STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION ON ITS OWN MOTION TO DEFINE THE VERTICAL AND AREAL EXTENT OF AQUIFERS POTENTIALLY VULNERABLE TO CONTAMINATION BY THE SURFACE DISPOSITION OF WATER PRODUCED IN CONJUNCTION WITH THE PRODUCTION OF OIL AND GAS IN McKINLEY COUNTY, RIO ARRIBA, SANDOVAL AND SAN JUAN COUNTIES, NEW MEXICO.

CASE NO. 8224
Order No. R-7940

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9:00 o'clock a.m. on February 20 and April 3, 22, and 23, 1985, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 12th day of June, 1985, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) Section 70-2-12 B(15) authorizes the Oil Conservation Division and Commission "to regulate the disposition of water produced or used in connection with the drilling for or producing of oil or gas, or both, and to direct surface or subsurface disposal of such water in a manner that will afford reasonable protection against contamination of fresh water supplies designated by the state engineer;".

(3) The State Engineer has designated all surface waters of the State and all ground waters containing 10,000 milligrams per liter (mg/l) of total dissolved solids (TDS), or less, for which there is a reasonably foreseeable future use as fresh water.

(4) Much production of crude oil and natural gas in New Mexico is accompanied by the co-production of water from the same formation (produced water).

(5) The volume of produced water varies from well to well and may range from barely measurable to several hundred barrels per day.

(6) The quality of produced water may vary from essentially fresh to highly or fully saturated with contaminants.

(7) New Mexico has two primary oil and gas producing areas defined as follows:

The Southeast producing area consisting of Eddy, Chaves, Lea, and Roosevelt Counties;

The Northwest producing area consisting of Rio Arriba, Sandoval, San Juan and McKinley Counties.

(8) In general, produced waters in the Southeast occur at higher volumes and substantially higher contaminant levels than in the Northwest.

(9) An order generally prohibiting the disposal of volumes of produced water in excess of one barrel per day (BPD) in unlined pits has been in effect in the Southeast since 1970.

(10) On June 7, 1984, the Oil Conservation Division, hereinafter referred to as "the Division", called this case before a hearing examiner to consider prohibition of the disposal of produced water in unlined pits or on the surface (surface waters or surface of the ground) in the Northwest producing area, at which time it was continued indefinitely.

(11) In July, 1984, the Director of the Oil Conservation Division appointed a committee to study and report on the disposal of produced water in the Northwest to assure that produced water disposal practices resulted in protection of fresh waters.

(12) Said committee was composed of representatives of the industry, the Environmental Improvement Division, the Bureau of Land Management, area Indian Tribes, environmental groups, the public and the Division.

(13) The committee divided itself into a long term and short term committee, the Short Term Committee being assigned the following tasks:

(a) Determine what constitutes an aquifer in the Northwest producing area which is vulnerable to contamination by the surface disposal of produced water;

(b) map the vulnerable aquifer(s);

(c) attempt to determine the probability unlined pits may have of contaminating the vulnerable aquifer(s); and

(d) prepare a recommendation to the Division for an order which will address the problems identified by the subcommittee.

(14) The Long Term Committee is to deal with issues unresolved from the efforts of the Short Term Committee.

(15) That upon completion of the work of the Short Term Committee, the subject case was readvertised in its present form to be heard by the Commission.

(16) In the subject case, the Commission seeks to define and describe the areal extent of aquifers in the Northwest producing area which are potentially vulnerable to contamination from the disposal of produced waters in unlined pits or on the surface.

(17) The Commission further seeks to prohibit and/or limit the disposition of such produced waters in such vulnerable area(s) as may be necessary for the purpose of affording reasonable protection against contamination of fresh water supplies therein.

(18) The Short Term Committee gathered considerable data as to well locations, (oil, gas and water), well depths, volumes of produced water and ground water quality in this area.

(19) The Short Term Committee agreed that the terms aquifer and vulnerable aquifer should be defined as follows:

(a) Aquifer: An aquifer is a saturated permeable geologic unit (a geological formation, group of formations, or part of a formation) that can transmit significant quantities of water under ordinary hydraulic gradients.

For purposes of this definition, the word significant means that the water from the aquifer is used for or may reasonably be presumed to be usable for municipal, industrial, domestic, agricultural, or stock watering purposes.

(b) Vulnerable Aquifer: For the purpose of this order, the following are defined as vulnerable aquifers:

(1) Unconfined aquifers that are less than 50 feet from the surface, or

(2) Unconfined aquifers in floodplain areas, or

(3) Aquifers in unconsolidated materials.

