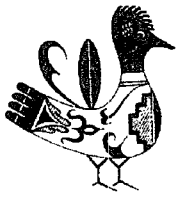
AMENDMENTS TO THE PIT RULE

OIL CONSERVATION COMMISSION HEARING

CASE 14292 April 2, 2009



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New Mexico Citizens
for Clean Air & Water
P.O. Box 5 Los Alamos 87544

To denote context of the rule amendment:

* Slides with this mark include evidence from the pit hearing.

\# Slides with this mark include evidence from the pit hearing, based on data from independent authorities.

WHAT IS THE WASTE?

3:1 waste "stabilization", 20:1 water leach

3,000 mg/l in leachant implies:

by volume, waste may be

more than 84% saturated brine

less than 16% solids

*

INDUSTRY PIT SAMPLING -- NORTHWEST

AVERAGES IN A SINGLE PIT

Pit	Aver. Chloride mg/kg	Range mg/kg	Test Result (mg/l) 3:1 stabilization 20:1 leach
SJC-1	1342	330 - 2600	11 - 87
SJC-2	6083	2200 - 14000	73 - 467
SJC-3	4072	960 - 6100	32 - 203

existing standard: 250

proposed standard: 3000

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OCD PIT SAMPLING -- NORTHWEST

Sample	Chloride mg/kg	Sodium mg/kg	Na/Cl atomic ratio	Test, after 3:1 stabilization and 20:1 leach mg/l
DP3 -01 Soil	704	1570	3.44	23.5
DP3 -03 Soil	417	2900	10.72	13.9
DP3 -08 Soil	962	2080	3.33	32.1
DP3 -09 Soil	927	3270	5.44	30.9
DP3 -10 Soil	5290	5290	1.54	176.3
PP3 -01 Soil	1990	3460	2.68	66.3

existing standard: 250

proposed standard: 3000

*

OCD PIT SAMPLING -- SOUTHEAST

Sample	Chloride	Sodium	Na/Cl	Test, after 3:1 stabilization and 20:1 leach
	mg/kg	mg/kg	atomic ratio	mg/l
CL-6 SOIL	18600	12900	1.07	620
DP1 Soil	8260	7060	1.31	275
DP4 Soil composite	30200	24100	1.23	1006
DP5 Soil	8910	3280	0.57	297
DP7 Soil	55200	32800	0.92	1840
DPA7 Soil	213000	30800	0.27	7100
DPH1 Soil	59100	33700	0.88	1970
DPH2 Soil	144000	41800	0.45	4800
DPH4 Soil	226000	43900	0.30	7533
DPH5 Soil	87900	26800	0.47	2930

existing standard 250
proposed standard 3000

AT WHAT LEVEL IS IT DAMAGING?

The most immediate effects are often on the surface of the ground, where plants and animals live.

#

EC

"The traditionally accepted objective criteria ... for all plants ...has been to decrease the salinity ... to less than 4 mmhos/cm ..."

American Petroleum Institute, Publication 4663, "Remediation of Salt-Affected Soils at Oil and Gas Production Facilities" (1997).

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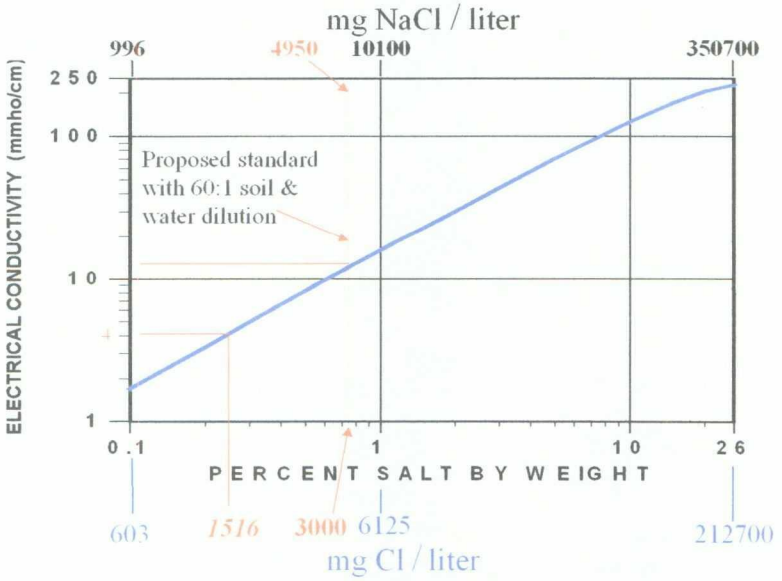
PROPERTIES OF SALT SOLUTIONS



