BW - ___999____

AGENDA, PRESENTATIONS & NOTES (2)

BRINE WELL WORK GROUP

3/26/09 - Present

Potash Well Siting, Construction & Operation (Richard Miller- Intrepid Potash)

Intrepid Potash Inc.
Potash Mining

Richard Miller

Topics

Selective Mineral Solution Mining – Formations remain

Intrepid Mine Locations: Carlsbad, Moab, Wendover
– All Different Mining Methods

Class III Injection Wells – Construction, Regulations

Corrosion Minimization – Casing, Cement, Cathodic Protection

A Solution Mining Technique used by others for controlling cavern size

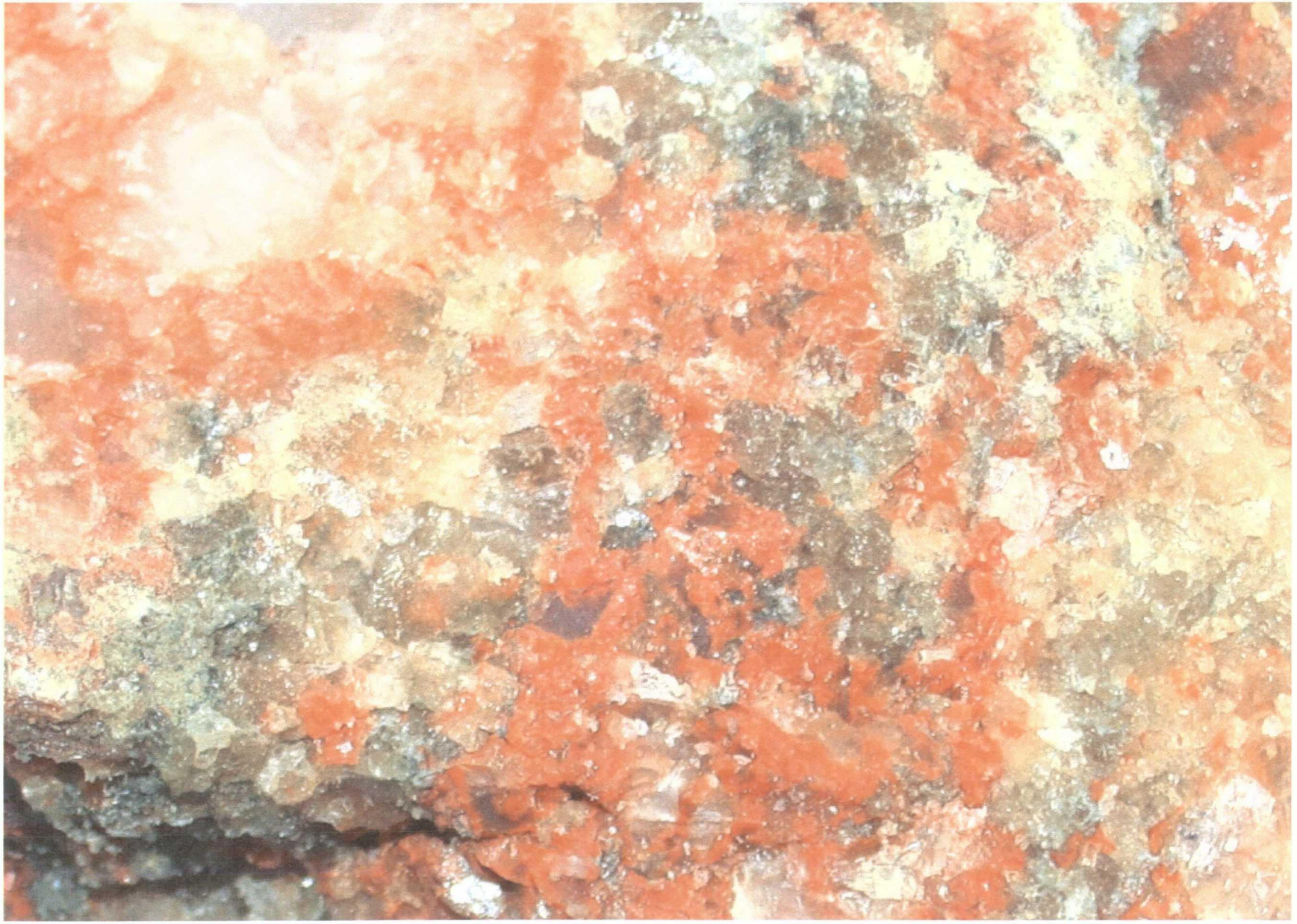
What is Potash?

- Potassium Chloride = KCl - Also Potassium Sulfate and Potassium Carbonate
- Ores: Sylvite, Langbeinite – 20%-30% KCl 70-80% NaCl
- Used mostly in fertilizer (N-P-K), oilfield fluids and various other industrial products

Selective Mineral Solution Mining

- Intrepid only does Selective Mineral Solution Mining
- Injectate fluid is Saturated in Salt – NaCl
- Injectate contacts remaining pillars from underground Room and Pillar Mine from the 1960's
- The Potash is dissolved, salt concentration is slightly reduced and Potash Mineral is removed in solution
- Salt Matrix in Pillars remain in place

Sylvite Ore – Contains ~25% Potash and ~75%Salt



Ore Left for Solution Mining

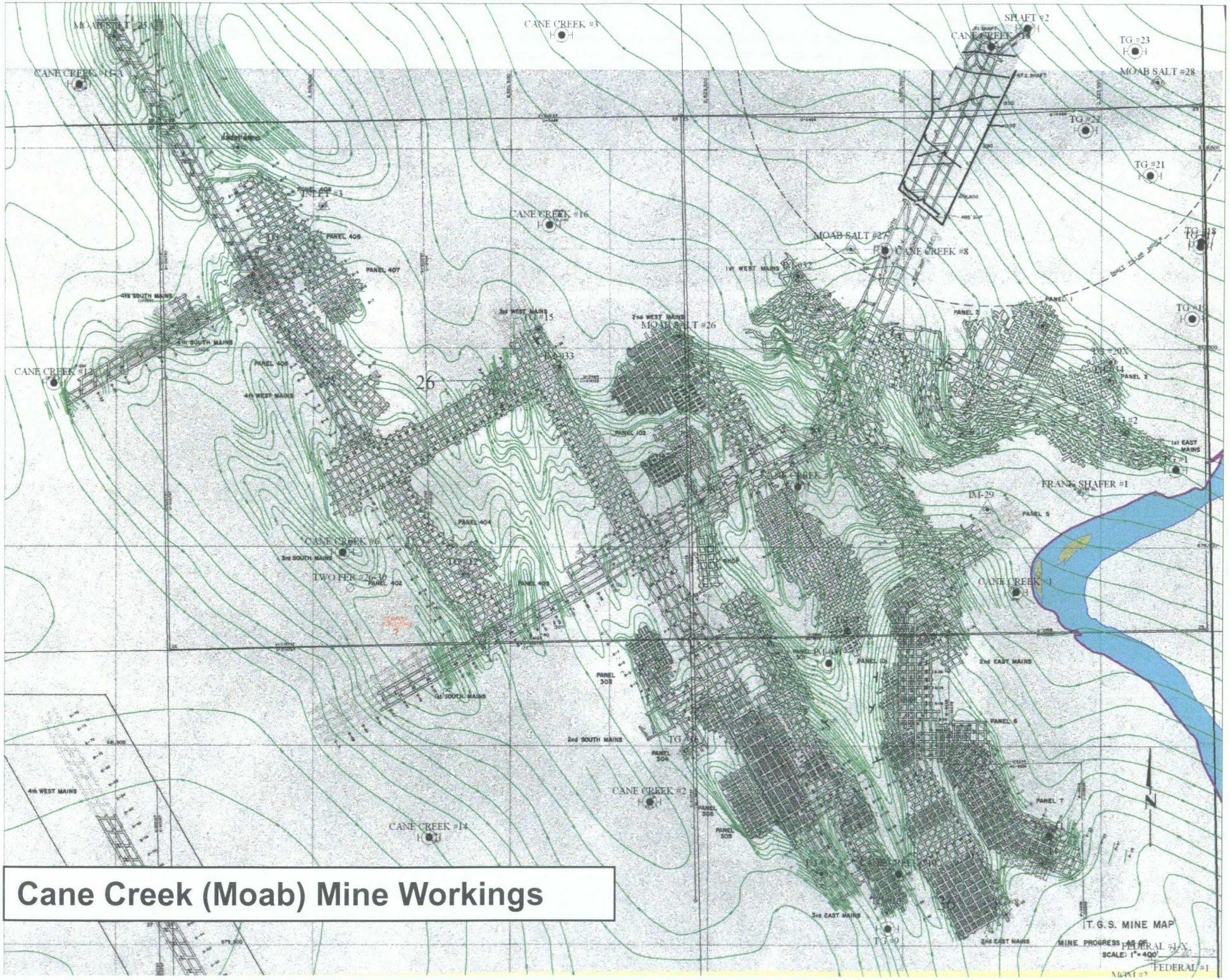
- Selective Dissolution of KCl from the Ore

Before

After

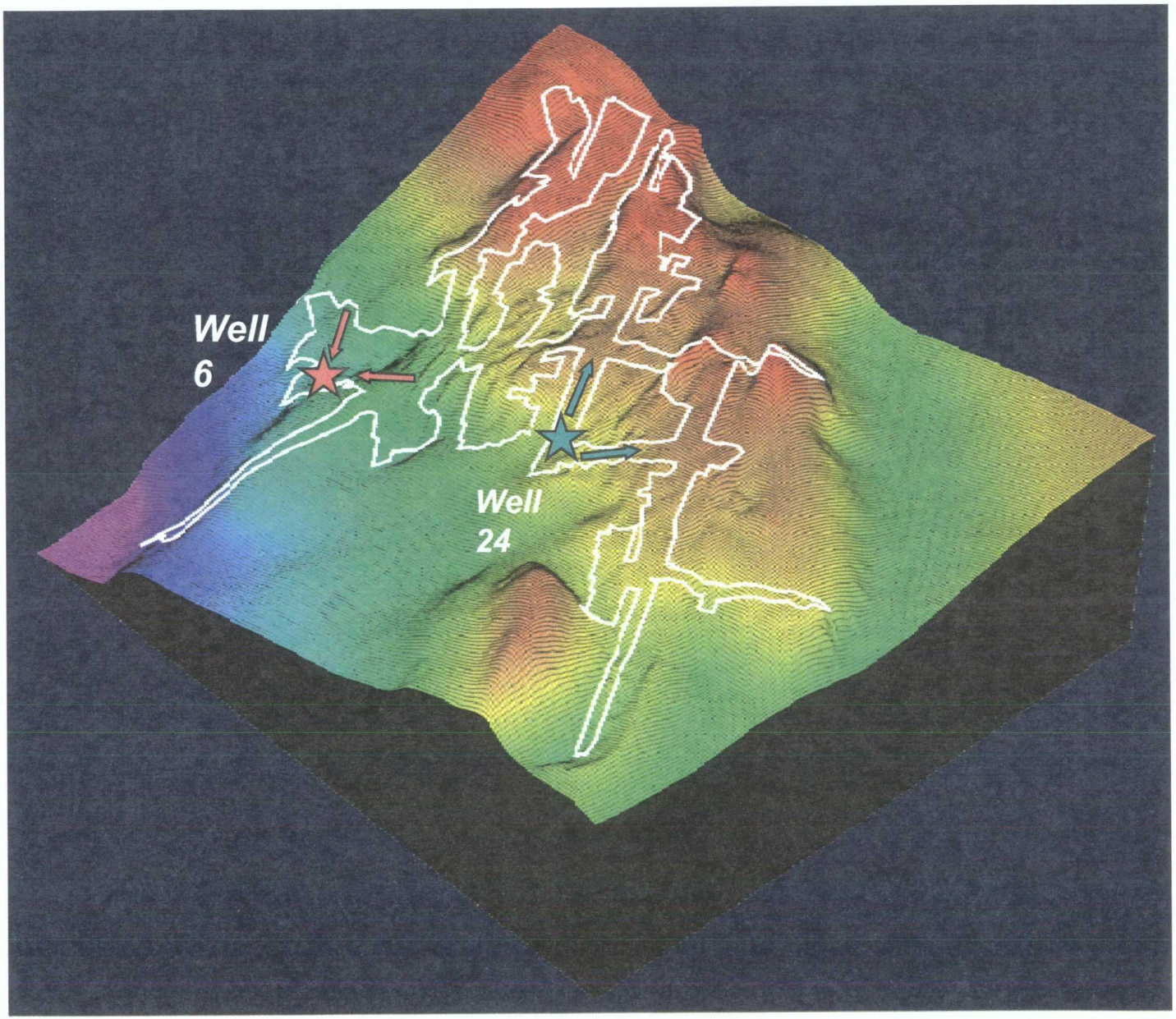
Selective Mineral Solution Mining in Moab

- Sylvite 5 Ore Zone
  - Inject NaCl- saturated water to control dissolution
  - Extract from wells completed into old mine workings
- Sylvite 9 Ore Zone (800' Below Sylvite 5)
  - Inject NaCl saturated water / extract in pressurized, horizontally-drilled cavern