(20) The Short Term Committee agreed that the vulnerable areas should constitute the following:

(a) That area which is defined as being within the valleys of the San Juan, Animas, and La Plata Rivers which is bounded by the topographic line on either side of the river that is 100 vertical feet above the river channel measured perpendicularly to the river channel.

(b) Those areas outside the above described area in which ground water is subsequently found to be within 50 feet of the ground surface currently to include:

SECTION	TOWNSHIP, NORTH	RANGE WEST	SECTION	TOWNSHIP, NORTH	RANGE WEST
17	28	8	13	30	12
18	28	11	15	30	12
26	28	15	27	30	12
16	29	10	33	30	12
24	29	12	1	30	13
17	29	18	6	30	15
23	29	19	16	30	15
30	29	19	21	30	15
5	30	10	29	30	16
3	30	11	34	30	19
7	30	11	13	31	10
8	30	11	35	31	11
10	30	11	10	32	10
19	30	11	23	32	11
			25	32	12

(c) Those areas that lie between the above-named rivers and the following ditches:

Highland Park Ditch
Hillside Thomas Ditch
Cunningham Ditch
Farmers Ditch
Halford Independent Ditch
Citizens Ditch
Hammond Ditch

(21) The Short Term Committee agreed to the definitions of the various types of pits which receive produced water including:

(a) Produced Water Pit: That pit which receives water produced from primary separation in conjunction with the production of crude oil and/or natural gas whether or not such pit is located at the site of production.

(b) Ancillary Pit: Those pits not receiving fluids from primary separation including but not limited to dehydrator pits, tank drain pits, pipeline drip collector pits, blowdown pits, and compressor scrubber pits. Examples are listed below:

(1) Dehydrator Pit: Those pits which normally receive produced water only from a dehydration unit.

(2) Blowdown Pit: Those pits which receive liquids only when a well is blown down.

(3) Tank Drain Pit: Those pits which receive water that is occasionally drained from a production storage tank.

(4) Pipeline Drip Collector Pit: Those pits which receive liquids which accumulate in gas pipelines.

(5) Compressor Scrubber Pit: Those pits which receive liquids at the compressor suction in event of primary separator failure.

(22) The Short Term Committee could not reach agreement on the issue of what, if any, small volume of produced water could be disposed of in unlined pits in the area while affording reasonable protection to fresh water.

(23) Per well produced water volumes vary from essentially 0 to more than 5 BPD in the area.

(24) Produced water quality varies in the area with some meeting State Engineer standards for fresh water (10,000 mg/l TDS or less).

(25) Contaminants in the produced water include but are not limited to chlorides, sulfates, arsenic, iron, manganese, and organics including benzene, toluene and xylenes.

(26) Benzene and toluene were addressed as the prime organic contaminants of concern in this case.

(27) Evidence presented shows that most of the produced water disposed of in unlined pits in the area, including the contaminant load, enters the subsurface rather than evaporating.

(28) The movement of produced water into the subsurface can result in such waters and the contaminants entering the fresh water supplies in the vulnerable area.

(29) The entry of such contaminated water into the fresh waters could contaminate such waters and cause them to become unfit for use at points of current or foreseeable future use.

(30) The potential for contamination of fresh water supplies is reduced by a variety of attenuation mechanisms and other factors which work to slow, halt, or reduce the concentration of contaminants, including mixing, volatilization, sorption, and microbiological degradation.

(31) A zone of unsaturated or partially saturated material above the water table (vadose zone) is necessary in order for said attenuation mechanisms to work effectively.

(32) The evidence in this case indicated that a minimum vadose zone thickness of 10 feet is necessary to protect ground water supplies under pits receiving even small volumes of produced water.

(33) Extensive expert testimony was offered relative to the microbiological degradation of organic contaminants and in particular benzene and toluene.

(34) The only sampling of produced water disposal sites in the area indicated that the level of benzene in produced waters decreased rapidly in the subsurface within very short distances from the disposal pits.

(35) This sampling was conducted at only three sites in the area and is insufficient to demonstrate that benzene or other organic or inorganic contaminants in produced water as a whole should not be considered as long term threats to fresh waters.

(36) The San Juan Basin, including the proposed vulnerable area, has experienced development of oil and natural gas for a period in excess of forty years.

(37) No party to the hearing presented any definitive evidence of contamination of fresh water resulting from disposal of produced water in unlined pits or on the surface in the area.

(38) The lack of such evidence of contamination could result from the operation of the aforesaid geohydrological, mechanical, and microbiological conditions in such a manner as to have prevented contamination of fresh water.

