Qualification (Exhibit 4 revised)   (title slide on screen)

I am Donald Neeper, speaking on behalf of the New Mexico
Citizens for Clean Air and Water. A notarized certificate
authorizing both myself and Dr. Bartlit to speak on behalf of
the organization was filed as Exhibit 1 with the pre-hearing
statement for these combined cases. Although I have been
qualified in these combined cases and in prior hearings as an
expert in soil physics, I will review a portion of my
qualifications today because I did not previously dwell on my
experience that applies particularly to today's subject, which
is how the state will establish limits to certain contaminants
abandoned on the soil or in burial units.

NMCCA&W Exhibit 4 is slightly revised in the pre-hearing
statement. It is changed from the original Exhibit 4, already
accepted into evidence, only in that my email address has
changed and my two newest publications now show the citations to
the document index as published in the journal last June. The
revised Exhibit 4 is included in paper copies of the pre-hearing
statement for this re-opened portion of the hearing.
Unfortunately, the revised exhibit was accidentally left out of
the electronic copies sent to the service list, for which I
apologize.

I have previously described my education with a Ph.D. in thermal
physics, after which I conducted post-doctoral research in
liquid helium. After coming to Los Alamos in 1968, I conducted
computer modeling of thermonuclear weapons, and computer
modeling of solar buildings. Iin the late 1990's, I was
interested in a particular mode of transport of vapor
contaminants in porous media, particularly in the soil. This
led to my supervision of the environmental investigation of four
sites at Los Alamos containing buried wastes. One of those
sites had chemical wastes; a second larger site contained both
chemical and radioactive wastes. The burial units were shafts
and pits, as deep as sixty feet. One or two units had been
shallow ponds, not unlike temporary drilling pits. A major task
was to assess the movement, if any, of the contaminants. In
that investigation we sampled surface soils as well as drill
cores and soil vapors as deep as a few hundred feet.

After official retirement in 1993, I spent several years in
consulting on that investigation and on similar questions of
subsurface contaminant transport. About ten years ago I
returned to the Los Alamos National Laboratory as a guest
scientist, with the personal project of understanding our

earlier measurements of the subsurface movement of chemical vapors that are similar to petroleum vapors.

Starting in 2001, I served three years on the governing board of STRONGER, a nonprofit organization funded by the EPA and by the American Petroleum Institute to review the environmental regulations of the petroleum-producing states. I also turned my attention to New Mexico's regulatory procedures. I remember participating in the 2003 pit hearing, in work groups, and in other hearings and in remediation proposals. In preparation for the 2007 pit hearing, I privately conducted both surface sampling and subsurface drilling of old pits. I initiated computer simulation of chloride transport using the FEHM code of the numerical hydrology group at Los Alamos. This code is an ever-evolving research tool that simulates the movement of water, gases, and chemicals in soils. It was used in support of the Yucca Mountain nuclear waste repository. It is used internationally and it is available to the public, but it should be used only by experts in close contact with those who actively modify this huge program. Although I worked out the equations that could represent the effects of extremely large salt concentrations, as the salt affects the vapor pressure, viscosity, and surface tension of the pore water, I did not have the several months of time that would be required to implement these extreme effects in the code, so my personal calculations simulated less extreme conditions. However, last month, a former colleague called to ask questions about those equations, which he is now implementing as the code is being applied to subsurface sequestration of carbon dioxide in regions containing hot, saturated brines.