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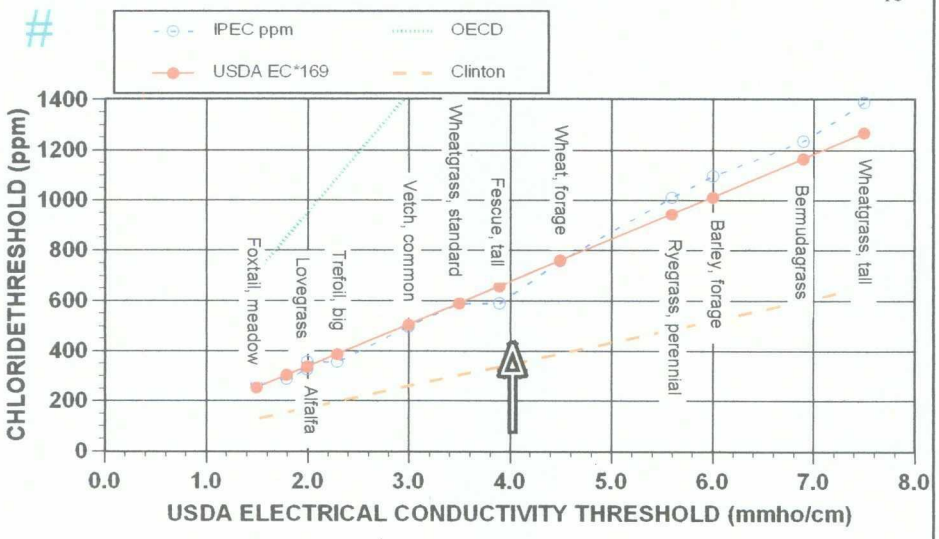

Threshold for chloride damage to grasses, as EC of paste by the USDA or as soil chloride by IPEC. Dashed lines are the outer limits of EC versus soil chloride reported by Bright and Addison, 2002.

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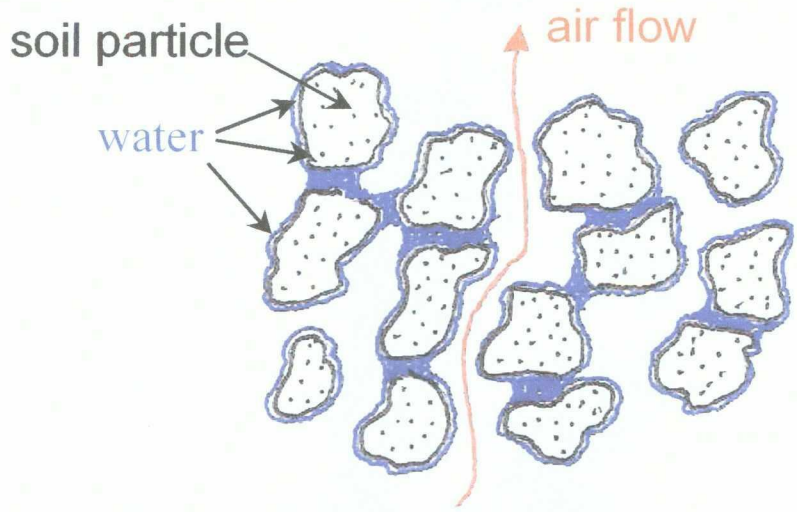
POROUS STRUCTURE OF THE SOIL



VOLUMETRIC MOISTURE: fraction of ***total volume*** occupied by water.