(39) The lack of evidence of contamination could also be as a result of a paucity of monitor wells and sampling in the area.

(40) At the time of the hearing, there was insufficient evidence upon which to make an absolute determination that it is necessary that no produced water be disposed of in unlined pits in the area in order to protect fresh water.

(41) Those testifying for the subcommittee and the industry were in general agreement that disposal of more than 5 barrels of produced water per day in unlined pits in the area should be prohibited in order to protect fresh water.

(42) The evidence in this case having shown that produced waters and their contaminant load can move into and contaminate fresh waters, the disposal of highly contaminated produced waters in unlined pits or on the surface in the area should be precluded.

(43) Pending further study, produced waters containing in excess of 10,000 mg/l TDS should be considered highly contaminated.

(44) The disposal of produced waters containing levels of total dissolved solids in excess of 10,000 mg/l in unlined pits or on the surface in the area should also be prohibited to provide protection for fresh water.

(45) The evidence presented in the case established that pits receiving one-half barrel per day of produced water, or less, do not represent a proven threat to fresh water in the area at this time and should be allowed to continue in operation provided that there is a minimum depth of 10 feet to ground water.

(46) In order to determine which disposal operations should be permitted and which should be prohibited, a survey of all produced water pits in the area should be conducted.

(47) Such survey should include operators, transporters, gas processing plants, produced water haulers and any other party who may own or operate produced water pits in the area.

(48) The elements of such survey should include the following information:

(a) name of the pit operator or owner;

(b) appropriate information on the location of the pit, the lease and well served and the type of pit (produced water vs. ancillary);

(c) dimensions of the pit;

(d) the volume of discharge to the pit and how that volume was measured;

(e) the quality of the discharge expressed as total dissolved solids;

(f) the date the TDS was determined; and,

(g) the depth to ground water (if inferred include relevant data)

(49) A reasonable period of time should be provided for the completion of the survey and any required elimination of unlined produced water disposal pits.

(50) The following periods should be considered reasonable:

For the pit survey, six months.

For elimination of unlined pits, 18 months.

(51) To assure that produced water which may be trucked or otherwise moved out of the area is not disposed of in a manner which represents a threat to fresh water, all such movement should be only after approval of the Division.

(52) Any application to dispose of produced water from the Vulnerable Area outside such area should be made in duplicate with one copy each to the Division's Santa Fe and Aztec offices giving such information on produced water quality and on the disposal site as the Division may require.

(53) While the evidence in this case was not sufficient to establish a complete prohibition of the use of unlined

disposal pits or only a very low limit of permitted disposal within the Vulnerable Area, it was sufficient to cause a prudent operator or owner to examine the location and circumstances of his produced water disposal to assure that the same would not result in contamination of fresh water.

(54) Regardless of the terms and conditions of this order, no person should dispose of produced water in the Vulnerable Area at such a location, or in such a manner, or under such conditions as to cause contamination of fresh water.

(55) The Division and the Committee should continue to study the potential for produced waters disposed of in unlined pits or on the surface in the area to contaminate fresh waters in the 18 months following the effective date of this order.

(56) Committee studies should focus on obtaining a greater number of samples near unlined produced water pits and analysis for a broad spectrum of potential contaminants.

(57) The Short Term Committee additionally proposed that an administrative procedure be established for permitting the continued operation of any unlined pit or surface disposal which might otherwise be prohibited as a result of the hearing and subsequent order.

(58) There was little testimony presented relative to the proposed administrative procedure.

(59) There was no demonstration that the procedure would be practical or appropriate.

(60) Until additional experience is gained in granting exceptions to the no unlined pit or surface disposal provisions of this order, no administrative exemption procedure should be established.

(61) The Short Term Committee further proposed that the provisions of this order not apply to any produced water when such water is disposed of in:

(a) "Any pits, ponds, lagoons, or impoundments resulting from activities regulated by a discharge plan approved and permit issued by NMOCD" (Division) "or NMEID under Water Quality Control Commission Regulations authorized under the New Mexico Water Quality Act."

(b) "Any pits, ponds, lagoons or impoundments resulting from activities regulated by a RCRA or NPDES permit issued by NMEID or EPA under RCRA or NPDES regulations authorized under the Resource Conservation and Recovery Act, New Mexico Hazardous Waste Act, Clean Water Act or Safe Drinking Water Act.", and,

(c) "Any pits, ponds, lagoons or impoundments resulting from activities regulated by a mining plan approved and permit issued by the New Mexico Coal Surface Mining Commission under the authority of the Surface Mined Lands Reclamation Act."