Cane Creek (Moab) Mine Workings

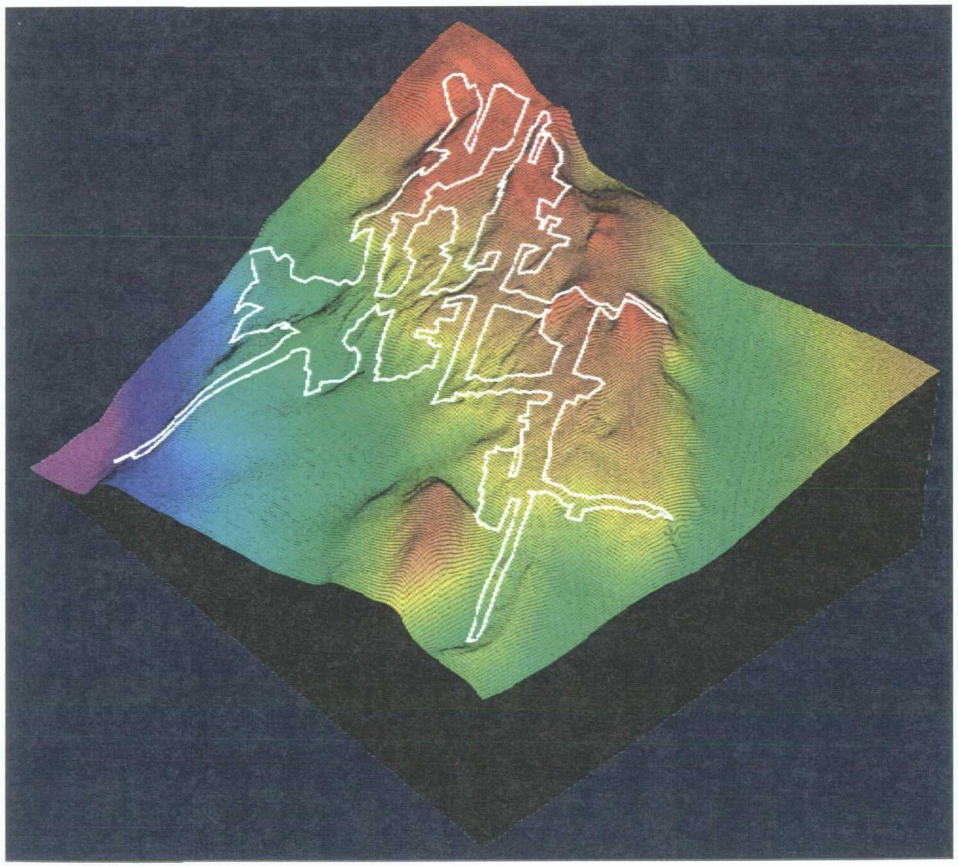
Sylvite 5 Mining

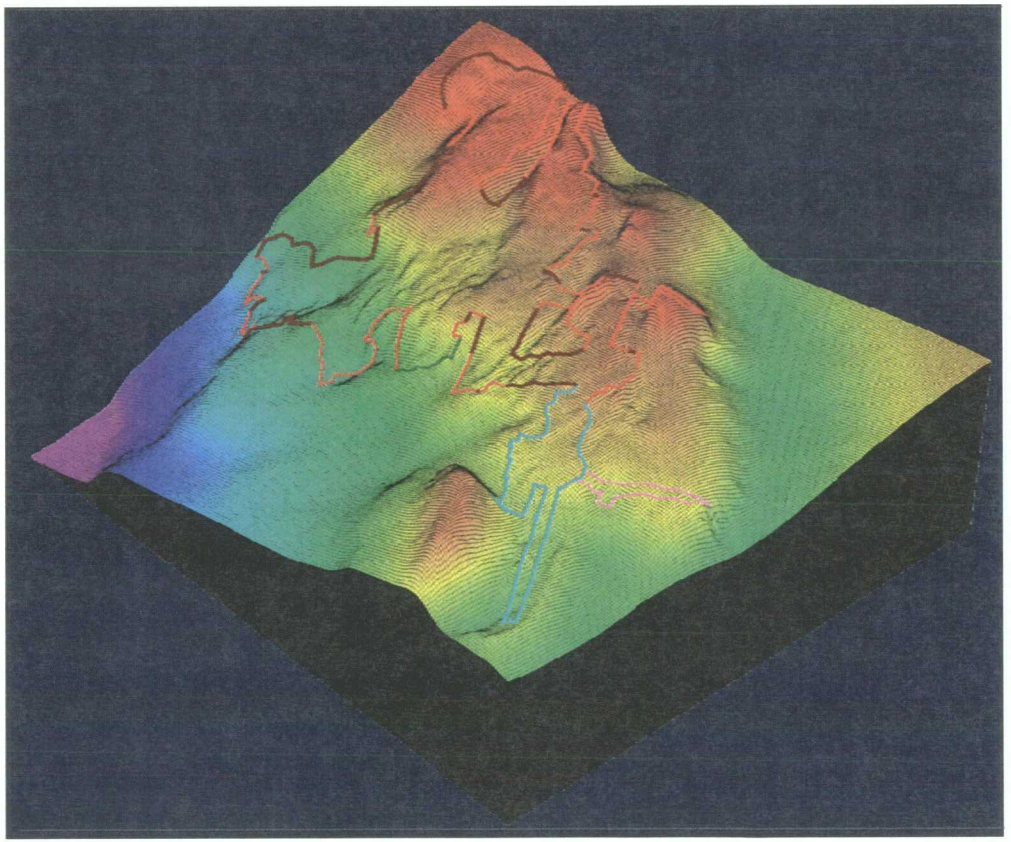


Mine Perimeter

- Calculated present perimeter
- Salt Pillars still in place

Original Perimeter






Well 24 - Brine Injection Well

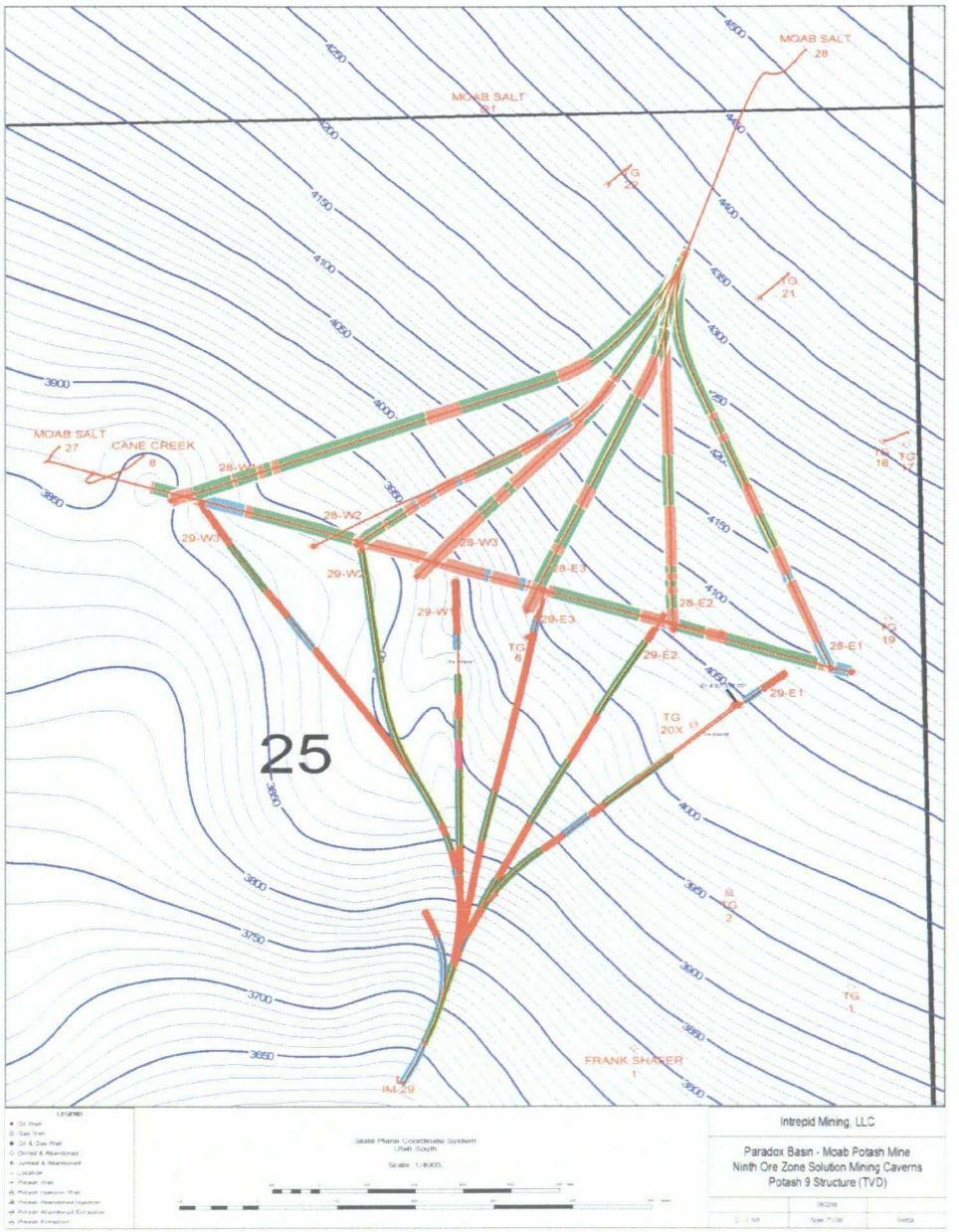
Brine Heater

Submerged Combustion

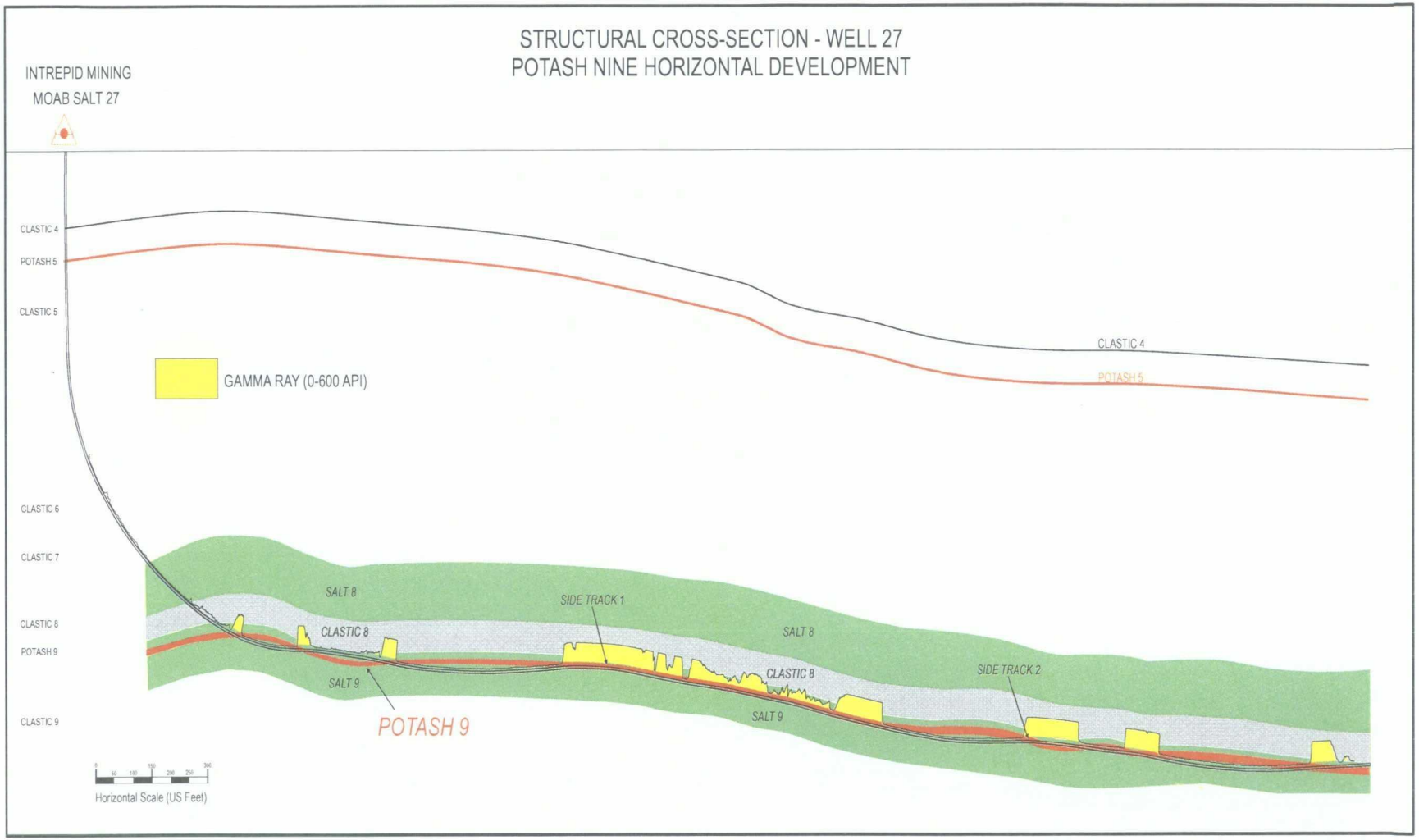
Sylvite 9 Mining

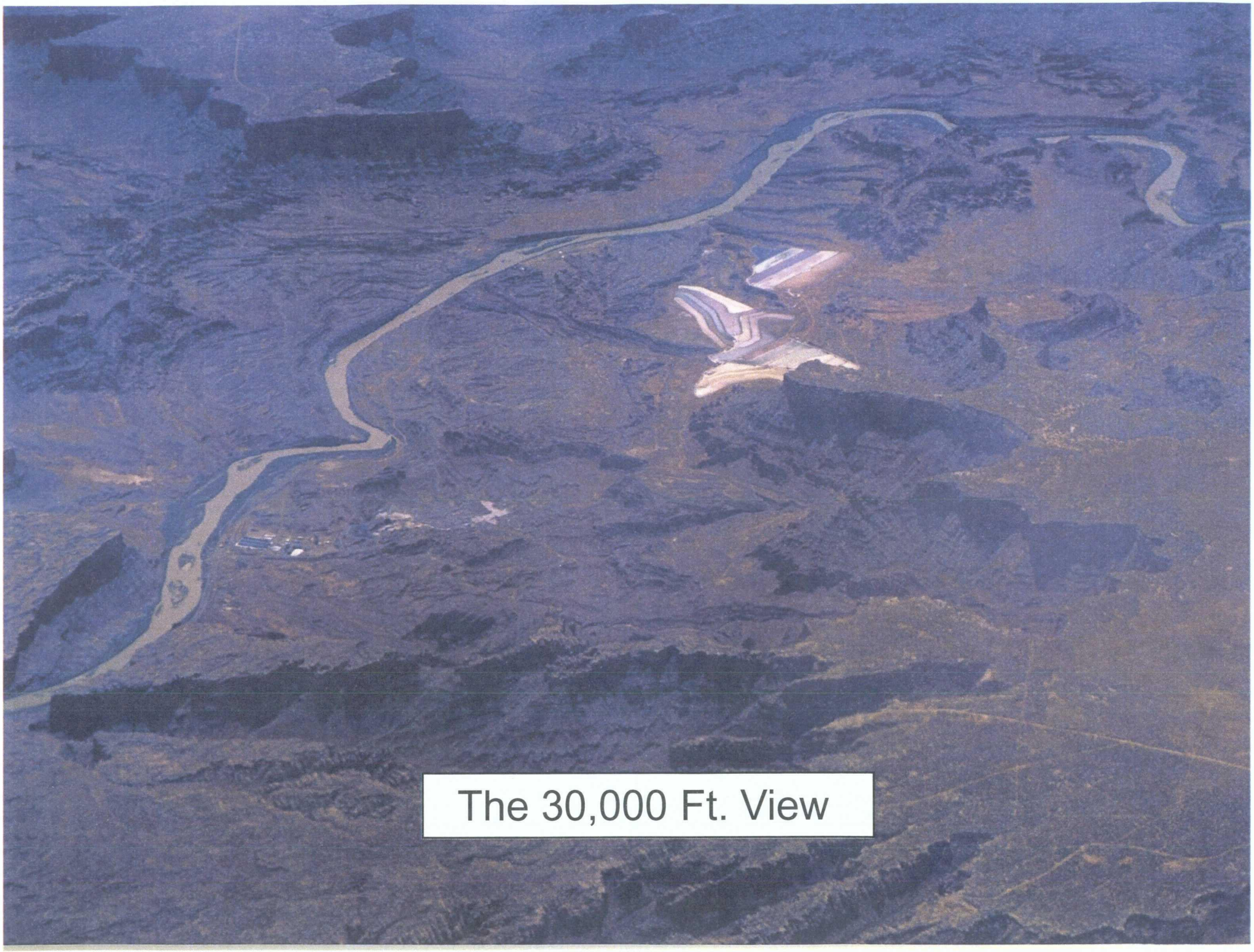
Borehole Layout

Map View

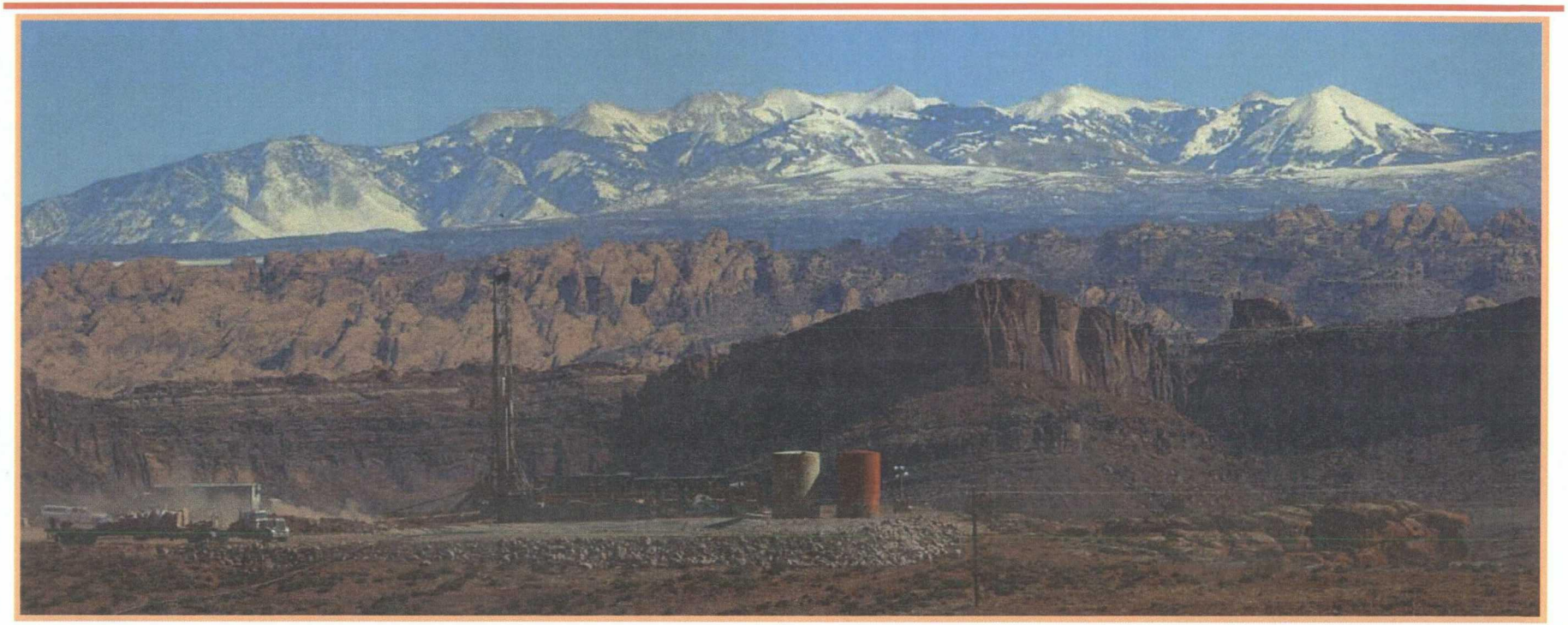


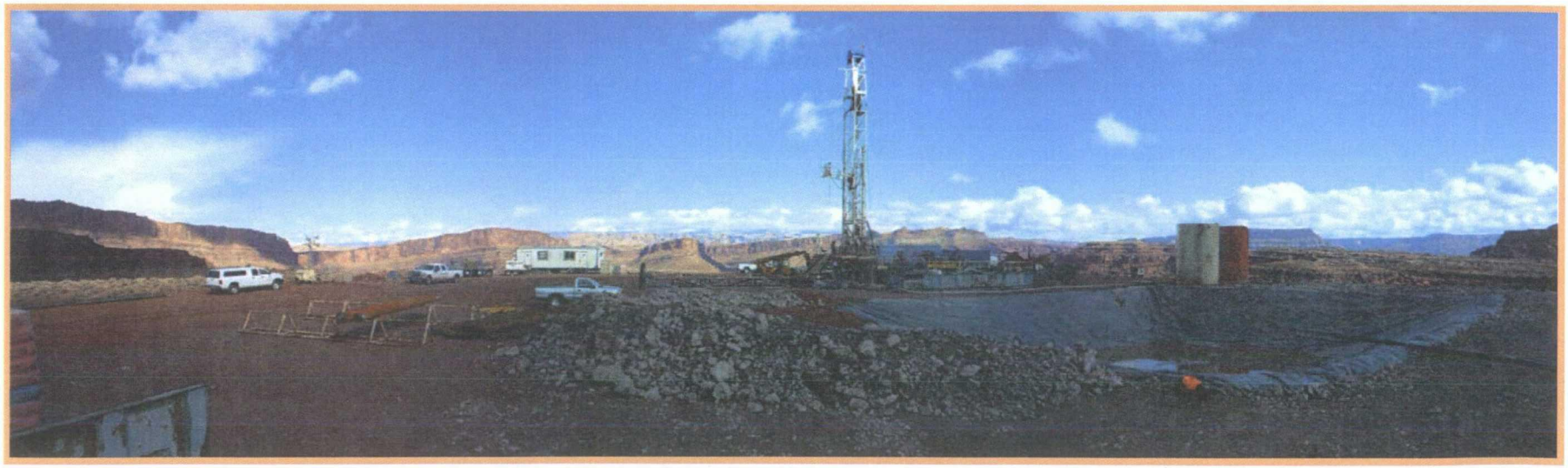
Cross Section of Lateral




The 30,000 Ft. View

Intrepid Potash-Moab, LLC
Brine Extraction Well-36
Drill Site

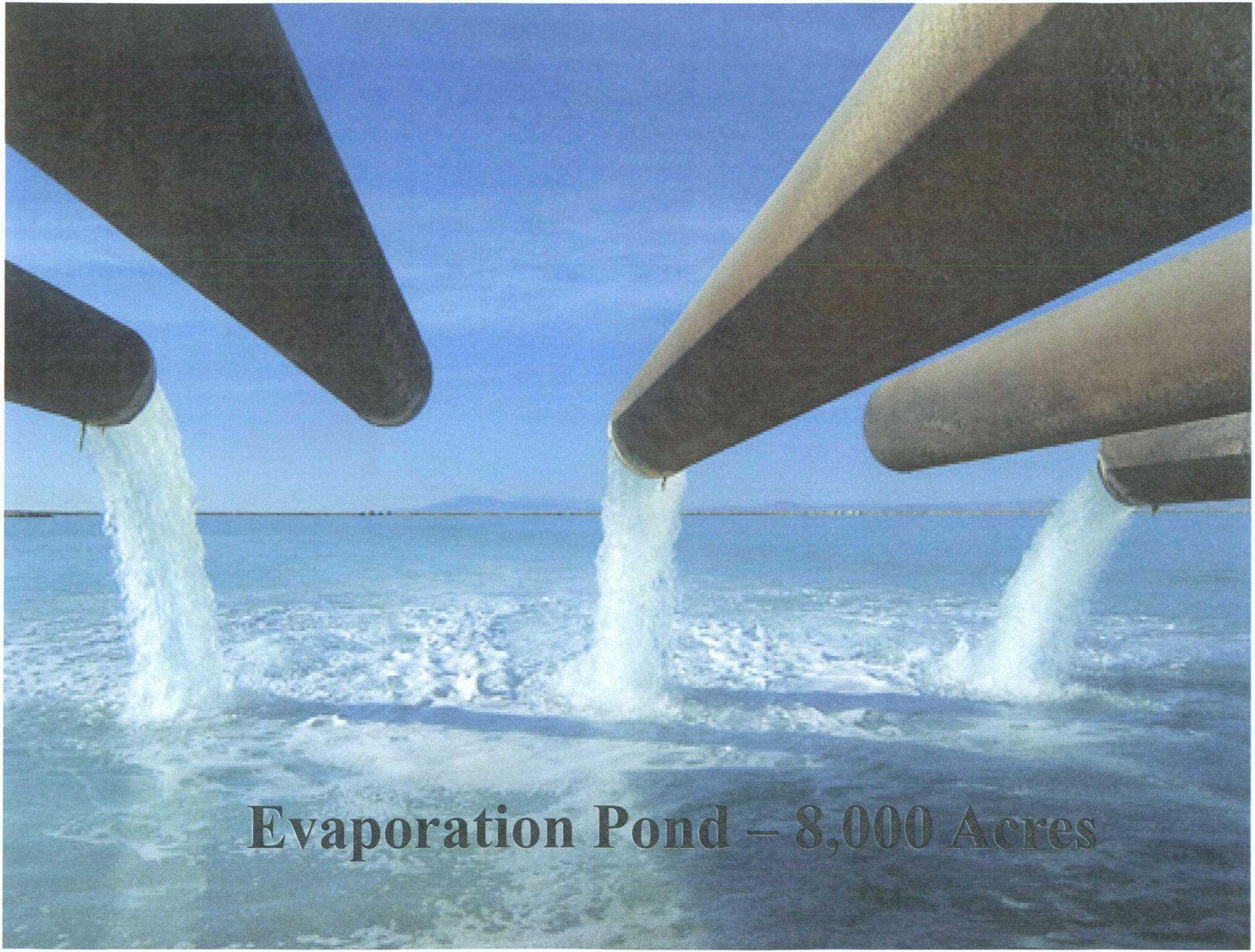




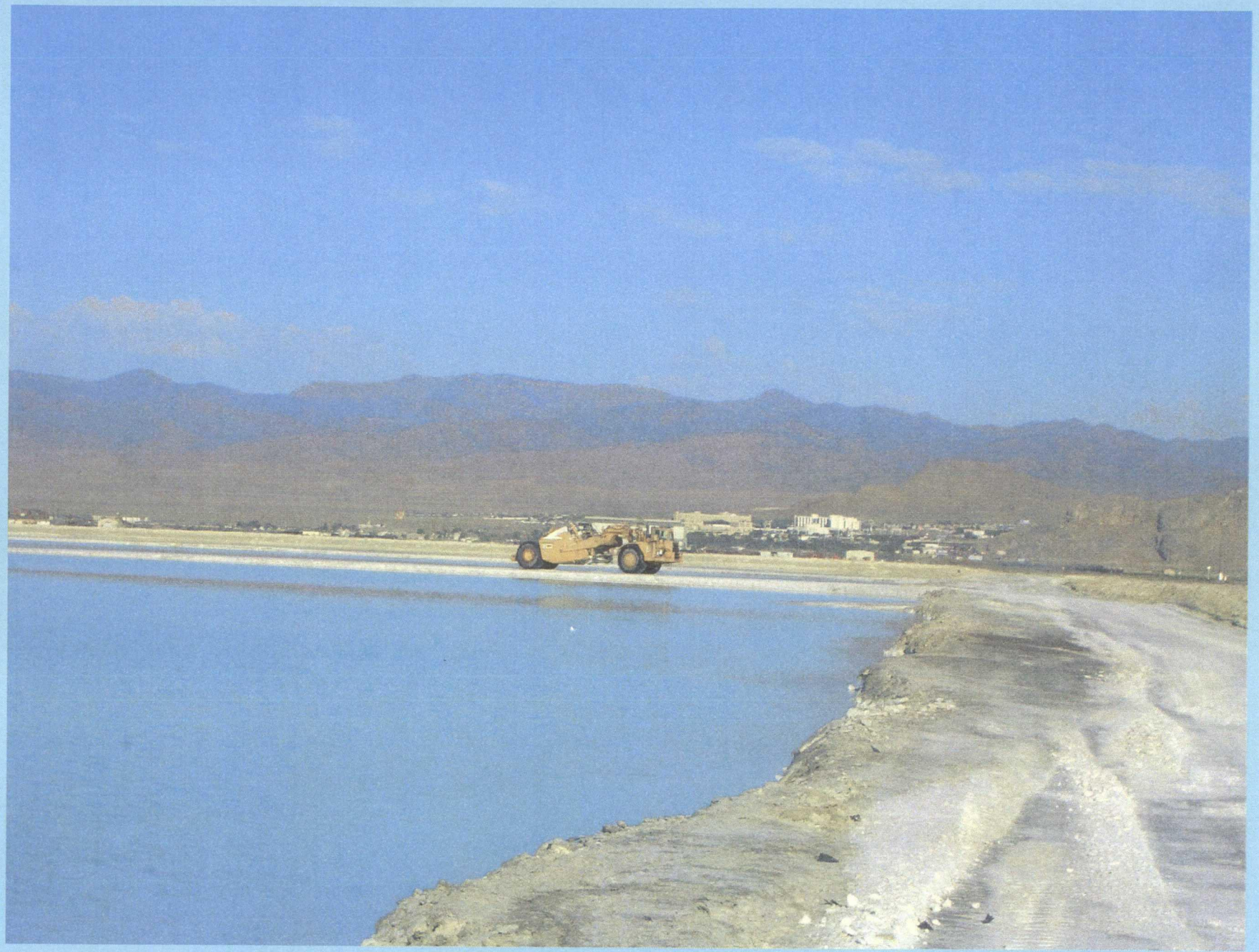
Intrepid Potash – 3 Locations

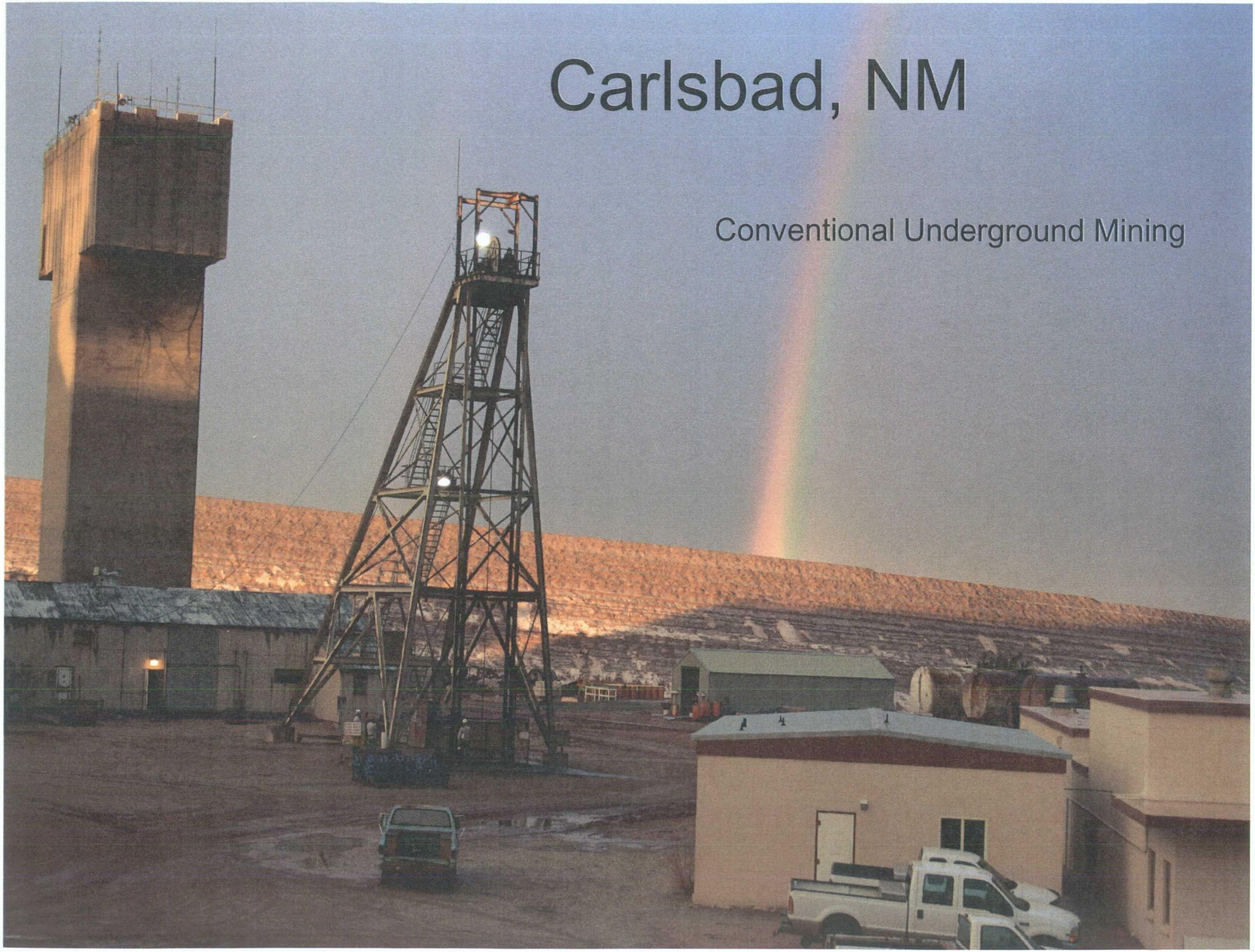
- Wendover, UT
  - Production via evaporation of shallow and deep groundwater
  - Utilizes high capacity deep brine wells
- Carlsbad, NM
  - Production via convention underground mining
- Moab, UT
  - Production via solution mining of former conventional mine workings and horizontally drilled caverns
  - Utilizes Class III injection/extraction wells


Wendover, UT
Brine Collection Ditch

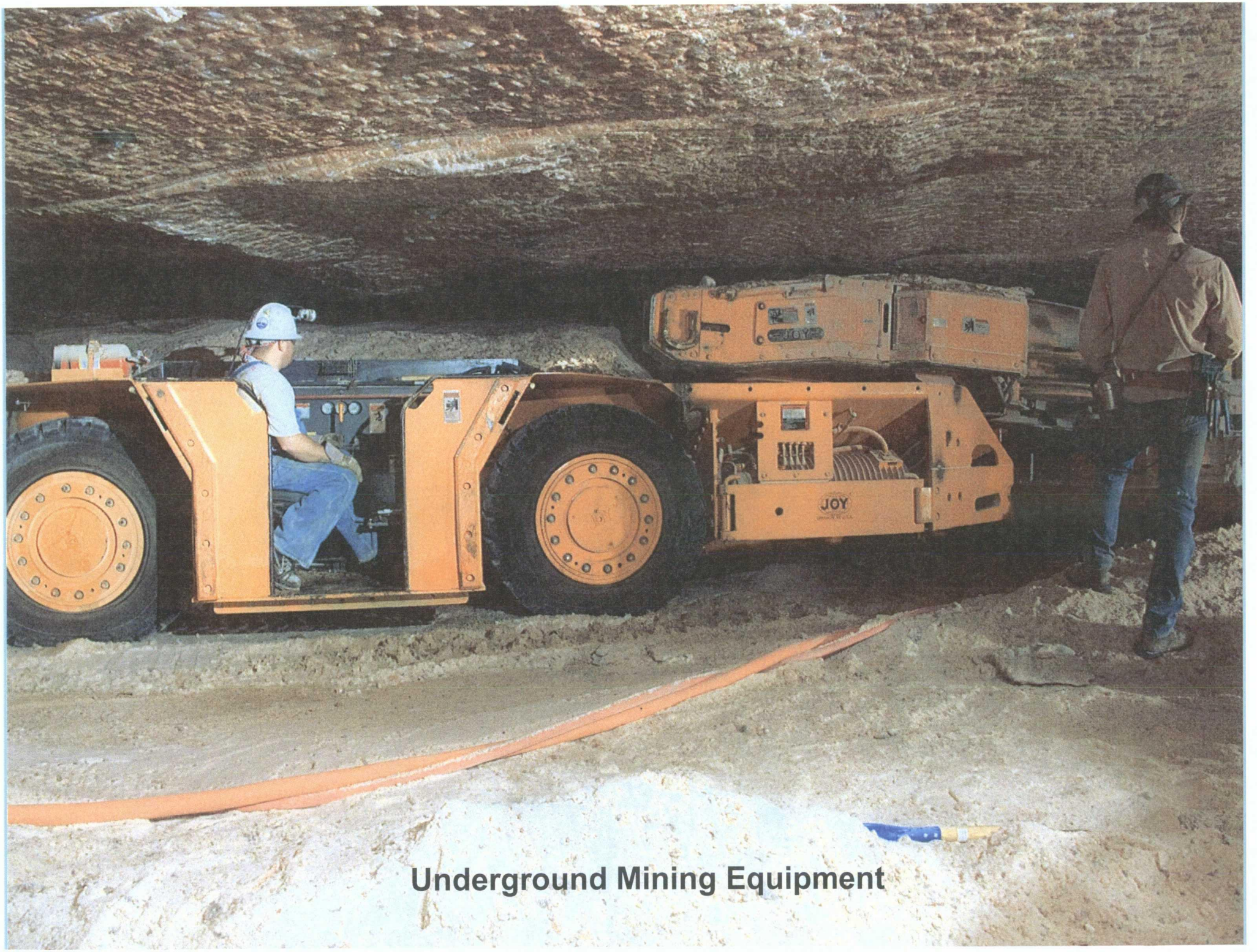

Evaporation Pond – 8,000 Acres

Evaporation/Harvesting Ponds




Carlsbad, NM
Conventional Underground Mining

Underground Mining Equipment



Underground Mining Equipment

LANGBEINITE ORE

UIC Construction Requirements

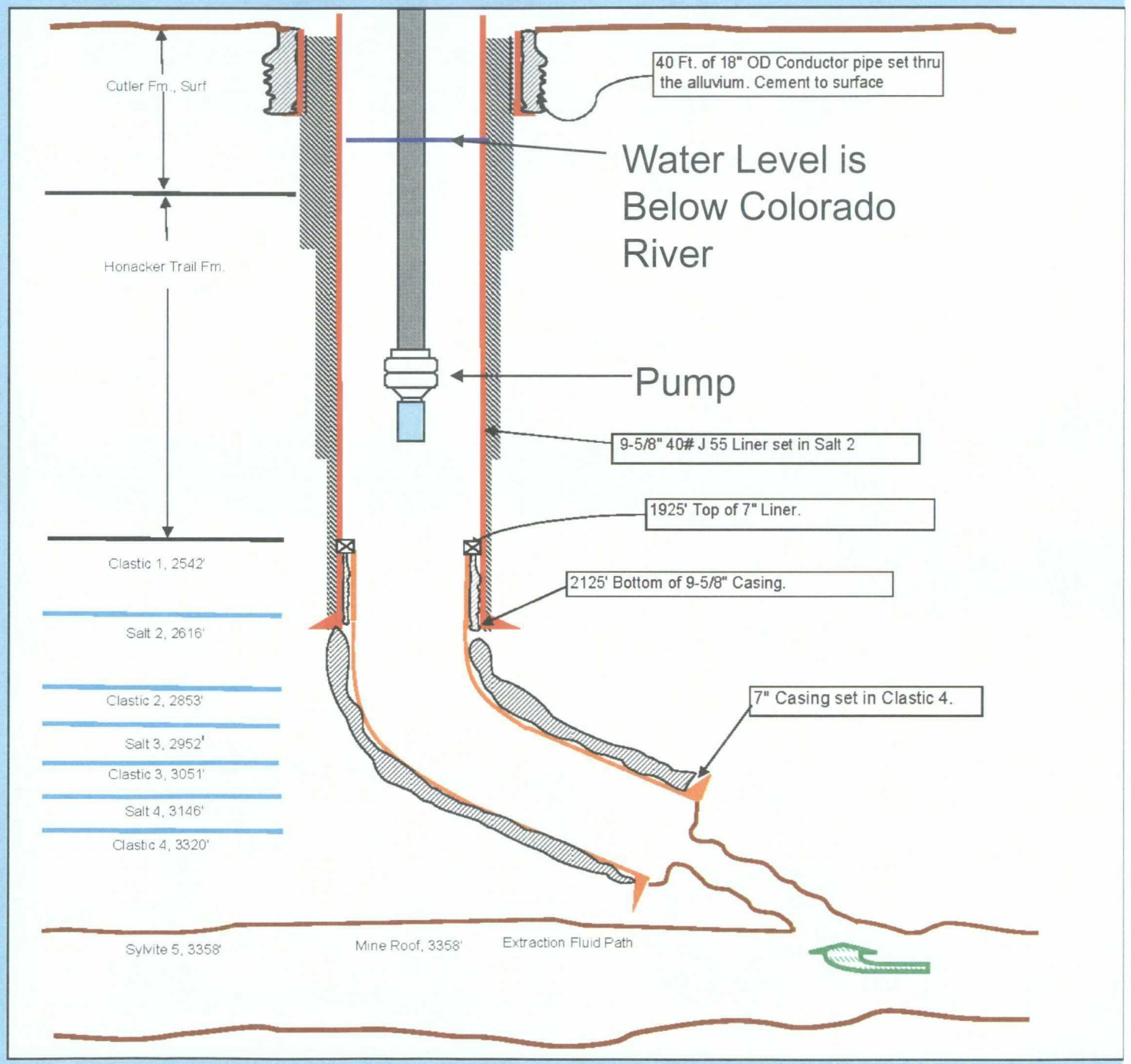
- Must protect USDW's
- Class I non-hazardous
  - Inject below Fm. with USDW within ¼ mile
  - Cased & Cmt to prevent fluid migration into or between USDW
  - Tubing and packer set at injection zone
  - Fluid (noncorrrosive) filled & pressurized annulus

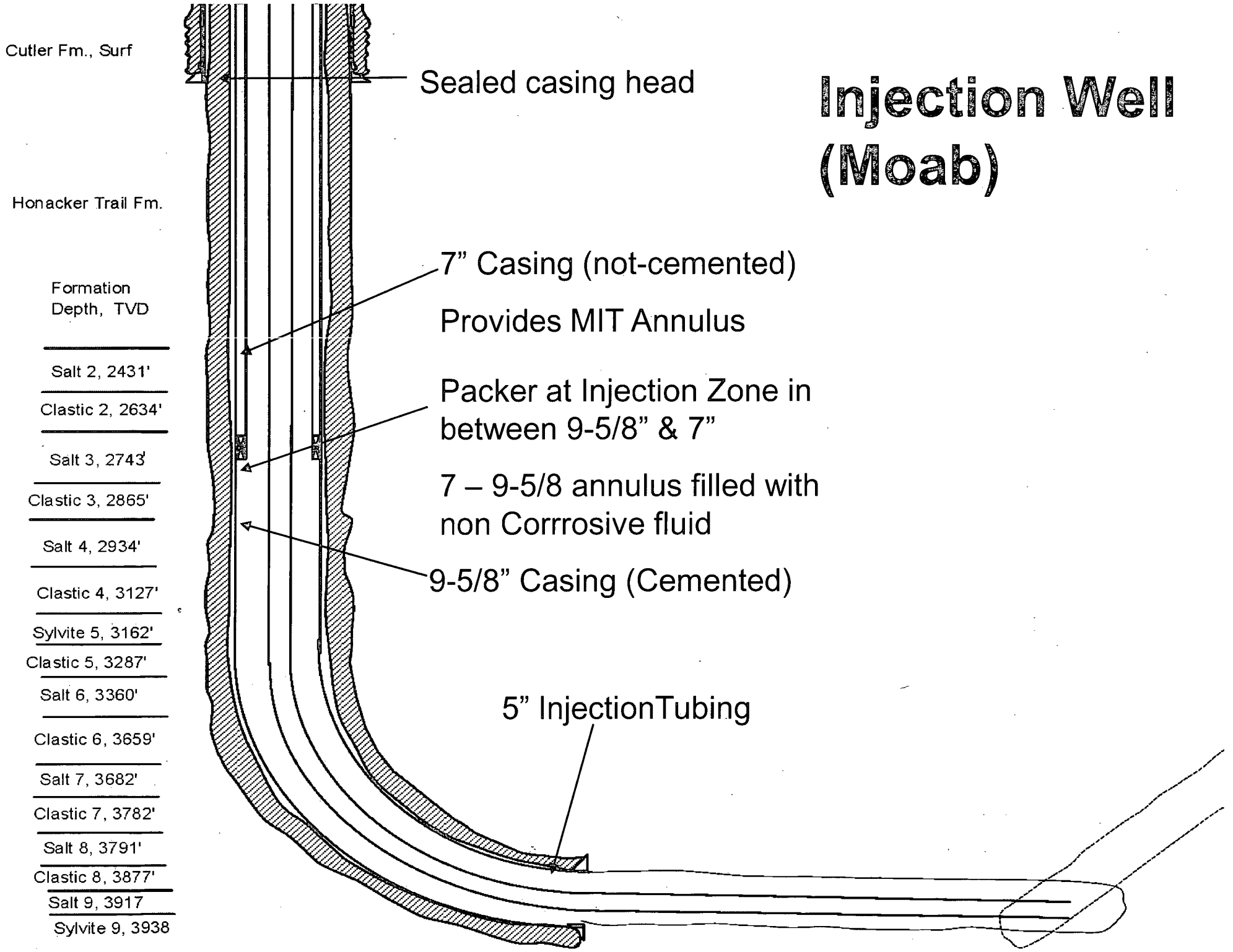
  Class II
  - Inject in Fm. separated from USDW by confining zone
  - Cased & Cmt to prevent fluid migration into or between USDW
- Class III
  - Inject below Fm. with USDW within ¼ mile
  - Cased & Cmt to prevent fluid migration into or between USDW

Extraction Well

- Uses SW saturated drilling fluids
- Liner cemented with SSW cement
- Demonstrate Mech Integrity: Internal - PSI Test

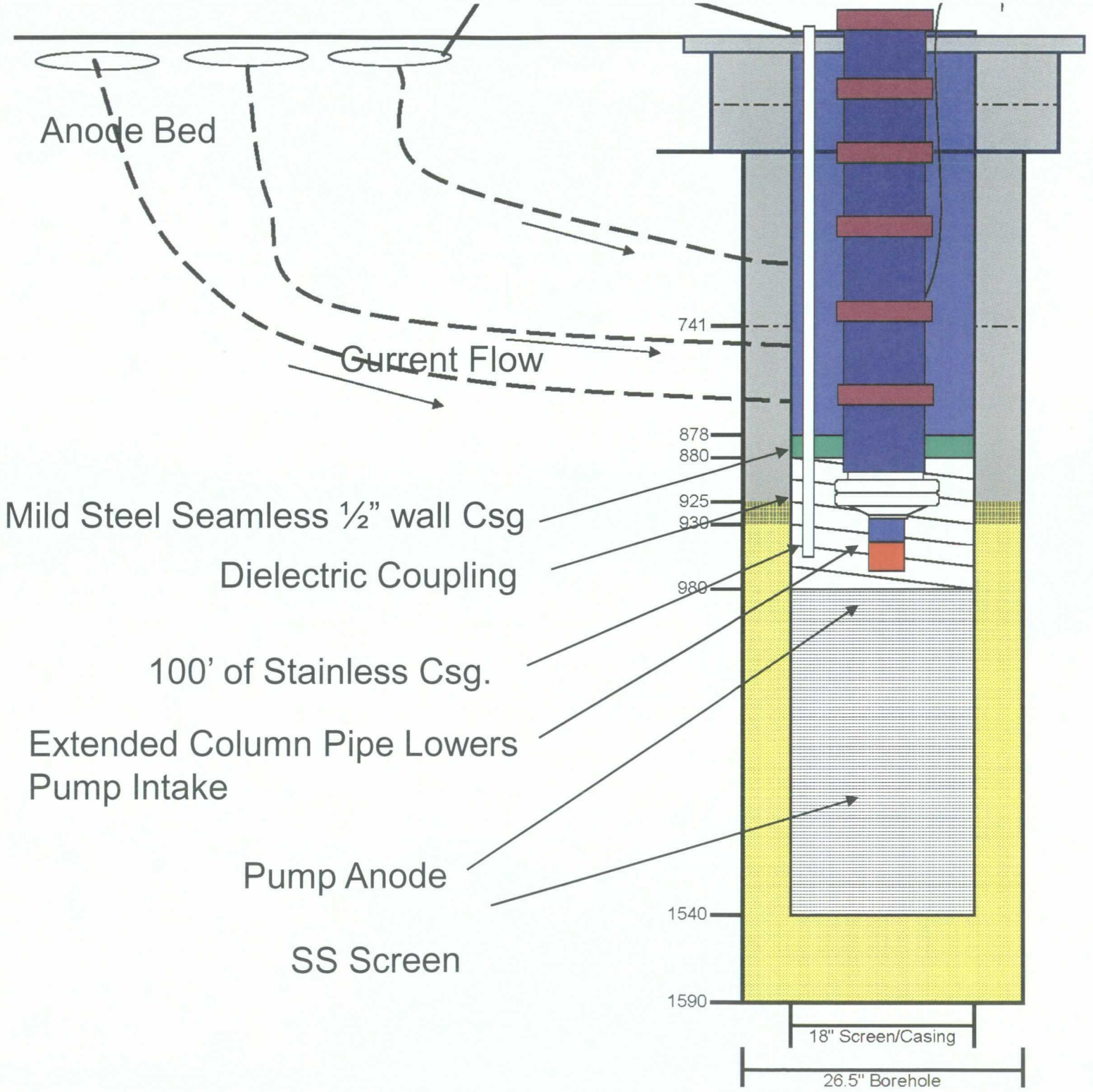
  External –RATS & Cement Records




Cutler Fm., Surf
Sealed casing head
Injection Well (Moab)
Honacker Trail Fm.
7" Casing (not-cemented)
Provides MIT Annulus
Formation Depth, TVD
Salt 2, 2431'
Clastic 2, 2634'
Salt 3, 2743'
Packer at Injection Zone in between 9-5/8" & 7"
Clastic 3, 2865'
7 – 9-5/8 annulus filled with non Corrrosive fluid
Salt 4, 2934'
9-5/8" Casing (Cemented)
Clastic 4, 3127'
Sylvite 5, 3162'
Clastic 5, 3287'
Salt 6, 3360'
5" InjectionTubing
Clastic 6, 3659'
Salt 7, 3682'
Clastic 7, 3782'
Salt 8, 3791'
Clastic 8, 3877'
Salt 9, 3917
Sylvite 9, 3938

Design Wells for Long Life

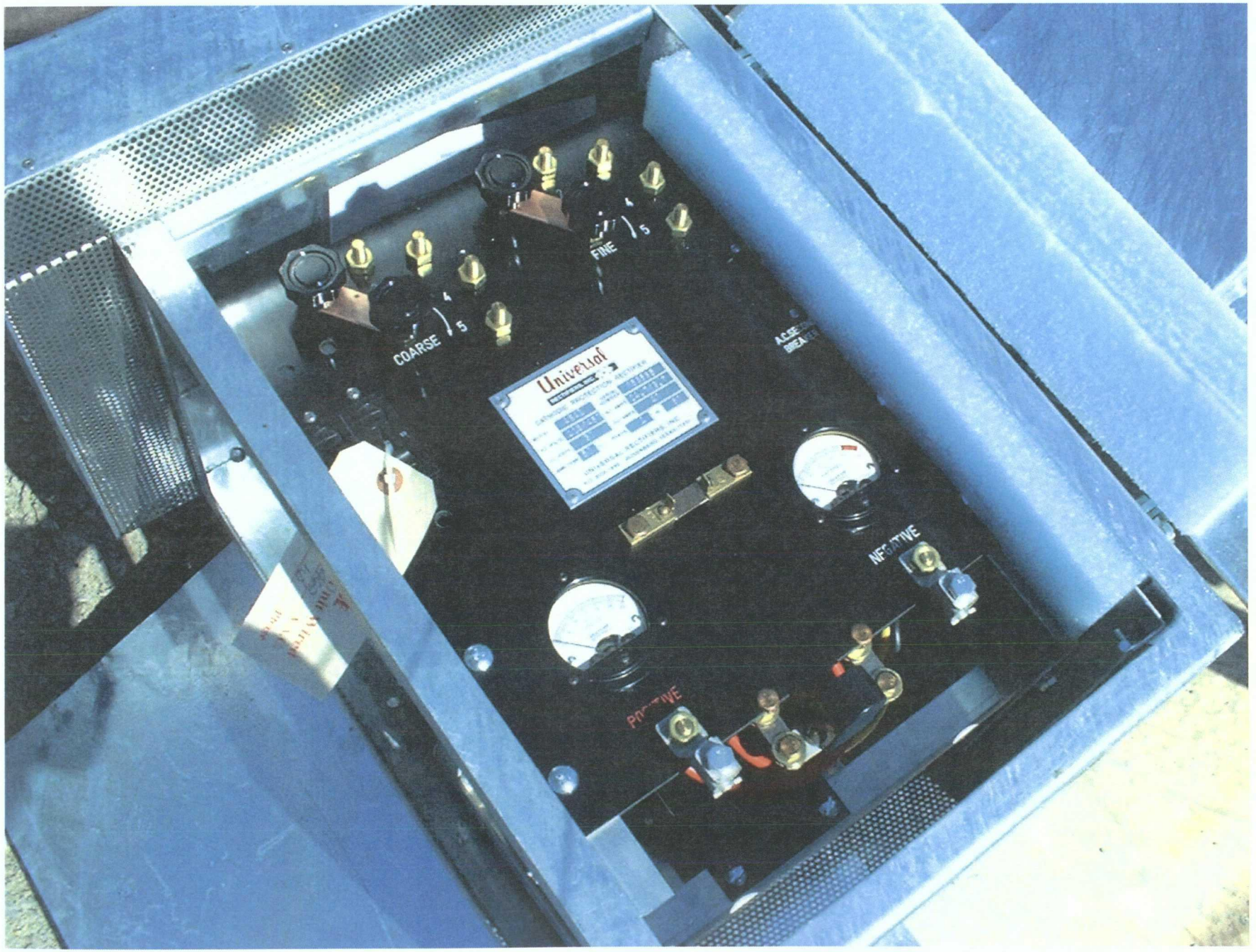
- Mild Carbon Steel Casing (J-55, K-55)
- Seamless Casing
- Coated Casing
- ASTM Type V Cement
  -Type F Flyash (<3% tricalcium aluminate)
  -Na-montmorillonite gel
- Cathodic Protection
- Additional Protective/Injection Casing Strings
- Dielectric Coupling
- Stainless Steel Blank Casing


Anode Bed
Current Flow
741
878
880
925
930
980
1540
1590
Mild Steel Seamless ½" wall Csg
Dielectric Coupling
100' of Stainless Csg.
Extended Column Pipe Lowers Pump Intake
Pump Anode
SS Screen
18" Screen/Casing
26.5" Borehole

Cast Iron

Anode Bed

Rectifier



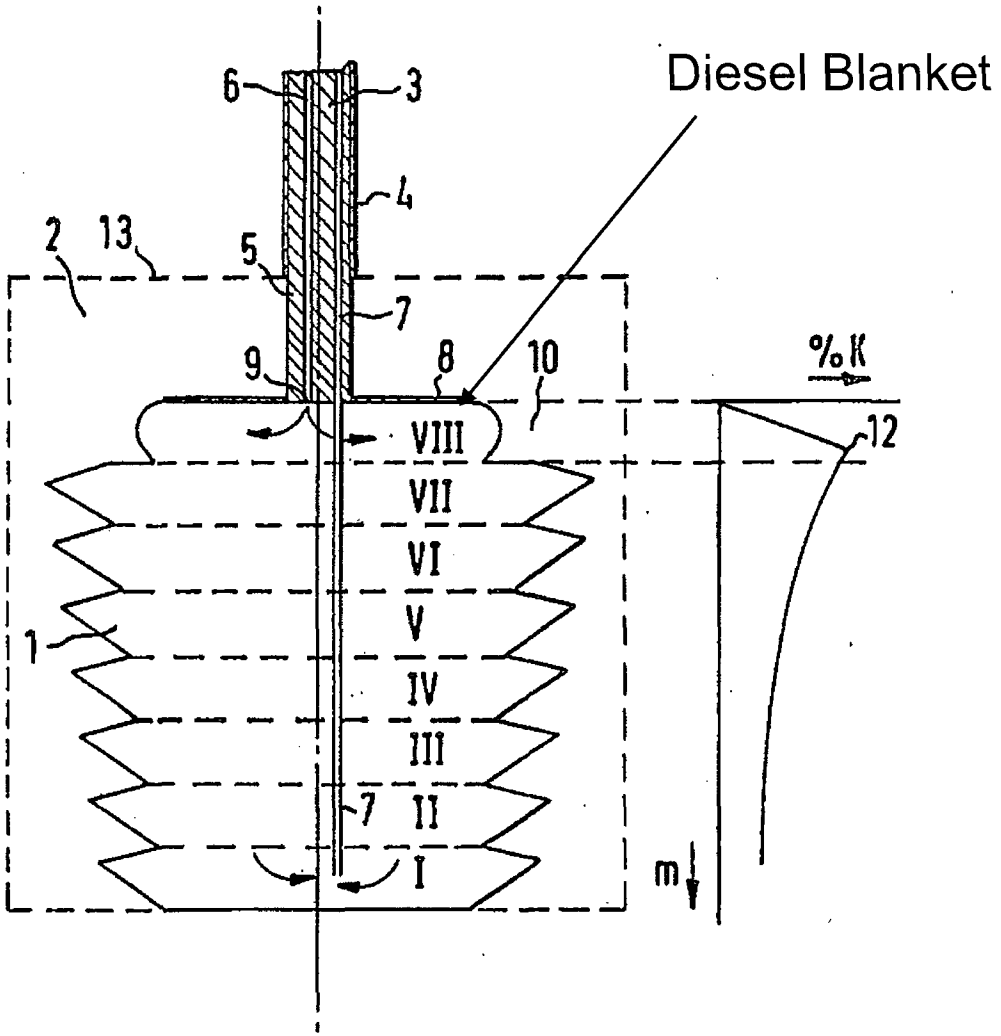
Sacrificial Anode below pump

Solution Mining Technique Patented and Used by Others

Placement of injection and extraction strings

Use of an inert (diesel) blanket

Allowable cavern height and diameter
TBD by Rock Mechanics Study
acceptable to OCD.



Chavez, Carl J, EMNRD

From: Richard Miller [RichardM@intrepidpotash.com]
Sent: Wednesday, April 01, 2009 2:35 PM
To: Chavez, Carl J, EMNRD
Subject: Solution mining with oil
Attachments: Solution Mining Method, Patent.pdf

Carl,

This is a method for solution mining with oil or other insoluble liquid blanket that I presented in part during my presentation. This is a method that will be useful in order to leave a minimum thickness of roof salt below the overburden.

Regards,

Richard Miller

Please note our new address as of March 16, 2009*
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Denver, CO 80202

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700 17th Street, Suite 1700
Denver, CO 80202
Cell 303-881-5440
303-296-3006
Fx 303-298-7502

United States Patent [19]

Steenge From: USPTO.gov

[11] 4,300,801

[45] Nov. 17, 1981

[54] METHOD OF SOLUTION MINING SALTS FROM AN UNDERGROUND SALT DEPOSIT

[75] Inventor: Wiecher D. E. Steenge, Amsterdam, Netherlands

[73] Assignee: Shell Internationale Research Maatschappij B.V., Netherlands

[21] Appl. No.: 158,171

[22] Filed: Jun. 10, 1980

[30] Foreign Application Priority Data

Jul. 6, 1979 [NL] Netherlands 7905287

[51] Int. Cl.³ E21B 43/28

[52] U.S. Cl. 299/5

[58] Field of Search 299/4, 5

[56] References Cited

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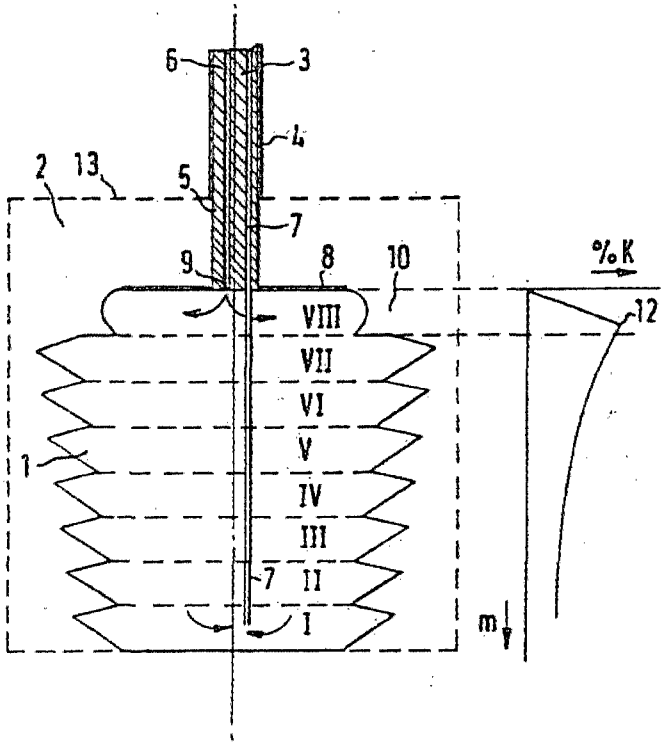
Primary Examiner—Price C. Faw, Jr.

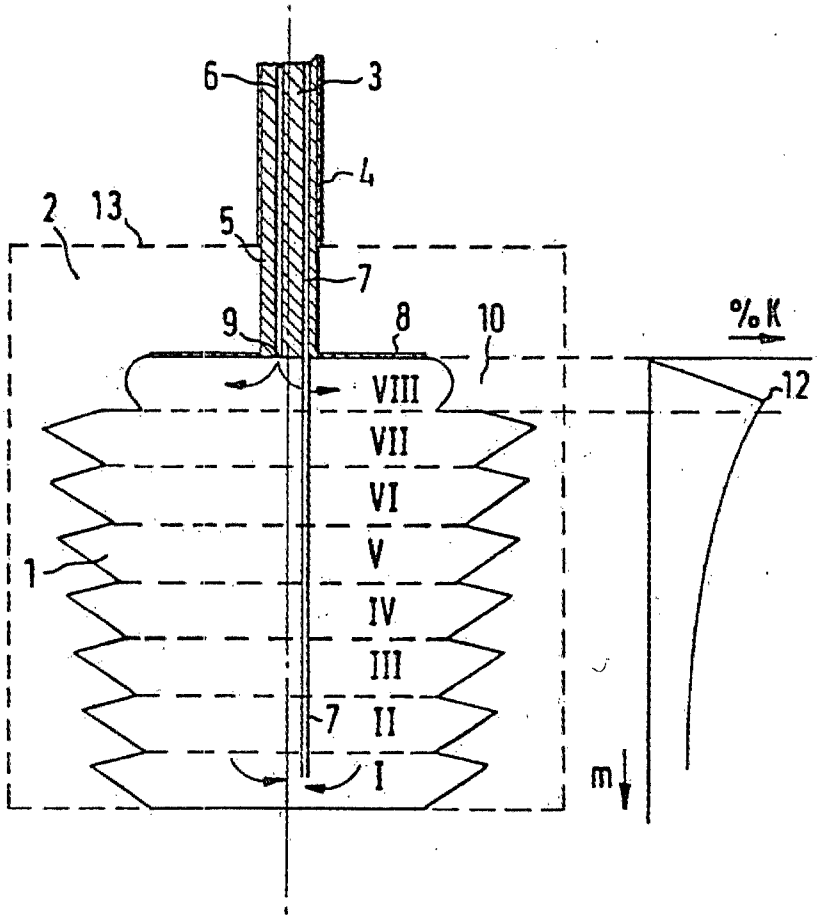
Attorney, Agent, or Firm—Jones, Tullar & Cooper

[57] ABSTRACT

Salts from a salt deposit including magnesium and potassium salts are mined by a solution process in a cavity at the lower end of a borehole. A solvent liquid (water) is injected into the cavity at a level that is periodically raised whereby super imposed slices or cuts of the part of the deposit around the borehole are consecutively dissolved. Brine is recovered from a low level in the cavity. The injection rate of the solvent liquid and the recovery rate of the brine are controlled such that the vertical distribution of the potassium content of the brine in the cavity shows a maximum within the uppermost slice or cut.

4 Claims, 1 Drawing Figure




6
3
4
2
13
5
7
9
8
10
%K
12
VIII
VII
VI
V
1
IV
III
7
II
I
m

METHOD OF SOLUTION MINING SALTS FROM AN UNDERGROUND SALT DEPOSIT

The invention relates to a method of solution mining salts from an underground salt deposit including salts of potassium and magnesium, by injecting water via a borehole into the deposit, thereby dissolving salts and forming a brine-filled cavity, protecting the roof of the cavity by an inert fluid layer, and recovering brine from the cavity at a level below the level at which water is injected. The level at which water is injected is periodically raised thereby consecutively dissolving super imposed slices of the part of the deposit around the borehole.

In particular, the present invention relates to a solution mining method suitable for recovering a brine from salt deposits, which brine has a high concentration of magnesium salts. In the majority of cases, these magnesium salts mainly occur in the salt deposits as carnallite ($MgCl_2.KCl.6H_2O$), carnallitite (a mixture of carnallite and halite), kieserite ($MgSO_4.H_2O$), bischophite ($MgCl_2.6H_2O$), kainite ($KCl.MgSO_4.2.75H_2O$) and tachhydrite ($CaCl_2.2MgCl_2.12H_2O$). These salts occur in conglomerate forms or in thin layers alternated by layers of halite (NaCl). The magnesium part, however, can only be recovered by dissolving at least part of the other salts, so that finally (after the mining process is finished) a cavity filled with brine and solids remains.

Each time that the level at which water is injected into the cavity is raised to dissolve a next slice of the part of the deposit around the borehole, the injected water will disperse below the inert fluid layer protecting the cavity roof against dissolution, and the salt deposit will dissolve over the height of the relevant slice in outward direction. The water on dissolving salts will change into brine and the density thereof will increase during the downward displacement of the brine towards the level at which the brine is recovered from the cavity.

Each slice of the deposit is dissolved by the injected water that flows in outward direction with respect to the injection point. The roof of the slice is protected against dissolution by a layer of inert fluid, such as oil. After the slice has obtained the desired radial dimension, the oil layer and the water injection point are raised over a pre-determined distance (for example 5 m) in order to dissolve a fresh slice of the salt deposit. This step is repeated various times until a cavity of the desired height (for example 100 m) has been obtained, at which point the salt mining operation is completed.

The oil layer on top of the water (brine) present in the cavity protects the roof of the cavity from being dissolved, and urges the water that is injected into the cavity to flow radially outwards from the water injection point (which is located close to the oil roof), thereby forming a horizontally extending slice from which the salt is dissolved from the part of the salt deposit around the borehole.