I have physically been in pits—landfill pits large and deep enough to contain several houses, and I have been in and oil field pits as small as a thousand square feet. I am offering this expanded description of my experience because I realize that my previous presentations before this Commission may have been too abbreviated—as one observer said, I tend to present two concepts but I leave out the three steps in between. Today I want to leave no doubts regarding my qualifications in investigating the subsurface migration of wastes; my experiences with buried wastes; my multiple experiences with computer simulation of physical systems including my experience in simulating chloride transport with the scientifically vetted subsurface heat and mass transport code called FEHM. From experience, I am familiar with many of the various units used to quantify the properties of soils and their contaminants. I know that, to understand the impact of specific regulations, it is

necessary to use measurement units within the context of where, and under what physical circumstances, a rule is applied. For example, water in soil might be quantified as fraction of mass (g/kg), or as fraction of porosity (called saturation), or as moisture potential that drives movement, and each expression presents a different view of the same thing, which is water in soil.

I offer myself as an expert in soils physics, qualified to evaluate the measurement and characterization of contaminants in soils.

I offer my updated resume as NMCCA&W Exhibit 4 revised, for the record of the hearing.

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* Pg 1. Title

I usually offer my testimony in a conversational manner.
However, I notice that in some cases my conversational words do
not carry the intended meaning when expressed in written form in
the record. Therefore, I may read some portions of my testimony
today, because I want to use exact words. I realize that one
purpose of this re-opened hearing is to establish a particular
clarity in the record, and I want the record to be helpful to
the Commission.

* Pg 2. Excerpt of transcript

This extract is copied from the transcript of the November 15
meeting of the Commission, to which I added the accents in red.
The Commission has asked specifically for units of mg/kg, and
for the record to contain a method of converting units. The
revised Tables submitted by industry appear not to respond to
these requests. I will offer the proposed limits in mg/kg, and
the conversion arithmetic for the record of this hearing. I will
also present other units with conversion, which may provide a
greater understanding of the tables. Finally, I shall indicate
where possibly erroneous text in the rule may lead to
conflicting interpretation of how Table II is applied.

* Pg 3 Conversion of units from EPA 1312 LEACH TEST

Here I provide the conversion between mg per liter of the leach
test and mg/kg of the dry solid pit waste after potential 3:1
dilution with clean soil. I recognize that the Commission may
already know this information. However, I am establishing the
conversion in the record of the hearing, so the Commission is
not constrained in making any conversions or comparisons it
wishes.

Let us start with a hypothetical sample of one kg of waste.

The 1312 test specifies leaching the solid material 20 liters of
liquid (in this case, water) for each kg of solid sample.

1 mg/liter in the leachate implies 20 mg/kg in the diluted
waste. To convert from mg/liter in the leach to mg/kg in the
diluted waste, multiply by 20.

* Pg 4 Other units appearing in the record EC

Some testimony in the record employed EC units, which usually
means the electrical conductivity of a saturated paste of the
solid with water. However, no conversion between EC and mg/kg
was offered in testimony.
      (read slide)

* Pg 5 Graphical conversion of EC to ppm (mg/kg).

Page 5 presents a method for relating EC to mg/kg. This is not
new information; it is in the record of the hearing, but it may
be obscure. I am not now discussing damage to vegetation. I am
using two data sets to show the conversion between EC and mg/kg,
which is ppm or parts per million. For this purpose, I could
have made a simpler chart, with arbitrary names for the points,
but I preferred to use material already in the record.

EC is electrical conductivity. Consider first only the points
shown on the chart as circles in blue. Imagine each point as
being on the horizontal axis, instead of on a slope. In your
imagination, just move each point down to the horizontal axis
that is labeled EC. For example, move the point called vetch at
EC 3 down until it sits on the horizontal axis. This indicates
the US Department of Agriculture found the effect labeled
"vetch" to occur at EC of 3.

Likewise, imagine moving all of the other circular blue points
down to the horizontal axis. You would then have a horizontal
line with blue circles indicating data points with names,
extending between EC zero and EC 8.0. The horizontal data come
from the U.S. Department of Agriculture.

Next consider the same maneuver, but move the blue circles to
the left, the vertical axis. You would then have a vertical
line with blue circles indicating named data points extending
between chloride values of zero and 1400 ppm, which is mg/kg.
The ppm values come from the Integrated Petroleum Environmental
Consortium of the University of Tulsa. The industry brought the
director of this consortium to testify in the surface waste
hearing.