(62) The Oil and Gas Act does not provide for delegation of the Division's responsibilities under Section 70-2-12 B(15).

(63) Except where a discharge plan approved under the Water Quality Act by the Division specifically authorizes the disposal of produced water in a pit, pond, lagoon or other impoundment, the proposed exceptions should not apply.

(64) To provide reasonable protection to fresh water supplies designated by the State Engineer, a Vulnerable Area should be designated within the Northwest producing area and special rules governing the disposal of produced water therein should be adopted in conformance with the foregoing findings.

IT IS THEREFORE ORDERED THAT:

(1) Within the San Juan Basin of New Mexico situated within the counties of Rio Arriba, Sandoval, San Juan, and McKinley, there is hereby designated the "Vulnerable Area" constituting the following:

(a) That area which is defined as being within the valleys of the San Juan, Animas, and La Plata Rivers which is bounded by the topographic line on either side of the river that is 100 vertical feet above the river channel measured perpendicularly to the river channel.

(b) Those areas outside the above described area in which ground water is subsequently found to be within 50 feet of the ground surface currently to include:

SECTION	TOWNSHIP, NORTH	RANGE WEST	SECTION	TOWNSHIP, NORTH	RANGE WEST
17	28	8	13	30	12
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23	29	19	16	30	15
30	29	19	21	30	15
5	30	10	29	30	16
3	30	11	34	30	19
7	30	11	13	31	10
8	30	11	35	31	11
10	30	11	10	32	10
19	30	11	23	32	11
			25	32	12

(c) Those areas that lie between the above-named rivers and the following ditches as shown on United States Geological Survey Quadrangle Maps located in and available for the use of operators at the Division district office at Aztec:

Highland Park Ditch

Hillside Thomas Ditch

Cunningham Ditch

Farmers Ditch

Halford Independent Ditch

Citizens Ditch

Hammond Ditch

(2) That Special Rules and Regulations governing the disposal of produced water in the Vulnerable Area of McKinley, Rio Arriba, Sandoval and San Juan Counties, New Mexico, are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS FOR THE DISPOSAL OF PRODUCED WATER IN THE VULNERABLE AREA IN McKINLEY, RIO ARRIBA, SANDOVAL AND SAN JUAN COUNTIES, NEW MEXICO.

RULE 1. APPLICABILITY:

These rules shall apply to all produced water disposal within the Vulnerable Area.

These rules shall further apply to all produced water from the Vulnerable Area and to its disposal whether within or without said area.

RULE 2. DEFINITIONS:

(a) Aquifer: An aquifer is a saturated permeable geologic unit (a geological formation, group of formations, or part of a formation) that can transmit significant quantities of water under ordinary hydraulic gradients.

For purposes of this definition, the word significant means that the water from the aquifer is used for or may reasonably be presumed to be usable for municipal, industrial, domestic, agricultural, or stock watering purposes.

(b) Fresh Water (to be protected) includes all surface waters and includes all underground waters containing 10,000 milligrams per liter or less of total dissolved solids except for which, after notice and hearing, it is found there is no reasonably foreseeable beneficial use which would be impaired by contamination of such waters.

(c) Produced Water shall mean those waters produced in conjunction with the production of crude oil and/or natural gas and commonly collected at field storage, processing, or disposal facilities including but not limited to: lease tanks, commingled tank batteries, burn pits, LACT units, dehydrators, and community or lease salt water disposal systems and which may be collected at gas processing plants, pipeline drips and other processing or transportation facilities.

(d) Produced Water Pit: That pit which receives water produced from primary separation in conjunction with the production of crude oil and/or natural gas

whether or not such pit is located at the site of production.

(e) Ancillary Pit: Those pits not receiving fluids, from primary separation including but not limited to dehydrator pits, tank drain pits, pipeline drip collector pits, blowdown pits and compressor scrubber pits. Examples are listed below:

(1) Dehydrator Pit: Those pits which normally receive produced water only from the dehydration unit.

(2) Blowdown Pit: Those pits which receive liquid only when a well is blown down.

(3) Tank Drain Pit: Those pits which receive water that is drained from a production storage tank.

(4) Pipeline Drip Collector Pit: Those pits which receive liquids which accumulate in gas pipelines.

(5) Compressor Scrubber Pit: Those pits which receive liquids at the compressor suction in event of primary separator failure.

RULE 3. PROHIBITIONS:

Effective January 1, 1987, within the Vulnerable Area, disposal of produced water or fluids produced in connection with the production of oil and natural gas, or both, in unlined pits or on the surface is prohibited, except for disposal of produced water specifically exempted herein.