That part of the borehole that is located above the salt layer to be mined is usually lined with a casing and the water injection and brine production are carried out via tubes suspended in the borehole. A separate tube may be used for controlling the oil roof.

By supplying the fresh water at a high level in the cavity and recovering brine from the cavity at a relatively low level the density of the brine will increase during its downward displacement to the level at which it is recovered from the cavity.

In solution mining methods of the above-mentioned type the cavity wall will continuously be dissolved over the total height thereof which will result in a conically-shaped cavity having the largest cross-section near the lower part thereof. Cylindrically shaped cavities, however, are preferred to guarantee a safe roof support for the production period and to prevent that contact is made with adjoining cavities from which brine has been recovered or is being recovered.

The object of the present invention is a solution mining method enabling formation of a cavity of a substantially cylindrical shape, and the recovery of a brine with a relatively high magnesium content.

According to the invention, there is provided a method of solution mining salts from an underground salt deposit including salts of potassium and magnesium by injecting water via a borehole into the deposit thereby dissolving salts and forming a brine-filled cavity, protecting the roof of the cavity by an inert fluid layer, and recovering brine from the cavity at a level below the level at which water is injected, wherein the level at which water is injected into the cavity is periodically raised thereby consecutively dissolving super imposed slices of the part of the deposit around the borehole. The water injection rate and the brine recovery rate are controlled such that the vertical distribution of the potassium content of the brine in the cavity shows a maximum within the uppermost slice.

By "control of the water injection rate and brine recovery rate" is to be understood the control of the quantity of water supplied and the control of the quantity of brine recovered per unit of time at any moment of the control period. The rate at which the liquid flows through the cavity can be influenced by this control.

As will be further explained hereinbelow, the residence time of the liquid in the uppermost or top slice plays an important role in the formation of the cavity.

It has been found that the solid salts of the deposit are dissolved in the fresh water injected into the cavity in about the ratio in which they present themselves to the injected water. The potassium and magnesium contents (and also the sodium content if sodium salt is present in the deposit) of the solvent liquid gradually increase and the salt in the top slice is gradually further dissolved. When the brine thus formed has reached a certain degree of saturation, the potassium content thereof will decrease, whereas the magnesium content will still further increase but at a reduced rate. Thus, after a maximum has been reached in the vertical distribution of the potassium content of the brine present in the uppermost slice of the part of the salt deposit around the borehole, magnesium salts will continue to be dissolved in the brine, whilst simultaneously therewith potassium salts are being precipitated from the brine. Any sodium salts present in the brine will also be precipitated therefrom. These salts either precipitate on the cavity wall or settle down in the cavity in crystalline form.

Further, it has been found that a brine—which contains such a quantity of magnesium salts that potassium salts (and sodium salts if present) precipitate therefrom if a further quantity of magnesium salts is dissolved—is incapable of dissolving the cavity wall in a uniform manner. Leaching of the cavity wall with such a brine that precipitates potassium (and sodium) salts is found to take place in a selective manner, whereby the magnesium rich layer, veins and crystals are dissolved and the

other parts of the wall remain intact (or crumble away and settle at the bottom of the cavity).

In the method of the present invention the cavity is formed by consecutively dissolving slices of salt at the top of the cavity with a solvent liquid which reaches the maximum concentration of potassium in the uppermost slice that is being formed. The cavity wall below the uppermost slice is thereby dissolved by a brine from which potassium salts precipitate, and this dissolution thereby yields a more concentrated magnesium-containing brine. In order to obtain the most advantageous cavity shape, the lower slices of the cavity should initially be dissolved during the formation thereof with a relatively small diameter and the diameters of the super imposed slices should be increased stepwise in the relevant formation periods. During the continued leaching of the cavity wall, the slices will increase in diameter and a cavity will finally be obtained having a substantially cylindrical shape, of say 100 m diameter.

It is preferred that the maximum potassium content is located at one-third of the slice height above the lower boundary of the top slice.

In carrying out the present process, the potassium content of the solvent liquid at various levels in the cavity is periodically or continuously determined, whereby a "potassium profile" across the cavity and in particular across the top slice thereof is obtained. The water injection rate and the brine recovery rate are then controlled such that the maximum value of the potassium profile is within the top slice (including the lower boundary thereof).

Information on the potassium profile is found to be imperative in order to ensure dissolving of the cavity wall under the most favourable conditions.

Since the area of the salt exposed to the liquid solvent during the dissolution of a slice is not constant, and often the composition of the exposed salt also varies, a close watch should be made on the variations of the potassium profile over the dissolving process. A number of techniques are available for this purpose. One way of determining the potassium content of the brine is by radiographic measurement of the concentration of radioactive potassium isotope. This yields reliable and rapidly available results, so that rapid control of the water injection is also possible. For the radiographic determination gamma radiation can be measured.

It will be appreciated that the two following zones can be distinguished at any moment in the cavity wherein the present method is being carried out:

1. an upper zone in which the brine is not yet saturated with potassium salts and in which the cavity wall is dissolved in a non-selective manner, and
2. a lower zone in which the contents of magnesium salts is so high that potassium salts precipitate if further magnesium salts are dissolved and in which the cavity wall and the lumps of salt detached from the cavity wall and descending in the liquid-filled cavity, are dissolved selectively (that is only the magnesium salts are dissolved). The dissolution rate of the magnesium salts in the lower zone is smaller than the dissolution rate of the magnesium salts in the upper zone.

If desired, the use of the present method may be restricted to the initial phase of forming a cavity in a salt deposit, whereby the potassium profile is only determined (periodically or continuously) when forming a lower set of slices of the cavity. The initial phase in the life of a cavity in which the lower set of slices is made is considered the most critical, since then only a small area of salt is exposed to the solvent liquid and the inherent advantages of the application of the invention are then greatest. After this initial phase the remaining (higher) slices can then be made, for example, while water is injected at a constant throughput.

The invention will be described by way of example with reference to the drawing in which a diagrammatic longitudinal section of a half-completed cavity and the lower part of a borehole are shown, and wherein the potassium profile over the liquid in the cavity is indicated on the right.

The drawing shows the cavity **1** at a certain moment of its formation in a salt deposit **2** including salts of magnesium, potassium and sodium. The slices I-VII have been dissolved in earlier stages of the process in the deposit **2**, and the slice VIII is still in the dissolution period thereof. The cavity **1**, which may be located at a depth of say 1500 m, communicates with the earth's surface via a borehole of which part **3** is lined with a casing **4** and of which uncased part **5** extends through the still undissolved part of the salt deposit **2**.

A water injection tube **6** and a brine production tube **7** extend through the borehole. The tube **6** debouches near the top of the cavity **1** and the tube **7** debouches at a short distance from the bottom of the cavity.

The tube **6** terminates in the upper region of the cavity at the level **9**, and the borehole as well as that volume of the cavity **1** located above the lower end of the tube **6** are filled with oil, so that an oil roof **8** is formed that will radially grow in size when the slice VIII expands into the zone **10** by the dissolution of the salt from this zone by the water injection via the tube **6**.

The radial size of the slice VIII is determined periodically or continuously in a known manner, such as by sonar measurements. When the desired radial extension of the slice VIII has been reached, the water injection and brine production are discontinued. The water injection tube **6** and the oil roof **8** are raised over a pre-determined distance that corresponds with the desired height of the next slice (not shown) that is to be dissolved from the deposit, and which slice is to be super imposed on the slice VIII.

Subsequently, the water injection (through tube **6**) and the brine production (through tube **6**) are re-started and during this next cycle, as well as during further cycles continuous care is taken that the potassium content of the liquid in the cavity has the vertical distribution as shown in the drawing, i.e. exhibits a maximum within the top slice.

In the area above the level **12** at which the maximum potassium content of the liquid is present, the liquid dissolves the salt in the zone **10** in a non-preferential manner so that the potassium and magnesium contents of the liquid continuously increase in downward direction.

In the area below the level **12** the liquid dissolves magnesium salts from the cavity wall in a preferential manner, whereas potassium and sodium salts are precipitated from the solution. Consequently, the potassium content (% K) decreases in downward direction, as shown in the drawing.

The wall of the cavity **1** will thereby acquire a profile as shown diagrammatically. Each slice remains recognizable to some extent. The wall of the cavity at the level of slices that have been dissolved in an earlier stage of the process will continue to be dissolved, whereby the contours of the slices will fade.

When, after a number of cycles, the level 9 at which water is injected into the cavity has reached the top 13 of the part of the deposit that is to be mined, the recovery of brine from the cavity is stopped after the final top slice has been dissolved. The supply of solvent liquid is also stopped and the cavity is kept under liquid pressure and sealed. After the permanent liquid filling in the cavity has been saturated, the cavity wall will no longer be dissolved and the cavity may be abandoned without any problems.

By the method according to the invention it is possible to mine a formation containing, for example, an average of 50% by weight of magnesium salts in such a manner that a brine with more than 15% by weight of magnesium salts is produced.

Cavities with a diameter of 100 m can be made in a salt deposit, 30–100% of which consists of carnallite, with a brine production rate of 3–30 m^3/h. The slice height is then preferably 3–10 m.

I claim:

1. Method of solution mining salts from an underground salt deposit having a substantially uniform composition including salts of potassium and magnesium by continuously injecting water via a borehole into the deposit thereby dissolving salts and forming a brine-filled cavity, protecting the roof of the cavity by an inert fluid layer, and continuously recovering brine from the cavity at a level close to the bottom of the cavity, wherein the level at which water is injected into the cavity is periodically raised thereby consecutively dissolving superimposed slices of the part of the deposit around the borehole, and controlling the water injection rate and the brine recovery rate such that the vertical distribution of the potassium content of the brine in the cavity shows a maximum within the uppermost slice and the vertical distribution of the magnesium content increases from the uppermost slice to the lowermost slice, each higher slice being initially formed with a diameter which is larger than that of the adjacent lower slice, the difference in initial slice diameters being such that the continued leaching in the lower slices, during initial formation of the uppermost slice, will increase the diameter of the lower slices until each lower slice has substantially the same diameter and a substantially cylindrical cavity is formed.

2. Method of solution mining salts from an underground salt deposit including salts of potassium and magnesium by injecting water via a borehole into the deposit thereby dissolving salts and forming a brine-filled cavity, protecting the roof of the cavity by an inert fluid layer, and recovering brine from the cavity at a level below the level at which water is injected, wherein the level at which water is injected into the cavity is periodically raised thereby consecutively dissolving superimposed slices of the part of the deposit around the borehole, and controlling the water injection rate and the brine recovery rate such that the vertical distribution of the potassium content of the brine in the cavity shows a maximum within the uppermost slice located at one-third of the slice height.

3. Method as recited in claim 2, in which the potassium content is determined by radiographic measurement of the concentration of radioactive potassium isotope.

4. Method of solution mining salts from an underground salt deposit including salts of potassium and magnesium by injecting water via a borehole into the deposit thereby dissolving salts and forming a brine-filled cavity, protecting the roof of the cavity by an inert fluid layer, and recovering brine from the cavity at a level below the level at which water is injected, wherein the level at which water is injected into the cavity is periodically raised thereby consecutively dissolving superimposed slices of the part of the deposit around the borehole, and controlling the water injection rate and the brine recovery rate such that the vertical distribution of the potassium content of the brine in the cavity shows a maximum within the uppermost slice, the potassium content being determined by radiographic measurement of the concentration of radioactive potassium isotope.

* * * * *

Chavez, Carl J, EMNRD

From: Richard Miller [RichardM@intrepidpotash.com]
Sent: Saturday, March 28, 2009 8:30 PM
To: Chavez, Carl J, EMNRD
Subject: Cement slurry design for use in salt sections
Attachments: Intrepid SSW Hi Sulfate Resistant Cement Slurry.doc

Carl,

Thank you for organizing and facilitating the meeting last week.

Someone asked for our cement design in salt sections so I thought I would send it to you to make available for all.

Regards,

Richard Miller

Please note our new address as of March 16, 2009*
Intrepid Potash, Inc.
707 17th Street, Suite 4200
Denver, CO 80202

Intrepid Potash Inc.
700 17th Street, Suite 1700
Denver, CO 80202
Cell 303-881-5440
303-296-3006
Fx 303-298-7502

Job Recommendation

Fluid Instructions
Fluid 1: Water Based Spacer
Dye Spacer Fluid Density: 10 lbm/gal
1 lbm/bbl Uranine 2313-Green-Dye -1# Fluid Volume: 10 bbl

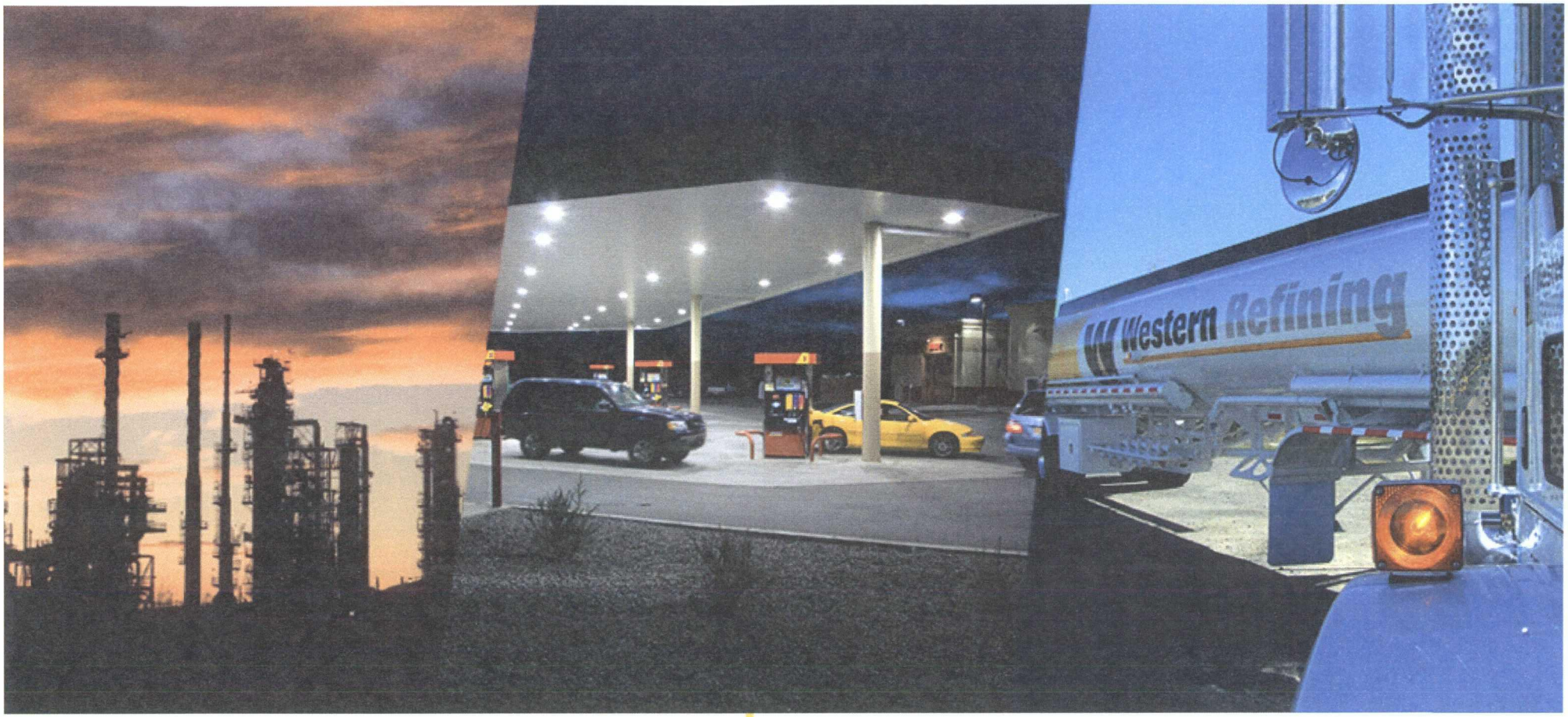
Fluid 2: **Primary Cement**
Premium Cement Fluid Weight 16.100 lbm/gal

94 lbm/sk Standard ASTM TYPE V Cement (Cement)
0.6 % Halad(R)-413 (Low Fluid Loss Control)
0.3 % D-AIR 3000 (Defoamer)
37.2 % Salt (Salt)

Slurry Yield: 1.249 ft^3/sk
Mix Fluid Fresh W.: 4.865 Gal/sk

Fluid 3: Salt Water Based Spacer
Salt Water Displacement Fluid Density: 10 lbm/gal

Detailed Pumping Schedule					
1	Spacer	Dye Spacer	10.0	4.0	10 bbl
2	Cement	Standard Cement Type V	16.1	4.0	235 sks
3	Spacer	Salt Water Displacement	10.0	4.0	74.318 bbl



Class II Hydrocarbon Storage Wells

Western Refining

Introduction

Western Refining

Western Refining Statistics

- Western Refining is one of the nation's largest independent oil refiners. With headquarters in El Paso, Texas, the company operates primarily in the Southwestern and Mid-Atlantic regions of the United States.

- Our four refineries are located in El Paso, Texas; near Gallup, New Mexico; in Bloomfield, New Mexico and in Yorktown, Virginia. These refineries have a combined crude oil processing capacity of approximately 235,000 barrels per day. A majority of products produced at these refineries are high-value light products, consisting of gasoline, diesel, and jet fuel. All four refineries have truck racks or marketing terminals.

Western Refining

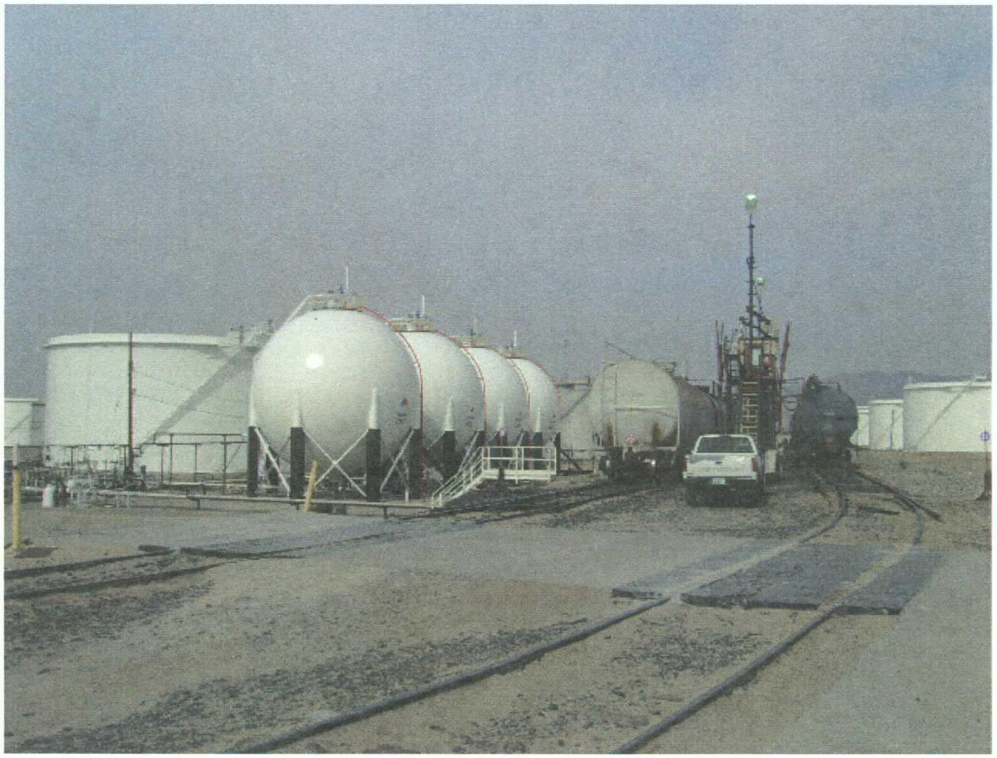
Western Refining Statistics

- Western Refining owns and operates a wholesale division that complements the refining operations. Through our refineries and these affiliated companies, we serve a broad customer base in Arizona, southern California, Colorado, Nevada, New Mexico, western Texas, Utah, northern Chihuahua, Mexico, and the central East Coast region.

- Western also own and operates approximately 160 convenience stores and gas stations located in New Mexico, Arizona, and Colorado. The company markets under its own brands of Giant, Mustang, and Sundial, plus a number of locations feature the brands of other oil companies. We also license Western branded fuel to other retail stores.

Western Refining

Refinery LPG Storage Requirements



- Butane – Gasoline blend stock during winter season
- Iso-Butane – Feed stock for Alkylation Unit
- Propane – Product storage

Western Refining

Underground LPG Storage Benefits

- **Underground storage is considered the safest method to store large quantities of hydrocarbons.**
- **Hydrocarbons are separated from oxygen (air) by rock.**
- **The rock is also provides protection from surface threats.**
- **High storage pressures are compatible with the subsurface rock and liquids.**
- **Underground storage is economical in comparison to surface storage.**

Western Refining

Siting

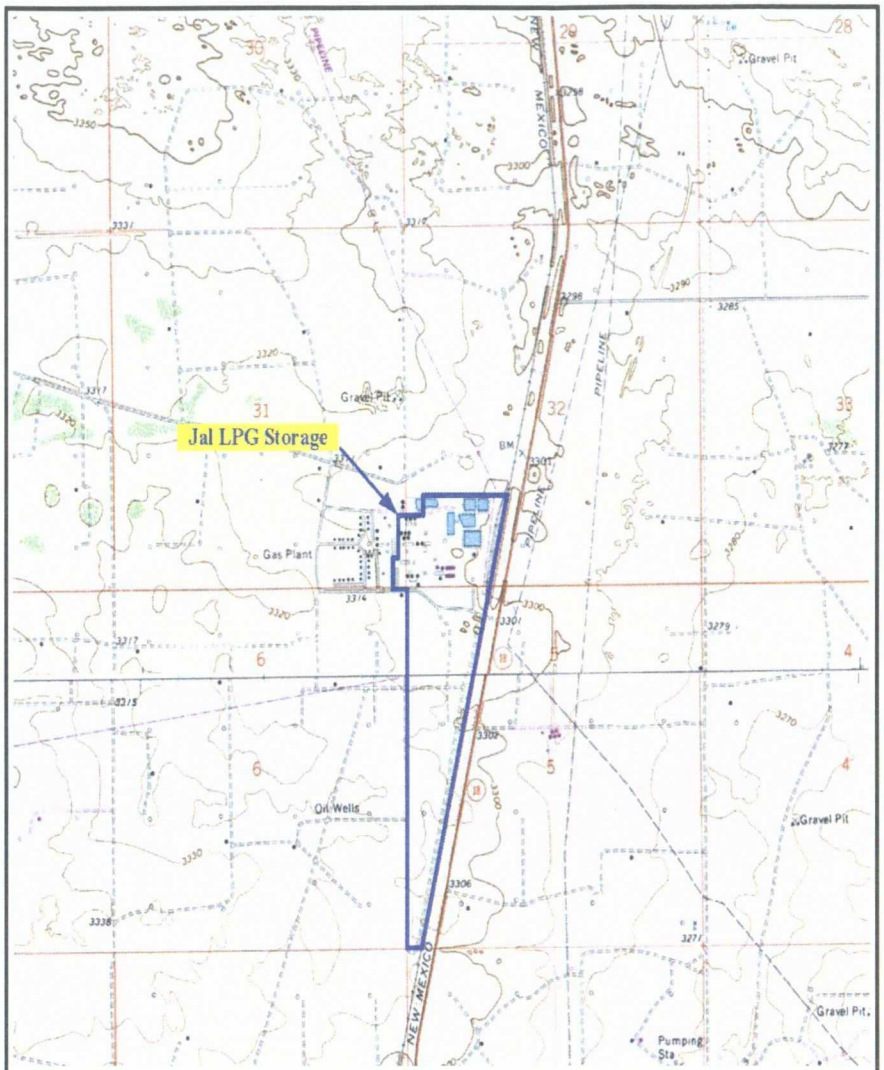
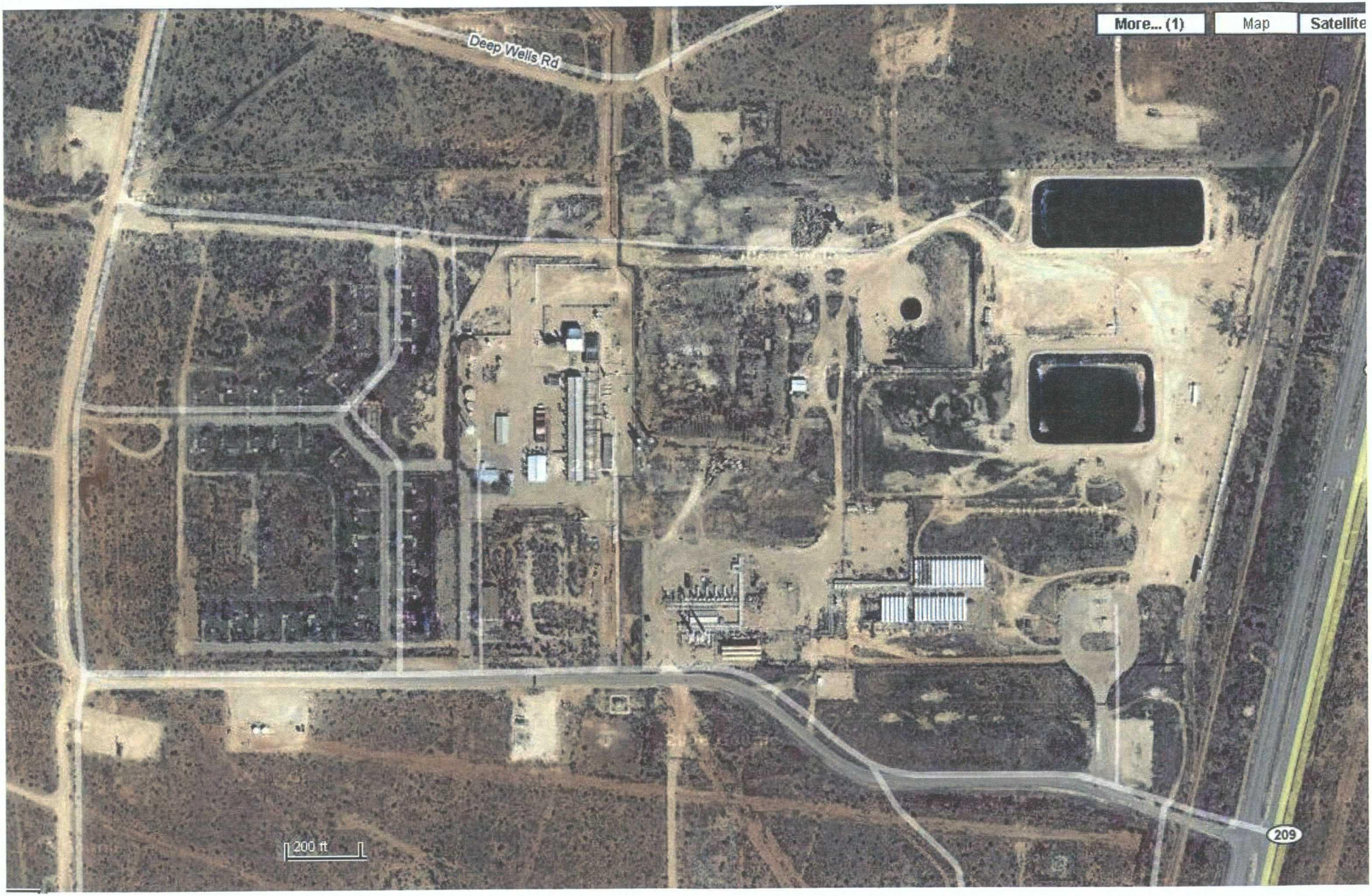
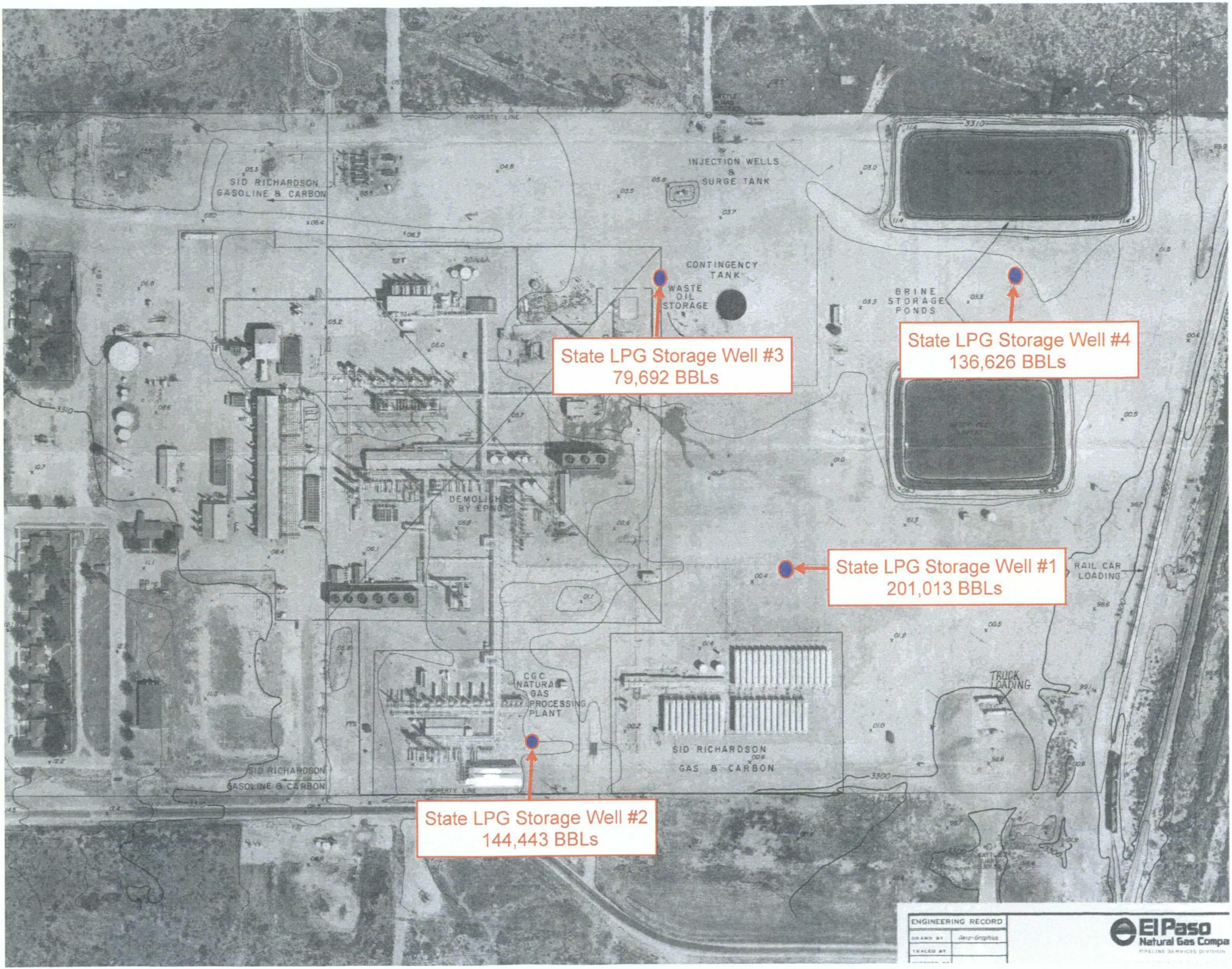


Figure 1 Site Vicinity / Topographic Map
Jal LPG Storage Facility
Sections 31 & 32, Township 23S Range 37E
Section 5, Township 24S Range 37E
Lea County, New Mexico

Western Refining

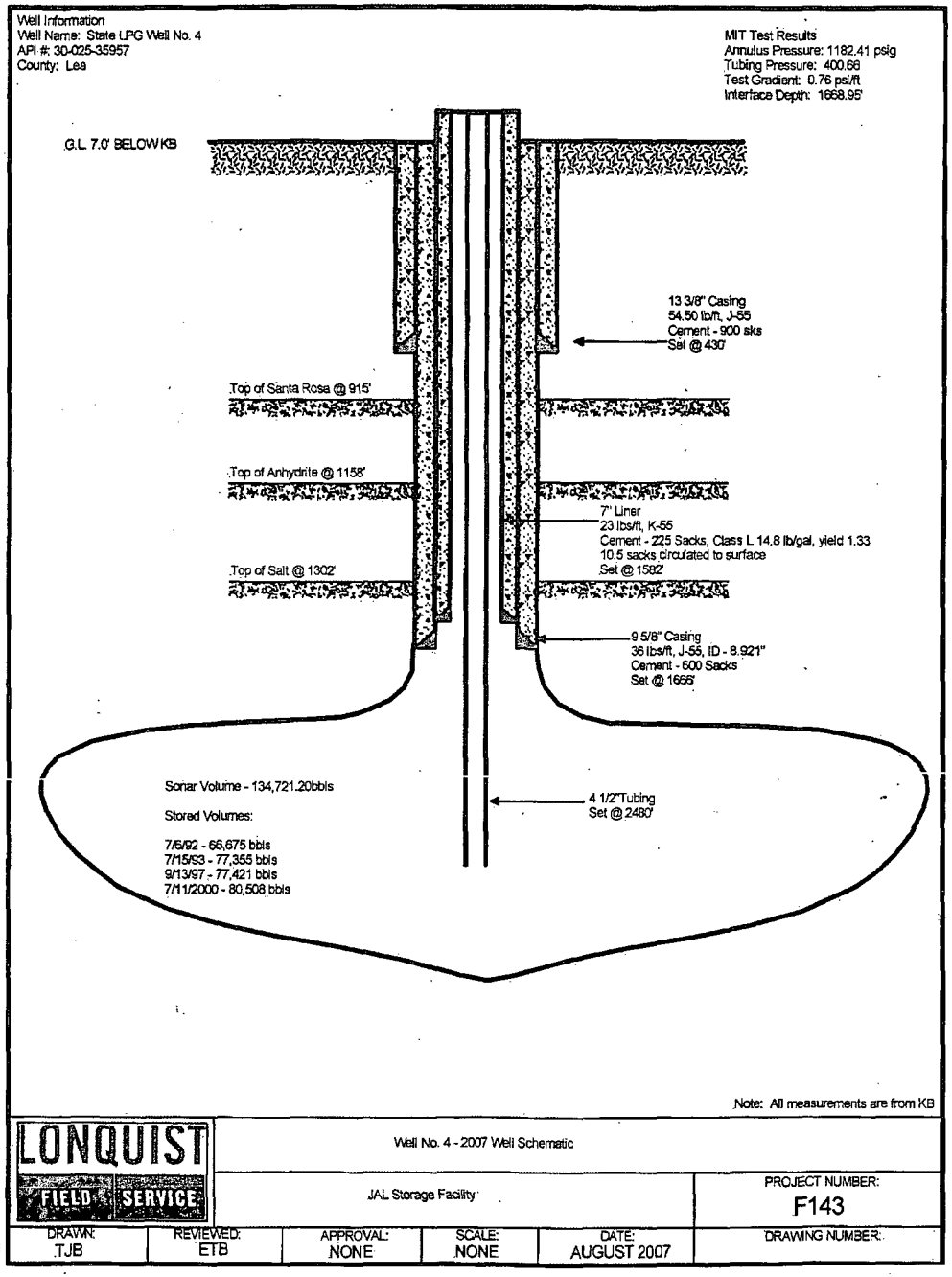


Western Refining


State LPG Storage Well #3
79,692 BBLs
State LPG Storage Well #4
136,626 BBLs
State LPG Storage Well #1
201,013 BBLs
State LPG Storage Well #2
144,443 BBLs
SID RICHARDSON
GASOLINE & CARBON
INJECTION WELLS
&
SURGE TANK
CONTINGENCY
TANK
WASTE
OIL
STORAGE
BRINE
STORAGE
PONDS
DEMOLISHED
BY EPNG
CGC
NATURAL
GAS
PROCESSING
PLANT
SID RICHARDSON
GAS & CARBON
RAIL CAR
LOADING
TRUCK
LOADING
PROPERTY LINE
ENGINEERING RECORD
DRAWN BY
Aero-Graphics
TRACED BY
El Paso
Natural Gas Compa
PIPELINE SERVICES DIVISION

Construction

MIT/Well Schematic

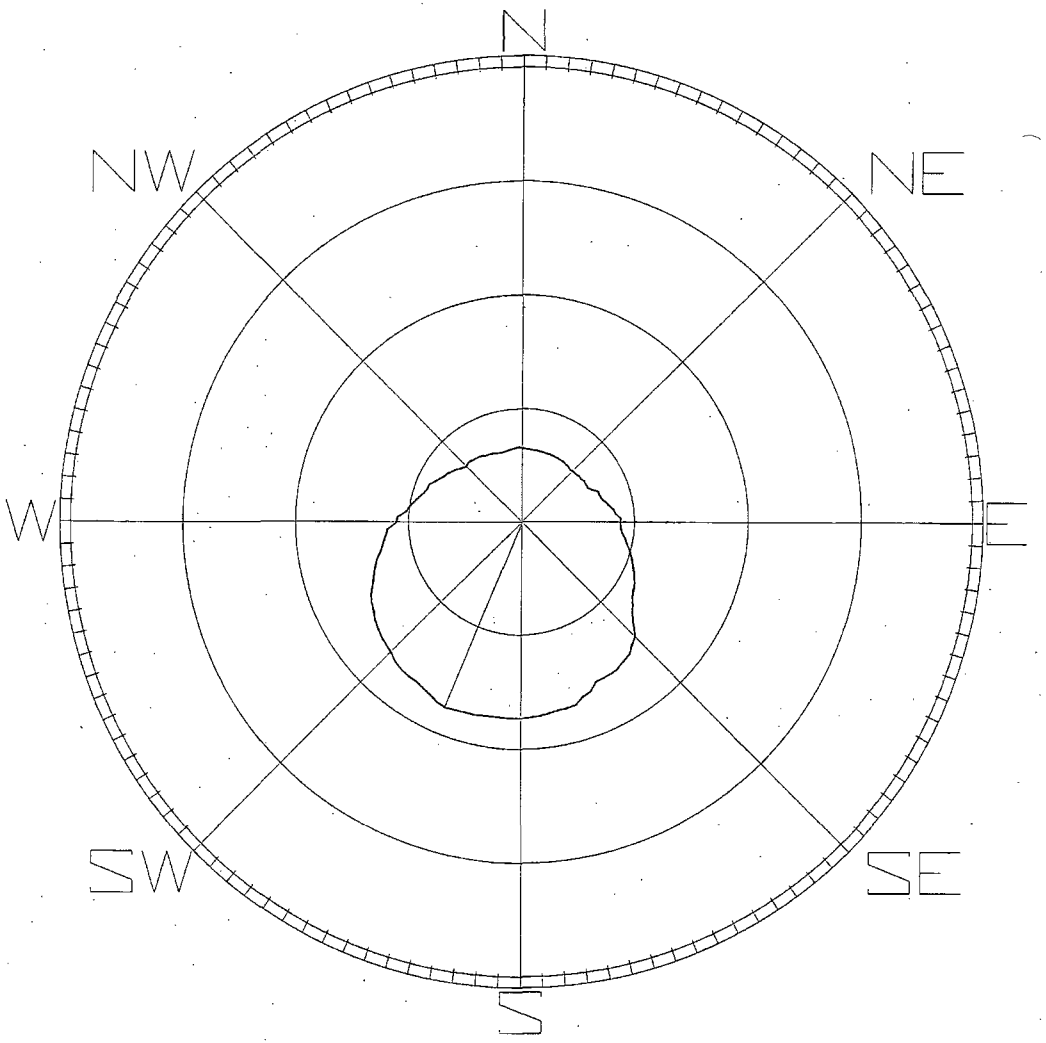


Western Refining

WESTERN REFINING
STATE LPG WELL NO. 4
JAL, NM

SONARWIRE, INC
Max Range vs Bearing

Max Radius= 70.4 ft @ 202.5 deg
Depth= 2596 ft. Fri, Aug 31, 2007



1 inch = 50.0 ft.