The names of the blue circles on our imaginary horizontal axis
correspond to the named circles on our imaginary vertical axis,
so you can then let the blue circles move back to the dotted
curve as shown. The blue dotted curve represents two data sets,

one plotted against the other. I indicate an approximate conversion by the red line, which is a fit to the data points below 800 ppm, or below EC of 5. In this fit, ppm (or mg/kg) equals EC value multiplied by 169, the approximate conversion I presented on page 4 of this exhibit.

These are not my data. and the only interpretation of this graph today is that it offers an approximate relationship between expressing chloride concentration as milligrams per kilogram (or ppm) and expressing concentration as EC.. Is this clear?

I will be pleased to present images illustrating the origins of these data sets if you request. The plot of one data set against the other offers an approximate conversion between EC and mg/kg (or ppm).

* Pg 6   Table I

Table I and Table II are based on depth to groundwater. I emphasize that groundwater is part of the environment, but the environment includes much more than groundwater. The surface of the ground is a crucial part of the environment, and protection of surface soils cannot be judged solely on the depth to groundwater. The contaminant limits in surface soils should also be based on surface effects, yet the allowed chloride concentration is 20,000 mg/kg if the depth to groundwater is greater than 100 ft.

My largest concern with Table I is that it is based on a single, 5-point composite sample of soil beneath a removed tank or a removed pit liner. If the tank or pit liner has had a slow leak at one place, there is no requirement to sample a wet spot or stained soil, or to investigate the depth of the resulting contamination. A leak of one drop every three seconds is about equal to 5 barrels per year. In effect, Table I is replacing the spill rule in these circumstances. Unless the average surface contamination indicated by 5 samples exceeds the limits of Table I, no remediation is required.

I will now deal with specific items on Table I.

On Page 4, I outlined in green items that have been changed since the earlier submission of Table I. I outlined in red other items that I will bring to your attention.

EPA 300.0 and leach method unspecified

I notice that no test method is specified for leaching the chloride from the solid sample. The specified EPA method 300.0 for quantifying the amount of chloride must be preceded by leaching of the chloride from the solid. Method 1312 was specified for the leach in Table II, leading the reader to speculate whether the Method 1312 leach is implicitly discouraged for testing of surface soils.

EPA 300.1 was originally specified In Table I as the test for the concentration of chloride. The proposed replacement of EPA 300.1 with EPA 300.0 is acceptable. The methods are very similar. Method 300.0 is frequently used for soils. It is a chromatographic procedure. It separates chloride and many other ions as they move with different speeds along a column. Quick, cheap tests for chloride can be done in the field; however, an established laboratory would probably use a leach, followed by Method 300.0 or 300.1 as a matter of course, perhaps avoiding conflict with chlorate ion or molecular chlorine.

Unconfined gw
Note the revised Table I still applies only to unconfined groundwater. In Table I, that would mean there are no limits to soil contamination so long as the groundwater can be labeled as "confined." A distinction between confined and unconfined groundwater leads to difficulties in enforcement, as you have noticed previously.

EPA 8015M   (pending NMOGA testimony)
I bring your attention to the proposed limit of GRO/DRO by Method 8015M. I believe 8015C is the current EPA modification of this test. 8015M would indicate a 13th official modification, because M is the 13th letter of the alphabet. I understand 8015M is not an official EPA designation, but it is frequently cited in the literature, as though it were official. I have not been able to find a modified procedure of EPA8015 to which this name officially applies, although it may exist.

TPH
EPA Method 8015 measures oils heavier than gasoline range and diesel range, although the proposed table calls only for limiting disposal according to the sum of these two ranges. The test will give the concentrations of the heavier hydrocarbons, but, in adoption of this table, the state is choosing to ignore that data. GRO plus DRO should not be confused with "TPH," which usually means total petroleum hydrocarbons, including the heavier oils. As proposed, specifications of Table I allow

unlimited contamination by oils and heavier hydrocarbons in the soils beneath a below grade tank, and it need never be cleaned up.