SATURATION: fraction of ***pore volume*** occupied by water.

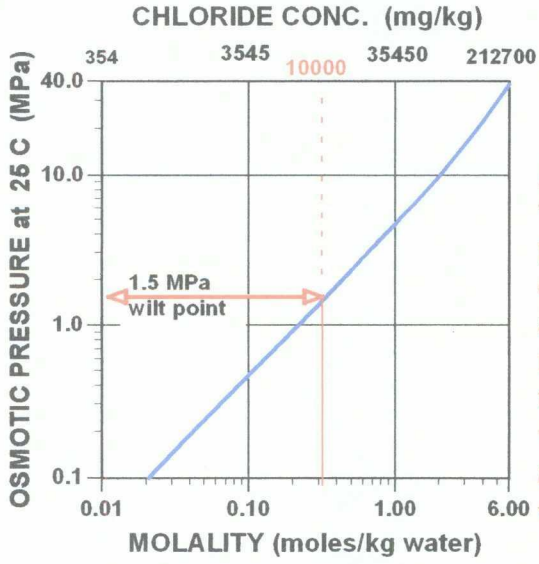
PROPERTIES OF SOME TYPICAL SOILS

TEXTURE	Vol moisture RESIDUAL	SATURATED
1 Sand	0.045	0.43
2 Loamy sand	0.057	0.41
3 Sandy loam "loose"	0.065	0.41
4 Loam	0.078	0.43
5 Sandy cl loam "moderate"	0.10	0.39
6 Silt loam	0.067	0.45
7 Silt	0.034	0.46
8 Clay loam "tight"	0.095	0.41
9 Sandy clay	0.10	0.38
10 Silty cl loam	0.089	0.43
11 Silty clay	0.07	0.36

From the U.S. Environmental Protection Agency, Unsaturated Soil Hydraulic Database, EPA/600/R-96/095, August, 1996.

15% volumetric moisture would be moderately dry

PERMANENT WILT POINT = NO RECOVERY



Soil with 1,000 mg/kg chloride at 15% volumetric moisture has 10,000 mg/kg chloride in the pore water.

After 3:1 dilution for "stabilization," the proposed standard is equivalent to approximately 30,000 mg/kg soil, or about 3 times the permanent wilt point for almost all plants at 15% volumetric moisture.

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SOME MODELING SIMULATIONS

One-dimensional

Unsaturated

Typical soil parameters

Input was measured soil moisture

Ignoring colligative (solution) effects

Modeling reveals that chlorides move preferentially ***downward*** in sandy soils and ***upward*** in clay-like soils.