160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160

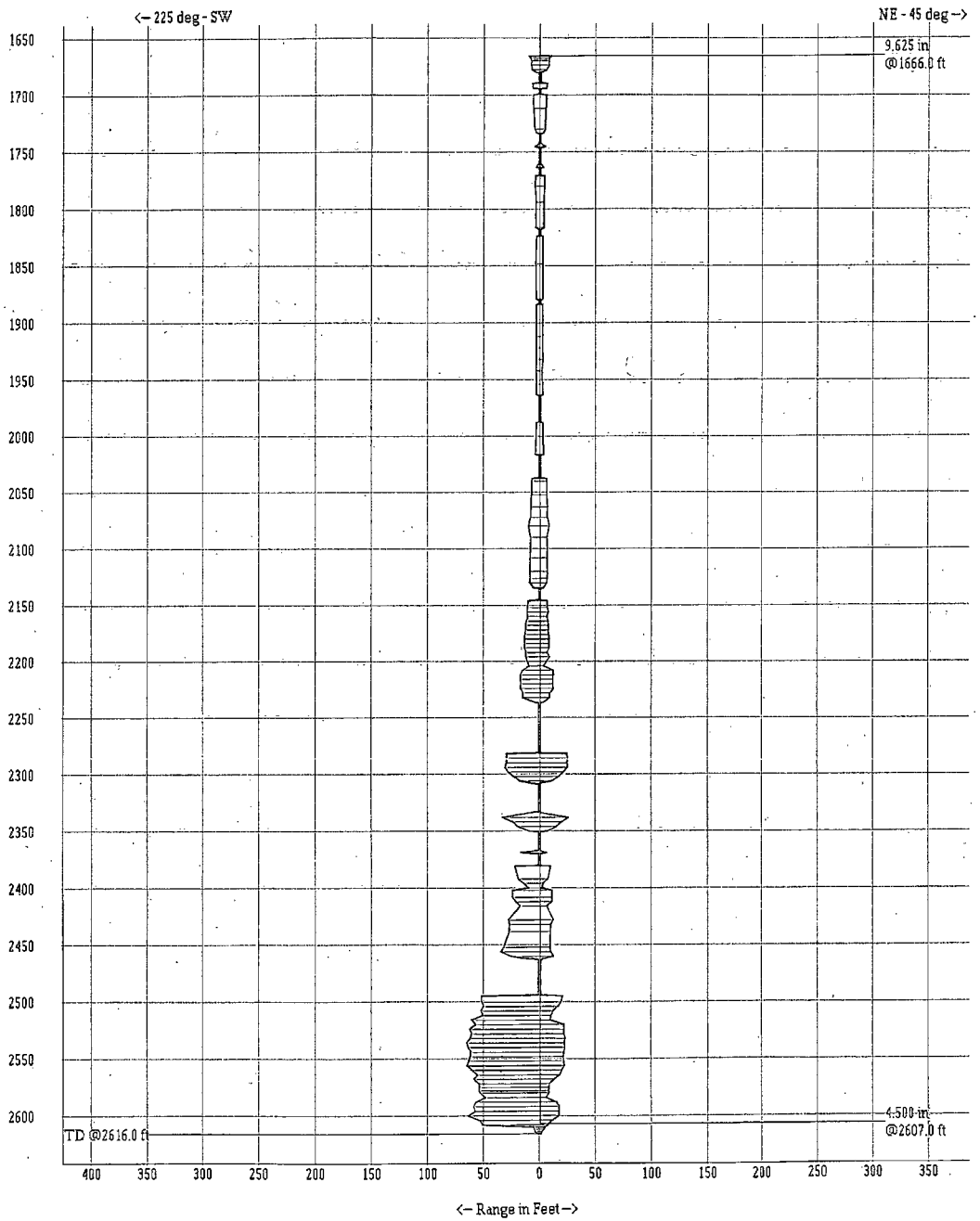
Western Refining

WESTERN REFINING
JAL, NM

SONARWIRE, INC

Vertical Cross Section

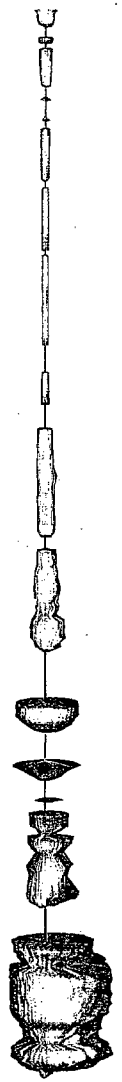
STATE LPG WELL NO. 4
Fri, Aug 31, 2007



3D SHADE PLOT

WESTERN REFINING
JAL, NM
STATE LPG WELL NO. 4
FRI, AUG 31, 2007

VIEWING AZIMUTH: 45
AXIS TILT: -10 DEGS

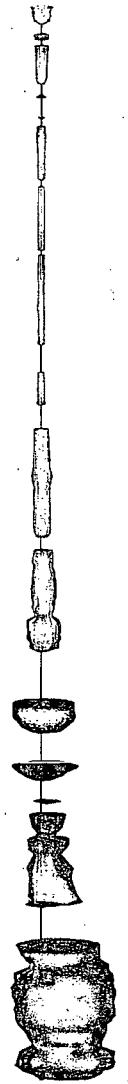


Western Refining

3D SHADE PLOT

WESTERN REFINING
JAL, NM
STATE LPG WELL NO. 4
FRI, AUG 31, 2007

VIEWING AZIMUTH: 135
AXIS TILT: -10 DEGS

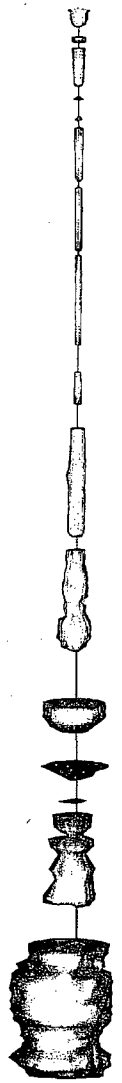


Western Refining

3D SHADE PLOT

WESTERN REFINING
JAL, NM
STATE LPG WELL NO. 4
FRI, AUG 31, 2007

VIEWING AZIMUTH: 225
AXIS TILT: -10 DEGS

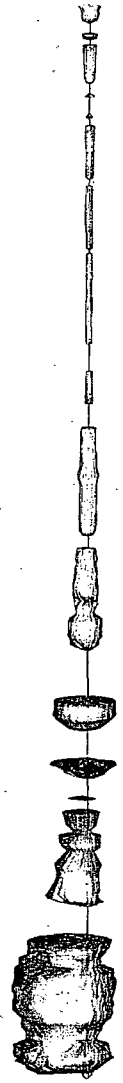


Western Refining

3D SHADE PLOT

WESTERN REFINING
JAL, NM
STATE LPG WELL NO. 4
FRI, AUG 31, 2007

VIEWING AZIMUTH: 315
AXIS TILT: -10 DEGS



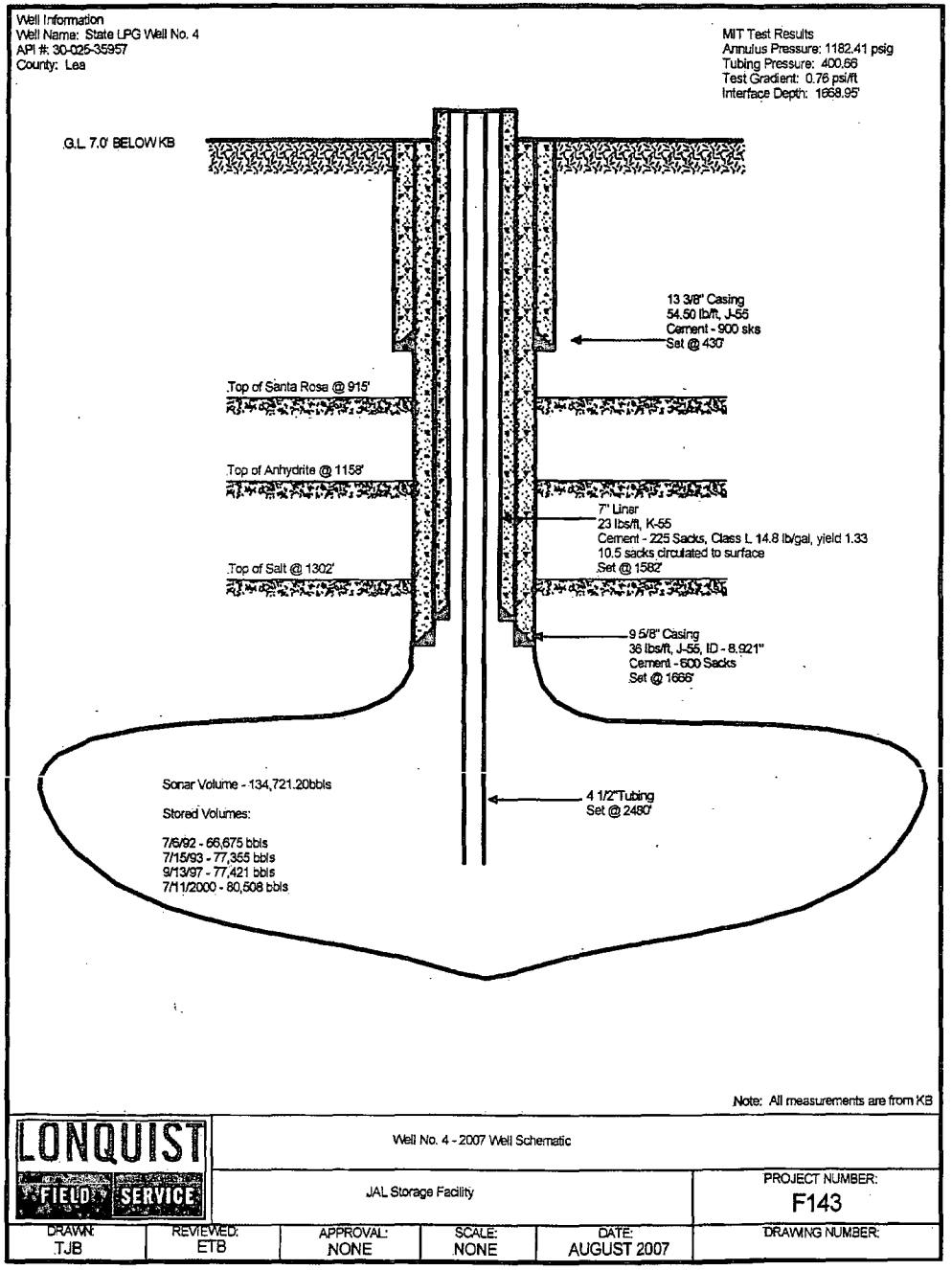
Western Refining

• Operations

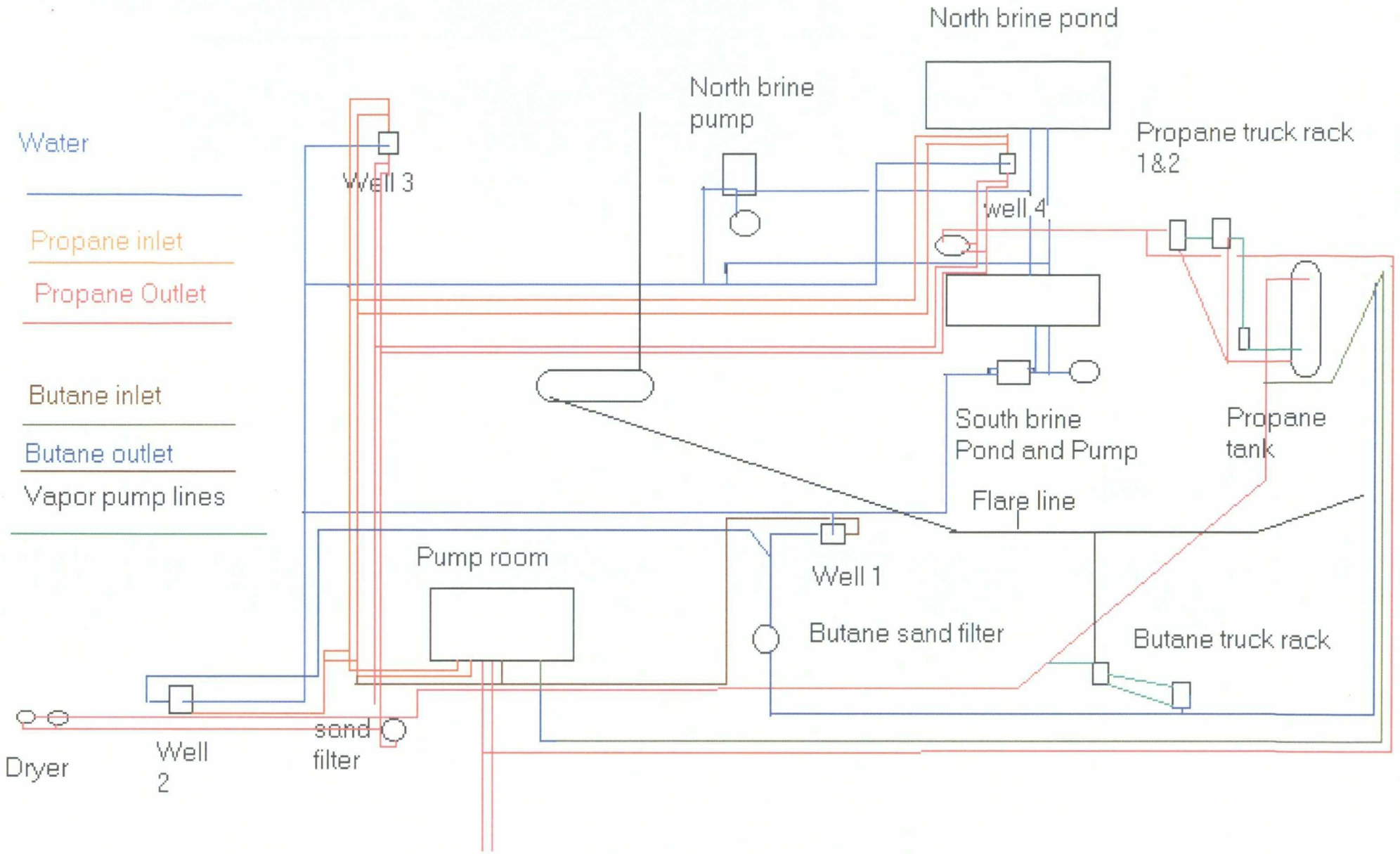
- The underground storage is always liquid filled.
- Well head pressures are strictly limited to protect the casing shoe integrity.
- Standard practice is to limit storage capacity increases to less that 1% per year.

Western Refining

MIT/Well Schematic



Western Refining


North brine pond
North brine pump
Water
Propane truck rack 1&2
Well 3
well 4
Propane inlet
Propane Outlet
Butane inlet
Butane outlet
Vapor pump lines
South brine Pond and Pump
Propane tank
Flare line
Pump room
Well 1
Butane sand filter
Butane truck rack
Dryer
Well 2
sand filter

Conclusion

Should these types of wells be considered similar to Class III brine wells for potential collapse?

- **There may be similarities during siting, design, and construction.**

Western Refining
San Juan
Products Terminal
111 Country Road 4990
Bloomfield, NM 87413
Phone: (505) 632-8006

Western Refining

BW - __999__

DISCHARGE PERMITS

Jims Water Service (BW-5)
Loco Hills (BW-21)

3/26/09 - Present

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor
Joanna Prukop
Cabinet Secretary

Mark E. Fesmire, P.E.
Director
Oil Conservation Division

March 7, 2008

Ms. Sherry Glass
Jims Water Service
11413 U.S. Hwy. 82
Artesia, New Mexico 88210

Re: **Discharge Permit State 24 Well No. 1 Brine Well (BW-005) Renewal**

Dear Ms. Glass:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the Jims Water Service ***(Owner/Operator)*** brine well BW 004 (API# 30-015-02036) located in the NW/4, SE/4 of Section 24, Township 18 South, and Range 28 East, NMPM, Eddy County, New Mexico, under the conditions specified in the enclosed **Attachment To The Discharge Permit.**

Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.**

Please be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail carlj.chavez@state.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Wayne Price
Environmental Bureau Chief

LWP/cc
Attachments-1
xc: OCD District Office

ATTACHMENT TO THE DISCHARGE PERMIT
Jims Water Service Brine Well (BW-005)
DISCHARGE PERMIT APPROVAL CONDITIONS

March 7, 2008

Please remit a check for $1700.00 made payable to Water Quality Management Fund:

Water Quality Management Fund
C/o: Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, New Mexico 87505

1. **Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of $100.00, plus a renewal flat fee (*see* WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required $100.00 filing fee. However, the owner/operator still owes the required $1,700.00 permit fee for a Class III Brine Well.

2. **Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on December 19, 2011** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. ***Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6, NMSA1978} and civil penalties may be assessed accordingly.***

3. **Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-1 through 70-2-38.

4. **Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its September 20, 2007 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.

5. **Modifications:** WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify

the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

6. **Waste Disposal and Storage:** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only oil field RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt oil field wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

A. **OCD Rule 712 Waste:** Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

B. **Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store oil field waste on-site for more than 180 days unless approved by the OCD.

7. **Drum Storage:** The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

8. **Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

9. **Above Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

10. Labeling: The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

11. Below-Grade Tanks/Sumps and Pits/Ponds.

A. All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

B. All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

C. The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds.

D. The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

12. Underground Process/Wastewater Lines:

A. The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for

atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

B. The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

13. **Class V Wells:** The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal systems at OCD-regulated facilities that inject non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic waste only, must be permitted by the New Mexico Environment Department (NMED).

14. **Housekeeping:** The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

15. **Spill Reporting:** The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC and OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days.

16. **OCD Inspections:** The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

17. **Storm Water:** The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

18. **Unauthorized Discharges:** The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in

20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein. ***An unauthorized discharge is a violation of this permit.***

19. Vadose Zone and Water Pollution: The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. Additional Site Specific Conditions: N/A

21. Brine Well(s) Identification, Operation, Monitoring, Bonding and Reporting.

A. Well Identification: API # 30-015-02036

B. Well Work Over Operations: OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production Method: Fresh water will be injected down the casing and brine shall be recovered up the tubing. Reverse flow will be allowed only once a month for up to 24 hours for clean out. Operators may request long term reverse operation if they can demonstrate that additional casing and monitoring systems are installed and approved by OCD. Operating in the reverse mode for more than 24 hours unless approved otherwise is a violation of this permit.

D. Well Pressure Limits: **The maximum operating surface injection and/or test pressure measured at the wellhead shall not exceed 137 psig unless otherwise approved by the OCD.** The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing: Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 300 psig measured on the surface casing for four hours. However, no operator may exceed test pressures that may cause formation fracturing (see item 21.D above) or system failures. Systems requiring test pressures less than 300 psig must be approved by OCD prior to testing. At least once every five years and during well work-overs the salt cavern formation will be isolated from the casing/tubing annuals and the casing

pressure tested at 300 psig for 30 minutes. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

Testing Schedule:

2007- 4 hour @ 300 psig casing open to formation test
2008- 4 hour @ 300 psig casing open to formation test
2009- 4 hour @ 300 psig casing open to formation test
2010- 4 hour @ 300 psig casing open to formation test
2011- 30 minute @ 300 psig casing test only (set packer to isolate formation)

F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

Any subsidence must be reported within 24 hours of discovery.

G. Production/Injection Volumes: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.

H. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.

I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from the brine well.

J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.

K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond in the amount of $50,000.00 to restore the site, plug and abandon

the well by January 1, 2008, pursuant to OCD rules and regulations. If warranted, OCD may require additional financial assurance.

L. Annual Report: All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Brine Well Report, name of operator, BW permit #, API# of well(s), date of report, and person submitting report.
2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.
3. Production volumes as required above in 21.G. including a running total should be carried over to each year. The maximum and average injection pressure.
4. A copy of the chemical analysis as required above in 21.H.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.
6. Brief explanation describing deviations from normal production methods.
7. A copy of any leaks and spills reports.
8. If applicable, results of any groundwater monitoring.
9. Information required from cavity/subsidence 21.F. above.
10. An Area of Review (AOR) summary.
11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

22. **Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

23. **Closure:** The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

24. **Certification: Glass Corporation (Owner/Operator)**, by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. **Owner/Operator** further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

Jim's Water Service
Company Name-print name above

Sherry Glass
Company Representative- print name

Sherry Glass
Company Representative- signature

Title Engineering Technician

Date: 4-3-08

New Mexico Energy, Minerals and Natural Resources Department

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Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

April 15, 2008

Mr. James R. Maloney
Loco Hills Water Disposal Co.
P.O. Box 68
Loco Hills, New Mexico 88210

Re: **Discharge Permit Brine Water Well No. 2 (BW-021) Renewal**
API# 30-015-36119

Dear Mr. Maloney:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation and injection for the **Loco Hills Water Disposal Company** ***(Owner/Operator)*** Brine Water Well No. 2 (BW-021) located in the NW/4, SW/4 of Section 16, 1453 FSL 221 FWL, Township 17 South and Range 30 East, NMPM, Eddy County, New Mexico, under the conditions specified in the enclosed **Attachment To The Discharge Permit**.

Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this Letter including permit fees.**

Please be advised that approval of this permit does not relieve the owner/operator of responsibility should operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail carlj.chavez@state.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Carl Chavez for Wayne Price.

Wayne Price
Environmental Bureau Chief

LWP/cc
Attachments-1
xc: OCD District Office

ATTACHMENT TO THE DISCHARGE PERMIT
Loco Hills Water Disposal Company Brine Well (BW-021)
DISCHARGE PERMIT APPROVAL CONDITIONS

April 15, 2008

Please remit a check for $1700.00 made payable to Water Quality Management Fund:

Water Quality Management Fund
C/o: Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, New Mexico 87505

1. **Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of $100.00, plus a renewal flat fee (*see* WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required $100.00 filing fee. However, the owner/operator still owes the required $1700.00 permit fee for a Class III Brine Well.

2. **Permit Expiration and Renewal:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on December 18, 2010** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. ***Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6, NMSA1978} and civil penalties may be assessed accordingly.***

3. **Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-1 through 70-2-38.

4. **Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its August 17, 2007 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with

the division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.

5. **Modifications:** WQCC Regulation 20.6.2.3107.C, 20.6.2.3109 and 20.6.2.5101.I NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

6. ***Waste Disposal and Storage:*** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only oil field RCRA-exempt wastes may be disposed of by injection in a Class II well. RCRA non-hazardous, non-exempt oil field wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

A. **OCD Rule 712 Waste:** Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

B. **Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store oil field waste on-site for more than 180 days unless approved by the OCD.

7. **Drum Storage:** The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

8. **Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

9. **Above Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

10. **Labeling:** The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

11. **Below-Grade Tanks/Sumps and Pits/Ponds.**

A. All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

B. All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports; location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

C. The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds.

D. The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

12. Underground Process/Wastewater Lines:

A. The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh

water or fluids that are gases at atmospheric temperature and pressure. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

B. The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

13. Class V Wells: The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal systems at OCD-regulated facilities that inject non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program.

Class V wells that inject domestic waste only, must be permitted by the New Mexico Environment Department (NMED).

14. **Housekeeping:** The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

15. **Spill Reporting:** The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC and OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days.

16. **OCD Inspections:** The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

17. **Storm Water:** The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any stormwater run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

18. **Unauthorized Discharges:** The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein.

An unauthorized discharge is a violation of this permit.

19. **Vadose Zone and Water Pollution:** The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. **Additional Site Specific Conditions:** N/A

21. Brine Well(s) Identification, Operation, Monitoring, Bonding and Reporting.

A. Well Identification: API# 30-015-36119

B. Well Work Over Operations: OCD approval will be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production Method: Fresh water will be injected down the casing and brine shall be recovered up the tubing. Reverse flow will be allowed only once a month for up to 24 hours for clean out. Operators may request long term reverse operation if they can demonstrate that additional casing and monitoring systems are installed and approved by OCD. Operating in the reverse mode for more than 24 hours unless approved otherwise is a violation of this permit.

D. Well Pressure Limits: **The maximum operating surface injection and/or test pressure measured at the wellhead shall not exceed 185 psig unless otherwise approved by the OCD.** The operator shall have a working pressure limiting device or controls to prevent overpressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing: Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 300 psig measured on the surface casing for four hours. However, no operator may exceed test pressures that may cause formation fracturing (see item 21.D above) or system failures. Systems requiring test pressures less than 300 psig must be approved by OCD prior to testing. At least once every five years and during well workovers the salt cavern formation will be isolated from the casing/tubing annuals and the casing pressure tested at 300 psig for 30 minutes. All pressure tests must be performed per the scheduled shown below and witnessed by OCD unless otherwise approved.

Testing Schedule:

2006- 4 hour	@ 300 psig casing open to formation test
2007- 4 hour	@ 300 psig casing open to formation test

2008-	30 minute	@ 300-500 psig casing test only (set packer to isolate formation from casing)
2009-	4 hour	@ 300 psig casing open to formation test
2010-	4 hour	@ 300 psig casing open to formation test

F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. OCD may require the operator to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

Any subsidence must be reported within 24 hours of discovery.

G. Production/Injection Volumes: The volumes of fluids injected (fresh water) and produced (brine) will be recorded monthly and submitted to the OCD Santa Fe Office in the annual report.

H. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and brine with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.

I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within ¼ mile from the brine well.

J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing, tubing or packer, or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and the operator receives OCD approval to re-start injection operations.

K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond in the amount of $50,000.00 to restore the site, plug and abandon the well, pursuant to OCD rules and regulations. If warranted, OCD may require additional financial assurance.

L. Annual Report: All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual Brine Well Report, name of operator, BW permit #, API# of well(s), date of report, and person submitting report.
2. Brief summary of brine wells operations including description and reason for any remedial or major work on the well. Copy of C-103.
3. Production volumes as required above in 21.G. including a running total should be carried over to each year. The maximum and average injection pressure.
4. A copy of the chemical analysis as required above in 21.H.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.
6. Brief explanation describing deviations from normal production methods.
7. A copy of any leaks and spills reports.
8. If applicable, results of any groundwater monitoring.
9. Information required from cavity/subsidence 21.F. above.
10. An Area of Review (AOR) summary.
11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

22. **Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer brine well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

23. **Closure:** The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed C-103 form for plugging and abandonment of the well(s). Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

24. Certification: Loco Hills Water Disposal Co. (Owner/Operator), by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained here. **Owner/Operator** further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

LOCO HILLS WATER DISPOSAL COMPANY
Company Name-print name above

JAMES R. MALONEY
Company Representative- print name

James R Maloney
Company Representative- signature

Title VICE PRESIDENT

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Joanna Prukop
Cabinet Secretary
Reese Fullerton
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 23, 2008

Mr. Ron Weaver, Product Terminals Manager
Western Refining Company, L.P.
111 County Road 4990
Bloomfield, New Mexico 87413

Re: Discharge Permit Renewal
Jal LPG Storage Facility (GW-007)
UIC Class II LPG Storage Wells: Well #1 30-025-35954; Well #2 30-025-35955; Well #3 30-025-35956; and Well #4 30-025-35957.
Lea County, New Mexico

Dear Mr. Weaver:

Pursuant to all applicable parts of the Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC and more specifically 20.6.2.3104 - 20.6.2.3999 discharge permit, and 20.6.2.5000-.5299 Underground Injection Control, the Oil Conservation Division (OCD) hereby approves the discharge permit and authorizes the operation, injection, and LPG storage for the **Western Refining, L.P., Jal LPG Storage Facility** (GW-007) located in the SW/4 of Section 32, Township 23 South, and Range37 East; SE/4 of Section 31, Township 23 South, and Range 37 East; and W/2 of Section 5, Township 24 South, and Range 37 East NMPM, Lea County, under the conditions specified in the enclosed **Attachment To The Discharge Permit.** Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 working days of receipt of this letter including permit fees.**

Please be advised that approval of this permit does not relieve the owner/operator of responsibility if operations result in pollution of surface water, ground water or the environment. Nor does approval of the permit relieve the owner/operator of its responsibility to comply with any other applicable governmental authority's rules and regulations.

If you have any questions, please contact Carl Chavez of my staff at (505-476-3491) or E-mail carlj.chavez@sate.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

For Wayne Price
Environmental Bureau Chief

LWP/cc
Attachments-1
xc: OCD District Office

ATTACHMENT TO THE DISCHARGE PERMIT APPROVAL CONDITIONS

1. **Payment of Discharge Plan Fees:** All discharge permits are subject to WQCC Regulations. Every billable facility that submits a discharge permit application will be assessed a filing fee of $100.00, plus a renewal flat fee (*see* WQCC Regulation 20.6.2.3114 NMAC). The Oil Conservation Division ("OCD") has received the required $100.00 filing fee. The flat fee for a UIC Class II gas (LPG) storage facility is $1700.00. Please submit this amount along with the signed certification in approximately 30 days. Checks should be made out to the New Mexico Water Quality Management Fund.

2. **Permit Expiration, Renewal Conditions and Penalties:** Pursuant to WQCC Regulation 20.6.2.3109.H.4 NMAC, this permit is valid for a period of five years. **The permit will expire on December 29, 2012** and an application for renewal should be submitted no later than 120 days before that expiration date. Pursuant to WQCC Regulation 20.6.2.3106.F NMAC, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved. ***Expired permits are a violation of the Water Quality Act {Chapter 74, Article 6, NMSA1978} and civil penalties may be assessed accordingly.***

3. **Permit Terms and Conditions:** Pursuant to WQCC Regulation 20.6.2.3104 NMAC, when a permit has been issued, the owner/operator must ensure that all discharges shall be consistent with the terms and conditions of the permit. In addition, all facilities shall abide by the applicable rules and regulations administered by the OCD pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-1 through 70-2-38.

4. **Owner/Operator Commitments:** The owner/operator shall abide by all commitments submitted in its August 29, 2007 discharge permit application, including attachments and subsequent amendments and these conditions for approval. Permit applications that reference previously approved plans on file with the division shall be incorporated in this permit and the owner/operator shall abide by all previous commitments of such plans and these conditions for approval.

5. **Modifications:** WQCC Regulation 20.6.2.3107.C and 20.6.2.3109 NMAC addresses possible future modifications of a permit. The owner/operator (discharger) shall notify the OCD of any facility expansion, production increase or process modification that would result in any significant modification in the discharge of water contaminants. The Division Director may require a permit modification if any water quality standard specified at 20.6.2.3103 NMAC is being or will be exceeded, or if a toxic pollutant as defined in WQCC Regulation 20.6.2.7 NMAC is present in ground water at any place of withdrawal for present or reasonably foreseeable future use, or that the Water Quality Standards for Interstate and Intrastate streams as specified in 20.6.4 NMAC are being or may be violated in surface water in New Mexico.

6. **Waste Disposal and Storage:** The owner/operator shall dispose of all wastes at an OCD-approved facility. Only oil field RCRA-exempt wastes may be disposed of by injection in a Class II Salt Water Disposal Well. Any disposal regardless of waste type by injection into a UIC Class II LPG Storage Well is prohibited and shall be a violation of the permit. RCRA non-

hazardous, non-exempt oil field wastes may be disposed of at an OCD-approved facility upon proper waste determination pursuant to 40 CFR Part 261. Any waste stream that is not listed in the discharge permit application must be approved by the OCD on a case-by-case basis.

A. **OCD Rule 712 Waste:** Pursuant to OCD Rule 712 (19.15.9.712 NMAC) disposal of certain non-domestic waste without notification to the OCD is allowed at NMED permitted solid waste facilities if the waste stream has been identified in the discharge permit and existing process knowledge of the waste stream does not change.

B. **Waste Storage:** The owner/operator shall store all waste in an impermeable bermed area, except waste generated during emergency response operations for up to 72 hours. All waste storage areas shall be identified in the discharge permit application. Any waste storage area not identified in the permit shall be approved on a case-by-case basis only. The owner/operator shall not store oil field waste on-site for more than 180 days unless approved by the OCD.

7. **Drum Storage:** The owner/operator must store all drums, including empty drums, containing materials other than fresh water on an impermeable pad with curbing. The owner/operator must store empty drums on their sides with the bungs in place and lined up on a horizontal plane. The owner/operator must store chemicals in other containers, such as tote tanks, sacks, or buckets on an impermeable pad with curbing.

8. **Process, Maintenance and Yard Areas:** The owner/operator shall either pave and curb or have some type of spill collection device incorporated into the design at all process, maintenance, and yard areas which show evidence that water contaminants from releases, leaks and spills have reached the ground surface.

9. **Above Ground Tanks:** The owner/operator shall ensure that all aboveground tanks have impermeable secondary containment (e.g., liners and berms), which will contain a volume of at least one-third greater than the total volume of the largest tank or all interconnected tanks. The owner/operator shall retrofit all existing tanks before discharge permit renewal. Tanks that contain fresh water or fluids that are gases at atmospheric temperature and pressure are exempt from this condition.

10. **Labeling:** The owner/operator shall clearly label all tanks, drums, and containers to identify their contents and other emergency notification information. The owner/operator may use a tank code numbering system, which is incorporated into their emergency response plans.

11. **Below-Grade Tanks/Sumps and Pits/Ponds.**

A. All below-grade tanks and sumps must be approved by the OCD prior to installation and must incorporate secondary containment with leak detection into the design. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal. All existing below-grade tanks and sumps without secondary containment and leak detection must be tested annually or as specified herein. Systems that have secondary containment with leak detection shall have a monthly inspection of the leak detection system to determine if the primary containment is leaking. Small sumps or

depressions in secondary containment systems used to facilitate fluid removal are exempt from these requirements if fluids are removed within 72 hours.

B. All pits and ponds, including modifications and retrofits, shall be designed by a certified registered professional engineer and approved by the OCD prior to installation. In general, all pits or ponds shall have approved hydrologic and geologic reports, location, foundation, liners, and secondary containment with leak detection, monitoring and closure plans. All pits or ponds shall be designed, constructed and operated so as to contain liquids and solids in a manner that will protect fresh water, public health, safety and the environment for the foreseeable future. The owner/operator shall retrofit all existing systems without secondary containment and leak detection before discharge permit renewal.

C. The owner/operator shall ensure that all exposed pits, including lined pits and open top tanks (8 feet in diameter or larger) shall be fenced, screened, netted, or otherwise rendered non-hazardous to wildlife, including migratory birds.

D. The owner/operator shall maintain the results of tests and inspections at the facility covered by this discharge permit and available for OCD inspection. The owner/operator shall report the discovery of any system which is found to be leaking or has lost integrity to the OCD within 15 days. The owner/operator may propose various methods for testing such as pressure testing to 3 pounds per square inch greater than normal operating pressure and/or visual inspection of cleaned tanks and/or sumps, or other OCD-approved methods. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

12. **Underground Process/Wastewater Lines:**

A. The owner/operator shall test all underground process/wastewater pipelines at least once every five (5) years to demonstrate their mechanical integrity, except lines containing fresh water or fluids that are gases at atmospheric temperature and pressure. Pressure rated pipe shall be tested by pressuring up to one and one-half times the normal operating pressure, if possible, or for atmospheric drain systems, to 3 pounds per square inch greater than normal operating pressure, and pressure held for a minimum of 30 minutes with no more than a 1% loss/gain in pressure. The owner/operator may use other methods for testing if approved by the OCD.

B. The owner/operator shall maintain underground process and wastewater pipeline schematic diagrams or plans showing all drains, vents, risers, valves, underground piping, pipe type, rating, size, and approximate location. All new underground piping must be approved by the OCD prior to installation. The owner/operator shall report any leaks or loss of integrity to the OCD within 15 days of discovery. The owner/operator shall maintain the results of all tests at the facility covered by this discharge permit and they shall be available for OCD inspection. The owner/operator shall notify the OCD at least 72 hours prior to all testing.

13. **Class V Wells:** The owner/operator shall close all Class V wells (e.g., septic systems, leach fields, dry wells, etc.) that inject non-hazardous industrial wastes or a mixture of industrial wastes and domestic wastes unless it can be demonstrated that ground water will not be impacted in the reasonably foreseeable future. Leach fields and other wastewater disposal

systems at OCD-regulated facilities that inject non-hazardous fluid into or above an underground source of drinking water are considered Class V injection wells under the EPA UIC program. Class V wells that inject domestic waste only, must be permitted by the New Mexico Environment Department (NMED).

14. Housekeeping: The owner/operator shall inspect all systems designed for spill collection/prevention and leak detection at least monthly to ensure proper operation and to prevent over topping or system failure. All spill collection and/or secondary containment devices shall be emptied of fluids within 72 hours of discovery. The owner/operator shall maintain all records at the facility and available for OCD inspection.

15. Spill Reporting: The owner/operator shall report all unauthorized discharges, spills, leaks and releases and conduct corrective action pursuant to WQCC Regulation 20.5.12.1203 NMAC and OCD Rule 116 (19.15.3.116 NMAC). The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days.

16. OCD Inspections: The OCD may place additional requirements on the facility and modify the permit conditions based on OCD inspections.

17. Storm Water: The owner/operator shall implement and maintain run-on and runoff plans and controls. The owner/operator shall not discharge any water contaminant that exceeds the WQCC standards specified in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) including any oil sheen in any storm water run-off. The owner/operator shall notify the OCD within 24 hours of discovery of any releases and shall take immediate corrective action(s) to stop the discharge.

18. Unauthorized Discharges: The owner/operator shall not allow or cause water pollution, discharge or release of any water contaminant that exceeds the WQCC standards listed in 20.6.2.3101 NMAC or 20.6.4 NMAC (Water Quality Standards for Interstate and Intrastate Streams) unless specifically listed in the permit application and approved herein. ***An unauthorized discharge is a violation of this permit.***

19. Vadose Zone and Water Pollution: The owner/operator shall address any contamination through the discharge permit process or pursuant to WQCC 20.6.2.4000-.4116 NMAC (Prevention and Abatement of Water Pollution). The OCD may require the owner/operator to modify its permit for investigation, remediation, abatement, and monitoring requirements for any vadose zone or water pollution. Failure to perform any required investigation, remediation, abatement and submit subsequent reports will be a violation of the permit.

20. Additional Site Specific Conditions:

A. The operator shall develop, implement and maintain a storage facility safety plan. The plan shall include current emergency response procedures, provisions to provide security against unauthorized activity, and any current gas release detection and prevention measures utilized by the facility. The emergency response procedures for the storage facility shall include contingency plans for gas storage well leaks and loss of containment from gas storage wells or the gas storage reservoir. The emergency

response procedures shall also identify public emergency response agencies to be notified for the protection of public safety. Copies of the plan shall be available at the storage facility and the nearest operational office of the operator or the facility. The operator shall keep the plan current or updated throughout its operations.

B. The Well No. 3 propane release discovery on March 29, 2008 and documented on Form C-141 dated May 20,2008 shall be investigated. A work plan for OCD approval shall be submitted within 90 days of permit issuance to investigate the release.

C. The closure of the Classifier and associated equipment shall be completed on or before the expiration date of this permit.

21. LPG Storage Well(s) Identification, Operation, Monitoring, Bonding and Reporting.

A. Well Identification: API #s: Well #1 30-025-35954; Well #2 30-025-35955; Well #3 30-025-35956; and Well #4 30-025-35957.

B. Well Work Over Operations: OCD approval shall be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production Method: Brine water shall be injected down the tubing to the base of the cavern to push or recover LPG upward through the casing. LPG storage shall be increased by withdrawing brine water from the tubing while injecting LPG down the casing. Brine water will be stored at ground level in two brine storage ponds. Fresh water injection down the tubing to dissolve or clear salt from the tubing for a maximum period of 24 hours shall be allowed when the structural stability of the cavern will not be compromised. Alternative cleaning methods must be approved by the OCD.

D. Well Pressure Limits: The maximum operating surface injection and/or test pressure measured at the wellhead shall not exceed:

LPG Well #1: 850 psig unless otherwise approved.
LPG Well #2: 850 psig unless otherwise approved.
LPG Well #3: 850 psig unless otherwise approved.
LPG Well #4: 850 psig unless otherwise approved.

The operator shall have a working pressure limiting device or controls to prevent over pressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to OCD within 24 hours of discovery.