Pg 7 Table I chloride limits

These are the concentrations that may be left on the ground surface, when removing a below grade tank or a pit liner. This expresses the limits of Table I in more intuitive units that may be useful during deliberations. I expressed the limits as what would occur if the chloride occurred as salt, which is sodium chloride. This page the conversion of chloride to salt for the record. The mass of salt, as sodium chloride, equals the mass of chloride multiplied by 1.648.

I remind you that the chloride concentration in the lifeless areas shown in my photographs on pages 15, 16, and 33 of NMCCA&W Exhibit 5 was approximately 3,000 mg/kg.

Pg 8 Table II Closure criteria for buried wastes

Again, I outline in green items that have been changed, and in red items to which I wish to draw attention.

EPA 1312 and 300.0
In green: this table specifies that chloride measurements must be determined by a sequence of two methods in the Solid Waste 846 catalog. Method 1312 is a procedure to leach a solid contaminant, such as chloride, out of a solid sample, such as soil. Method 1312 is certainly adequate for extracting chloride from the solid sample. (*Has the industry witness answered why the test procedure of Table II is different from that of Table I?*)

mg/L
Apparently contrary to the expressed wishes of the Commission, the revised table still specifies the chloride limits in terms of milligrams per liter, which is the chloride content of the liquid with which the solid sample has been leached. Specification in terms of the leachate is not necessary here, any more than it would be necessary in Table I, where the chloride limit is expressed in milligrams per kilogram of solid sample (usually this means dry solid sample). Both for Table I and Table II, the chloride must be leached from the solid sample with a liquid, usually water. It is not wrong to specify Method

1312 for leaching the chloride, but to specify the practical limit in terms of the leachate concentration is like describing whether a laundered shirt is clean by looking at the wash water. For your convenience, I have placed the equivalent concentration of the dry solid sample in red type on the right margin of the table.

As given by the conversion factor of 20 presented on page 3, 2500 mg/L is equivalent to 50,000 mg/kg and 5,000 mg/L is equivalent to 100,000 mg/kg.

TPH
As in Table I, the sum of GRO and DRO should not be identified as total petroleum hydrocarbons. The question on the naming of Method 8015M remains.

unconfined grnd wtr
As written, this table, like Table I, applies only to unconfined groundwater, which is difficult to assess and enforce.

IPANM <100 ft
Finally, in the lower left box of the table, I note that the submission of IPANM would limit application of Table II to situations with groundwater at depths less than 100 feet, meaning there would be no limitations on any chemical content whatsoever in wastes buried where groundwater depth is more than 100 feet below the wastes.

Pg. 9   Waste chloride limits in intuitive units.

On page 9, I present the chloride limits of Table II in mg/kg and in more intuitive units, expressed as equivalent fraction of salt. The proposed limits would allow burial of diluted pit waste containing the equivalent of 8 or 16 percent salt, or, in the IPANM proposal for groundwater depths more than 100 ft below burial, unlimited concentrations.

* Pg. 10   Origin of CHLORIDE LIMITS OF TABLE II

As an illustration, Page 10 presents the movement of chloride as it proceeds from original pit contents, through dilution with soils, and on to testing after the prescribed EPA 1312 leach procedure. In an imaginary example, we begin with one kilogram

of original pit contents, diluted with clean soils to approximately four kilograms, and leached with 80 liters of water.

2500 mg/L chloride in 80 liters of leach water indicates that 200,000 mg of chloride came from the original one kilogram of pit contents.

The reason for this example is to indicate that the original pit contents may contain up to four times the limit indicated by Table II. We can understand the limits of Table II by comparing with actual data from pits in the field, but to make the comparison we must compare original pit contents with a number that is four times the limit of Table II.