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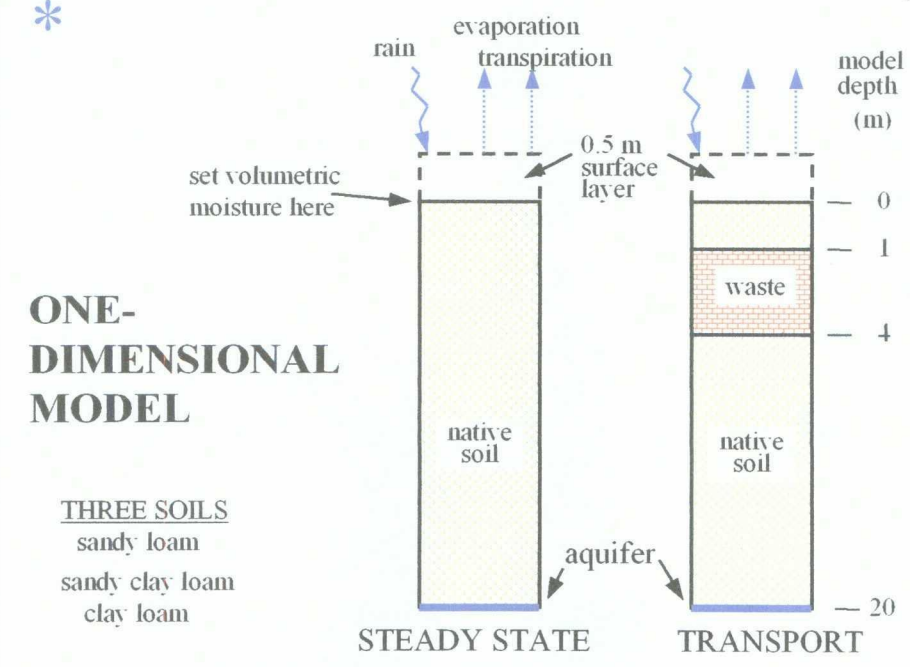
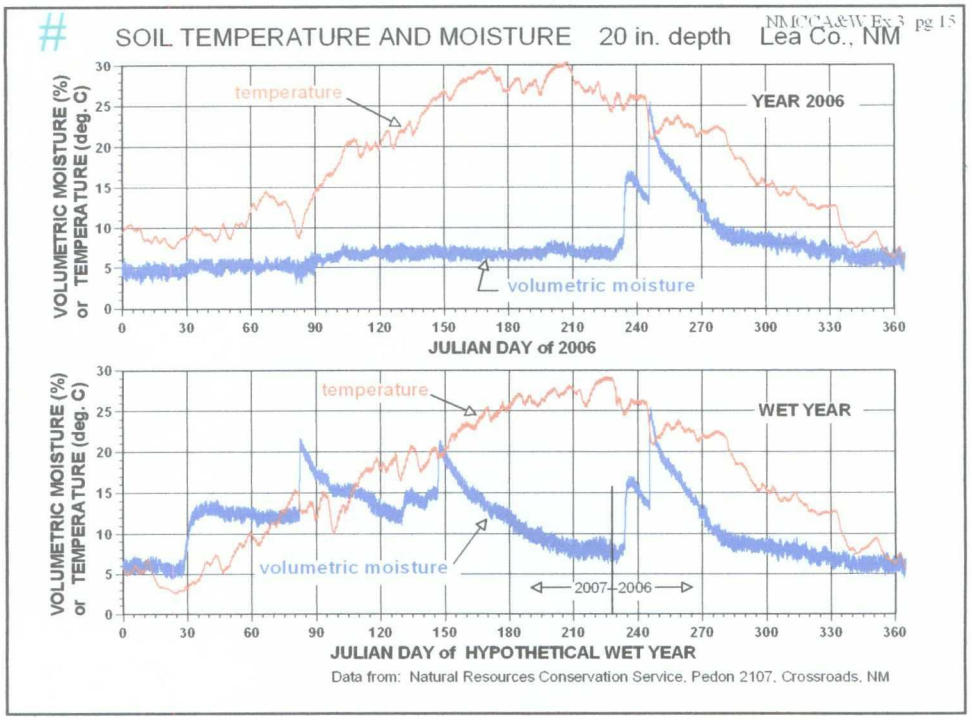