E. Mechanical Integrity Testing (MIT): Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 500 psig measured on the surface casing for four hours. However, no operator may

exceed test pressures that may cause formation fracturing (see item 21.D above) or system failure. Systems requiring test pressures less than 500 psig or methods that use testing media other than fluids, i.e., gas, must be approved by OCD prior to testing. In accordance with EPA UIC Well requirements, at least once every five years and during well work-overs, the salt cavern formation shall be isolated from the casing/tubing annuals and the casing pressure tested at 500 psig for 30 minutes. All pressure tests must be performed per the schedule shown below and witnessed by OCD unless otherwise approved.

MIT Testing Schedule:

Well No. 1	4/25/2013	Well No. 1 Nitrogen/Brine Interface Test* (Pass: Allowable Loss < 0.11 bbl./hr.)
Well No. 2	3/14/2013	Same as Well No. 1 above.
Well No. 3	8/19/2012	Same as Well No. 1 above.
Well No. 4	8/19/2012	Same as Well No. 1 above.
Above Wells	Work-over	EPA 5 Yr.**

Notes:

* The owner/operator shall perform a 72 hour Nitrogen/Brine Interface Mechanical Integrity Test – Internal (casing) & External (cavern) a minimum of every 5 years.
** An EPA 5 Yr. MIT 30 min. @ minimum 500 psig casing test only (set packer above casing shoe to isolate formation from tubing/annuals- Pass: +/- 10% of start pressure) shall be performed immediately after any well work-over.

F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. A subsidence monitoring work plan shall be submitted by the operator within 90 days of permit issuance to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

Any subsidence must be reported within 24 hours of discovery.

G. Production/Injection Volumes: The volumes of fluids injected (produced brine) vs. LPG will be recorded monthly (C-131A) and submitted to the OCD Santa Fe Office in the annual report (C-131B).

H. Analysis of Injection Fluid or Brine: Provide an analysis of the injection fluid with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.

I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within 1/2 mile from any EPA Class II LPG Storage Well.

J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing or tubing or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and receive OCD approval to re-start injection operations.

K. Bonding or Financial Assurance: The operator shall maintain at a minimum, a one well plugging bond (OCD Form B-1) for each UIC Class II LPG Storage Well in the amount specified under the Oil and Gas Act, pursuant to OCD rules and regulations.

L. Annual Report: All operators shall submit an annual report due on January 31 of each year. The report shall include the following information:

1. Cover sheet marked as "Annual LPG Storage Well Report, name of operator, GW permit #, API# of well(s), date of report, and person submitting report.
2. Brief summary of LPG Storage Wells operations including description and reason for any remedial or major work on the well. Copy of C-103.
3. Production volumes as required above in 21.G. including a running total should be carried over to each year. The maximum and average injection pressure.
4. A copy of the chemical analysis as required above in 21.H.
5. A copy of any mechanical integrity test chart, including the type of test, i.e. open to formation or casing test.
6. Brief explanation describing deviations from normal production methods.
7. A copy of any leaks and spills reports.
8. If applicable, results of any groundwater monitoring.
9. Information required from cavity/subsidence 21.F. above.
10. An Area of Review (AOR) summary.
11. Sign-off requirements pursuant to WQCC Subsection G 20.6.2.5101.

22. **Transfer of Discharge Permit:** Pursuant to WQCC 20.6.2.5101.H the owner/operator and new owner/operator shall provide written notice of any transfer of the permit. Both parties shall sign the notice 30 days prior to any transfer of ownership, control or possession of a facility

with an approved discharge permit. In addition, the purchaser shall include a written commitment to comply with the terms and conditions of the previously approved discharge permit. OCD will not transfer LPG Storage Well operations until proper bonding or financial assurance is in place and approved by the division. OCD reserves the right to require a modification of the permit during transfer.

23. Closure Plan and Financial Assurance: The owner/operator shall notify the OCD when operations of the facility are to be discontinued for a period in excess of six months. Prior to closure of the facility, the operator shall submit for OCD approval, a closure plan including a completed Form C-103 for plugging and abandonment of the well(s), modification plan, and/or provide adequate financial assurance. Closure and waste disposal shall be in accordance with the statutes, rules and regulations in effect at the time of closure.

24. Certification: Western Refining, L.P., by the officer whose signature appears below, accepts this permit and agrees to comply with all submitted commitments, including these terms and conditions contained herein. **Western Refining, L.P.** further acknowledges that the OCD may, for good cause shown, as necessary to protect fresh water, public health, safety, and the environment, change the conditions and requirements of this permit administratively.

Conditions accepted by: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

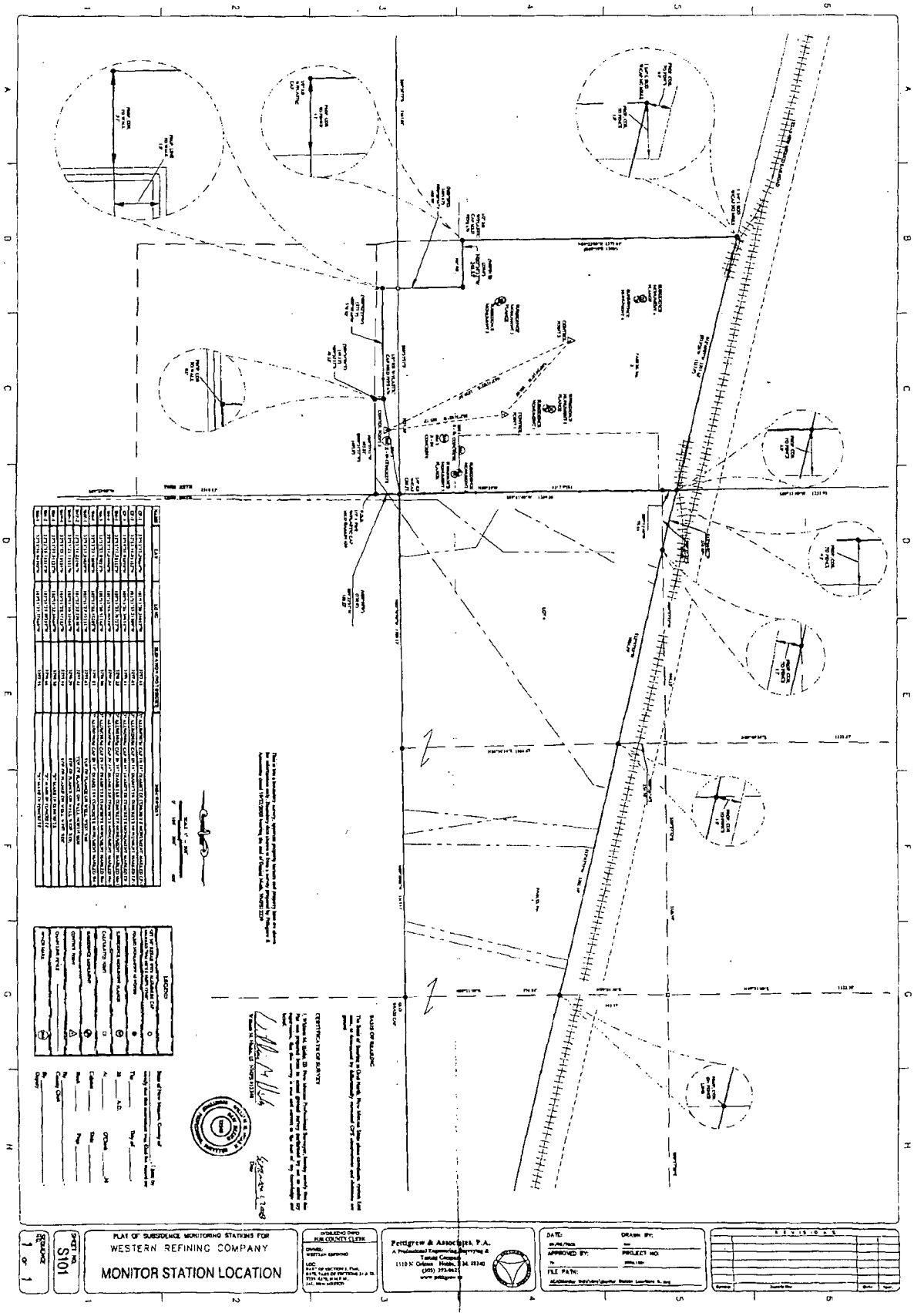
Western Refining Co.
Company Name-print name above

Ron Weaver
Company Representative- print name

Ron Weaver
Company Representative- signature

Title: Products Terminals Mgr

Date: 6/10/08



PLAT OF SUBSIDENCE MONITORING STATIONS FOR
WESTERN REFINING COMPANY

MONITOR STATION LOCATION

SHEET NO. S101

SEQUENCE 1 of 1

Pettigrew & Associates, P.A.
A Professional Engineering, Surveying &
Mapping Corporation
1110 N. Orleans Hobbs, NM 88240
(505) 393-9621

DATE:
DRAWN BY:
APPROVED BY:
PROJECT NO.
FILE PATH:

Submit 3 Copies To Appropriate District Office
District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Ave., Artesia, NM 88210
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
May 27, 2004

WELL API NO. 30-025-35954

5. Indicate Type of Lease STATE X FEE ☐

6. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name: State LPG Storage Well

1. Type of Well: Oil Well ☐ Gas Well X Other LPG Storage

8. Well Number 1

2. Name of Operator: Western Refining Company, LP

9. OGRID Number 248440

3. Address of Operator: PO Box 1345 Jal, New Mexico 88252

10. Pool name or Wildcat Salado

4. Well Location
Unit Letter M : 450 feet from the South line and 780 feet from the West line
Section 32 Township 23S Range 37E NMPM Lea County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

Pit or Below-grade Tank Application ☐ or Closure ☐

Pit type_____ Depth to Groundwater_____ Distance from nearest fresh water well_____ Distance from nearest surface water_____

Pit Liner Thickness: _____ mil Below-Grade Tank: Volume _____ bbls; Construction Material _____

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK X	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
OTHER: ☐		OTHER: ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 1103. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

The following activities were completed:

1-13-09
Perforated tubing with 80 holes from 1800 ft to 1804 ft.

1-17-09
Perforated tubing with 96 holes from 1796 ft. to 1800 ft.

Well one was put into service after perforating tubing on January 13, 2009. After operating well 1 for the next several days, it was determined that well 1 was not taking enough brine water.

We moved up hole another 4 feet and perforated the tubing between 1796 and 1800 feet. The well was put into service and is currently working within its normal parameters.

Well Diameter

Sonar to 1750 FT. = 29,049.5 Barrels per cubic ft.

Overfill Cavern (Controlled) 6-26-01= 1796 FT. 201,013 barrel per cubic ft.

201,013-29,049.5= 171,963.5 barrels in 46 feet of height.

171,963.5/46 ft= 3,738.34 barrels per cubic ft.

3,738.34 * 5.615= 20,990.779 cubic feet per foot.

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Revised June 10, 2003

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to Appropriate
District Office

DISCHARGE PLAN APPLICATION FOR BRINE EXTRACTION FACILITES

(Refer to the OCD Guidelines for assistance in completing the application)

☐ New ☐ Renewal

I. Facility Name: _____

II. Operator: _____

Address: _____

Contact Person: _____ Phone: _____

III. Location: _____/4 _____/4 Section _____ Township _____ Range _____
Submit large scale topographic map showing exact location.

IV. Attach the name and address of the landowner of the facility site.

V. Attach a description of the types and quantities of fluids at the facility.

VI. Attach a description of all fluid transfer and storage and fluid and solid disposal facilities.

VII. Attach a description of underground facilities (i.e. brine extraction well).

VIII. Attach a contingency plan for reporting and clean-up of spills or releases.

IX. Attach geological/hydrological evidence demonstrating that brine extraction operations will not adversely impact fresh water.

X. Attach such other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.

XI. CERTIFICATION:

I hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Name: _____ Title: _____

Signature: _____ Date: _____

E-mail Address: _____

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL
RESOURCES DEPARTMENT

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

FORM C-108
Revised June 10, 2003

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: _____Secondary Recovery _____Pressure Maintenance _____Disposal _____Storage
Application qualifies for administrative approval? _____Yes _____No

II. OPERATOR: _____

ADDRESS: _____

CONTACT PARTY: _____ PHONE: _____

III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? _____Yes _____No
If yes, give the Division order number authorizing the project: _____

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).

*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

NAME: _____ TITLE: _____

SIGNATURE: _____ DATE: _____

E-MAIL ADDRESS: _____

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(3) A description of the tubing to be used including its size, lining material, and setting depth.

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name.

(2) The injection interval and whether it is perforated or open-hole.

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

(1) The name, address, phone number, and contact party for the applicant;

(2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;

(3) The formation name and depth with expected maximum injection rates and pressures; and,

(4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

Side 1

INJECTION WELL DATA SHEET

OPERATOR: _____

WELL NAME & NUMBER: _____

WELL LOCATION: _____
FOOTAGE LOCATION UNIT LETTER SECTION TOWNSHIP RANGE

WELLBORE SCHEMATIC

WELL CONSTRUCTION DATA

Surface Casing

Hole Size: _____ Casing Size: _____

Cemented with: _____ sx. *or* _____ ft^3

Top of Cement: _____ Method Determined: _____

Intermediate Casing

Hole Size: _____ Casing Size: _____

Cemented with: _____ sx. *or* _____ ft^3

Top of Cement: _____ Method Determined: _____

Production Casing

Hole Size: _____ Casing Size: _____

Cemented with: _____ sx. *or* _____ ft^3

Top of Cement: _____ Method Determined: _____

Total Depth: _____

Injection Interval

_____ feet to _____

(Perforated or Open Hole; indicate which)

Side 2

INJECTION WELL DATA SHEET

Tubing Size: _____ Lining Material: _____

Type of Packer: _____

Packer Setting Depth: _____

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes _____No

   If no, for what purpose was the well originally drilled? _____

   _____

2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): _____

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. _____

   _____

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

   _____

   _____

   _____

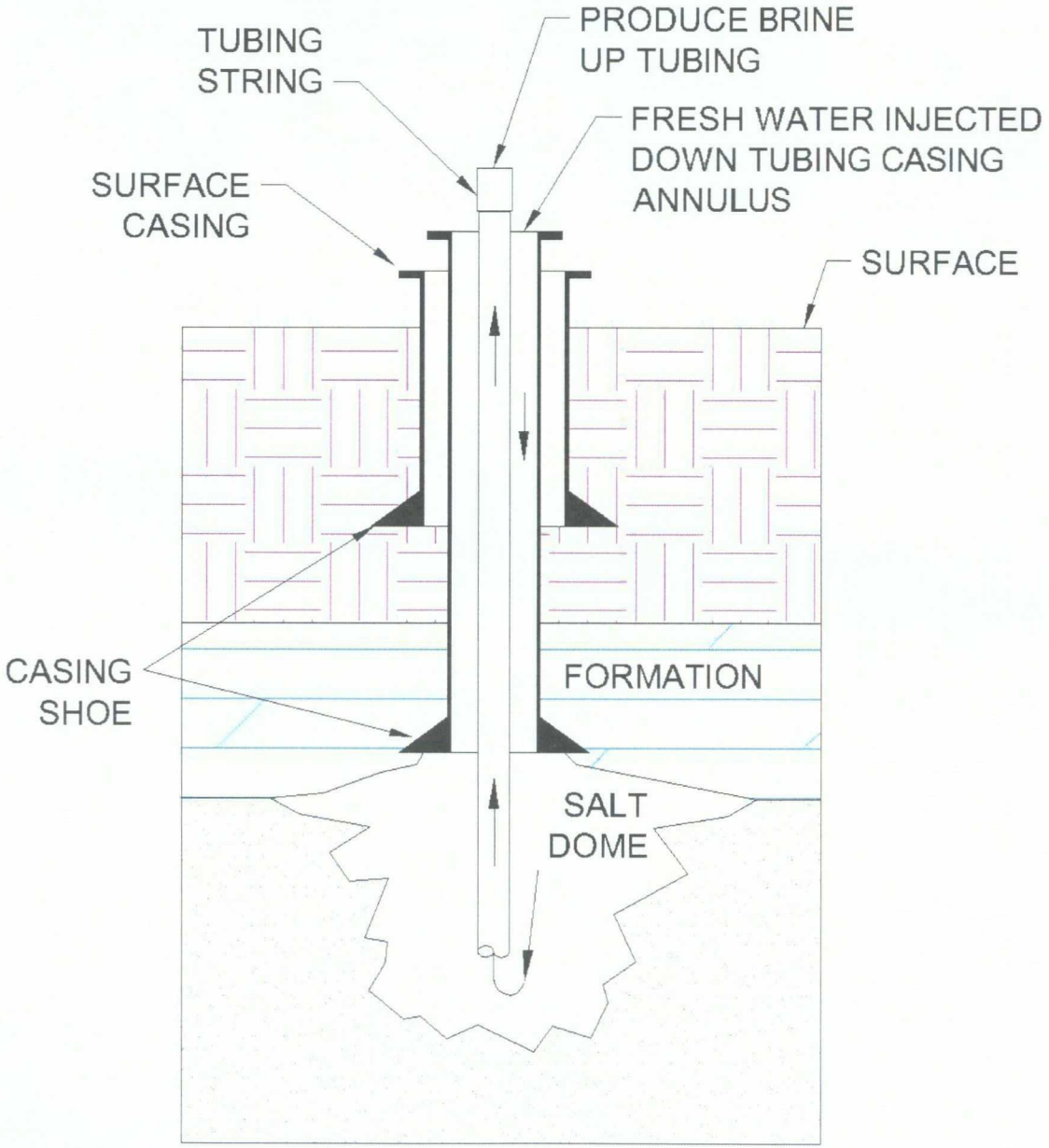
Brine Well Construction Characteristics

- Wellbore Configurations
- Flow Directions
- Cavern Growth
- Overburden Impact

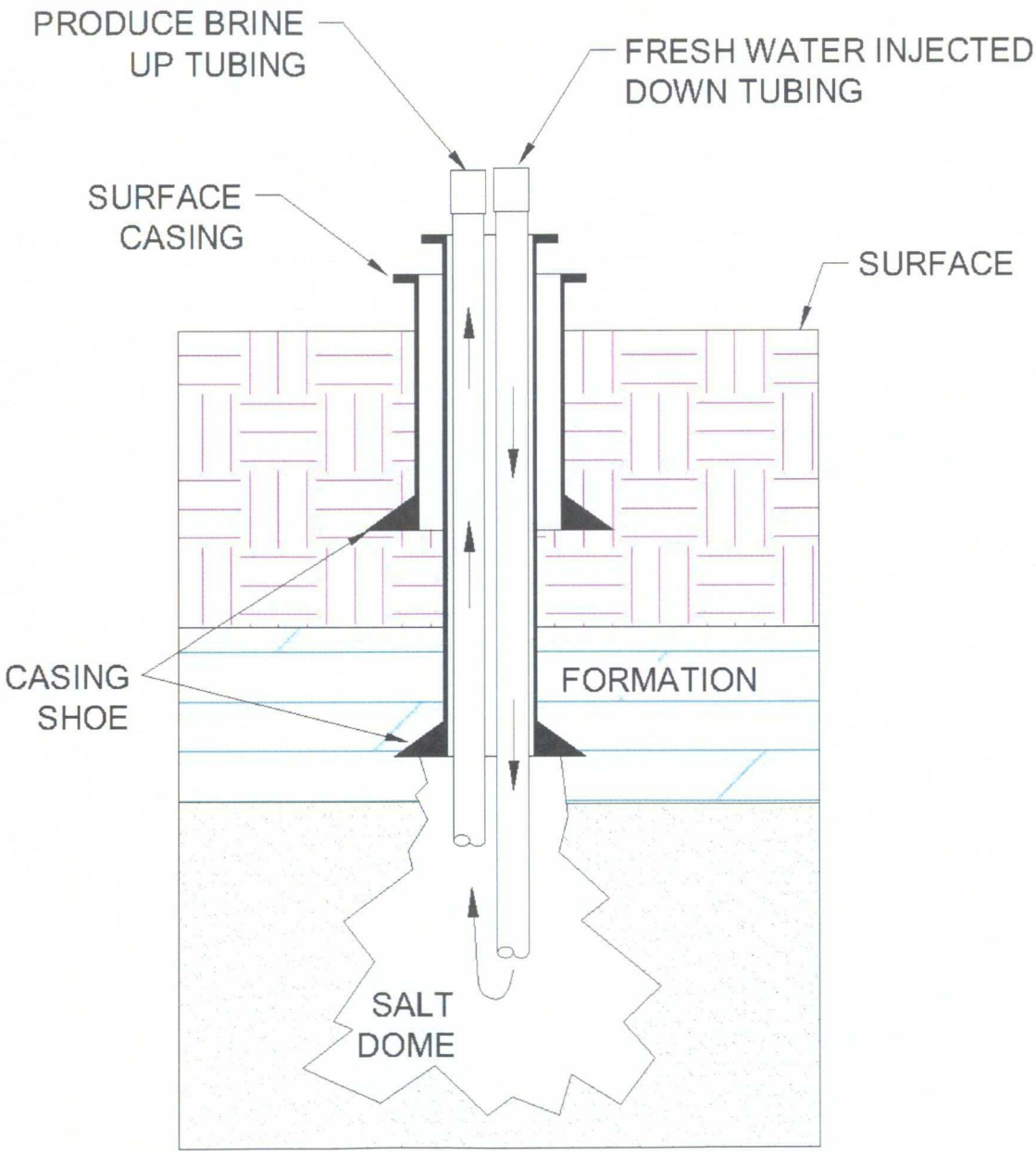
Brine Well Configurations

- Single Tubing String
- Dual String
- Dual Wells
- Re-completed Wells

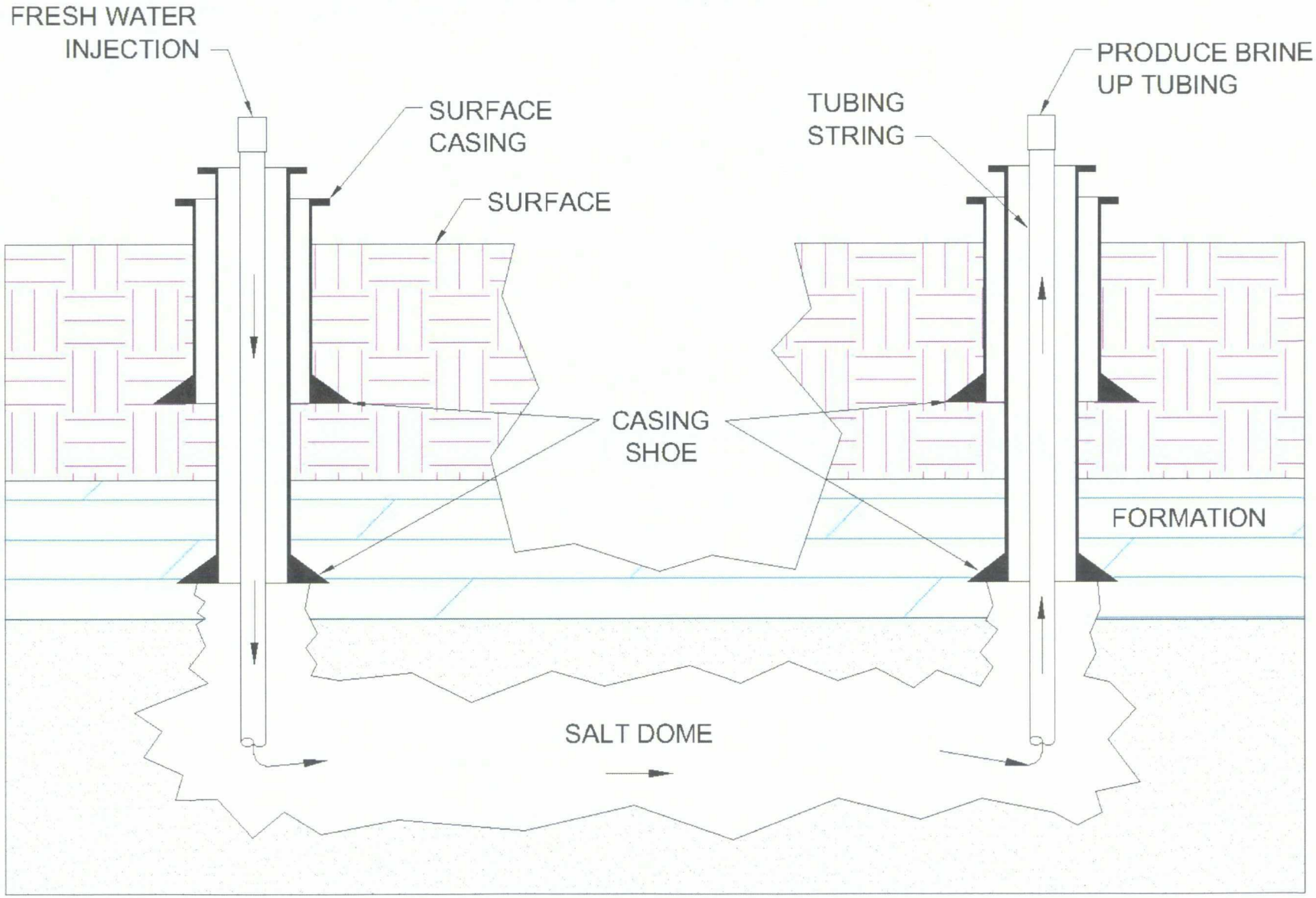
SINGLE TUBING STRING



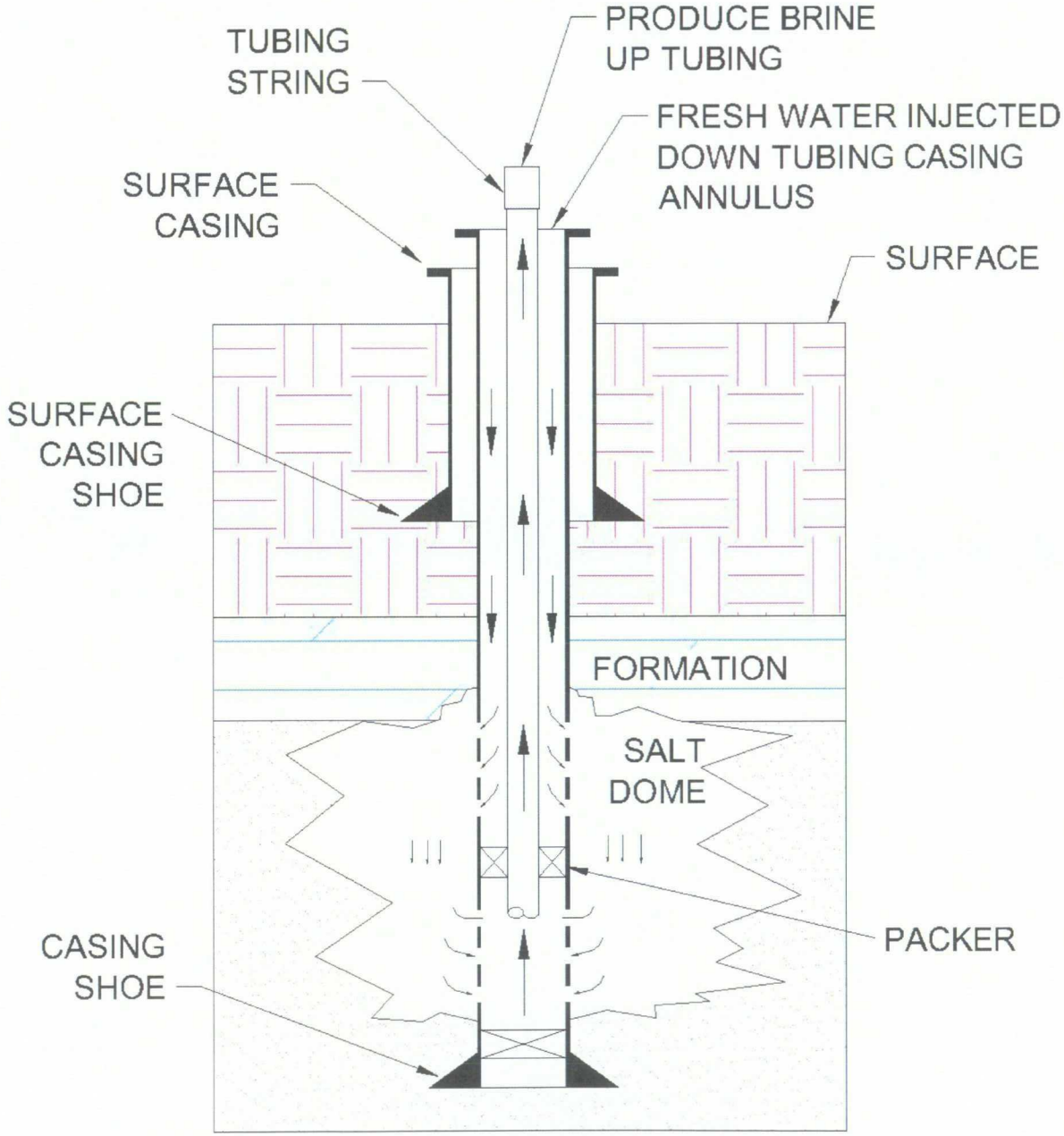
DUAL TUBING STRINGS



SINGLE TUBING DUAL WELLS



CASED HOLE SINGLE TUBING STRING



Solution Mining and Brine Production

Mark J Cartwright
United Brine Services Co, LLC
Texas Brine Co, LLC

Overview

- Texas Brine Company - History and Operations
- Barbers Hill Operation
- Typical Domal and Bedded Brine Production
- Brine Production Fundamentals
- Design Standards
    - Site Characterization
    - Local/Regional Geology
- Operating Techniques
    - Tubing Adjustments
        - Workover Rig or Casing Jacks
        - Tubing Cut or Perforation
    - Diesel Pad Management
        - Surface Pressure Observation
        - Interface Surveys
        - Injection or Withdrawal
- Maintenance Practices
    - Annual Subsidence Surveys
    - Annual Interface Surveys
    - Through-pipe Sonar Surveys
- Recommendations

TBC Experience

Largest independent brine producer in US supplying over 30% of the brine requirements of the chloralkali industry

Founding member of the Solution Mining Research Institute

Over 60 years in solution mining industry and over 75 years in hard rock salt mining, (United Salt Corporation)

Over 100 solution mined caverns and ~ 150 million barrels of capacity

Over 7 million tons/year produced in 5 states and soon to achieve over 9 million tons/year

Over 20 wells in LPG storage service

- Isobutylene
- Isobutane
- Normal Butane
- Y-Grade
- Ethylene

Soon to have 10 wells in Natural Gas service containing up to 50 Bcf

Solar salt production, (USC, Carlsbad)

North American Salt Deposits

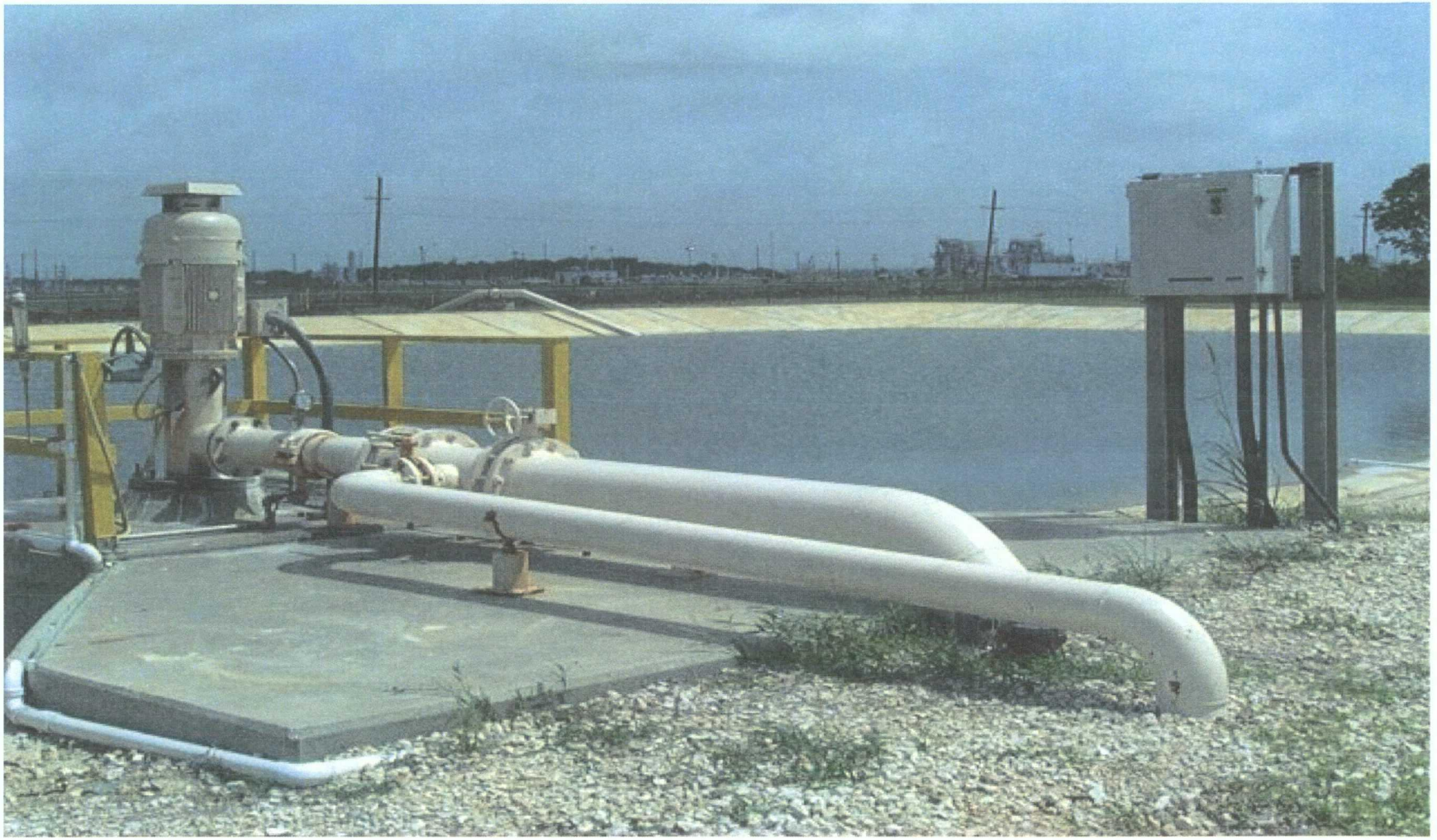
Various Salt Deposits

Water from Surface Sources or Water Wells

16” brine production well at Barbers Hill

300 Mbbl freshwater pit at Barbers Hill

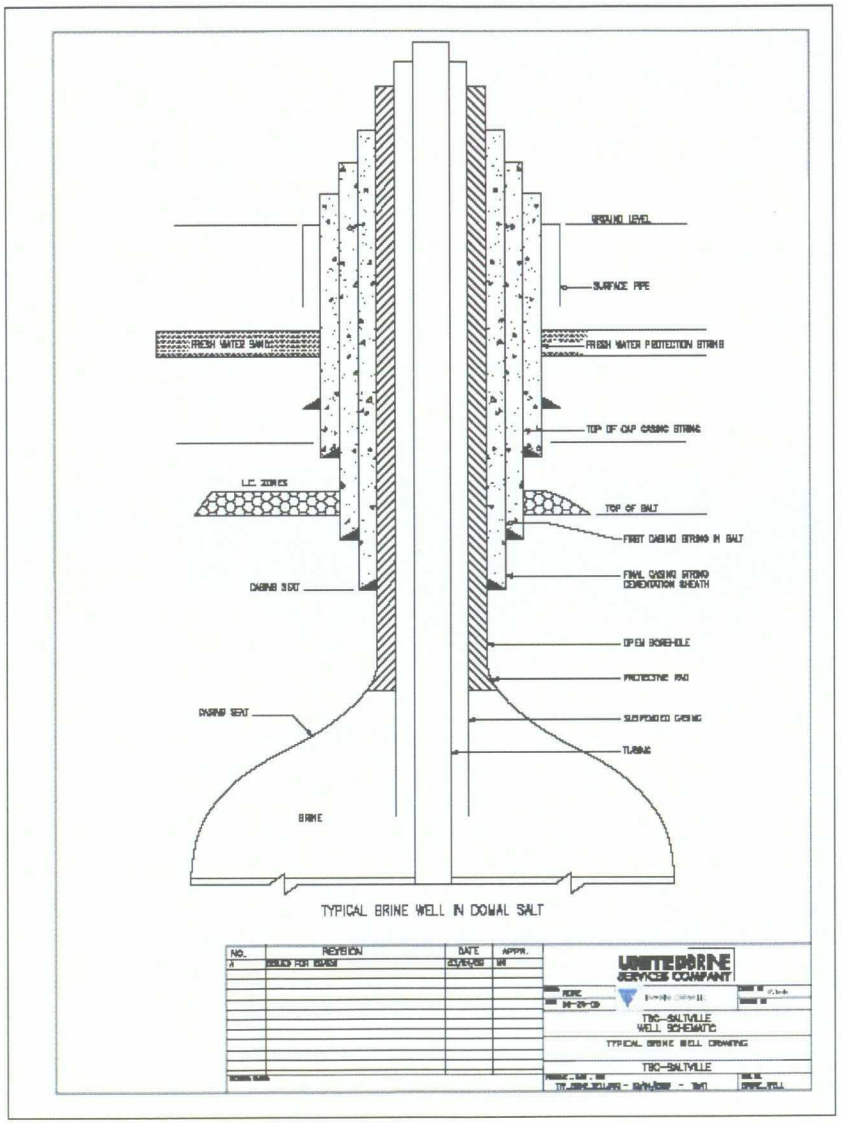
Saturated Brine Discharged into a Lined Brine Pit

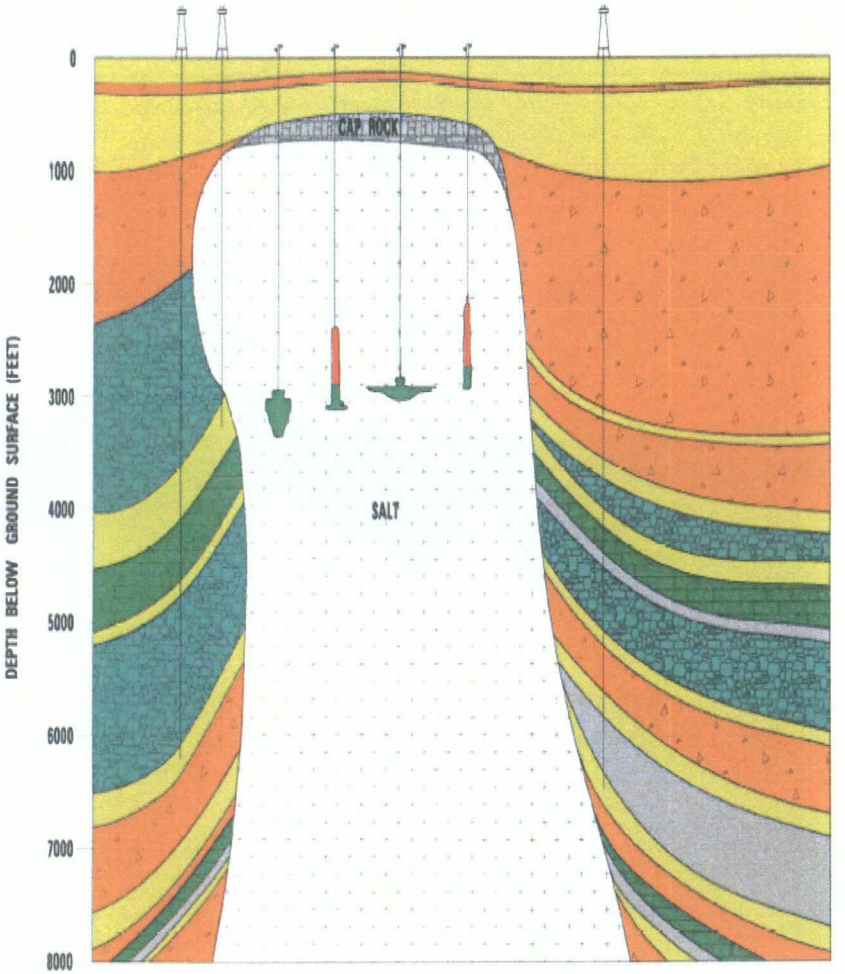


Raw Brine Pumped to Primary Brine Treatment Plant for Precipitation of Calcium Carbonate and Magnesium Hydroxide