In testimony of this hearing, I have not heard scientific justification for the numerical values of the limits proposed in the tables. I therefore offer a context for understanding those limits. During 2007, both industry and OCD sampled pits. The purpose of the sampling was to discover what chemicals occur in pits. OCD sampled approximately 22 pits. The pits were randomly selected from a list of pits ready for closure, with the water removed. All solid samples except one were single-point samples, not composite samples. One sample was a two-point composite.

Industry sampled three pits in the southeast and three pits in the northeast. The pits were sampled before the water was removed. I have no access to the details of sample acquisition or to the laboratory reports, so I limit my discussion to the OCD sampling. The available information indicates the industry results would not alter the conclusions reached here.

Pg 11 Comparison with OCD pit Sampling—FOUR ANALYTES

Page 11 compares the proposed limits of all four contaminants in Table II with actual pit contents as found by the OCD in the southeast. Comparison with measured pit contents requires that we express the Table II limit as equivalent mg/kg, multiplied by four to convert from diluted wastes back to pit content. This is not suggesting that the limit in Table II should be multiplied by four; rather, it is necessary to do so here because we are comparing the limits, expressed as pit contents, with actual data of undiluted pit material.

I identify one pit of the OCD sampling as a statistical "outlier," because it had strange values of organic components, values far larger than those of any other pits. I therefore did not include the values from this outlier pit in the averages or maximum the of organic materials. In photos, that pit appeared as though a floating layer of oil had not been sucked away with the water, and consequently the petroleum sat on the drying mud. In short, I suggest we ignore the hydrocarbon data from the outlier pit.

GRO plus DRO: Only the value of one sample, appearing here as the maximum, exceeded the proposed GRO+DRO limit for shallow groundwater, and no values exceed the limit for deep groundwater.

BTEX: No OCD samples came anywhere close to the BTEX limit.

BENZENE: The average of the benzene samples far exceeded the proposed limit. Compliance with the benzene limit can probably be achieved by the one-year drying time allowed in the proposed rule, because benzene moves in the vapor phase, and will be removed from exposed pit contents by barometric pumping, which is the daily movement of air into and out of the surface. Prior to the 2007 pit hearing, the OCD assembled a working group of industry, land, agriculture, and citizen representatives. I remember discussions in which the industry at that time expressed its eagerness to close temporary pits as soon as possible, which led to the six-month closure condition in the present rule.

CHLORIDE: The average of all pits sampled is within all limits, and the maximum is well within the limit for deeper groundwater. There was no outlier among the chloride data, although the maximum chloride occurred in the pit with outlier organic contents. That maximum is barely above the limit for shallow groundwater, and well within the limit for deeper groundwater.

Conclusion: except for benzene, the proposed limits for all of the contaminants that remain in the proposed rule will rarely be exceeded in normal operations. Because benzene will evaporate, it is therefore tempting to think that the concentration limits and the extended pit drying time were established, not by environmental concerns, but rather established to allow the industry to operate without restrictions.

I remind myself that the only reason for Rule 17 is environmental protection.

Pg. 12 Relation of Table II to 19.15.17.10 C "on-site"

The significance of the tables is strongly related to where and
how the tables apply. There are some conflicts and some logical
nonsense that result when Table II is applied as directed by the
text elsewhere in the rule.

    (read the slide)

Let me review this. Sub-section 19.15.17.10 C(2) gives the
impression of providing setbacks for buried wastes because it
explicitly provides setbacks from water courses, buildings,
water supplies, wetlands, and other geographic features.
However, the wording in fact eliminates any setbacks specified
in C(2) unless the burial is on-site.

I hope the Commission will correct this illogical language.

Pg 13. Relation of Table II to 19.15.17.10 C(2) "exceed"

The wording of this sub-paragraph conflicts with the burial
restrictions of Table II.