ONE-DIMENSIONAL MODEL

THREE SOILS
sandy loam
sandy clay loam
clay loam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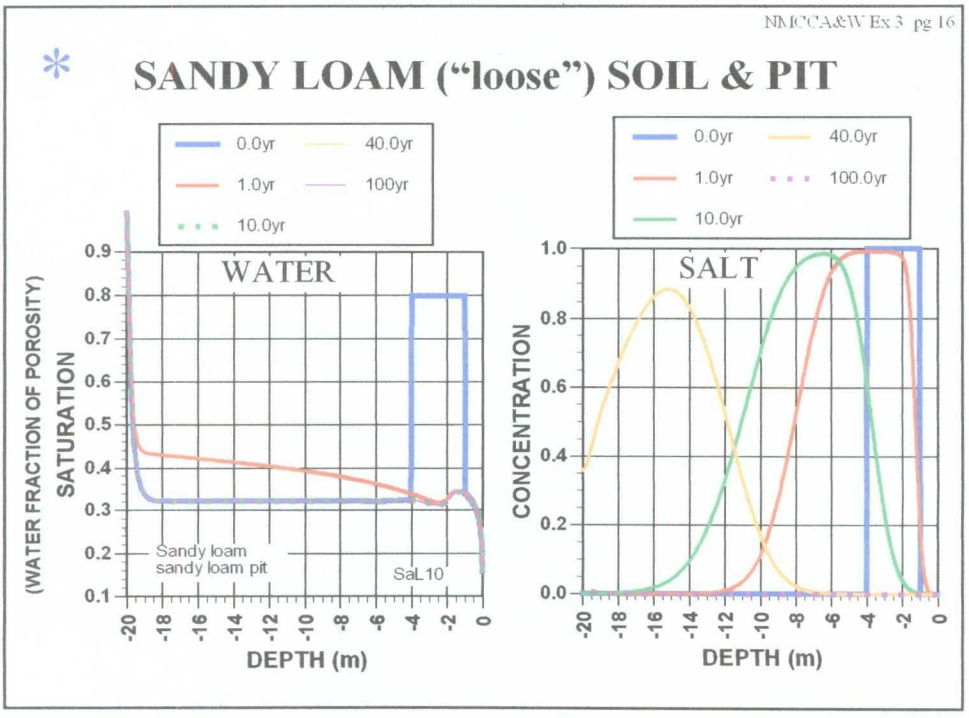
SOIL TEMPERATURE AND MOISTURE 20 in. depth Lea Co., NM
VOLUMETRIC MOISTURE (%) or TEMPERATURE (deg. C)
temperature
YEAR 2006
volumetric moisture
JULIAN DAY of 2006
WET YEAR
2007-2006
JULIAN DAY of HYPOTHETICAL WET YEAR
Data from: Natural Resources Conservation Service, Pedon 2107, Crossroads, NM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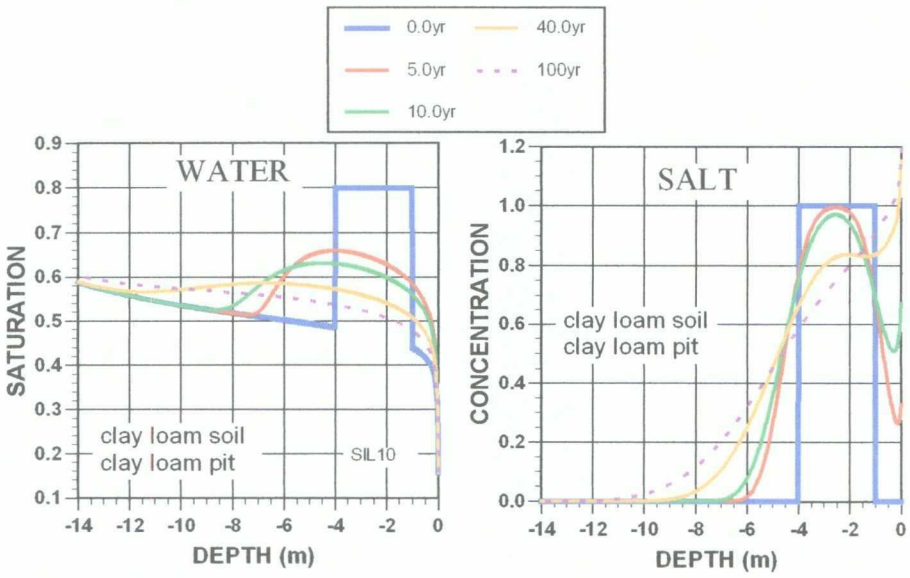
SANDY LOAM ("loose") SOIL & PIT
0.0yr
40.0yr
1.0yr
100yr
10.0yr
WATER
(WATER FRACTION OF POROSITY) SATURATION
Sandy loam
sandy loam pit
SaL10
DEPTH (m)
SALT
CONCENTRATION
DEPTH (m)