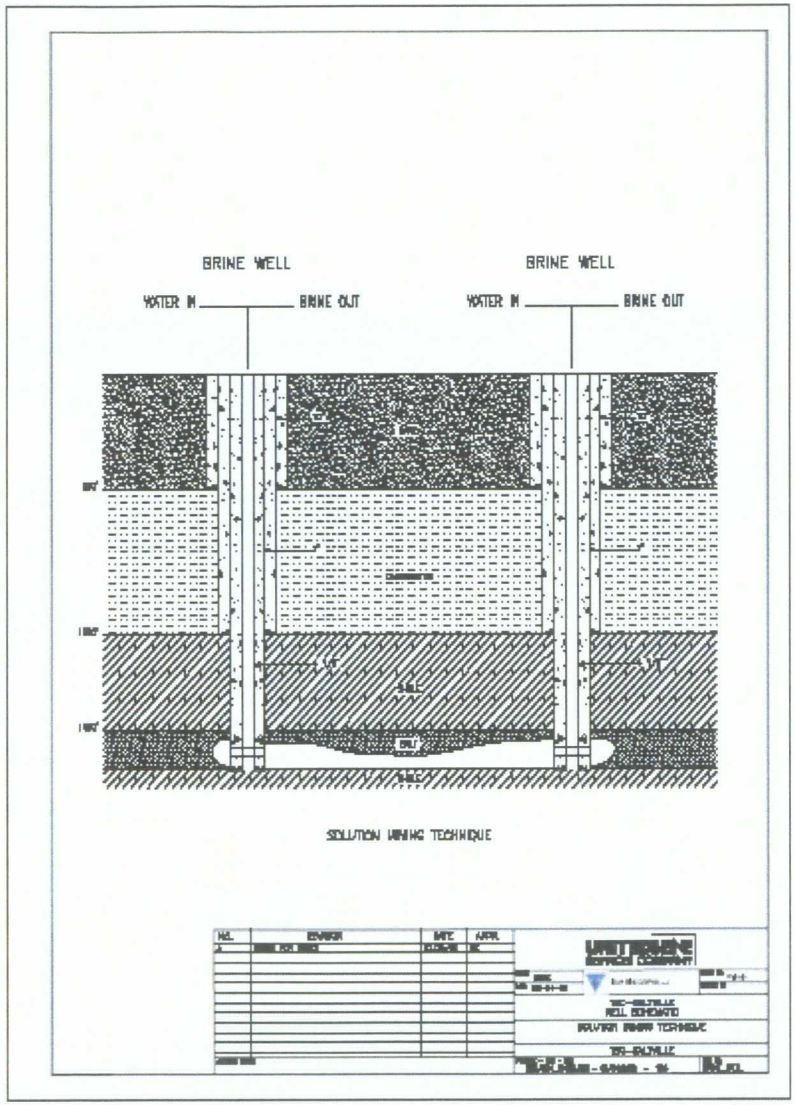
Treated Brine is Pumped to Evaporation Facility

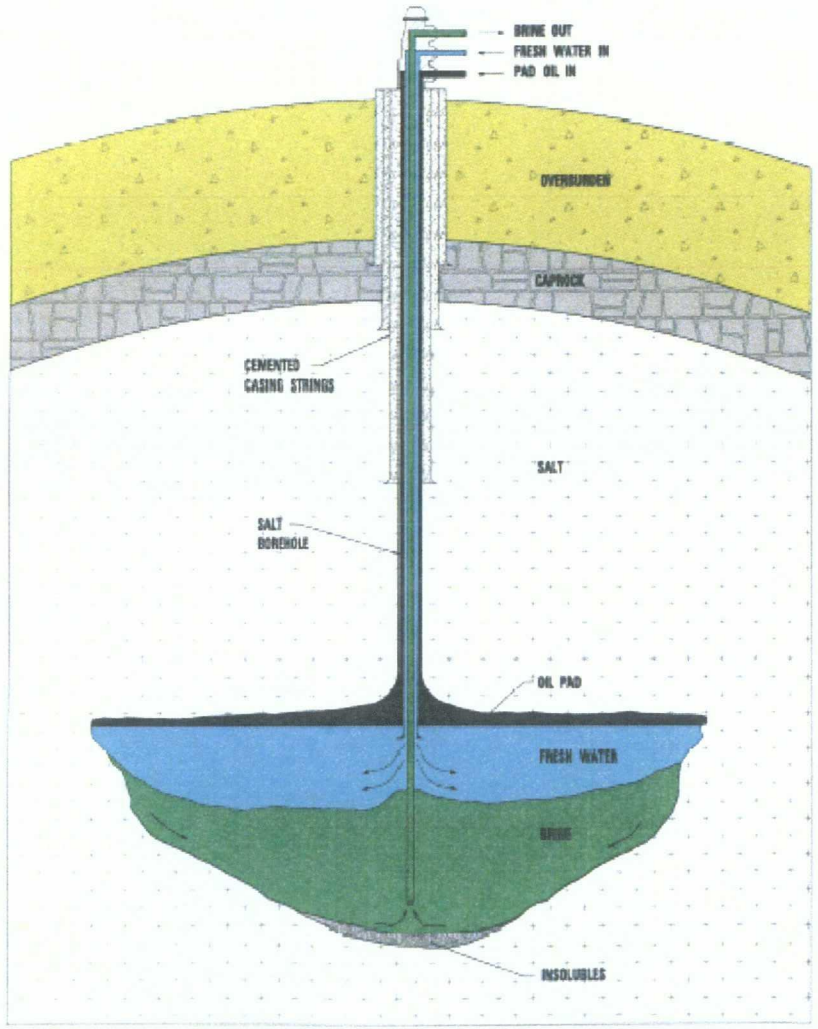
Typical Salt Dome Brine Production Well





Typical Bedded Salt Brine Production Wells





Fundamentals to Sustainable Brine Production

Site Characterization before Construction and During Operation

Design Principles

- Solid Cement and Steel from Surface to Salt
- Two Suspended Tubing Strings
- Fluid Measurement Equipment
- Pressure Monitoring Equipment
- Production Constraints – Size Limitations
- Minimum Saltback
- Solution Mining Models

Operating Principles

- Inert Pad for Roof Protection and Engineered Roof Construction
- Water Injection through Tubing and Brine Production through Casing
- Routine MIT's
- Regular Sonar and Interface Surveys
- Minimum Daily Recording of Production, Pressure Data, Brine Quality

Site Characterization

- Regional and Local Geological Setting
  - Overburden
    - Sufficient Thickness
    - Sufficient Competency
  - Salt Formation Characterization
    - Salt Isopach and Structure Contour Maps
    - Salt and Non Salt Unit Characterization
    - Natural Occurring Dissolution
  - Geohydrology
    - Water Aquifers
    - Potentiometric Surfaces
  - Area of Perpetual Review
    - Artificial Penetrations
    - Status of AP's within ¼ Mile
    - Confirmation of Sufficient Casing Cementation
    - Confirmation of Sufficient Plug and Abandonment
    - Rig Supply Wells

Subsidence

Will occur over any solution mined cavern, both vertical and horizontal movement possible

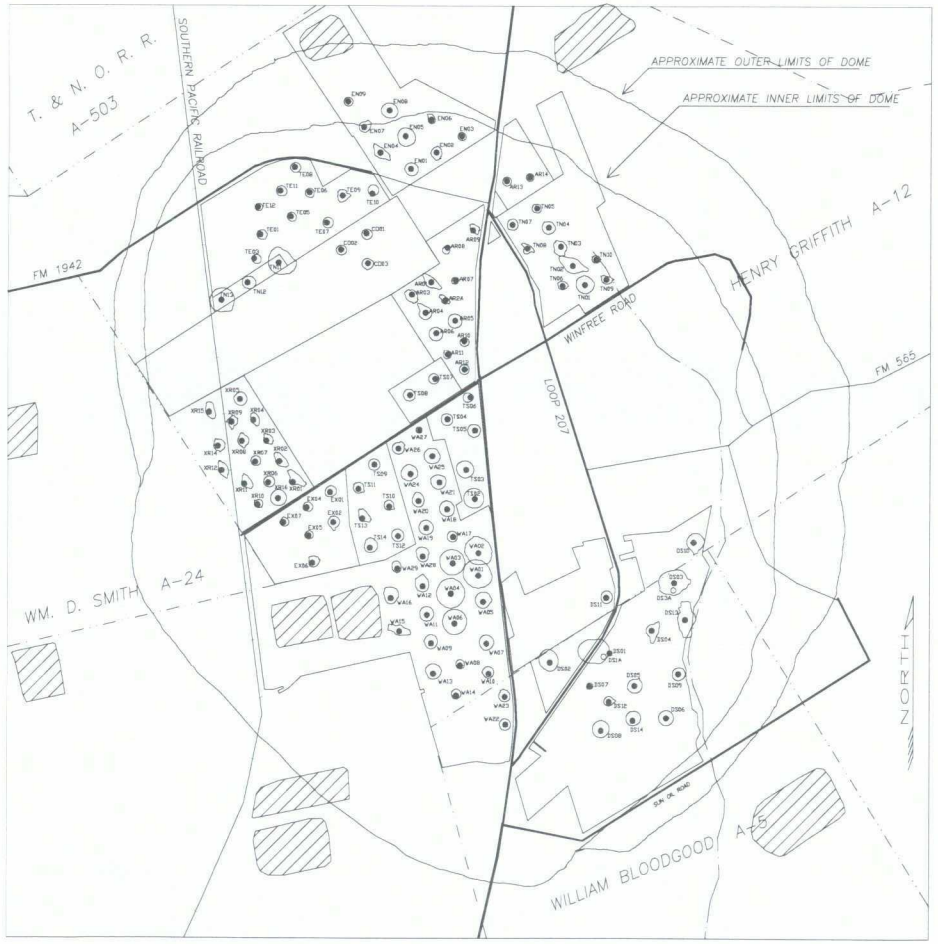
Monitoring program may be necessary and in some cases is required

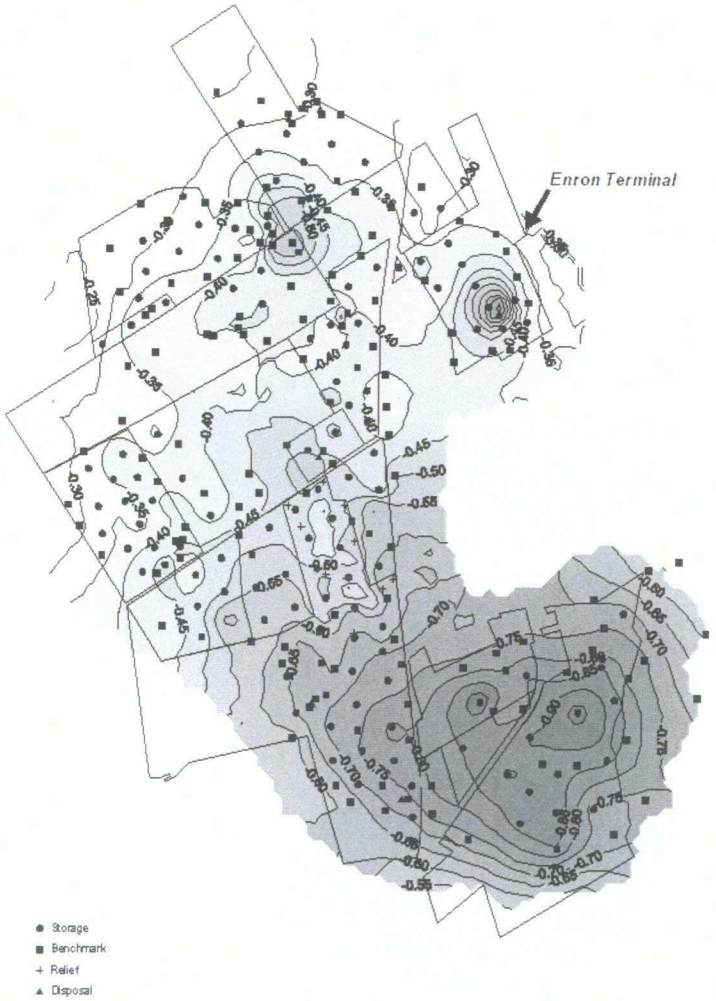
- Must be precise or value is diminished
- Multiple surface monuments required
- Stationary reference benchmark or use of Global Positioning System
- Routine and accurate data interpretation for establishing subsidence rates and trends

Monitoring subsidence can provide predictive insight into future sinkhole events

Subsidence Monitoring

Barbers Hill Dome, Chambers County, TX





Recommendations

- Immediate Data Collection on Existing Brine Wells
  - Local and Regional Geology Characterizations
  - Well History
    - Construction
    - Production
    - Level Surveys
  - Sonar Surveys
  - Hydrostatic Pressure Tests
  - Risk Rank
  - Consider Re-Permitting with Minimum Standards
  - Consider Permit Termination is Certain Cases
- Possible Re-Entry of Plugged Wells, (Carlsbad)
- Plug Into other State UIC Programs and Associations, (SMRI)
- Proceed with OCD/Industry Collaboration on New Regulations to Control Brine Well

"Salt and salt deposits have concerned man since before the dawn of recorded history."

Carey Croneis - Chancellor and Wiess Professor of Geology, Rice University
Foreword to the First Edition of *Salt Domes*
by Michel T. Halbouty, June 1967

QUESTIONS

Useful Conversions

- 1 GB = 2.64# salt produced
- 1 BB = 110.88# salt produced
- 1 BB = 0.0554 tons salt produced
- 2.64 bbls space = 1 short ton salt produced
- 1 tons salt = 2.64 bbls space
- 1 GW = 2.54# salt produced
- 1 ton salt produced = 757.57 GB produced
- 1 Ton salt produced = 787.40 GW Injected
- 1 GB = .1336 cu ft (7.48 GB/cu f1 GB = .0056 G space created
- 1 BB = 0.235 B space created
- 1 B space = 4.29 BB = 475.87# salt produced
- 1 B space = 4.46 BW injected
- 1 GW = 2.9378# salt dissolved
- 1 GW = 2.54 # salt produced
- 1 BW = 123.387# salt dissolved
- 1 BW = 106.68# salt produced
- 1 BW = 0.162 B space
- 1.04 GW injected = 1.00 BB produced
- 1 Ton salt produced X 3.02 = B space
- 1 Ton salt X 2.64 = 1 B space
- 1 # salt produced = 0.883 G space
- 1 # salt produced = .0021 B space
- 1 B space = 6.2 BW
- 1 B space = 5.61 cu ft
- 1 cu ft salt = 0.1781 B space
- 1 cu ft salt = 135#

Chavez, Carl J, EMNRD

From: Mark Cartwright [mcartwright@unitedbrine.com]
Sent: Wednesday, April 01, 2009 10:10 AM
To: Chavez, Carl J, EMNRD
Cc: Sanchez, Daniel J., EMNRD; VonGonten, Glenn, EMNRD; Griswold, Jim, EMNRD
Subject: Re: I & W Brine Well (BW-6) Carlsbad, NM

Hello folks - some quick thoughts and recommendations on the Carlsbad brine well.

- Emergency response/contingency plan involving State/County/City
- Every attempt should be made to characterize the cavern
  - Well construction
  - Production history
  - Estimated dimensions
  - Local/regional geology, (stratigraphy and structure)
  - Stability model - Geomechanical study by Respec or PB-ESS, (Dr. Van Sambeek and Dr. Ratigan, respectively)
  - Given cavern's sensitive location, several steps might be considered
    - High resolution seismic survey
    - Subsidence monitoring
    - Re-entry for direct monitoring
      - Seismic probe
      - Pressure probe
      - Well and cavern logging
      - If risk is found intolerable, develop concepts for possible backfilling
        - Sand
        - Crushed limestone
        - Salt from potash mine
        - If backfilling or other stabilization methods are prohibitive, consider ultimate failure with marginal impact
          - Reroute roadways and utilities
          - Reroute irrigation canal
          - Relocate homeowners and businesses

It was a pleasure meeting you. I wish you all the best and look forward to any future opportunities.

Mark

"Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>

03/27/2009 06:08 PM

To <mcartwright@unitedbrine.com>
cc "Sanchez, Daniel J., EMNRD" <daniel.
EMNRD" <Glenn.VonGonten@state.n
<Jim.Griswold@state.nm.us>
Subject I & W Brine Well (BW-6) Carlsbad, NM

Mark:

Could you please send me an e-mail on the immediate concerns you have with the I & W brine well that you discussed with me after the meeting on Friday, March 27, 2009?

Also, any other immediate concerns that you have.

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, February 12, 2009 10:52 AM
To: david_herrell@blm.gov; James_Rutley@blm.gov; mike_schumacher@cargill.com; daniel.ferguson@wipp.ws; byrum.charles@epa.gov; Leissner.Ray@epamail.epa.gov; hugh.harvey@intrepidpotash.com; lmolleur@keyenergy.com; gveni@nckri.org; Leavitt, Marcy, NMENV; brada.jones@state.nm.us; Chavez, Carl J, EMNRD; VonGonten, Glenn, EMNRD; Griswold, Jim, EMNRD; Price, Wayne, EMNRD; Kostrubala, Thaddeus; balch@prrc.nmt.edu; lland@gis.nmt.edu; leo.vansambeek@respec.com; rlbeauh@sandia.gov; grkirke@sandia.gov; reitze@socon.com; douglas.johnson@rrc.state.tx.us; mcartwright@unitedbrine.com; dave.hughes@wipp.ws; Allen.Hains@wnr.com; ken.parker@wnr.com; Ron.Weaver@wnr.com
Cc: Sanchez, Daniel J., EMNRD; jhand@kdhe.state.ks.us; khoeffner@kdheks.gov; mcochran@kdheks.gov; jvoigt@solutionmining.org; cpoyer@kdhe.state.ks.us; douglas.johnson@rrc.state.tx.us; joeb@dnr.state.la.us; psbriggs@gw.dec.state.ny.us
Subject: New Mexico UIC Class III Brine Well Evaluation Work Group March 26 - 27, 2009
Attachments: KS UIC regs Class III Final Draft (2).doc; OCD UIC Class III Brine Well Evaluation Group.xlsx

Ladies and Gentlemen:

The purpose of the work group is to focus on an examination of the causes of the recent brine well collapses and provide recommendations for a safe path forward in a report to the NM Oil Conservation Commission by May 1, 2009. The 6-month brine well moratorium will end May 14, 2009.

Please mark your calendars for the work group meeting scheduled for March 26 – 27, 2009 at the New Mexico Oil Conservation Division (NMOCD). The 2-day meeting will be held in "Porter Hall" (1st floor) of the Wendell Chino Building, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505.

The NMOCD has received your responses and/or your referrals to the NMOCD by the recipients of the NMOCD's request for the above subject on January 27, 2009. The NMOCD compiled a spreadsheet based on the information received to date (see attached spreadsheet) and is working on an agenda based on your recommended topics.

You will notice that the NMOCD has also added an Internet Work Group in the event the work group develops a draft product that requires review by members of the work group. The Internet Work Group was created to be included in the event it wishes to provide comments in the process. The NMOCD feels that including other experts from across the country who are unable to attend the meeting will benefit the process. Although, the number of biographies requested by the NMOCD to date is incomplete. Participants are encouraged to send their brief biographies for compilation and inclusion in NMOCD's records.

The NMOCD requests contact information from those persons on the spreadsheet who lack contact info., etc. Please send it to me to update the work group tables and also if you are on the work group or internet work group.

Please find below UIC Brine Well Regulations links and/or attachments from KS, TX and NM in advance of the meeting to begin looking over regulations in comparison to New Mexico. This will surely be an agenda item.

Kansas UIC Brine Well Regulations (Draft Regulations are currently in Progress)

Kansas is in the process of adopting new Class III regulations to strengthen our control over these types of wells, so I have attached (see attached word document) our latest draft for your review. Hope this information helps and we look forward to assisting in your project.
Here is the link to our website: http://www.kdheks.gov/uic/index.html.

I have a new email address: khoeffner@kdheks.gov
Kirk Hoeffner, LG
Unit Chief, Underground Injection Control
Geology Section, Bureau of Water
Kansas Department of Health & Environment
1000 SW Jackson St. Suite 420

Topeka, KS 66612-1367
Telephone: (785) 296-1843
Fax: (785) 296-5509

Texas UIC Brine Well Regulations

Here is the link to our Rules, go to Chapter 3: Oil and Gas Division, then scroll to Rule 3.81, let me know if you have any trouble getting there:

http://www.rrc.state.tx.us/rules/rule.php

Respectfully,
Doug O. Johnson, PE
Manager for Injection - Storage Permits and Support Technical Permitting Section Oil and Gas Division
Texas Railroad Commission
Douglas.johnson@rrc.state.tx.us

New Mexico UIC Brine Well Regulations

Regulations: 20.6.2 NMAC: http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0002.htm

Guidance: UIC Manual: http://www.emnrd.state.nm.us/ocd/Publications.htm

Please contact me to update your contact information, add new members, etc., or if you have questions. Thank you for your participation.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

Kansas Department of Health & Environment Draft Regulations

3/5/2009

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-7. Draft permits. 40 CFR 124.6, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-8. Fact sheets. 40 CFR 124.8, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec.19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

3/5/2009

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-9. Establishing permit conditions. 40 CFR 144.52, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-10. Term of permits. (a) Class I, III, and V permits shall be effective for a fixed term not to exceed 10 years.

~~(b) Class III permits shall be issued for a period up to the operating life of the facility.~~

~~(c) Each permit shall be reviewed at least once every five years to determine whether it should be modified, revoked and reissued, or terminated, with the exception of permits for class I hazardous waste injection wells, which shall be reviewed at least annually to determine whether they should be modified, revoked and reissued, or terminated.~~

~~(d) Modification of permits shall not include extension of the maximum duration specified in subsection (a). At the end of the permit term, application shall be filed for a new permit.~~

(b) If the permittee wishes to continue an activity regulated by the permit after the expiration date of the permit, the permittee shall apply for and obtain a new permit. An application to renew the permit shall be filed with the department at least 180 days before the permit expiration date. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended May 1, 1987; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-11. Schedules of compliance. 40 CFR 144.53, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-12. Requirements for recording and reporting of monitoring results. 40 CFR 144.54, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

3/5/2009

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-13. Effect of a permit. 40 CFR 144.35, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-14. Transfer of permits. 40 CFR 144.38, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-15. Modification or revocation and reissuance of permits. 40 CFR 124.5 and 40 CFR 144.39, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

3/5/2009

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-16. Termination of permits. 40 CFR 144.40 as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by K.S.A. 2007 Supp. 65-171d; implementing K.S.A. 65-165; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-17. Minor modifications of permits. 40 CFR 144.41, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

3/5/2009

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-18. Area permits. 40 CFR 144.33, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-19. Emergency permits. 40 CFR 144.34, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec.19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-20. Corrective action. 40 CFR 144.55, 40 CFR 146.7 and 40 CFR 146.64, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec.19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-21. Public notice of permit actions and public comment period; public comments and requests for public hearings; public hearings; response to comments. ~~(a)~~ 40 CFR 124.10 through 40 CFR 124.12~~;~~, and 40 CFR 124.17, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference.

~~(b) Any provisions of Kansas law which provide additional opportunity for public comment or public hearing shall supersede the provisions of the federal regulations.~~ (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-22. Signatories to permit applications and reports. 40 CFR 144.32, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-27. Prohibition of movement of fluid into underground sources of drinking water. 40 CFR 144.12, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-28. Establishing maximum injection pressure. (a) A maximum allowable injection pressure for each injection well shall be established by the secretary as a permit condition.

(b) (1) All class I wells operating on other than gravity flow shall be prohibited.

(2) In the case of gravity flow, the positive wellhead pressure for a class I well shall not exceed 35 pounds per square inch gauge.

(c) For all wells, the maximum operating pressure shall not be allowed to exceed fracture pressure, except during the development of fractures for well stimulation operations, or ~~during the development of solution-mined wells as defined in K.A.R. 28-43-2(c)~~ for the purpose of establishing the connection of a class III salt solution mining well to other class III wells for operation as a salt solution mining gallery. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____, and K.S.A. 2007 Supp. 55-1, 117; effective P-_____)

Kansas Department of Health and Environment
Proposed Amended Regulation

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28-46-29. Design and construction requirements. 40 CFR 146.12 and 40 CFR 146.65, governing class I wells; and 40 CFR 146.32, governing class III wells, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. In addition, the following requirements shall apply to class III salt solution mining wells:

(a) Each salt solution mining well cavern wall shall be located not less than 50 feet from other active or abandoned brine-supply wells or other holes or excavations penetrating the salt section, except where the wells, holes or excavations have been properly plugged, and not less than 50 feet from existing surface structures not owned by the permittee, including any transportation artery.

(b) The cavern wall for a solution mining well shall be located not less than 50 feet from the property boundaries of any owners who have not consented to the mining of salt under their property.

(c) A salt solution mining wellhead shall be located not less than 150 feet from the property boundaries of any owners who have not consented to the mining of salt under their property.

(d) For each new salt solution mining well new or like new oil-field type steel surface casing shall be set through all freshwater formations and encased in cement from bottom to top by circulating cement through the bottom of the casing to the surface.

(e) Production casing, for each new salt solution mining well, shall be set into the upper

part of the salt formation and encased in cement as specified in this regulation. The casing shall extend a minimum of 55 feet into the salt formation. Centralizers shall be used on the outside of the production casing and shall not be spaced more than 100 feet apart. Before setting and cementing the production casing, the mudcake on the bore wall shall be removed by the use of scratchers or a washing method approved by the director. The cement for that part of the casing opposite the salt formation shall be prepared with salt-saturated cement.

(f) A variance for each well not meeting these requirements may be granted by the secretary if all the following conditions are met:

(1) The variance is protective of public health, safety, and the environment;

(2) the permittee agrees to perform any additional monitoring or well improvements, or any combination thereof, if required by the secretary; and

(3) the permittee agrees to conduct a geomechanical study in support of the variance request. The geomechanical study shall be conducted by a contractor experienced in conducting and interpreting geomechanical studies.

(g) Each permittee seeking a variance shall submit a written request, including justification for the variance, the geomechanical study and interpretation, and any additional supporting information to the secretary for review and consideration for approval.

(h) A cement bond log shall be conducted on the production casing after the cement mixture has cured for a minimum of 72 hours and submitted to the department within 45 days from completion of the test. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-

86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended

P-_____.), and K.S.A. 2007 Supp. 55-1, 117; effective

P-_____)

Kansas Department of Health and Environment
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28-46-29a. Operation of class III wells. (a) Each class III salt solution mining well shall not be operated under any of the following conditions:

(1) Where the salt roof is less than 50 feet in thickness above the washed cavern;

(2) the solution cavern has been developed as a single well and the dimensions of the cavern across a horizontal plane exceed 400 feet at any depth, or 300 feet when occurring in the upper one-third of the potential cavern height;

(3) the top of the solution cavern is less than 250 feet from the ground surface;

(4) the solution cavern has been developed as part of a gallery and the dimensions of the cavern across a horizontal plane exceed 400 feet at any depth, or 300 feet when occurring in the upper one-third of the potential cavern height, except the route of interconnection between wells;

(5) in areas where the depth to the top of the salt section is less than 400 feet below land surface, the dimensions of the cavern across a horizontal plane exceed 300 feet in diameter, except the route of interconnection between wells;

(6) the distance between adjacent galleries is less than 100 feet from the wall of a cavern in an adjacent gallery; or

(7) if there are leaks or losses of fluid in the casing or surface pipe of a well.

(b) A variance for wells not meeting the requirements in paragraphs (a)(2) and (a)(4) through (a)(6) may be granted by the secretary if all of the following conditions are met:

(1) The variance is protective of public health, safety, and the environment;

(2) the applicant or permittee agrees to perform any additional monitoring or well improvements, or any combination, if required by the secretary; and

(3) the applicant or permittee agrees to conduct a geomechanical study in support of the variance request. The geomechanical study shall be conducted by a contractor experienced in conducting and interpreting geomechanical studies.

(c) Each applicant or permittee seeking a variance shall submit a written request, including justification for the variance, the geomechanical study and interepretation, and any additional supporting information to the secretary for review and consideration for approval. (Authorized by and implementing K.S.A. 2007 Supp. 55-1, 117; effective P-_____)

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Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-30. ~~Operating,~~ Monitoring and reporting requirements for class I wells. 40 CFR 146.13, 40 CFR 146.67, 40 CFR 146.68 and 40 CFR 146.69, regulating class I wells ~~and 40 CFR 146.33, regulating class III wells~~, as in effect on ~~April 1, 1993~~ July 1, 2007, are hereby adopted by reference. In addition to 40 CFR 144.14 and 40 CFR 146.70, the following requirements are applicable to each class I hazardous waste injection well.

(a) Records of the continuously monitored parameters shall be maintained in addition to the monthly average, minimum and maximum values of the following parameters:

(1) Injection pressure;

(2) flow rate;

(3) injection volume; and

(4) annular pressure.

(b) Monitoring results shall be reported to the department on a monthly basis on forms provided by the department.

(c) The necessary number of monitoring wells in appropriate geologic zones for early detection of contaminant migration, to protect public health, safety, and the environment, shall be determined by the secretary. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994, amended P-_____.)

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28-46-30a. Monitoring and reporting requirements for class III wells. 40 CFR 146.33, regulating class III wells, as in effect on July 1, 2007, is hereby adopted by reference. In addition, the following requirements shall apply to the permittee of a class III salt solution mining well:

(a) Within two years of the effective date of this regulation, each permittee shall submit a facility plan for monitoring the injection and withdrawal volumes and injection pressures that meets the secretary's approval and ensures the protection of public health, safety, and the environment.

(b) The following monitoring records shall be submitted to the department on a monthly basis on a form provided by the department:

(1) The weekly injection and withdrawal volume for each salt solution mining well or gallery;

(2) the weekly injection and withdrawal ratio for each salt solution mining well or gallery; and

(3) a summary of the weekly minimum and maximum injection pressures for each salt solution mining well or gallery.

(c) A report shall be submitted annually to the department, on a form provided by the department, including the following:

(1) For each well, a percentage of the remaining amount of salt that can potentially be mined in accordance with these regulations; and

(2) a summary of facility activities regarding abnormal fluid loss, well drilling, well plugging, geophysical well logging, sonar caliper surveys, mechanical integrity testing, calibration and maintenance of flow meters and gauges, elevation survey results, and the description of the model theory used to calculate the percentage of the total amount of remaining salt that can potentially be mined in accordance with these regulations.

(d) If an unanticipated loss of fluid has occurred or the monitoring system indicates that leakage has occurred and has been verified, the permittee shall notify the department orally within 24 hours of discovery and confirm, in writing, within seven days regarding the abnormal loss or leakage.

(e) A sonar caliper survey shall be conducted on each well when calculations based on a model, approved by the secretary, indicate that 20% of the total amount of remaining salt that can potentially be mined in accordance with these regulations has been mined. The well shall be checked by the permittee to determine the dimensions and configuration of the cavern developed by the solutioning, and thereafter upon increments of the solutioning of each additional 20% of the total amount of remaining salt that can be potentially be mined in accordance with these regulations.

(f) Any permittee may use an alternative method for determining the dimensions and configuration of the solution mining cavern if the secretary determines that the alternative

method is substantially equivalent to the sonar caliper survey. The permittee shall submit the following information for the secretary's consideration:

(1) A description of the survey method and theory of operation, including the survey sensitivities, and justification for the survey parameters;

(2) a description of the well and cavern conditions under which the survey can be conducted;

(3) the procedure for interpreting the survey results; and

(4) an interpretation of the survey upon completion of the survey.

(g) More frequent monitoring of the cavern dimensions and configuration by sonar caliper survey may be required if the integrity or stability of the cavern is suspect. Each existing well shall comply with the survey frequency established in the well permit. The results of the survey, including logs, and an interpretation by a contractor experienced in sonar interpretation shall be submitted to the department within 45 days of completing the survey.

(h) A variance request to the sonar caliper survey frequency may be submitted by the permittee to the secretary for review and consideration if the sonar survey frequency results in undesirable cavern development, as determined by the secretary, providing both of the following conditions are met:

(1) The variance is protective of public health, safety, and the environment; and

(2) the permittee agrees to perform any additional monitoring or well improvements, or any combination thereof, if required by the secretary.

(i) Each permittee seeking a variance shall submit a written request, including

justification for the variance and any supporting data to the secretary for review and consideration for approval.

(j) The thickness of the salt roof shall be checked at the end of two years of use and biennially thereafter, unless otherwise permitted by the secretary by gamma ray or other methods approved by the secretary. A report of the method used and a copy of the survey shall be submitted to the department within 45 days from completion of the test.

(k) Each permittee shall give oral notification to the department of a verified exceedence of the maximum permitted injection pressure within 24 hours of discovery of the exceedence and submit written notification within seven calendar days to the department.

(l) Each new well shall have a meter to measure injection or withdrawal volume and the permittee shall maintain records of these flow volumes at the facility and shall make the records available to the secretary upon request.

(m) Each permittee shall submit a ground subsidence monitoring plan to the secretary within two years of the effective date of these regulations. The following requirements shall apply:

(1) The ground subsidence monitoring plan shall include the following information:

(A) A description of the method for conducting an elevation survey; and

(B) the criteria for establishing monuments, benchmarks, and wellhead survey points.

(2) The criteria for subsidence monitoring shall be as follows:

(A) Level measurements to the accuracy of 0.01 foot shall be made.

(B) Verified surface elevation changes in excess of 0.10 foot shall be reported within 24

hours of discovery to the department.

(C) No established benchmark shall be changed, unless the permittee submits a justification that the change is protective of public health, safety, and the environment.

(D) If a benchmark is changed, the elevation change from the previous benchmark shall be noted in the elevation survey report.

(E) Each permittee shall submit the elevation before and after any wellhead work that results in a change in the survey point at the wellhead.

(3) The elevation survey shall be conducted by a licensed professional land surveyor.

(4) All annual elevation survey results shall be submitted to the department within 45 days after completion of the survey.

(5) All certified and stamped field notes shall be made available by the permittee upon request by the secretary. (Authorized by and implementing K.S.A. 2007 Supp. 55-1, 117; effective P-_____.)

Kansas Department of Health and Environment
Proposed New Regulation

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28-46-30b. Groundwater monitoring for class III wells. (a) Each permittee of a salt solution mining well shall submit a groundwater monitoring plan, within two years of the effective date of these regulations, to the secretary for review and consideration for approval to ensure the protection of public health, safety, and the environment.

(b) All well locations and the spacing between all well locations shall be based on the geology and the hydrogeology at the facility to ensure the protection of public health, safety, and the environment, and shall meet the Secretary's approval.

(c) Within two years of the effective date of these regulations, each permittee shall submit a quality assurance plan, including techniques for sampling and analysis that meets the Secretary's approval and ensures the protection of public health, safety, and the environment.

(d) Each permittee shall collect groundwater samples and analyze the samples for chloride and any other parameters determined by the secretary that may pose a threat to public health, safety, and the environment. The sampling results shall be submitted to the department on forms provided by the department.

(e) Each permittee shall submit the results for chloride analyses from groundwater samples to the department on an annual basis on forms provided by the department or on a more frequent basis as determined by the secretary to ensure protection of public health, safety, and the environment.

(f) Each permittee shall submit a static groundwater level measurement for each monitoring

well with the chloride analyses results as specified in subsection (e).

(g) Any permittee where chloride concentrations in the groundwater exceeds concentrations greater than 250 milligrams per liter or the established background chloride concentration may be required to submit a workplan that meets the secretary's approval to ensure protection of public health, safety and the environment, and describes the methods to delineate potential source areas and to control migration of the chloride contamination. (Authorized by and implementing K.S.A. 2007 Supp. 55-1, 117; effective P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-31. Information to be considered by the secretary. 40 CFR 146.14, 40 CFR 146.62, 40 CFR 146.66, 40 CFR 146.70 and 40 CFR part 144, subpart F, for class I wells and 40 CFR 146.34, for class III wells, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. In addition to 40 CFR 146.14, 40 CFR 146.62, 40 CFR 146.66, 40 CFR 146.70 and 40 CFR part 144, subpart F, the following shall be applicable to class I hazardous waste injections wells:

(a) The ~~provisions of~~ requirements pursuant to K.S.A. 65-3439, and amendments thereto, as ~~it~~ the requirements ~~relates~~ relate to hazardous waste injection wells shall be applicable to class I hazardous waste injection wells.

(b) Each applicant shall be responsible for providing all available information to the department necessary ~~for the secretary to determine~~ so that well injection of the hazardous waste liquid in question is the most reasonable method of disposal after all other options have been considered.

(1) Factors to be considered in determining the most reasonable method shall include those ~~set forth~~ specified in K.S.A. 65-3439~~(d)~~, and amendments thereto.

(2) All factors considered shall be documented in a detailed report ~~in the format required by the secretary~~ submitted to the department.

(c) The location of each abandoned oil and gas well and exploratory hole within the area

of review, as specified in K.A.R. 28-46-32, shall be determined through a detailed record search and field survey.

(1) An interview with those responsible for drilling, producing, plugging, or witnessing these activities shall be a part of the record.

(2) The results of the field survey shall be documented in a report ~~in the format required by the secretary~~ submitted to the department.

(3) A map geographically documenting the location of all the holes and abandoned wells within the area of review, as specified in K.A.R. 28-46-32, shall be included as a part of the report. (Authorized by and implementing K.S.A. 2006 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; and amended P-_____.) and K.S.A. 2007 Supp. 55-1, 117; effective P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-33. Mechanical integrity testing. (a) A mechanical integrity test consisting of a pressure test with a liquid to evaluate the absence of a significant leak in the casing, tubing or packer and a test to determine the absence of significant fluid movement through vertical channels adjacent to the wellbore shall be required of each class I and class III permittee on each injection well at least once every five years.

(1) For class I hazardous waste injection wells, the mechanical integrity shall be conducted in accordance with 40 CFR 146.8 and 40 CFR 146.68(d), as in effect on July 1, 2007, and shall be demonstrated by the permittee by using all of the following:

(A) Conducting a pressure test with a liquid of the casing, tubing and packer at least annually and ~~whenever~~ if there has been a well workover;

(B) conducting a test of the bottom-hole cement by use of an approved radioactive survey at least annually;

(C) conducting a temperature, noise or oxygen activation log to test for movement of fluid along the borehole at least once every five years; and

(D) conducting a casing inspection log at least once every five years.

(2) The test for class I non-hazardous waste injection wells shall be conducted in accordance with 40 CFR 146.8, as ~~in effect April 1, 1993~~ adopted in K.A.R. 28-46-1.

(3) The test for class III injection wells shall be conducted in accordance with 40 CFR 146.8, ~~as in effect on April 1, 1993~~, except the casing shall be pressure tested by the use of a mechanical packer or retrievable plug~~; and the test for class I hazardous waste injection wells shall be conducted in accordance with 40 CFR 146.8 and 40 CFR 146.68(d), as in effect on April 1, 1993~~.

(b) ~~The~~ Each permittee shall be notified at least 30 days in advance ~~by the secretary~~ by the department that a mechanical integrity test ~~must~~ shall be performed, or a permittee may notify the ~~secretary~~ department that a voluntary mechanical integrity test will be performed at least 14 days in advance of the test.

(c) ~~The~~ Each permittee shall be required to cease injection operations immediately and to conduct a mechanical integrity test ~~approved by the secretary if the secretary believes that, due to an apparent problem~~, ~~the~~ if continued use of an injection well constitutes a threat to ~~human~~ public health or to waters of the state. Injection operations shall not be resumed until all of the following are met:

(1) The test has been conducted;

(2) ~~it~~ the test has been demonstrated ~~to the satisfaction of the secretary~~ that the well has mechanical integrity; and

(3) authorization to use the well has been ~~given~~ approved by the secretary.

(d) ~~A qualified state inspector~~ The secretary's authorized representative shall ~~be provided by the secretary to~~ witness all of the pressure mechanical integrity tests performed.

(e) ~~The~~ Each permittee shall submit results of all mechanical integrity tests to the secretary, in writing, within 30 days after the test has been conducted.