    (read slide)

Pg. 14. Conclusions

    (read slide)

If I am allowed to offer my impressions of Table I and Table II,
I find two strong impacts:

1) My first concern is with the land surface. Table I specifies
contaminant limits on the surface of the ground. The 5,000 and
20,000 mg/kg chloride limits are equivalent to EC values of
about 30 and something far exceeding 100, respectively. You can
make your own comparisons with EC limits given in other
testimony and exhibits regarding various life forms. These
values denote a dead land.

2) My second concern is with the cost of eventual remediation.
Table II specifies the limits for buried contaminants. The

testimony contains conflicting estimates of how fast and how far
the chloride will move, but all measurements at actual pits show
motion of roughly ten feet or more in a decade.   Sooner or
later, many of these pits will cause problems for which the
remediation, when remediation is done, will cost money
approximating the cost of drilling the well, not the cost of
making the pit.   If someone wants to argue the costs of
environmental remediation with me, I am willing to explain my
concerns.   If only ten percent of the pits require remediation,
the costs will be such that either the state, or the remaining
operators, will be unable to afford it.   That is my concern.

I offer NMCCA&W Exhibit 6 for acceptance in the record.

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   (green slide)

RELATION OF TABLE

BACKGROUND

The proposed 19.15.17.10 C (2) for "on-site closure." It refers to Table II. Setbacks for trenches a 19.15.17.10 C(2).

CONFLICT DUE TO THE TERM '

In 19.15.17.10 C(2), <u>trench setba exceed the limits of Table II.</u>
The term "exceed" in 19.15.17.1 by "do not exceed." Otherwise, not exceed the limits may be bur wastes that do exceed the limits the setbacks. This contradicts 19 prohibits burial of wastes that ex

PITS AND BELOW-GRADE TANKS

OIL CONSERVATION COMMISSION HEARING

CASES 14784, 14785   January 9, 2013

Donald A. Neeper, Ph.D.

New Mexico Citizens

for Clean Air & Water

P.O. Box 5   Los Alamos   87544

From the transcript of the Nov. 15, 2012 Commission meeting.
pages 4-5

CHAIRMAN BAILEY:

14   The Commission should have concerns about the
15   numerical limits in the tables that are part of Section
16   19.15.17.13. These tables use values that are reported
17   as either milligrams per kilogram or milligrams per
18   liter. The table should use one method of reporting for
19   all values, particularly since the Commission is leaning
20   towards use of only one table, rather than two.
21   I recommend that since the measurements are of
22   soils or wastes mixed with soils, that milligrams per
23   kilograms would be a more appropriate method of
24   calculation. However, since the record does not support
25   any conversion of values currently in the proposal, the
1   Commission cannot make such a conversion on its own.

(accents added)

Conversion between mg/kg solid and
mg/liter liquid per EPA 1312 leach test

leach
20 liters kg

1 kg
solid waste

20 liters liquid leach
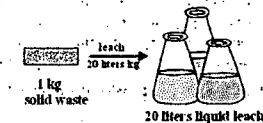
Example: 20 mg chloride ⟶ 20 mg chloride

20 mg/kg   1 mg/liter

1 mg/L in leach implies 20 mg/kg in diluted pit waste

To convert mg/L to mg/kg, multiply by 20.

OTHER UNITS APPEARING IN THE RECORD

EC units may be needed in deliberations regarding the tables.

There is no exact conversion from EC (dS/m or mmho/cm) because "EC" is usually measured in a saturated paste of water and soil. The amount of water added to make a paste is inexact, and soil density varies.

As an **approximation**, to convert EC to mg/kg, multiply the EC value by (1010/6), which is 169. Deviation from this linear rule occurs above EC=100.

Example: EC limit* of alkali sacaton = 12; 12x169 = 2028 mg/kg.