CLAY LOAM ("tight") SOIL & PIT



RESULTS OF THE MODELING

In loose soil, chloride travels from a pit to groundwater at 101 ft below the wastes in 100 years.

In tight soil, the chloride reaches 13 ft below the wastes in 40 years and 20 ft in 100 years, but it moves upward toward ground surface.

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DOES THE MODEL COMPARE WITH REALITY?

Modeling calculations are consistent with the results of three field exercises to test surface and subsurface soil samples for chloride.

Surface sampling near Caprock, March-April, 2006

Subsurface sampling near Caprock, April 3, 2007

Surface and subsurface sampling near Loco Hills, June 30, 2007.

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SAMPLING NEAR

CAPROCK AND LOCO HILLS

Measurements confirm that chlorides are not retained by the hydrologic properties of the pit material, but can move several meters in a time scale of decades.

Caprock: Chloride concentrations extend past 15 feet total depth at two pits that are 31 and 11 years after closure. The surface is dead.

Loco Hills: Two pits, 30 years and 6 years after closure show a leading edge of chloride plume at 25-30 feet. The surface shows no contamination.

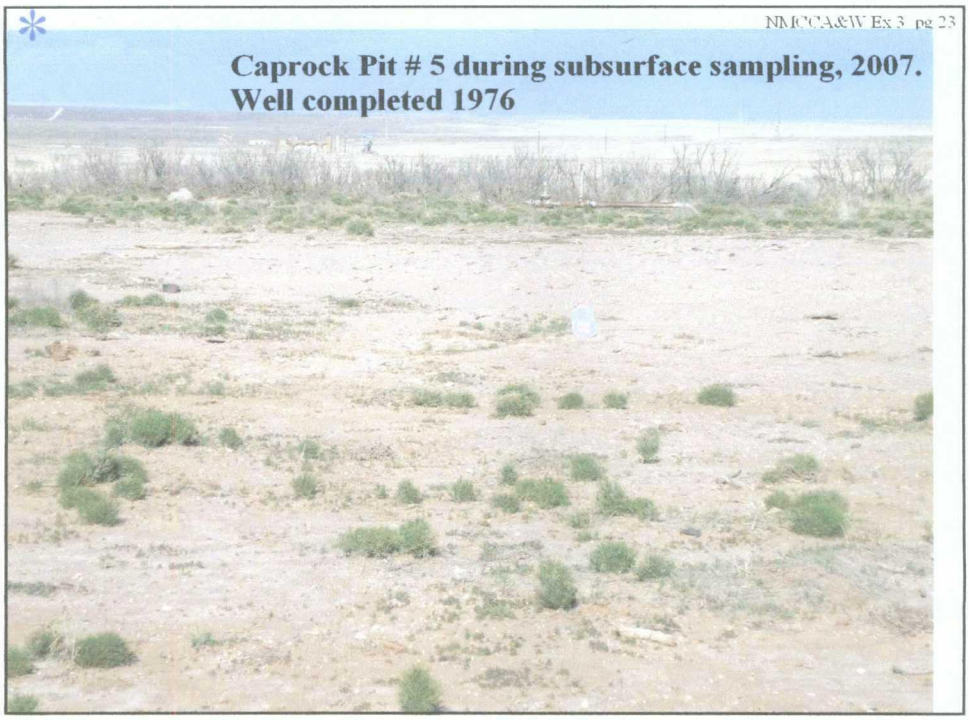
* IS TRENCH BURIAL SECURE?