(f) 40 CFR 144.51(p), as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference.

(Authorized by and implementing K.S.A. 2006 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.), and

K.S.A. 2007 Supp. 55-1, 117; effective P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-34. Plugging and abandonment. 40 CFR 144.51(n)~~;~~, 40 CFR 144.52(a)(6), 40 CFR 146.10, 40 CFR 146.71, 40 CFR 146.72 and 40 CFR 146.73, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. In addition, the following shall apply for class III salt solution mining wells,

(a) The plugging of each salt solution mining well shall be conducted as specified in the department=s document titled Aprocedure for plugging and abandonment of a class III salt solution mining well, procedure #:UICIII-7," dated March 2005, and hereby adopted by reference.

(b) Any permittee may use an alternative method for the plugging of each salt solution mining well if the secretary determines that the alternative method is substantially equivalent to the procedure specified in subsection (a) and is protective of public health, safety and the environment. The permittee shall submit a detailed description of the alternative plugging method for the secretary's consideration. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d, effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.), and K.S.A. 2007 Supp. 55-1, 117; effective P-_____.)

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Proposed Amended Regulation

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28-46-35. State inspection and right of entry. ~~(a) Qualified state inspectors to inspect and monitor injection well facilities shall be provided by the secretary.~~

~~(b)~~ An ~~duly~~ authorized ~~representatives~~ representative of the secretary shall have access to injection facilities for all activities required by these regulations. (Authorized by K.S.A. ~~1984~~ 2007 Supp. 65-171d; implementing K.S.A. 65-170b; effective May 1, 1982; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-40. Exempted aquifers. (a) An aquifer may be designated by the secretary as exempt from protection as an underground source of drinking water. Criteria for exemption may include whether an aquifer meets one of the following:

(1) Contains water with more that 10,000 milligrams per liter of total dissolved solid;

(2) produces mineral, hydrocarbon or geothermal energy; or

(3) is situated at a depth ~~which~~ that makes the recovery of water economically impractical.

(b) These designations shall be first submitted to and approved by the administrator of the United States environmental protection agency. (Authorized by and implementing K.S.A. ~~1984~~ 2007 Supp. 65-171d; effective May 1, 1982; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-41. Sharing of information. 40 CFR 145.14, as in effect on ~~April 1, 1993~~ July 1, 2007, is adopted by reference. (Authorized by K.S.A. 2007 Supp. 65-171d; implementing K.S.A. 65-170g; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-44. Sampling and analysis techniques. (a) Sampling and analysis shall be performed in accordance with the techniques ~~prescribed~~ specified in 40 CFR part 136, as in effect on ~~April 1, 1993~~ July 1, 2007, ~~which~~ is adopted by reference.

(b) ~~Where~~ If 40 CFR part 136 does not contain sampling and analytical techniques for the parameter in question, or ~~where it is determined by the secretary that the~~ if in part 136 the sampling and analytical techniques are inappropriate for the parameter in question, the sampling and analysis shall be performed using validated analytical methods or other appropriate sampling and analytical procedures approved by the secretary to ensure the protection of public health, safety, and the environment.

~~(c) Alternate sampling and analytical techniques suggested by the permittee or other persons will be considered by the secretary.~~ (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed New Regulation

Article 46 - Underground Injection Control Regulations

28-46-45. Salt solution mining well operations; fees. (a) Each permittee shall submit an annual permit fee of $12,000 per facility and $175 per unplugged salt solution mining well on or before April 1 of each year.

(b) Fees shall be made payable to the AKansas department of health and environment - subsurface hydrocarbon storage fund.

(c) The fees collected under the provisions of this regulation are nonrefundable.

(d) If ownership of a salt solution mining well or salt solution mining facility changes during the term of a valid permit, no additional fee shall be required unless a change occurs that results in a new salt solution mining well or an expanded facility operation. (Authorized by and implementing K.S.A. 55-1,118; effective P-_____.)

Kansas Department of Health and Environment
Proposed Revocation Regulation

Article 46 - Underground Injection Control Regulations

28-46-1. General provisions. (Authorized by and implementing K.S.A. 65-171d; effective May 1, 1982; amended, T-86-47, Dec 19, 1985; amended May 1, 1986; amended March 21, 1994, revoked P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-2a. Definitions. (a) The following federal regulations, as in effect on ~~July 1, 2005~~ July 1, 2007, are hereby adopted by reference, except as specified:

(1) 40 CFR 124.2, except for the following terms and their definitions:

(A) AApplication@;

(B) Adirector@;

(C) Afacility or activity@;

(D) Amajor facility@;

(E) Aowner or operator@;

(F) Apermit@; and

(G) ASDWA@;

(2) 40 CFR 144.3, except for the following terms and their definitions:

(A) AApplication@;

(B) Aappropriate act and regulations@;

(C) Adirector@;

(D) Adraft permit@;

(E) AIndian tribe@;

(F) Atotal dissolved solids@; and

(G) Awell@;

(3) 40 CFR 144.61;

(4) 40 CFR 146.3, except for the following terms and their definitions:

(A) AApplication@;

(B) Adirector@;

(C) Aexempted aquifer@;

(D) Afacility or activity@;

(E) AIndian tribe@;

(F) Aowner or operator@;

(G) Apermit@;

(H) ASDWA@;

(I) Asite@; and

(J) Awell@; and

(5) 40 CFR 146.61(b), except for the term Acone of influence@ and its definition.

(b) In addition to the definitions adopted in subsection (a), the following definitions shall apply in this article:

(1) AApplication@ means the standard departmental form or forms required for applying for a permit, including any additions, revisions, and modifications to the forms.

(2) AAuthorized by rule,@ when used to describe an injection well, means that the well meets all of the following conditions:

(A) The well is a class V injection well.

(B) The well is in compliance with this article.

(C) The well is not prohibited, as specified in K.A.R. 28-46-26a.

(D) The well is not required by the secretary to have a permit.

(3) ACone of impression@ means the mound in the potentiometric surface of the receiving formation in the vicinity of the injection well.

(4) ACone of influence@ means the area around a well within which increased injection pressures caused by injection into the well would be sufficient to drive fluids into an underground source of drinking water (USDW).

(5) ADepartment@ means the Kansas department of health and environment.

(6) ADirector@ means the director of the division of environment of the Kansas department of health and environment.

(7) AExisting salt solution mining@ means a well authorized and permitted by the secretary before the effective date of these regulations.

(8) AFracture pressure@ means the wellhead pressure that could cause vertical or horizontal fracturing of rock along a well bore.

(9) AGallery @ means a series of two or more salt solution mining wells that are artificially connected within the salt horizon and are produced as a system with one or more wells designated for withdrawal of solutioned salt.

~~(8)~~ (10) AInjection well facility@ and "facility" ~~means all land, structures, appurtenances, and improvements on which one or more injection wells are located and that are within the same well field or project~~ mean the acreage associated with the injection field with facility boundaries

approved by the secretary. This term shall include the injection wells, wellhead, and any related equipment, including any appurtenances associated with the well field.

~~(9)~~ (11) AMaximum allowable injection pressure@ means the maximum wellhead pressure not to be exceeded as a permit condition.

~~(10)~~ (12) AMotor vehicle waste disposal well@ and AMVWDW@ mean a disposal well that received, receives, or has the potential to receive fluids from vehicular repair or maintenance activities.

(13) AProduction casing@ when used for a class III well, means the casing inside the surface casing of a well that extends into the salt formation.

(14) "Salt roof" means a value that is determined by subtracting the depth in feet below groundsurface of the highest point of a salt solution mining cavern from the depth in feet below groundsurface of the top of the salt section and approved by the secretary.

(15) ATransportation artery@ means any highway, county road, township road, private road, railroad, excluding existing right-of-way, not owned or leased by the permittee.

~~(11)~~ (16) ASecretary@ means the secretary of the Kansas department of health and environment or the secretary=s authorized representative.

~~(12)~~ (17) AWell@ means any of the following:

(A) A bored, drilled, or driven shaft whose depth is greater than the largest surface dimension;

(B) a dug hole whose depth is greater than the largest surface dimension;

(C) a sinkhole modified to receive fluids; or

(D) a subsurface fluid distribution system. (Authorized by and implementing K.S.A. ~~2005~~ 2007 Supp. 65-171d; effective March 2, 2007; amended P-_____.)

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Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-3. Classification of injection wells. 40 CFR 144.6, 40 CFR 144.80, and 40 CFR 146.5, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985, amended May 1, 1986; amended March 21, 1994; amended P-_____.)

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Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-4. Injection of hazardous or radioactive wastes into or above an underground source of drinking water. Injection of hazardous or radioactive wastes into or above an underground source of drinking water shall be prohibited. ~~Any similar injection taking place before the effective date of these rules and regulations shall be stopped immediately on the effective date of these rules and regulations.~~ ~~The secretary may issue such orders or take such actions as may be appropriate to enforce the provisions of this section~~. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended P-_____.)

3/5/2009

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-5. Application for injection well permits. 40 CFR 124.3 and 40 CFR 144.31, as in effect on ~~April 1, 1993~~ July 1, 2007, are adopted by reference. In addition, the provisions of K.S.A. 65-3437, and amendments thereto, ~~which relate~~ that relate to hazardous waste injection wells shall be applicable to class I hazardous waste injection wells. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

Kansas Department of Health and Environment
Proposed Amended Regulation

Article 46 - Underground Injection Control Regulations

28-46-6. Conditions applicable to all permits. 40 CFR 144.51(a) through (p), as in effect ~~April 1, 1993~~ July 1, 2007, are adopted by reference. (Authorized by and implementing K.S.A. 2007 Supp. 65-171d; effective May 1, 1982; amended, T-83-49, Dec. 22, 1982; amended May 1, 1983; amended, T-86-47, Dec. 19, 1985; amended May 1, 1986; amended March 21, 1994; amended P-_____.)

abatement completion report, or modifies or terminates an approved abatement plan, he shall provide written notice of such action by certified mail to the responsible person and any person who participated in the action.

B. Any person who participated in the action before the secretary and who is adversely affected by the action listed in Subsection A of 20.6.2.4114 NMAC may file a petition requesting a review before the commission.

C. The petition shall be made in writing to the commission and shall be filed with the commission's secretary within thirty (30) days after receiving notice of the secretary's action. The petition shall specify the portions of the action to which the petitioner objects, certify that a copy of the petition has been mailed or hand-delivered to the secretary, and to the applicant or permittee if the petitioner is not the applicant or permittee, and attach a copy of the action for which review is sought. Unless a timely petition for hearing is made, the secretary's action is final.

D. The proceedings before the commission shall be conducted as provided in the commission's adjudicatory procedures, 20 NMAC 1.3.

E. The cost of the court reporter for the hearing shall be paid by the petitioner.

F. The appeal provisions do not relieve the owner, operator or responsible person of their obligations to comply with any federal or state laws or regulations.

[12-1-95, 11-15-96; 20.6.2.4114 NMAC - Rn, 20 NMAC 6.2.IV.4114, 1-15-01; A, 7-16-06]

20.6.2.4115 COURT REVIEW OF COMMISSION DECISIONS: Court review of commission decisions shall be as provided by law.

[12-1-95; 20.6.2.4115 NMAC - Rn, 20 NMAC 6.2.IV.4115, 1-15-01]

20.6.2.4116 - 20.6.2.4999: [RESERVED]

[12-1-95; 20.6.2.4116 - 20.6.2.4999 NMAC - Rn, 20 NMAC 6.2.IV.4116-5100, 1-15-01]

20.6.2.5000 UNDERGROUND INJECTION CONTROL:

[12-1-95; 20.6.2.5000 NMAC - Rn, 20 NMAC 6.2.V, 1-15-01]

20.6.2.5001 PURPOSE: The purpose of Sections 20.6.2.5000 through 20.6.2.5299 NMAC controlling discharges from underground injection control wells is to protect all ground water of the State of New Mexico which has an existing concentration of 10,000 mg/l or less TDS, for present and potential future use as domestic and agricultural water supply, and to protect those segments of surface waters which are gaining because of ground water inflow for uses designated in the New Mexico Water Quality Standards. Sections 20.6.2.5000 through 20.6.2.5299 NMAC include notification requirements, and requirements for discharges directly into the subsurface through underground injection control wells.

[20.6.2.5001 NMAC - N, 12-1-01]

20.6.2.5002 UNDERGROUND INJECTION CONTROL WELL CLASSIFICATIONS:

A. Underground injection control wells include the following.

(1) Any dug hole or well that is deeper than its largest surface dimension, where the principal function of the hole is emplacement of fluids.

(2) Any septic tank or cesspool used by generators of hazardous waste, or by owners or operators of hazardous waste management facilities, to dispose of fluids containing hazardous waste.

(3) Any subsurface distribution system, cesspool or other well which is used for the injection of wastes.

B. Underground injection control wells are classified as follows:

(1) Class I wells inject fluids beneath the lowermost formation that contains 10,000 milligrams per liter or less TDS. Class I hazardous or radioactive waste injection wells inject fluids containing any hazardous or radioactive waste as defined in 74-4-3 and 74-4A-4 NMSA 1978, including any combination of these wastes. Class I non-hazardous waste injection wells inject non-hazardous and non-radioactive fluids, and they inject naturally-occurring radioactive material (NORM) as provided by Section 20.3.1.1407 NMAC.

(2) Class II wells inject fluids associated with oil and gas recovery.

(3) Class III wells inject fluids for extraction of minerals or other natural resources, including sulfur, uranium, metals, salts or potash by in situ extraction. This classification includes only in situ production from ore bodies that have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V.

(4) Class IV wells inject fluids containing any radioactive or hazardous waste as defined in 74-4-3 and 74-4A-4 NMSA 1978, including any combination of these wastes, above or into a formation that contains 10,000 mg/l or less TDS.

(5) Class V wells inject a variety of fluids and are those wells not included in Class I, II, III or IV. Types of Class V wells include, but are not limited to, the following:

(a) Domestic liquid waste injection wells

(i) domestic liquid waste disposal wells used to inject greater than 2,000 gallons per day of treated domestic liquid waste through subsurface fluid distribution systems or vertical wells;

(ii) septic system wells used to emplace greater than 2,000 gallons per day of domestic liquid waste into the subsurface, which are comprised of a septic tank and subsurface fluid distribution system;

(iii) large capacity cesspools used to inject greater than 2,000 gallons per day of domestic liquid waste, including drywells that sometimes have an open bottom and/or perforated sides.

(b) Industrial waste injection wells

(i) air conditioning return flow wells used to return to the supply aquifer the water used for heating or cooling;

(ii) dry wells used for the injection of wastes into a subsurface formation;

(iii) geothermal energy injection wells associated with the recovery of geothermal energy for heating, aquaculture and production of electrical power;

(iv) stormwater drainage wells used to inject storm runoff from the surface into the subsurface;

(v) motor vehicle waste disposal wells that receive or have received fluids from vehicular repair or maintenance activities;

(vi) car wash waste disposal wells used to inject fluids from motor vehicle washing activities.

(c) Mining injection wells

(i) stopes leaching wells used for solution mining of conventional mines;

(ii) brine injection wells used to inject spent brine into the same formation from which it was withdrawn after extraction of halogens or their salts;

(iii) backfill wells used to inject a mixture of water and sand, mill tailings or other solids into mined out portions of subsurface mines whether water injected is a radioactive waste or not;

(iv) injection wells used for in situ recovery of lignite, coal, tar sands, and oil shale.

(d) Ground water management injection wells

(i) ground water remediation injection wells used to inject contaminated ground water that has been treated to ground water quality standards;

(ii) in situ ground water remediation wells used to inject a fluid that facilitates vadose zone or ground water remediation.

(iii) recharge wells used to replenish the water in an aquifer, including use to reclaim or improve the quality of existing ground water;

(iv) barrier wells used to inject fluids into ground water to prevent the intrusion of saline or contaminated water into ground water of better quality;

(v) subsidence control wells (not used for purposes of oil or natural gas production) used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft of fresh water;

(vi) wells used in experimental technologies.

(e) Agricultural injection wells - drainage wells used to inject fluids into ground water to prevent the intrusion of saline or contaminated water into ground water of better quality.

[20.6.2.5002 NMAC - N, 12-1-01]

20.6.2.5003 NOTIFICATION AND GENERAL OPERATION REQUIREMENTS FOR ALL UNDERGROUND INJECTION CONTROL WELLS: All operators of underground injection control wells, except those wells regulated under the Oil and Gas Act, the Geothermal Resources Conservation Act, and the Surface Mining Act, shall:

A. For existing underground injection control wells, submit to the secretary the information enumerated in Subsection C of Section 20.6.2.1201 NMAC of this Part; provided, however, that if the information in Subsection C of Section 20.6.2.1201 NMAC has been previously submitted to the secretary and acknowledged by him, the information need not be resubmitted; and

B. Operate and continue to operate in conformance with Sections 20.6.2.1 through 20.6.2.5299 NMAC.

C. For new underground injection control wells, submit to the secretary the information enumerated in Subsection C of Section 20.6.2.1201 NMAC of this Part at least 120 days prior to well construction.

[9-20-82, 12-1-95; 20.6.2.5300 NMAC - Rn, 20 NMAC 6.2.V.5300, 1-15-01; 20.6.2.5003 NMAC - Rn, 20.6.2.5300 NMAC, 12-1-01; A, 12-1-01; A, 9-15-02]

20.6.2.5004 PROHIBITED UNDERGROUND INJECTION CONTROL ACTIVITIES AND WELLS:

A. No person shall perform the following underground injection activities nor operate the following underground injection control wells:

(1) The injection of fluids into a motor vehicle waste disposal well is prohibited. Motor vehicle waste disposal wells are prohibited. Any person operating a new motor vehicle waste disposal well (for which construction began after April 5, 2000) must close the well immediately. Any person operating an existing motor vehicle waste disposal well must cease injection immediately and must close the well by December 31, 2002, except as provided in this Subsection.

(2) The injection of fluids into a large capacity cesspool is prohibited. Large capacity cesspools are prohibited. Any person operating a new large capacity cesspool (for which construction began after April 5, 2000) must close the cesspool immediately. Any person operating an existing large capacity cesspool must cease injection immediately and must close the cesspool by December 31, 2002.

(3) The injection of any hazardous or radioactive waste into a well is prohibited, except as provided in this Subsection.

(a) Class I hazardous or radioactive waste injection wells are prohibited, except naturally-occurring radioactive material (NORM) regulated under Section 20.3.1.1407 NMAC is allowed as a Class I non-hazardous waste injection well pursuant to Subsection B (1) of Section 20.6.2.5002 NMAC;

(b) Class IV wells are prohibited, except for wells re-injecting treated ground water into the same formation from which it was drawn as part of a removal or remedial action if the injection has prior approval from the Environmental Protection Agency (EPA) or the department under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or the Resource Conservation and Recovery Act (RCRA).

(4) Barrier wells, drainage wells, recharge wells, return flow wells, and motor vehicle waste disposal wells are prohibited, except when the discharger can demonstrate that the discharge will not adversely affect the health of persons, and

(a) the injection fluid does not contain a contaminant which may cause an exceedance at any place of present or reasonable foreseeable future use of any primary state drinking water maximum contaminant level as specified in the water supply regulations, "Drinking Water" (20 NMAC 7.1) [20.7.10 NMAC], adopted by the Environmental Improvement Board under the Environmental Improvement Act or the standard of Section 20.6.2.3103 NMAC, whichever is more stringent;

(b) the discharger can demonstrate that the injection will result in an overall or net improvement in water quality as determined by the secretary.

B. Closure of prohibited underground injection control wells shall be in accordance with Section 20.6.2.5005 NMAC and Section 20.6.2.5209 NMAC.

[20.6.2.5004 NMAC - N, 12-1-01]

20.6.2.5005 PRE-CLOSURE NOTIFICATION AND CLOSURE REQUIREMENTS:

A. Any person proposing to close a Class I, III, IV or V underground injection control well must submit pre-closure notification to the department at least 30 days prior to closure. Pre-closure notification must include the following information:

(1) Name of facility
(2) Address of facility
(3) Name of Owner/Operator
(4) Address of Owner/Operator
(5) Contact Person
(6) Phone Number
(7) Type of Well(s)
(8) Number of Well(s)
(9) Well Construction (e.g. drywell, improved sinkhole, septic tank, leachfield, cesspool, other…)
(10) Type of Discharge

(11) Average Flow (gallons per day)
(12) Year of Well Construction
(13) Proposed Well Closure Activities (e.g. sample fluids/sediment, appropriate disposal of remaining fluids/sediments, remove well and any contaminated soil, clean out well, install permanent plug, conversion to other type well, ground water and vadose zone investigation, other)
(14) Proposed Date of Well Closure
(15) Name of Preparer
(16) Date

B. Proposed well closure activities must be approved by the department prior to implementation.
[20.6.2.5005 NMAC - N, 12-1-01]

20.6.2.5006 DISCHARGE PERMIT REQUIREMENTS FOR CLASS V INJECTION WELLS
Class V injection wells must meet the requirements of Sections 20.6.2.3000 through 20.6.2.3999 NMAC and Sections 20.6.2.5000 through 20.6.2.5006 NMAC.
[20.6.2.5006 NMAC - N, 12-1-01]

20.6.2.5007 - 20.6.2.5100: [RESERVED]
[12-1-95; 20.6.2.5001 - 20.6.2.5100 NMAC - Rn, 20 NMAC 6.2.IV.4116-5100, 1-15-01; 20.6.2.5007 -20.6.2.5100 NMAC - Rn 20.6.2.5001 - 20.6.2.5100 NMAC, 12-1-01]

20.6.2.5101 DISCHARGE PERMIT AND OTHER REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. Class I non-hazardous waste injection wells and Class III wells must meet the requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC in addition to other applicable requirements of the commission regulations. The secretary may also require that some Class IV and Class V wells comply with the requirements for Class I non-hazardous waste injection wells in Sections 20.6.2.5000 through 20.6.2.5299 NMAC if the secretary determines that the additional requirements are necessary to prevent the movement of water contaminants from a specified injection zone into ground water having 10,000 mg/l or less TDS. No Class I non-hazardous waste injection well or Class III well may be approved which allows for movement of fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC, or pursuant to a temporary designation as provided in Paragraph (2) of Subsection C of Section 20.6.2.5101 NMAC.

B. Operation of a Class I non-hazardous waste injection well or Class III well must be pursuant to a discharge permit meeting the requirements of Sections 20.6.2.3000 through 20.6.2.3999 NMAC and Sections 20.6.2.5000 through 20.6.2.5299 NMAC.

C. Discharge permits for Class I non-hazardous waste injection wells, or Class III wells affecting ground water of 10,000 mg/l or less TDS submitted for secretary approval shall:

(1) Receive an aquifer designation if required in Section 20.6.2.5103 NMAC prior to discharge permit issuance; or

(2) For Class III wells only, address the methods or techniques to be used to restore ground water so that upon final termination of operations including restoration efforts, ground water at any place of withdrawal for present or reasonably foreseeable future use will not contain either concentrations in excess of the standards of Section 20.6.2.3103 NMAC or any toxic pollutant. Issuance of a discharge permit or project discharge permit for Class III wells that provides for restoration of ground water in accordance with the requirements of this Subsection shall substitute for the aquifer designation provisions of Section 20.6.2.5103 NMAC. The approval shall constitute a temporary aquifer designation for a mineral bearing or producing aquifer, or portion thereof, to allow injection as provided for in the discharge permit. Such temporary designation shall expire upon final termination of operations including restoration efforts.

D. The exemptions from the discharge permit requirement listed in Section 20.6.2.3105 NMAC do not apply to underground injection control wells except as provided below:

(1) Wells regulated by the Oil Conservation Division under the exclusive authority granted under Section 70-2-12 NMSA 1978 or under other Sections of the "Oil and Gas Act";

(2) Wells regulated by the Oil Conservation Division under the "Geothermal Resources Act";

(3) Wells regulated by the New Mexico Coal Surface Mining Bureau under the "Surface Mining Act";

(4) Wells for the disposal of effluent from systems which receive less than 2,000 gallons per day of domestic sewage effluent and are regulated under the "Liquid Waste Disposal Regulations" (20 NMAC 7.3) [20.7.3 NMAC] adopted by the Environmental Improvement Board under the "Environmental Improvement Act".

E. Project permits for Class III wells.

(1) The secretary may consider a project discharge permit for Class III wells, if the wells are:

(a) Within the same well field, facility site or similar unit,

(b) Within the same aquifer and ore deposit,

(c) Of similar construction,

(d) Of the same purpose, and

(e) Operated by a single owner or operator.

(2) A project discharge permit does not allow the discharger to commence injection in any individual operational area until the secretary approves an application for injection in that operational area (operational area approval).

(3) A project discharge permit shall:

(a) Specify the approximate locations and number of wells for which operational area approvals are or will be sought with approximate time frames for operation and restoration (if restoration is required) of each area; and

(b) Provide the information required under the following Sections of this Part, except for such additional site-specific information as needed to evaluate applications for individual operational area approvals: Subsection C of Section 20.6.2.3106, Sections 20.6.2.3107, 20.6.2.5204 through 20.6.2.5209, and Subsection B of Section 20.6.2.5210 NMAC.

(4) Applications for individual operational area approval shall include the following:

(a) Site-specific information demonstrating that the requirements of this Part are met, and

(b) Information required under Sections 20.6.2.5202 through 20.6.2.5210 NMAC and not previously provided pursuant to Subparagraph (b) of Paragraph (3) of Subsection E of this Section.

(5) Applications for project discharge permits and for operational area approval shall be processed in accordance with the same procedures provided for discharge permits under Sections 20.6.2.3000 through 20.6.2.3114 NMAC, allowing for public notice on the project discharge permit and on each application for operational area approval pursuant to Section 20.6.2.3108 NMAC with opportunity for public hearing prior to approval or disapproval.

(6) The discharger shall comply with additional requirements that may be imposed by the secretary pursuant to this Part on wells in each new operational area.

F. If the holder of a discharge permit for a Class I non-hazardous waste injection well, or Class III well submits an application for discharge permit renewal at least 120 days before discharge permit expiration, and the discharger is in compliance with his discharge permit on the date of its expiration, then the existing discharge permit for the same activity shall not expire until the application for renewal has been approved or disapproved. An application for discharge permit renewal must include and adequately address all of the information necessary for evaluation of a new discharge permit. Previously submitted materials may be included by reference provided they are current, readily available to the secretary and sufficiently identified to be retrieved.

G. Discharge Permit Signatory Requirements: No discharge permit for a Class I non-hazardous waste injection well or Class III well may be issued unless:

(1) The application for a discharge permit has been signed as follows:

(a) For a corporation: by a principal executive officer of at least the level of vice-president, or a representative who performs similar policy-making functions for the corporation who has authority to sign for the corporation; or

(b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(c) For a municipality, state, federal, or other public agency: by either a principal executive officer who has authority to sign for the agency, or a ranking elected official; and

(2) The signature is directly preceded by the following certification: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment."

H. Transfer of Class I non-hazardous waste injection well and Class III well Discharge Permits.

(1) The transfer provisions of Section 20.6.2.3111 NMAC do not apply to a discharge permit for a Class I non-hazardous waste injection well or Class III well.

(2) A Class I non-hazardous waste injection well or Class III well discharge permit may be transferred if:

(a) The secretary receives written notice 30 days prior to the transfer date; and

(b) The secretary does not object prior to the proposed transfer date. The secretary may require modification of the discharge permit as a condition of transfer, and may require demonstration of adequate financial responsibility.

(3) The written notice required by Subparagraph (b) of Paragraph (2) of Subsection I above shall:

(a) Have been signed by the discharger and the succeeding discharger, including an acknowledgement that the succeeding discharger shall be responsible for compliance with the discharge permit upon taking possession of the facility; and

(b) Set a specific date for transfer of discharge permit responsibility, coverage and liability; and

(c) Include information relating to the succeeding discharger's financial responsibility required by Paragraph (17) of Subsection B of Section 20.6.2.5210 NMAC.

I. Modification or Termination of a Discharge Permit for a Class I non-hazardous waste injection well or Class III well: If data submitted pursuant to any monitoring requirements specified in the discharge permit or other information available to the secretary indicate that this Part are being or may be violated, the secretary may require modification or, if it is determined by the secretary that the modification may not be adequate, may terminate a discharge permit for a Class I non-hazardous waste injection Well, or Class III well or well field, that was approved pursuant to the requirements of this under Sections 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

(1) Noncompliance by the discharger with any condition of the discharge permit; or

(2) The discharger's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or the discharger's misrepresentation of any relevant facts at any time; or

(3) A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination.

[9-20-82, 12-1-95, 11-15-96; 20.6.2.5101 NMAC - Rn, 20 NMAC 6.2.V.5101, 1-15-01; A, 12-1-01; A, 9-15-02]

20.6.2.5102 PRE-CONSTRUCTION REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. Discharge Permit Requirement for Class I non-hazardous waste injection wells.

(1) Prior to construction of a Class I non-hazardous waste injection well or conversion of an existing well to a Class I non-hazardous waste injection well, an approved discharge permit is required that incorporates the requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC, except Subsection C of Section 20.6.2.5210 NMAC. As a condition of discharge permit issuance, the operation of the Class I non-hazardous waste injection well under the discharge permit will not be authorized until the secretary has:

(a) Reviewed the information submitted for his consideration pursuant to Subsection C of Section 20.6.2.5210 NMAC, and

(b) Determined that the information submitted demonstrates that the operation will be in compliance with this Part and the discharge permit.

(2) If conditions encountered during construction represent a substantial change which could adversely impact ground water quality from those anticipated in the discharge permit, the secretary shall require a discharge permit modification or may terminate the discharge permit pursuant to Subsection I of Section 20.6.2.5101 NMAC, and the secretary shall publish public notice and allow for comments and hearing in accordance with Section 20.6.2.3108 NMAC.

B. Notification Requirement for Class III wells.

(1) The discharger shall notify the secretary in writing prior to the commencement of drilling or construction of wells which are expected to be used for in situ extraction, unless the discharger has previously received a discharge permit or project discharge permit for the Class III well operation.

(a) Any person, proposing to drill or construct a new Class III well or well field, or convert an existing well to a Class III well, shall file plans, specifications and pertinent documents regarding such construction or conversion, with the Ground Water Quality Bureau of the Environment Department.

(b) Plans, specifications, and pertinent documents required by this Section, if pertaining to geothermal installations, carbon dioxide facilities, or facilities for the exploration, production, refinement or pipeline transmission of oil and natural gas, shall be filed instead with the Oil Conservation Division.

(c) Plans, specifications and pertinent documents required to be filed under this Section must be filed 90 days prior to the planned commencement of construction or conversion.

(d) The following plans, specifications and pertinent documents shall be provided with the notification:

(i) Information required in Subsection C of Section 20.6.2.3106 NMAC;

(ii) A map showing the Class III wells which are to be constructed. The map must also show, in so far as is known or is reasonably available from the public records, the number, name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features, including residences and roads, that are within the expected area of review (Section 20.6.2.5202 NMAC) of the Class III well or well field perimeter;

(iii) Maps and cross-sections indicating the general vertical and lateral limits of all ground water having 10,000 mg/l or less TDS within one mile of the site, the position of such ground water within this area relative to the injection formation, and the direction of water movement, where known, in each zone of ground water which may be affected by the proposed injection operation;

(iv) Maps and cross-sections detailing the geology and geologic structure of the local area, including faults, if known or suspected;

(v) The proposed formation testing program to obtain an analysis or description, whichever the secretary requires, of the chemical, physical, and radiological characteristics of, and other information on, the receiving formation;

(vi) The proposed stimulation program;

(vii) The proposed injection procedure;

(viii) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(ix) Proposed construction procedures, including a cementing and casing program, logging procedures, deviation checks, and a drilling, testing, and coring program;

(x) Information, as described in Paragraph (17) of Subsection B of Section 20.6.2.5210 NMAC, showing the ability of the discharger to undertake measures necessary to prevent groundwater contamination; and

(xi) A plugging and abandonment plan showing that the requirements of Subsections B, C and D of Section 20.6.2.5209 NMAC will be met.

(2) Prior to construction, the discharger shall have received written notice from the secretary that the information submitted under item 10 of Subparagraph (d) of Paragraph (1) of Subsection B of Section 20.6.2.5102 NMAC is acceptable. Within 30 days of submission of the above information the secretary shall notify the discharger that the information submitted is acceptable or unacceptable.

(3) Prior to construction, the secretary shall review said plans, specifications and pertinent documents and shall comment upon their adequacy of design for the intended purpose and their compliance with pertinent Sections of this Part. Review of plans, specifications and pertinent documents shall be based on the criteria contained in Section 20.6.2.5205, Subsection E of Section 20.6.2.5209, and Subparagraph (d) of Paragraph (1) of Subsection B of Section 20.6.2.5102 NMAC.

(4) Within thirty (30) days of receipt, the secretary shall issue public notice, consistent with Subsection B of Section 20.6.2.3108 NMAC, that notification was submitted pursuant to Subsection B of Section 20.6.2.5102 NMAC. The secretary shall allow a period of at least thirty (30) days during which comments may be submitted. The public notice shall include:

(a) Name and address of the proposed discharger;

(b) Location of the discharge;

(c) Brief description of the proposed activities;

(d) Statement of the public comment period; and

(e) Address and telephone number at which interested persons may obtain further information.

(5) The secretary shall comment in writing upon the plans and specifications within sixty (60) days of their receipt by the secretary.

(6) Within thirty (30) days after completion, the discharger shall submit written notice to the secretary that the construction or conversion was completed in accordance with submitted plans and specifications, or shall submit as-built plans detailing changes from the originally submitted plans and specifications.

(7) In the event a discharge permit application is not submitted or approved, all wells which may cause groundwater contamination shall be plugged and abandoned by the applicant pursuant to the plugging and abandonment plan submitted in the notification; these measures shall be consistent with any comments made by the

secretary in his review. If the wells are not to be permanently abandoned and the discharger demonstrates that plugging at this time is unnecessary to prevent groundwater contamination, plugging pursuant to the notification is not required. Financial responsibility established pursuant to Sections 20.6.2.5000 through 20.6.2.5299 NMAC will remain in effect until the discharger permanently abandons and plugs the wells in accordance with the plugging and abandonment plan.
[9-20-82, 12-24-87, 12-1-95; 20.6.2.5102 NMAC - Rn, 20 NMAC 6.2.V.5102, 1-15-01; A, 12-1-01]

20.6.2.5103 DESIGNATED AQUIFERS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. Any person may file a written petition with the secretary seeking commission consideration of certain aquifers or portions of aquifers as "designated aquifers". The purpose of aquifer designation is:

(1) For Class I non-hazardous waste injection wells, to allow as a result of injection, the addition of water contaminants into ground water, which before initiation of injection has a concentration between 5,000 and 10,000 mg/l TDS; or

(2) For Class III wells, to allow as a result of injection, the addition of water contaminants into ground water, which before initiation of injection has a concentration between 5,000 and 10,000 mg/l TDS, and not provide for restoration or complete restoration of that ground water pursuant to Paragraph (2) of Subsection C of Section 20.6.2.5101 NMAC.

B. The applicant shall identify (by narrative description, illustrations, maps or other means) and describe such aquifers, in geologic and/or geometric terms (such as vertical and lateral limits and gradient) which are clear and definite.

C. An aquifer or portion of an aquifer may be considered for aquifer designation under Subsection A. of this Section, if the applicant demonstrates that the following criteria are met:

(1) It is not currently used as a domestic or agricultural water supply; and

(2) There is no reasonable relationship between the economic and social costs of failure to designate and benefits to be obtained from its use as a domestic or agricultural water supply because:

(a) It is situated at a depth or location which makes recovery of water for drinking or agricultural purposes economically or technologically impractical at present and in the reasonably foreseeable future; or

(b) It is already so contaminated that it would be economically or technologically impractical to render that water fit for human consumption or agricultural use at present and in the reasonably foreseeable future.

D. The petition shall state the extent to which injection would add water contaminants to ground water and why the proposed aquifer designation should be approved. For Class III wells, the applicant shall state whether and to what extent restoration will be carried out.

E. The secretary shall either transmit the petition to the commission within sixty (60) days recommending that a public hearing be held, or refuse to transmit the petition and notify the applicant in writing citing reasons for such refusal.

F. If the secretary transmits the petition to the commission, the commission shall review the petition and determine to either grant or deny a public hearing on the petition. If the commission grants a public hearing, it shall issue a public notice, including the following information:

(1) Name and address of the applicant;

(2) Location, depth, TDS, areal extent, general description and common name or other identification of the aquifer for which designation is sought;

(3) Nature of injection and extent to which the injection will add water contaminants to ground water; and

(4) Address and telephone number at which interested persons may obtain further information.

G. If the secretary refuses to transmit the petition to the commission, then the applicant may appeal the secretary's disapproval of the proposed aquifer designation to the commission within thirty (30) days, and address the issue of whether the proposed aquifer designation meets the criteria of Subsections A, B, C, and D of this Section.

H. If the commission grants a public hearing, the hearing shall be held in accordance with the provisions of Section 74-6-6, NMSA 1978.

I. If the commission does not grant a public hearing on the petition, the aquifer designation shall not be approved.

J. After public hearing and consideration of all facts and circumstances included in Section 74-6-4(D), NMSA 1978, the commission may authorize the secretary to approve a proposed designated aquifer if the commission determines that the criteria of Subsection A, B, C, and D of this section are met.

K. Approval of a designated aquifer petition does not alleviate the applicant from complying with other Sections of Sections 20.6.2.5000 through 20.6.2.5299 NMAC, or of the responsibility for protection, pursuant to this part, of other nondesignated aquifers containing ground water having 10,000 mg/l or less TDS.

L. Persons other than the petitioner may add water contaminants as a result of injection into an aquifer designated for injection, provided the person receives a discharge permit pursuant to the requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC. Persons, other than the original petitioner or his designee, requesting addition of water contaminants as a result of injection into aquifers previously designated only for injection with partial restoration shall file a petition with the commission pursuant to the requirements of Subsections A, B, C, and D of this Section.

[9-20-82, 12-1-95; 20.6.2.5103 NMAC - Rn, 20 NMAC 6.2.V.5103, 1-15-01; A, 12-1-01]

20.6.2.5104 WAIVER OF REQUIREMENT BY SECRETARY FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. Where a Class I non-hazardous waste injection well or a Class III well or well field, does not penetrate, or inject into or above, and which will not affect, ground water having 10,000 mg/l of less TDS, the secretary may:

(1) Issue a discharge permit for a well or well field with less stringent requirements for area of review, construction, mechanical integrity, operation, monitoring, and reporting than required by Sections 20.6.2.5000 through 20.6.2.5299 NMAC; or

(2) For Class III wells only, issue a discharge permit pursuant to the requirements of Sections 20.6.2.3000 through 20.6.2.3114 NMAC.

B. Authorization of a reduction in requirements under Subsection A of this Section shall be granted only if injection will not result in an increased risk of movement of fluids into ground water having 10,000 mg/l or less TDS, except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC.

[9-20-82, 12-1-95; 20.6.2.5104 NMAC - Rn & A, 20 NMAC 6.2.V.5104, 1-15-01; A, 12-1-01]

20.6.2.5105 - 20.6.2.5199: [RESERVED]

[12-1-95; 20.6.2.5105 - 20.6.2.5199 NMAC - Rn, 20 NMAC 6.2.V.5105-5199, 1-15-01]

20.6.2.5200 TECHNICAL CRITERIA AND PERFORMANCE STANDARDS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

[12-1-95; 20.6.2.5200 NMAC - Rn, 20 NMAC 6.2.V.5200, 1-15-01; A, 12-1-01]

20.6.2.5201 PURPOSE: Sections 20.6.2.5200 through 20.6.2.5210 NMAC provide the technical criteria and performance standards for Class I non-hazardous waste injection wells and Class III wells.

[9-20-82; 20.6.2.5201 NMAC - Rn, 20 NMAC 6.2.V.5201, 1-15-01; A, 12-1-01]

20.6.2.5202 AREA OF REVIEW:

A. The area of review is the area surrounding a Class I non-hazardous waste injection well or Class III well or the area within and surrounding a well field that is to be examined to identify possible fluid conduits, including the location of all known wells and fractures which may penetrate the injection zone.