* tr. pg. 1314; L 16-21

This approximate conversion is illustrated in page 21 of NMCCA&W Exhibit 5, where EC 6 in a paste corresponds to 1,010 mg/kg in the soil.

USDA ELECTRICAL CONDUCTIVITY THRESHOLD (mmho/cm)
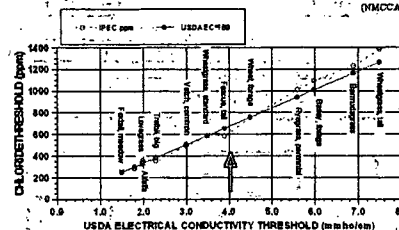
Threshold for chloride damage to grasses, expressed as EC of saturated paste by the U.S. Department of Agriculture or as soil chloride content by IPEC. The graph suggests that the two data sets have a common origin.

Chloride: Integrated Petroleum Environmental Consortium; EC: USDA O. E. Brown Salinity Laboratory, http://www.ussl.ars.usda.gov/pls/rotlc/sp/SA1.TT42B

Table 1 of NMOGA revision of 11/29/2012

Table 1. 19.15.17.13 NMAC
Closure Criteria for Soils Beneath
Pits & Below Grade Tanks

Depth to Unconfined Groundwater less than 10,000 mg/l TDS	Constituent	Method	Limit**
≤50 feet	Chloride	EPA 300.0*	5,000 mg/kg
	TPH (GRO-DRO)	8015M	100 mg/kg
	BTEX	8021B or 8015M	50 mg/kg
	Benzene	8021B or 8015M	10 mg/kg
>50 feet-100 feet	Chloride	EPA 300.0*	10,000 mg/kg
	TPH (GRO-DRO)	8015M	1,000 mg/kg
	BTEX	8021B or 8015M	50 mg/kg
	Benzene	8021B or 8015M	10 mg/kg
> 100 feet	Chloride	EPA 300.0*	20,000 mg/kg
	TPH (GRO-DRO)	8015M	5,000 mg/kg
	BTEX	8021B or 8015M	50 mg/kg
	Benzene	8021B or 8015M	10 mg/kg

* Or other test methods approved by the Division
** Numerical limits or natural background level, whichever is greater

Item to note   Item revised

TABLE I

PROPOSED SOIL CHLORIDE LIMITS

Conversion to more intuitive units (%)

Depth to groundwater	Chloride soils limit (mg/kg)	Limit as NaCl* (%)
≤ 50 ft	5,000 mg/kg	0.82 %
>50-100 ft	10,000 mg/kg	1.65 %
>100 ft	20,000 mg/kg	3.30 %

*NaCl = Cl · 1.648

Table II of NMOGA revision of 11/29/2012

Table II. 19.15.17.13 NMAC
Closure Criteria for Wastes Left in Place
in Temporary Pits & Burial Trenches

Depth to Unconfined Groundwater less than 10,000 mg/l TDS	Constituent	Method	Limit**	Expressed as mg kg of diluted waste
25-50 feet below trench/pit	Chloride	EPA SW-846 Method 1312 (SPLP) and EPA Method 300.0*	2,500 mg/L	50,000 mg kg
	TPH (GRO+DRO)	8015M	100 mg/kg	
	BTEX	8021B or 8015M	50 mg/kg	
	Benzene	8021B or 8015M	10 mg/kg	
> 50 below trench/pit	Chloride	EPA SW-846 Method 1312 (SPLP) and EPA Method 300.0*	5,000 mg/L	100,000 mg kg
	TPH (GRO+DRO)	8015M	1,000 mg/kg	
IPANM ..100	BTEX	8021B or 8015M	50 mg/kg	
	Benzene	8021B or 8015M	10 mg/kg	

* Or other test methods approved by the Division
** ...

item to note   **item revised**

TABLE II

PROPOSED WASTE CHLORIDE LIMITS

Conversion to more intuitive units (%)

Depth to groundwater	Chloride waste limit (mg/kg)	Waste limit* as NaCl* (%)
≤ 50 ft	50,000 mg/kg	8.2 %
>50-100 ft	100,000 mg/kg	16.5 %
>100 ft	IPANM unlimited	

*NaCl = Cl · 1.648
Original pit material may contain 4 times the waste limit.

