 8S | 30E | 3555 | 3600 | 3618 | F |
| 20081 | 115 | R-9029-A | Conversion | 660 FSL | 1980 FEL | O | 14 | 8S | 30E | 3531 | 3571 | 3694 | F |
| 20031 | 116 | R-9029-A | Conversion | 660 FSL | 1980 FWL | N | 14 | 8S | 30E | 3572 | 3619 | 3660 | F |
| 20094 | 117 | R-9029-A | Conversion | 660 FSL | 660 FWL | M | 14 | 8S | 30E | 3503 | 3604 | 3670 | F |
| 20077 | 118 | R-9029-A | Conversion | 660 FSL | 660 FEL | P | 15 | 8S | 30E | 3472 | 3564 | 3650 | P |

## 16 Previously Permitted Injection Wells - 650 psi Maximum Surface Injection Pressure

| (30-005) | Well | Injection Permit | Status | NS | EW | Unit | Sec | Tsp | Rge | Top Interval | Bot Interval | TD | LND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20677 | 094 | WFX-595 | Existing | 1328 FNL | 1336 FEL | G | 16 | 8S | 30E | 3292 | 3338 | 3550 | S |
| 20067 | 016 | R-9029 | Existing | 660 FNL | 660 FEL | A | 9 | 8S | 30E | 3192 | 3385 | 3510 | F |
| 20069 | 021 | R-9029 | Existing | 660 FNL | 1980 FWL | C | 11 | 8S | 30E | 3383 | 3477 | 3532 | P |
| 10523 | 023 | R-9029 | Existing | 660 FNL | 660 FEL | A | 11 | 8S | 30E | 3478 | 3576 | 3576 | P |
| 10514 | 026 | R-9029 | Existing | 1980 FNL | 1980 FEL | G | 11 | 8S | 30E | 3456 | 3575 | 3605 | P |
| 10522 | 032 | R-9029 | Existing | 1980 FNL | 660 FWL | E | 10 | 8S | 30E | 3192 | 3385 | 3410 | P |
| 20027 | 034 | R-9029 | Existing | 1980 FNL | 1980 FEL | G | 9 | 8S | 30E | 3192 | 3385 | 3450 | F |
| 20004 | 044 | R-9029 | Existing | 1980 FSL | 660 FEL | I | 9 | 8S | 30E | 3192 | 3385 | 3500 | P |
| 10539 | 051 | R-9029 | Existing | 1980 FSL | 700 FEL | I | 11 | 8S | 30E | 3514 | 3628 | 3668 | P |
| 10528 | 054 | R-9029 | Existing | 660 FSL | 1980 FEL | O | 11 | 8S | 30E | 3500 | 3610 | 3644 | P |
| 10540 | 079 | R-9029 | Existing | 660 FNL | 1980 FWL | C | 14 | 8S | 30E | 3452 | 3568 | 3602 | P |
| 10572 | 081 | R-9029 | Existing | 660 FNL | 660 FEL | A | 14 | 8S | 30E | 3528 | 3654 | 3680 | P |
| 20165 | 171 | R-9029 | Existing | 1980 FNL | 1980 FEL | G | 33 | 8S | 30E | | | 3630 | F |
| 20177 | 172 | R-9029 | Existing | 1980 FNL | 660 FWL | E | 33 | 8S | 30E | | | 3560 | F |
| 20224 | 178 | R-9029 | Existing | 660 FSL | 660 FWL | M | 34 | 8S | 30E | | | 3623 | F |
| 20169 | 180 | R-9029 | Existing | 660 FNL | 1980 FEL | O | 33 | 8S | 30E | | | 3580 | F |