RULE 4. EXEMPTIONS:

(a) The provisions of this order shall not apply to:

(1) Produced water pits which receive five (5) barrels or less per day (daily) of produced water provided that such produced water has a concentration of total dissolved solids of 10,000 milligrams per liter (mg/l) or less and that the base of such pit is at least 10 feet above the water table.

(2) Unlined produced water or ancillary pits which receive one-half (1/2) barrel or less per day (daily) of produced water provided that the base of such pit is at least 10 feet above the water table.

(3) Any pits, ponds, lagoons or impoundments resulting from activities regulated by a discharge plan approved and permit issued by The Division under Water Quality Control Commission Regulations authorized under the New Mexico Water Quality Act which permit specifically authorizes the disposal of produced water.

(b) Notwithstanding the exceptions contained in this rule, the surface disposal of produced water in the Vulnerable Area at such a location or in such a manner or under such conditions as to cause contamination of fresh water is hereby prohibited.

RULE 5. SURFACE DISPOSAL FACILITIES TO BE APPROVED:

(a) Beginning October 1, 1985, no produced water shall be removed from the Vulnerable Area for surface disposal except to such facilities as may be approved by the Division.

(b) Surface disposal facility approval outside the Vulnerable Area may be made after notice and hearing or administratively upon a satisfactory showing that the proposed surface disposal does not endanger fresh water.

(c) No produced water may be disposed of or stored in below grade tanks or lined pits within the Vulnerable Area except after approval of the Division.

(d) The Director of the Division is hereby authorized to approve administratively the use of lined pits or below grade tanks within the Vulnerable Area for disposal or storage of produced water upon a proper showing that the tank or lined pit will be constructed and operated in such a manner as to safely contain the fluids to be placed therein and to detect leakage therefrom. Any existing lined pit or below grade tank shall be required to come into compliance with this rule by January 1, 1986.

RULE 6. PIT REGISTRATION:

(a) By January 1, 1986, the owner/operator of any existing produced water pit or ancillary pit seeking to continue use of such pit for disposal purposes must have filed a Pit Registration Form with the Division in accordance with the directions thereon as shown on Exhibit "A" attached to this order.

(b) The owner/operator of any unlined produced water pit or ancillary pit constructed on or after the date of this order must file a Pit Registration Form with the Division within 90 days following initial production into or through the facility served by such pit.

RULE 7. PIT CLOSURE:

That any pit which is not registered in accordance with RULE (6) above shall be closed in a manner approved by the Oil Conservation Division.

IT IS FURTHER ORDERED THAT:

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JIM BACA, Member

ED KELLEY, Member

R. L. STAMETS, Chairman and Secretary

S E A L

STATE OF NEW MEXICO
Energy and Minerals Department

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501
(505) 827-5800

AZTEC DISTRICT OFFICE
1000 Rio Brazos Road
Aztec, New Mexico 87410
(505) 334-6178

PRODUCED WATER
PIT REGISTRATION FORM
(Instructions on Back)

Owner/Operator: _____
(List information only for pits operated by you at a lease or at other locations)

Well and Lease, or Facility Name: _____

Location: _____

(A) Pit	(B) Maximum Daily Discharge to Each Pit	(C) Pit Type	(D) Depth to Ground Water	(E) Sample of Discharge to Each Pit	
				TDS (in mg/l) or conductivity & temperature	Sample Date
Primary Pit/ Produced Water Pit					
Ancillary Pit(s)					

CASE NO. 8224
ORDER NO. R-7940
EXHIBIT "A"

State of New Mexico
Energy and Minerals Department

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501
(505) 827-5800

CENTRALIZED DISPOSAL OR COLLECTION PIT REGISTRATION FORM

Owner/Operator: _____
(List information only for pits operated by you at a lease or at other locations)

Address: _____

Well and Lease, or Facility Name: _____

Location: _____

(A) Pit Fluid Sources	(B) Pit Fluid Type: 1. Produced Water 2. Completion Fluids 3. Drilling Fluids 4. Drill Cuttings	(C) Maximum Daily Discharge to each Pit	(D) Pit Type: 1. Unlined 2. Lined 3. Tank
List all Wells & Locations that Contribute Fluid to Pit			

Is this facility located in or within 100 horizontal feet of a watercourse? Yes_____ No_____
Watercourse: Any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

Is ground water at the site at 10 feet or less from the base of the pit? Yes_____ No_____

I hereby certify that I am familiar with the information contained in and submitted with this application and that such information is true, accurate and complete to the best of my knowledge and belief."

_____ (Signature)

_____ (Date)

_____ (Printed Name of Person Signing)

_____ (Title)