Where did Table II come from?

To answer, we must compare Table II limits with reality, as indicated by measurements of the original pit contents.

1 kg original pit contents	stabilize mix 3:1 →	4 kg diluted solid waste	leach 20 liters kg →	80 liters liquid leach
200,000 mg/kg		50,000 mg/kg		2,500 mg/liter
200,000 mg Cl		200,0000 mg Cl →		200,000 mg Cl
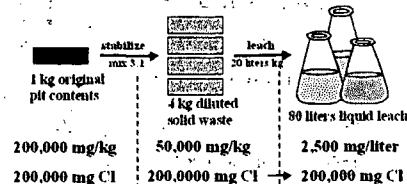
The original pit contents may contain up to 4 times the Table II limit.

COMPARISON OF TABLE II WITH OCD PIT SAMPLING

10-13 pits sampled, southeast

	Table II		Pit contents before dilution		
Analyte	Grnd wtr ft	4xLimit mg/kg	Average mg/kg	Maximum mg/kg	Outlier mg/kg
GRO+DRO	<50 ft >50 ft	400 4000	208	515	6623
BTEX	all	200	2.68	5.21	60.3
BENZENE	all	40	130	402	2710
CHLORIDE	<50 ft >50 ft	200,000 400,000	91,757	226,000	no outlier

Except for benzene,
the diluted wastes are unlikely to approach the limits of Table II.

CONFOUNDED RELATION OF TABLE II TO 19.15.17.10 C

BACKGROUND

A temporary pit may be "offsite" according to the definition of 19.15.17.7 Q. The term "on-site" has been deleted from the trench specifications in 19.15.17.11 K. Therefore, neither temporary pits nor trenches are necessarily located on-site

CONFUSION BY THE TERM "ON-SITE CLOSURE" IN 10 C

The term "on-site closure" in 19.15.17.10 C implies that 10 C applies only "on-site," which is undefined. Setbacks for trenches appear only in 10 C(2). Therefore, although setbacks for pits also appear in 19.15.17.10 A, no setbacks are required for any trench that can be regarded as off-site. Trench burial for wastes within the limits of Table II can therefore be done with no horizontal separation from buildings, surface water, or a floodplain

RELATION OF TABLE II TO 19.15.17.10 C'(2)

BACKGROUND
The proposed 19.15.17.10 C (2) prescribes horizontal setbacks for "on-site closure." It refers to 19.15.17.13, which contains Table II. Setbacks for trenches are established only in 19.15.17.10 C(2).

CONFLICT DUE TO THE TERM "exceed"
In 19.15.17.10 C(2), trench setbacks apply only if the wastes exceed the limits of Table II.

The term "exceed" in 19.15.17.10 C(2) should be replaced by "do not exceed." Otherwise, C(2) implies wastes that do not exceed the limits may be buried without setbacks, while wastes that do exceed the limits must be buried according to the setbacks. This contradicts 19.15.17.13 B(8), which prohibits burial of wastes that exceed the limits of Table II.

CONCLUSIONS

1. Table II as proposed is not responsive to the Commission's request for a single set of units. The proposed chloride concentrations of 2500 and 5000 mg/L are equivalent to 50,000 and 100,000 mg/kg, respectively in diluted waste.

2. The proposed CHLORIDE, GRO+DRO, and BTEX limits of Table II appear to be based on the maximum concentrations that might occur, without relation to environmental protection.

3. The combination of Sub-sections 7 Q, 11 K, and 10 C with Table II provide conflicting interpretations of the permissible geographical locations for waste burials. Literal interpretation allows trench burial without the stated setbacks.