2 lb. Hammer, gentle swing onto ball hammer resting on 12 mil liner over 2 inch hole. A similar test on a double layer of 12 mil liner did not penetrate.

Trench burial must be secure for thousands of years.

Might the liner be punctured when filling?

Might a closed trench subside?


Caprock Pit # 5 during subsurface sampling, 2007.
Well completed 1976


NEW DRAINAGE INTO PIT!

THE ECONOMIC CONTEXT OF THE PROPOSED INCREASE IN TRENCH BURIAL STANDARD FROM

250 mg/l TO 3000 mg/l

AFTER 3:1 AND 20:1 DILUTION BY STABILIZATION AND LEACHING.

STATE OF NEW MEXICO
GOVERNOR BILL RICHARDSON

For Immediate Release
February 18, 2009

Contact: Jodi McGinnis Parker
505.476.3226

Governor Bill Richardson Proposes Modifications to New Mexico's Oil Field Pit Rule

Governor meets with oil and gas industry reps, changes will moderate fiscal impact of compliance

SANTA FE – Governor Bill Richardson today announced that he is directing Energy, Minerals and Natural Resources Department Secretary Joanna Prukop to work with the oil and gas industry to modify several provisions of the State's Pit Rule. The proposed changes would allow oil and gas companies to better absorb the costs associated with the stronger regulations which were implemented last year. Governor Richardson personally met recently with leaders of the oil and gas industry as well as oil patch legislators to discuss their concerns about the financial impact of the rule.

"The oil and gas industry is critical to New Mexico's economy and these changes will help producers weather the financial storm while still protecting the environment," said Governor Richardson.

The Pit Rule was revised last year with the input of industry, the environmental community and many other stakeholders. It was designed to protect the State of New Mexico and its citizens from any future ground water or other environmental contamination from oil field waste pits, and also to protect the operators from the potentially crippling liability of major environmental impacts.

"We are not doing anything to diminish the environmental protections gained by the Pit Rule, but we are going to work with industry to ease the financial burden of compliance," stated Joanna Prukop, Cabinet Secretary, New Mexico Energy, Minerals and Natural Resources Department.

Since it went into effect on June 16, 2008, oil prices hit an all time high of $147 per barrel in July 2008 and have since dropped towards $34 a barrel today. The oil and gas industry plays a critical role in the State of New Mexico and it is important that government and the private sector work together during these difficult economic times.

Therefore, the Oil Conservation Division will propose six changes to the Pit Rule to support the oil and gas industry as they move forward in complying with the Pit Rule.

NMCCA&W Ex 3 pg 27

Pit Rule Proposed Change to Address Issues in SE New Mexico

Re: Waste Material Burial Closure Standard for Chloride
With Regard To On-site Trench Burial

Proposed change: **Requires Commission Action**

OCD will propose amendments to the Pit Rule to **increase** the content (waste) **burial standard for chlorides** from 250 mg/l to **3000 mg/l** or to allow the buried waste to be the same as **background concentrations at the site** for trench burial closure method.

Proposed change to 19.15.17.13.F(3)(c):

"....Using EPA SW-846 method 1312 or other EPA leaching procedure that the division approves, the operator shall demonstrate that the chloride concentration ... does not exceed ~~250~~ 3000 mg/l or the background concentration, whichever is greater, and that the concentrations of the water contaminants specified in Subsection A of 20.6.2.3103 NMAC as determined by appropriate EPA methods do not exceed the standards specified in Subsection A of 20.6.2.3103 NMAC, unless otherwise specified above ...."

Benefits to operators in regards to the proposed change:

Allows operators of **temporary pits** and operators of **closed-loop systems who use drying pads** to implement the **on-site trench burial** closure method rather than having to implement dig and haul for a temporary pit or for a drying pad associated with a closed-loop system.

Allows operators in areas with soils that may have been impacted from such activities as potash mining or have naturally occurring high chloride concentrations to close to background rather than the proposed 3,000 mg/L standard. Operators must still determine that the proposed location satisfies the siting requirements, such as the 100 feet to ground water from the bottom of the buried waste.

Cost analysis comparison for SE New Mexico: *(Assume a 35% decrease in drilling for 09 vs 08)*

285 APDs of the projected 1046 would satisfy the > 120' depth to ground water (bgs).

Annual costs savings range: *(to implement on-site trench burial over waste excavation removal)*
= (285)($11,881) to (285)($49,513)
= **$3,386,085.00 to $14,111,205.00 annually**

JPrukop 02/17/02

NMCCA&W Ex 3 pg 28

Taxes ...

New Mexico State Revenues from Oil and Gas Production

Total, all funds (Millions of dollars)

FY2003	FY2004	FY2005	FY2006	FY2007
1274	1503	1956	2503	2301

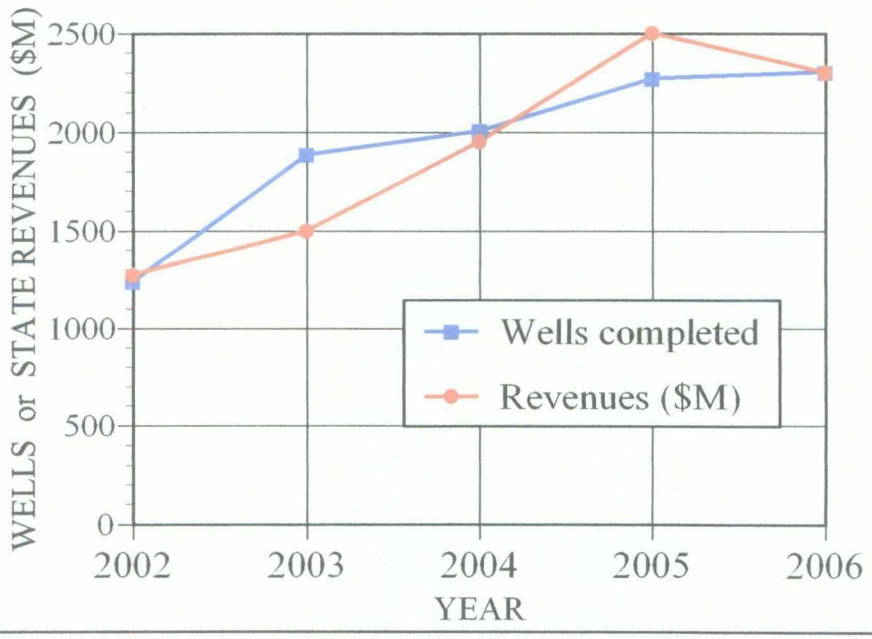
Source: Annual Report, 2007
Energy, Minerals and Natural Resources Department

Activity ...

OIL, GAS AND OTHER WELLS COMPLETED
(by year)

2002	2003	2004	2005	2006
1239	1887	2009	2272	2302

Source: Annual Report, 2007
Energy, Minerals and Natural Resources Department



CONCLUSION

There is little rational justification, either technical or economic, for the proposed 13-fold increase in salt content of material buried on-site.

MODIFICATIONS

19.15.17.13 F(3)(a) insert the following sentence so that both OCD and the operator know when there is opportunity for trench burial:

An operator who closes a drying pad or temporary pit by on-site trench burial shall determine the depth to any soil or rock saturated with water within 200 feet below ground surface, and record that depth on or with the drilling log.

Amendment for temporary relief should have an expiration.

19.15.17.13 F(3)(c) insert a clause:

...does not exceed ~~250~~ 3000 mg/l prior to June 16, 2011 and does not exceed 250 mg/l after that date, or the background concentration whichever is greater, ...