B. The area of review for each Class I non-hazardous waste injection well, or each Class III well or well field shall be an area which extends:

(1) Two and one half (2 1/2) miles from the well, or well field; or

(2) One-quarter (1/4) mile from a well or well field where the area of review is calculated to be zero pursuant to Paragraph (3) of Subsection B below, or where the well field production at all times exceeds injection to produce a net withdrawal; or

(3) A suitable distance, not less than one-quarter (1/4) mile, proposed by the discharger and approved by the secretary, based upon a mathematical calculation to determine the area of review. Computations to determine the area of review may be based upon the parameters listed below and should be calculated for an injection time period equal to the expected life of the Class I non-hazardous waste injection well, or Class III well or well field. The following modified Theis equation illustrates one form which the mathematical model may take to compute the

area of review; the discharger must demonstrate that any equation or simulation used to compute the area of review applies to the hydrogeologic conditions in the area of review.

$$r = \left(\frac{2.25KHt}{S10^{x}} \right)^{1/2}$$

Where:

$$x = \frac{4BKH\,(H_w - H_{bo})x\ S_pG_b}{2.3\ Q}$$

r = Radius of the area of review for a Class I non-hazardous waste injection well or Class III well (length)

K = Hydraulic conductivity of the injection zone (length/time)

H = Thickness of the injection zone (length)

t = Time of injection (time)

S = Storage coefficient (dimensionless)

Q = Injection rate (volume/time)

H_{bo} = Observed original hydrostatic head of injection zone (length) measured from the base of the lowest aquifer containing ground water of 10,000 mg/l or less TDS

H_w = Hydrostatic head of underground source of drinking water (length) measured from the base of the lowest aquifer containing ground water of 10,000 mg/l or less TDS

S_pG_b = Specific gravity of fluid in the injection zone (dimensionless)

B = 3.142 (dimensionless)

(4) The above equation is based on the following assumptions:

(a) The injection zone is homogenous and isotropic;

(b) The injection zone has infinite areal extent;

(c) The Class I non-hazardous waste injection well or Class III well penetrates the entire thickness of the injection zone;

(d) The well diameter is infinitesimal compared to "r" when injection time is longer than a few minutes; and

(e) The emplacement of fluid into the injection zone creates an instantaneous increase in pressure.

C. The secretary shall require submittal by the discharger of information regarding the area of review including the information to be considered by the secretary in Subsection B of Section 20.6.2.5210 NMAC.
[9-20-82, 12-1-95; 20.6.2.5202 NMAC - Rn, 20 NMAC 6.2.V.5202, 1-15-01; A, 12-1-01]

20.6.2.5203 CORRECTIVE ACTION FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. Persons applying for approval of a Class I non-hazardous waste injection well, or a Class III well or well field shall identify the location of all known wells, drill holes, shafts, stopes and other conduits within the area of review which may penetrate the injection zone, in so far as is known or is reasonably available from the public records. For such wells or other conduits which are improperly sealed, completed, or abandoned, or otherwise provide a pathway for the migration of contaminants, the discharger shall address in the proposed discharge plan such steps or modifications (corrective action) as are necessary to prevent movement of fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC.

B. Prior to operation, or continued operation of a well for which corrective action is required pursuant to Subsections A or D of Section 20.6.2.5203 NMAC, the discharger must demonstrate that:

(1) All required corrective action has been taken; or

(2) Injection pressure is to be limited so that pressure in the injection zone does not cause fluid movement through any well or other conduit within the area of review into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC. This pressure limitation may be removed after all required corrective action has been taken.

C. In determining the adequacy of corrective action proposed in the discharge permit application, the following factors will be considered by the secretary:

(1) Chemical nature and volume of the injected fluid;

(2) Chemical nature of native fluids and by-products of injection;

(3) Geology and hydrology;

(4) History of the injection and production operation;

(5) Completion and plugging records;

(6) Abandonment procedures in effect at the time a well, drill hole, or shaft was abandoned; and

(7) Hydraulic connections with waters having 10,000 mg/l or less TDS

D. In the event that, after approval for a Class I non-hazardous waste injection well or Class III well has been granted, additional information is submitted or it is discovered that a well or other conduit within the applicable area of review might allow movement of fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC, the secretary may require action in accordance with Subsection I of Section 20.6.2.5101 and Subsection B Section 20.6.2.5203 NMAC.
[9-20-82, 12-1-95; 20.6.2.5203 NMAC - Rn, 20 NMAC 6.2.V.5203, 1-15-01; A, 12-1-01]

20.6.2.5204 MECHANICAL INTEGRITY FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. A Class I non-hazardous waste injection well or Class III well has mechanical integrity if there is no detectable leak in the casing, tubing or packer which the secretary considers to be significant at maximum operating temperature and pressure; and no detectable conduit for fluid movement out of the injection zone through the well bore or vertical channels adjacent to the well bore which the secretary considers to be significant.

B. Prior to well injection and at least once every five years or more frequently as the secretary may require for good cause during the life of the well, the discharger must demonstrate that a Class I non-hazardous waste injection well or Class III well has mechanical integrity. The demonstration shall be made through use of the following tests:

(1) For evaluation of leaks,

(a) Monitoring of annulus pressure (after an initial pressure test with liquid or gas before operation commences), or

(b) Pressure test with liquid or gas;

(2) For determination of conduits for fluid movement,

(a) The results of a temperature or noise log, or

(b) Where the nature of the casing used for Class III wells precludes use of these logs, cementing records and an appropriate monitoring program as the secretary may require which will demonstrate the presence of adequate cement to prevent such movement;

(3) Other appropriate tests as the secretary may require.

C. The secretary may consider the use by the discharger of equivalent alternative test methods to determine mechanical integrity. The discharger shall submit information on the proposed test and all technical data supporting its use. The secretary may approve the request if it will reliably demonstrate the mechanical integrity of wells for which its use is proposed. For Class III wells this demonstration may be made by submission of adequate monitoring data after the initial mechanical integrity tests.

D. In conducting and evaluating the tests enumerated in this Section or others to be allowed by the secretary, the discharger and the secretary shall apply methods and standards generally accepted in the affected industry. When the discharger reports the results of mechanical integrity tests to the secretary, he shall include a description of the test(s), the method(s) used, and the test results. In making an evaluation, the secretary's review shall include monitoring and other test data submitted since the previous evaluation.

[9-20-82, 12-1-95; 20.6.2.5204 NMAC - Rn, 20 NMAC 6.2.V.5204, 1-15-01; A, 12-1-01]

20.6.2.5205 CONSTRUCTION REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. General Construction Requirements Applicable to Class I non-hazardous waste injection wells and Class III wells.

(1) Construction of all Class I non-hazardous waste injection wells and all new Class III wells shall include casing and cementing. Prior to well injection, the discharger shall demonstrate that the construction and operation of:

(a) Class I non-hazardous waste injection wells will not cause or allow movement of fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC;

(b) Class III wells will not cause or allow movement of fluids out of the injection zone into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC.

(2) The construction of each newly drilled well shall be designed for the proposed life expectancy of the well.

(3) In determining if the discharger has met the construction requirements of this Section and has demonstrated adequate construction, the secretary shall consider the following factors:

(a) Depth to the injection zone;

(b) Injection pressure, external pressure, annular pressure, axial loading, and other stresses that may cause well failure;

(c) Hole size;

(d) Size and grade of all casing strings, including wall thickness, diameter, nominal weight, length, joint specification, and construction material;

(e) Type and grade of cement;

(f) Rate, temperature, and volume of injected fluid;

(g) Chemical and physical characteristics of the injected fluid, including corrosiveness, density, and temperature;

(h) Chemical and physical characteristics of the formation fluids including pressure and temperature;

(i) Chemical and physical characteristics of the receiving formation and confining zones including lithology and stratigraphy, and fracture pressure; and

(j) Depth, thickness and chemical characteristics of penetrated formations which may contain ground water.

(4) To demonstrate adequate construction, appropriate logs and other tests shall be conducted during the drilling and construction of new Class I non-hazardous waste injection wells or Class III wells or during work-over of existing wells in preparation for reactivation or for change to injection use. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the secretary for review prior to well injection. The logs and tests appropriate to each type of injection well shall be based on the intended function, depth, construction and other characteristics of the well, availability of similar data in the area of the drilling site and the need for additional information that may arise from time to time as the construction of the well progresses.

(a) The discharger shall demonstrate through use of sufficiently frequent deviation checks, or another equivalent method, that a Class I non-hazardous waste injection well or Class III well drilled using a pilot hole then enlarged by reaming or another method, does not allow a vertical avenue for fluid migration in the form of diverging holes created during drilling.

(b) The secretary may require use by the discharger of the following logs to assist in characterizing the formations penetrated and to demonstrate the integrity of the confining zones and the lack of vertical avenues for fluid migration:

(i) For casing intended to protect ground water having 10,000 mg/l or less TDS: Resistivity, spontaneous potential, and caliper logs before the casing is installed; and a cement bond, or temperature log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection: Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed; and fracture finder or spectral logs; and a cement bond or temperature log after the casing is set and cemented.

(5) In addition to the requirements of Section 20.6.2.5102 NMAC, the discharger shall provide notice prior to commencement of drilling, cementing and casing, well logging, mechanical integrity tests, and any well work-over to allow opportunity for on-site inspection by the secretary or his representative.

B. Additional Construction Requirements for Class I non-hazardous waste injection wells.

(1) All Class I non-hazardous waste injection wells shall be sited in such a manner that they inject into a formation which is beneath the lowermost formation containing, within one quarter mile of the well bore, ground water having 10,000 mg/l TDS or less except as approved pursuant to Section 20.6.2.5103 NMAC.

(2) All Class I non-hazardous waste injection wells shall be cased and cemented by circulating cement to the surface.

(3) All Class I non-hazardous waste injection wells, except those municipal wells injecting noncorrosive wastes, shall inject fluids through tubing with a packer set in the annulus immediately above the injection zone, or tubing with an approved fluid seal as an alternative. The tubing, packer, and fluid seal shall be designed for the expected length of service.

(a) The use of other alternatives to a packer may be allowed with the written approval of the secretary. To obtain approval, the operator shall submit a written request to the secretary which shall set forth the proposed alternative and all technical data supporting its use. The secretary may approve the request if the alternative method will reliably provide a comparable level of protection to ground water. The secretary may approve an alternative method solely for an individual well or for general use.

(b) In determining the adequacy of the specifications proposed by the discharger for tubing and packer, or a packer alternative, the secretary shall consider the following factors:

(i) Depth of setting;

(ii) Characteristics of injection fluid (chemical nature or characteristics, corrosiveness, and density);

(iii) Injection pressure;

(iv) Annular pressure;

(v) Rate, temperature and volume of injected fluid; and

(vi) Size of casing.

C. Additional Construction Requirements for Class III wells.

(1) Where injection is into a formation containing ground water having 10,000 mg/l or less TDS, monitoring wells shall be completed into the injection zone and into the first formation above the injection zone containing ground water having 10,000 mg/l or less TDS which could be affected by the extraction operation. If ground water having 10,000 mg/l or less TDS below the injection zone could be affected by the extraction operation, monitoring of such ground water may be required. These wells shall be of sufficient number, located and constructed so as to detect any excursion of injection fluids, process byproducts, or formation fluids outside the extraction area or injection zone. The requirement for monitoring wells in aquifers designated pursuant to Section

20.6.2.5103 NMAC may be waived by the secretary, provided that the absence of monitoring wells does not result in an increased risk of movement of fluids into protected ground waters having 10,000 mg/l or less TDS.

(2) Where injection is into a formation which does not contain ground water having 10,000 mg/l or less TDS, no monitoring wells are necessary in the injection zone. However, monitoring wells may be necessary in adjoining zones with ground water having 10,000 mg/l or less TDS that could be affected by the extraction operation.

(3) In an area that the secretary determines is subject to subsidence or collapse, the required monitoring wells may be required to be located outside the physical influence of that area.

(4) In determining the adequacy of monitoring well location, number, construction and frequency of monitoring proposed by the discharger, the secretary shall consider the following factors:

(a) The local geology and hydrology;

(b) The operating pressures and whether a negative pressure gradient to the monitor well is being maintained;

(c) The nature and volume of injected fluid, formation water, and process by-products; and

(d) The number and spacing of Class III wells in the well field.

[9-20-82, 12-1-95; 20.6.2.5205 NMAC - Rn, 20 NMAC 6.2.V.5205, 1-15-01; A, 12-1-01]

20.6.2.5206 OPERATING REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. General Operating Requirements Applicable to Class I non-hazardous waste injection wells and Class III wells.

(1) The maximum injection pressure at the wellhead shall not initiate new fractures or propagate existing fractures in the confining zone, or cause the movement of injection or formation fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC.

(2) Injection between the outermost casing and the well bore is prohibited in a zone other than the authorized injection zone.

B. Additional Operating Requirements for Class I non-hazardous waste injection wells.

(1) Except during well stimulation, the maximum injection pressure shall not initiate new fractures or propagate existing fractures in the injection zone.

(2) Unless an alternative to a packer has been approved under Subparagraph (c) of Paragraph (3) of Subsection B of Section 20.6.2.5205 NMAC, the annulus between the tubing and the long string of casing shall be filled with a fluid approved by the secretary and a pressure, also approved by the secretary shall be maintained on the annulus.

C. Additional Operating Requirements for Class III wells: Initiation of new fractures or propagation of existing fractures in the injection zone will not be approved by the secretary as part of a discharge permit unless it is done during well stimulation and the discharger demonstrates:

(1) That such fracturing will not cause movement of fluids out of the injection zone into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC, and

(2) That the provisions of Subsection C of Section 20.6.2.3109 and Subsection C of Section 20.6.2.5101 NMAC for protection of ground water are met.

[9-20-82, 12-1-95; 20.6.2.5206 NMAC - Rn, 20 NMAC 6.2.V.5206, 1-15-01; A, 12-1-01]

20.6.2.5207 MONITORING REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. The discharger shall demonstrate mechanical integrity for each Class I non-hazardous waste injection well or Class III well at least once every five years during the life of the well pursuant to Section 20.6.2.5204 NMAC.

B. Additional Monitoring Requirements for Class I non-hazardous waste injection wells.

(1) The discharger shall provide analysis of the injected fluids at least quarterly or, if necessary, more frequently to yield data representative of their characteristics.

(2) Continuous monitoring devices shall be used to provide a record of injection pressure, flow rate, flow volume, and pressure on the annulus between the tubing and the long string of casing.

(3) The discharger shall provide wells within the area of review as required by the discharge permit to be used by the discharger to monitor pressure in, and possible fluid movement into, ground water having 10,000 mg/l or less TDS except for such ground waters designated pursuant to Section 20.6.2.5103 NMAC. This Section

does not require monitoring wells for Class I non-hazardous waste injection wells unless monitoring wells are necessary due to possible flow paths within the area of review.

C. Additional Monitoring Requirements for Class III wells.

(1) The discharger shall provide an analysis or description, whichever the secretary requires, of the injected fluids at least quarterly or, if necessary, more frequently to yield representative data.

(2) The discharger shall perform:

(a) Appropriate monitoring of injected and produced fluid volumes by whichever of the following methods the secretary requires:

(i) Recording injection pressure and either flow rate or volume every two weeks; or

(ii) Metering and daily recording of fluid volumes;

(b) Monitoring every two weeks, or more frequently as the secretary determines, of the monitor wells, required in Subsection C of Section 20.6.2.5205 NMAC for:

(i) Water chemistry parameters used to detect any migration from the injection zone;

(ii) Fluid levels adjacent to the injection zone; and

(c) Other necessary monitoring as the secretary for good cause may require to detect movement of fluids from the injection zone into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC.

(3) With the approval of the secretary, all Class III wells may be monitored on a well field basis by manifold monitoring rather than on an individual well basis. Manifold monitoring to determine the quality, pressure, and flow rate of the injected fluid may be approved in cases of facilities consisting of more than one Class III well, operating with a common manifold, provided that the discharger demonstrates that manifold monitoring is comparable to individual well monitoring.

[9-20-82, 12-1-95; 20.6.2.5207 NMAC - Rn, 20 NMAC 6.2.V.5207, 1-15-01; A, 12-1-01]

20.6.2.5208 REPORTING REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. Reporting Requirements for Class I non-hazardous waste injection wells.

(1) If a Class I non-hazardous waste injection well is found to be discharging or is suspected of discharging fluids into a zone or zones other than the permitted or authorized injection zone, the discharger shall within 24 hours notify the secretary of the circumstances and action taken. The discharger shall provide subsequent written reports as required by the secretary.

(2) The discharger shall provide reports quarterly to the secretary on:

(a) The physical, chemical and other relevant characteristics of injection fluids;

(b) Monthly average, maximum and minimum values for injection pressure, flow rate and volume, and annular pressure; and

(c) The results of monitoring prescribed under Subsection B of Section 20.6.2.5207 NMAC.

(3) The discharger shall report, no later than the first quarterly report after completion, the results of:

(a) Periodic tests of mechanical integrity as required in Sections 20.6.2.5204 and 20.6.2.5207 NMAC;

(b) Any other test of the Class I non-hazardous waste injection well conducted by the discharger if required by the secretary;

(c) Any well work-over; and

(d) Any changes within the area of review which might impact subsurface conditions.

B. Reporting Requirements for Class III wells.

(1) The discharger shall notify the secretary within 48 hours of the detection or suspected detection of a leachate excursion, and provide subsequent reports as required by the secretary.

(2) The discharger shall provide to the secretary:

(a) Reports on required monitoring quarterly, or more frequently as required by the secretary; and

(b) Results of mechanical integrity testing as required in Sections 20.6.2.5204 and 20.6.2.5207 NMAC and any other periodic tests required by the secretary. These results are to be reported no later than the first regular report after the completion of the test.

(3) Where manifold monitoring is permitted, monitoring results may be reported on a well field basis, rather than individual well basis.

C. Report Signatory Requirements.

(1) All reports submitted pursuant to this Section shall be signed and certified as provided in Subsection G of Section 20.6.2.5101 NMAC, or by a duly authorized representative.

(2) For a person to be a duly authorized representative, authorization must:

(a) Be made in writing by a signatory described in Paragraph (1) of Subsection G of Section 20.6.2.5101 NMAC;

(b) Specify either an individual or a position having responsibility for the overall operation of that regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, or position of equivalent responsibility; and

(c) Have been submitted to the secretary.

[9-20-82, 12-1-95; 20.6.2.5208 NMAC - Rn, 20 NMAC 6.2.V.5208, 1-15-01; A, 12-1-01]

20.6.2.5209 PLUGGING AND ABANDONMENT FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. The discharger shall submit as part of the discharge permit application, a plan for plugging and abandonment of a Class I non-hazardous waste injection well or a Class III well that meets the requirements of Subsection C of Section 20.6.2.3109 and Subsection C of Section 20.6.2.5101 NMAC and 20.6.2.5005 NMAC for protection of ground water. If requested, a revised or updated abandonment plan shall be submitted for approval prior to closure. The obligation to implement the plugging and abandonment plan as well as the requirements of the plan survives the termination or expiration of the permit.

B. Prior to abandonment of a well used in a Class I non-hazardous waste injection well or Class III well operation, the well shall be plugged in a manner which will not allow the movement of fluids through the well bore out of the injection zone or between other zones of ground water. Cement plugs shall be used unless a comparable method has been approved by the secretary for the plugging of Class III wells at that site.

C. Prior to placement of the plugs, the well to be abandoned shall be in a state of static equilibrium with the mud weight equalized top to bottom, either by circulating the mud in the well at least once or by a comparable method approved by the secretary.

D. Placement of the plugs shall be accomplished by one of the following:

(1) The Balance Method; or

(2) The Dump Bailer Method; or

(3) The Two-Plug Method; or

(4) An equivalent method with the approval of the secretary.

E. The following shall be considered by the secretary in determining the adequacy of a plugging and abandonment plan.

(1) The type and number of plugs to be used;

(2) The placement of each plug, including the elevation of the top and bottom;

(3) The type, grade and quantity of cementing slurry to be used;

(4) The method of placement of the plugs;

(5) The procedure to be used to plug and abandon the well; and

(6) Such other factors that may affect the adequacy of the plan.

F. The discharger shall retain all records concerning the nature and composition of injected fluids until five years after completion of any plugging and abandonment procedures.

[9-20-82, 12-1-95; 20.6.2.5209 NMAC - Rn, 20 NMAC 6.2.V.5209, 1-15-01; A, 12-1-01]

20.6.2.5210 INFORMATION TO BE CONSIDERED BY THE SECRETARY FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELLS AND CLASS III WELLS:

A. This Section sets forth the information to be considered by the secretary in authorizing construction and use of a Class I non-hazardous waste injection well or Class III well or well field. Certain maps, cross-sections, tabulations of all wells within the area of review, and other data may be included in the discharge permit application submittal by reference provided they are current, readily available to the secretary and sufficiently identified to be retrieved.

B. Prior to the issuance of a discharge permit or project discharge permit allowing construction of a new Class I non-hazardous waste injection well, operation of an existing Class I non-hazardous waste injection well, or operation of a new or existing Class III well or well field, or conversion of any well to injection use, the secretary shall consider the following:

(1) Information required in Subsection C of Section 20.6.2.3106 NMAC;

(2) A map showing the Class I non-hazardous waste injection well, or Class III well or well fields, for which approval is sought and the applicable area of review. Within the area of review, the map must show, in so far as is known or is reasonably available from the public records, the number, name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features, including residences and roads;

(3) A tabulation of data on all wells within the area of review which may penetrate into the proposed injection zone. Such data shall include, as available, a description of each well's type, the distance and direction to the injection well or well field, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the secretary may require;

(4) For wells within the area of review which penetrate the injection zone, but are not properly completed or plugged, the corrective action proposed to be taken under Section 20.6.2.5203 NMAC;

(5) Maps and cross-sections indicating the general vertical and lateral limits of all ground water having 10,000 mg/l or less TDS within the area of review, the position of such ground water within the area of review relative to the injection formation, and the direction of water movement, where known, in each zone of ground water which may be affected by the proposed injection operation;

(6) Maps and cross-sections detailing the geology and geologic structure of the local area, including faults, if known or suspected;

(7) Generalized maps and cross-sections illustrating the regional geologic setting;

(8) Proposed operating data, including:

(a) Average and maximum daily flow rate and volume of the fluid to be injected;

(b) Average and maximum injection pressure;

(c) Source of injection fluids and an analysis or description, whichever the secretary requires, of their chemical, physical, radiological and biological characteristics;

(9) Results of the formation testing program to obtain an analysis or description, whichever the secretary requires, of the chemical, physical, and radiological characteristics of, and other information on, the receiving formation, provided that the secretary may issue a conditional approval of a discharge permit if he finds that further formation testing is necessary for final approval;

(10) Expected pressure changes, native fluid displacement, and direction of movement of the injected fluid;

(11) Proposed stimulation program;

(12) Proposed or actual injection procedure;

(13) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(14) Construction procedures, including a cementing and casing program, logging procedures, deviation checks, and a drilling, testing, and coring program;

(15) Contingency plans to cope with all shut-ins or well failures so as to prevent movement of fluids into ground water having 10,000 mg/l or less TDS except for fluid movement approved pursuant to Section 20.6.2.5103 NMAC;

(16) Plans, including maps, for meeting the monitoring requirements of Section 20.6.2.5207 NMAC; and

(17) The ability of the discharger to undertake measures necessary to prevent contamination of ground water having 10,000 mg/l or less TDS after the cessation of operation, including the proper closing, plugging and abandonment of a well, ground water restoration if applicable, and any post-operational monitoring as may be needed. Methods by which the discharger shall demonstrate the ability to undertake these measures shall include submission of a surety bond or other adequate assurances, such as financial statements or other materials acceptable to the secretary, such as: (1) a surety bond; (2) a trust fund with a New Mexico bank in the name of the State of New Mexico, with the State as Beneficiary; (3) a non-renewable letter of credit made out to the State of New Mexico; (4) liability insurance specifically covering the contingencies listed in this paragraph; or (5) a performance bond, generally in conjunction with another type of financial assurance. Such bond or materials shall be approved and executed prior to discharge permit issuance and shall become effective upon commencement of construction. If an adequate bond is posted by the discharger to a federal or another state agency, and this bond covers all of the measures referred to above, the secretary shall consider this bond as satisfying the bonding requirements of Sections 20.6.2.5000 through 20.6.2.5299 NMAC wholly or in part, depending upon the extent to which such bond is adequate to ensure that the discharger will fully perform the measures required hereinabove.

C. Prior to the secretary's approval that allows the operation of a new or existing Class I non-hazardous waste injection well or Class III well or well field, the secretary shall consider the following:

(1) Update of pertinent information required under Subsection B of Section 20.6.2.5210 NMAC;
(2) All available logging and testing program data on the well;
(3) The demonstration of mechanical integrity pursuant to Section 20.6.2.5204 NMAC;
(4) The anticipated maximum pressure and flow rate at which the permittee will operate;
(5) The results of the formation testing program;
(6) The physical, chemical, and biological interactions between the injected fluids and fluids in the injection zone, and minerals in both the injection zone and the confining zone; and
(7) The status of corrective action on defective wells in the area of review.

[9-20-82, 12-24-87, 12-1-95; 20.6.2.5210 NMAC - Rn, 20 NMAC 6.2.V.5210, 1-15-01; A, 12-1-01]

20.6.2.5211 - 20.6.2.5299: [RESERVED]

[12-1-95; 20.6.2.5211 - 20.6.2.5299 NMAC - Rn, 20 NMAC 6.2.V.5211-5299, 1-15-01]

HISTORY of 20.6.2 NMAC:

Pre-NMAC History:

Material in this Part was derived from that previously filed with the commission of public records - state records center and archives:

WQC 67-2, Regulations Governing Water Pollution Control in New Mexico, filed 12-5-67, effective 1-4-68
WQC 72-1, Water Quality Control Commission Regulations, filed 8-4-72, effective 9-3-72
WQC 77-1, Amended Water Quality Control Commission Regulations, filed 1-18-77, effective 2-18-77
WQC 81-2, Water Quality Control Commission Regulations, filed 6-2-81, effective 7-2-81
WQC 82-1, Water Quality Control Commission Regulations, filed 8-19-82, effective 9-20-82

History of Repealed Material: [Reserved]

Other History:

20 NMAC 6.2, Water Quality - Ground and Surface Water Protection, filed 10-27-95, effective 12-1-95
20 NMAC 6.2, Water Quality - Ground and Surface Water Protection, filed 10-15-96, effective 11-15-96
20 NMAC 6.2, Water Quality - Ground and Surface Water Protection, filed 11-30-00, effective 1-15-01
20 NMAC 6.2, Water Quality - Ground and Surface Water Protection, filed 9-16-01, effective 12-1-01
20 NMAC 6.2, Water Quality - Ground and Surface Water Protection, filed 8-1-02, effective 9-15-02

Railroad Commission of Texas Class III Brine Well Regulations

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TITLE 16	ECONOMIC REGULATION
PART 1	RAILROAD COMMISSION OF TEXAS
CHAPTER 3	OIL AND GAS DIVISION
RULE §3.81	**Brine Mining Injection Wells**

(a) Definitions. The following words and terms, when used in this section, shall have the following meanings, unless the context clearly indicates otherwise.

(1) Affected person--A person who, as a result of the activity sought to be permitted, has suffered or may suffer actual injury or economic damage other than as a member of the general public.

(2) Brine mining facility or facility--The brine mining injection well, and the pits, tanks, fresh water wells, pumps, and other structures and equipment that are or will be used in conjunction with the brine mining injection well.

(3) Brine mining injection well--A well used to inject fluid for the purpose of extracting brine by the solution of a subsurface salt formation. The term "brine mining injection well" does not include a well used to inject fluid for the purpose of leaching a cavern for the underground storage of hydrocarbons or the disposal of waste, or a well used to inject fluid for the purpose of extracting sulphur by the thermofluid mining process.

(4) Commission--The Railroad Commission of Texas.

(5) Director--The director of the Oil and Gas Division or a staff delegate designated in writing by the director of the Oil and Gas Division or the commission.

(6) Existing brine mining injection well--A brine mining injection well in which injection operations began prior to the effective date of this section.

(7) Fresh water--Water having bacteriological, physical, and chemical properties that make it suitable and feasible for beneficial use for any lawful purpose.

(8) New brine mining injection well--A brine mining injection well in which injection operations begin on or after the effective date of this section.

(9) Permit--A written authorization issued by the commission under this section for the operation of a brine mining injection well.

(10) Person--A natural person, corporation, organization, government or governmental subdivision or agency, business trust, estate, trust partnership, association, or any other legal entity.

(11) Pollution--The alteration of the physical, chemical, or biological quality of, or the contamination of, water that makes it harmful, detrimental, or injurious to humans, animal life, vegetation or property or to public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(b) Prohibitions.

(1) Unauthorized injection. No person may operate a brine mining injection well without obtaining a permit from the commission under this section. No person may begin constructing a new brine mining injection well until the commission has issued a permit to operate the well under this section and a permit to drill, deepen, plug back, or reenter the well under §3.5 of this title (relating to Application to Drill, Deepen, Reenter, or Plug Back) (Statewide Rule 5).

(2) Fluid migration. No person may operate a brine mining injection well in a manner that allow fluids to escape from the permitted injection zone. If fluids are migrating from the permitted injection zone, the operator shall immediately cease injection operations.

(3) Falsifying documents and tampering with gauges. No person may knowingly make any false statement, representation, or certification in any application, report, record, or other document submitted or required to be maintained under this section or under any permit issued pursuant to this section, or falsify, tamper with, or knowingly render inaccurate any monitoring device or method required to be maintained under this section or under any permit issued pursuant to this section.

(c) Standards for permit issuance. A permit may be issued only if the commission determines that the operation of the brine mining injection well will not result in the pollution of fresh water. All permits issued under this section will contain the conditions required by subsections (f) and (g) of this section, and all other conditions reasonably necessary to prevent the pollution of fresh water.

(d) Permit application.

(1) Duty to apply. Any person who operates or proposes to operate a brine mining injection well shall file a permit application with the commission in Austin within the time provided in paragraph (2) of this subsection. The applicant shall mail or deliver a copy of the application to the appropriate district office on the same day the application is mailed or delivered to the commission in Austin. A permit application will be considered filed with the commission on the date it is received by the commission in Austin.

(2) Time to apply.

(A) Any person who proposes to operate a new brine mining injection well shall file a permit application at least 180 days before the date on which injection is to begin, unless a later date has been authorized by the director.

(B) Any person who is operating an existing brine injection well shall file a permit application within 90 days of the effective date of this section.

(C) Any person who has obtained a permit under this section and who wishes to continue to operate the brine mining injection well after the permit expires shall file an application for new permit at least 180 days before the existing permit expires, unless a later date has been authorized by the director.

(3) Who applies. When a brine mining facility is owned by one person but is operated by another person, it is the operator's duty to file an application for a permit.

(4) Application requirements for all applicants. All applicants shall submit the following information, using application forms supplied by the commission:

(A) name, mailing address, and location of the brine mining facility for which the application is submitted;

(B) the operator's name, mailing address, telephone number, and status as federal, state, private, public, or other entity, and a statement indicating whether the operator is the owner of the facility;

(C) the proposed uses for the brine mined at the facility;

(D) a listing of all permits or construction approvals for the facility received or applied for under federal or state environmental programs;

(E) a topographic map, or other map if the topographic map is unavailable, extending one mile beyond the property boundaries of the facility, depicting the facility and those springs, other surface water bodies, drinking water wells, and other wells listed in public records or otherwise known to the applicant within 1/4 mile of the facility property boundary;

(F) a plat showing the oil and gas operators of the tract on which the facility is located and the tracts adjacent to the tract on which the facility is located. On the plat or on a separate sheet attached to the plat, the applicant shall list the names and addresses of the oil and gas operators;

(G) a plat showing the surface ownership of the tract on which the facility is located and the tracts adjacent to the tract on which the facility is located. On the plat or on a separate sheet attached to the plat, the applicant shall list the names and addresses of the surface owners, as determined from the current county tax rolls or other reliable sources, and shall identify the source of the list. If the director determines that, after diligent efforts, the applicant has been unable to ascertain the name and address of one or more surface owners, the director may waive the requirements of this subparagraph with respect to those surface owners;

(H) a map with surveys marked showing the type, location, and depth of all wells of public record within a 1/4 mile radius of the brine mining injection well that penetrate the salt formation. The applicant shall attach the following information to the map:

(i) a tabulation of the wells showing the dates the wells were drilled and the present status of the wells; and

(ii) plugging records for plugged and abandoned wells and completion records for other wells;

(I) a letter from the Texas Commission on Environmental Quality stating the depth to which fresh water strata should be protected;

(J) a complete electric log of the brine mining injection well or a nearby well. On the log, the applicant shall identify the geologic formations between the land surface and the top of the salt formation and the depths at which they occur;

(K) a drawing of the surface and subsurface construction details of the brine mining injection well;

(L) the proposed maximum daily injection rate and maximum injection pressure;

(M) the proposed injection procedure;

(N) the proposed mechanical integrity testing procedure;

(O) the source of mining water to be used at the facility. If the source is groundwater, the following information must be included:

(i) the groundwater formation name;

(ii) an depth of the groundwater formation; and

(iii) an analysis of the groundwater;

(P) the direction of the hydraulic gradient in the area; and

(Q) the proposed groundwater monitoring plan, or an alternate plan for assuring that fluids are not escaping from the permitted injection zone.

(5) Additional information. The applicant shall submit any other information required on the application form supplied by the commission. In addition to the information reported on the application form, the applicant shall submit, at the director's request, any other information the commission may reasonably require to assess the brine mining injection well and to determine whether to issue a permit.

(e) Signatories to applications and reports.

(1) Applications. All applications shall be signed as follows:

(A) for a corporation, by a responsible corporate officer. A responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy-making or decision-making functions for the corporation; or

(B) for a partnership or sole proprietorship, by a general partner or the proprietor, respectively.

(2) Reports. All reports required by permits and other information requested by the commission shall be signed by a person described in paragraph (1) of this subsection or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(A) the authorization is made in writing by a person described in paragraph (1) of this subsection;

(B) the authorization specifies an individual or position having responsibility for the overall operation of the regulated facility; and

(C) the authorization is submitted to the commission before or together with any report of information signed by the authorized representative.

(3) Certification. Any person signing a document under paragraph (1) or (2) of this subsection shall make the following certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or who are directly responsible for gathering the

information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information."

(f) Conditions applicable to all permits. The conditions specified in this subsection apply to all permits.

(1) Duty to comply. The operator shall comply with all conditions of the permit. Any permit noncompliance is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

(2) Duty to reapply. If the operator wishes to continue a permitted activity after the expiration date of the permit, the operator shall apply for and obtain a new permit.

(3) Need to halt or reduce activity not a defense. It is not a defense for an operator in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

(4) Duty to mitigate. The operator shall take all reasonable steps to minimize and correct any adverse effect on the environment resulting from noncompliance with the permit.

(5) Proper operation and maintenance. The operator shall at all times properly operate and maintain all facilities and systems of treatment and control, and related appurtenances, that are installed or used by the operator to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up and auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) Permit actions. The permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the operator for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

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Notes from Brine Well Workgroup by Jim Rutley- BLM

March 26 and 27, 2009

New Mexico Oil Conservation Division, Santa Fe, New Mexico

March 26, 2009

Wayne Price' Hypothesis—Oil well drilling adjacent to Loco Hills Sinkhole drilled into salt flow and allowed the brine to flow out depressurizing cavity which facilitated its collapse.

Operator intends to fill sinkhole with half million cubic yards of fill

(Have Dave Herrell and Wayne Macon check water well located west of sink for possible contaminants, check temperature, etc.)

Brainstorming (Open Session)

Dennis Powers' estimate the top of the salt at the Loco Hills sink at 337 feet below surface.

Approximately 7 million barrels of salt was produced from Loco Hills brine Well

Specific limit of production per brine well

At least 100 feet of salt back above cavern

Top down approach from the Governor

Aspect ratio, width to height, function of overburden

Minimum salt back, separating overburden from cavern

Limit size and volume of brine produced (back as ft (depth))

Witness reverse flow treatments and limit to 24 hours maximum

Annual test of casing, simple as test of fresh water column into annulus for short period (4hrs?)

Water-brine interface test, tested during completion.

Standard casing test drill out

Fresh water column with temperature and pressure

Oil blanket to control back

Modify policy not to re-enter oil or gas wells, unless well is constructed to meet UIC Class III requirements and is verified

Online reporting of production data, get professional interpretation of data

Set maximum roof diameter. Approximately 200'?, 100'?, 50'? depending on depth and overburden integrity

Could "Thermal Energy Tool" (used in finding caves) be used to determine size of cavity? Drop thermal tool inside casing?

SMRI software. Simulate life of planned well.

Price of brine? $1.00 and $1.20.

Maximum production quota per well, single well, two well system, etc.

Beam Theory (Wayne Price) Roof stability calculation

Positive monitoring tool? Seismic

Allen Haynes of Western Refining

Risks of LPG storage

1. Safety
2. Environmental
3. Reliability

LPG storage considered the safest and most economical method of storing hydrocarbons. The rock provides protection from surface events.

Cavern is full of brine before LPG flows into cavity. 2 strings of cemented casing plus one cemented liner. Sonar tests are run periodically.

Should these type of wells be considered similar to Class III brine wells for potential collapse?

Brine well database similar to Texas database for brine wells?

Courtney Herrick, Sandia National Lab—Carlsbad discussion on Rock Mechanics of Sinkholes

Sinkholes are dissolution of bedrock (salt)

Breccia chimneys can form up to 1200 meters deep. Since 1986, over 5000 breccia pipes have been identified in North America

3 to 4 times the size of the cavity, subsidence chimneys will propagate upwards.

Consider monitoring seismographs. Possible consider lowering seismic signal alert and subtract noise.

Use of cap oil or other material to prevent leaching of roof salt and allow cavern shaping

Suggest layer of alt below caprock

Suggest salt tolerant cements for casing and placement

Identify and determine tensile strength of overburden in analysis of permit

George Veni, Karst Institute

Suggest classification of known brine wells both inactive and active based on concern level (red flags)

Chuck Byrum, EPA-WIPP

WIPP conducts an annual impact study on nine township area surrounding the land withdrawal area

WIPP very concerned about existing Salt Water Disposal Wells located on the SE and SW corners of the WIPP boundary area. If the salt fails, the WIPP fails. WIPP studies anything that can jeopardize 10,000 years of waste depository.

WIPP would like to increase the boundary of disposal and injection wells from the WIPP boundary to 5 miles or more

WIPP concerned about frequency and proximity of drilling to boundary area

Jason McCartney—underground 3D mapping of salt caverns www.socon.com

Bill client per job—lump $sum

Price dependent on depth, casing shoe, type of pipe, size of pipe, deviation log, tool insurance.

Can shoot through two sleeves of pipe

Problems:

If tubing size is smaller than tool

Collapse and bends in casing (anhydrites and shales)

Suggestions for Brine Wells

Insert larger diameter tubing and slow drilling down to allow less deviation to improve sonar performance

Require Sonar testing in known Karst areas, sinkholes in the area, salt creep potential, etc

March 27, 2009

Siting Requirements (Open Discussion)

Brine operators want brine facility located near trucking (transportation) outlets, such as across from airport in Carlsbad

Brine operators argue that setting casing 100 feet into salt causes problems with compressive strength of casing and could be compromised with deeper salt location

Brine wells permitting should be performed on a case by case scenario with reference to size of roof and production ability. Site Geology and Stratigraphy needs to be included in permitting

Depth is a function of size and shape of cavern

Single string can achieve desired shape, but what if leaks occur in the surface casing?

Consider Thievery zones

Every 7 bbls of fresh water pumped in, you lose at least one barrel

Kevin Stafford, Dissertation of dissolution in Southern New Mexico

Loren Molleur (Key)

Single Tubing String

No cavern information on 32 wells

Physically impossible to log/survey wells because of tubing/casing of older wells. What age of casing do you begin to suspect integrity issues?

Loco Hills sink cavity was in Rustler formation (salt stringer), there was no back

Railroad Commission requires 600' back in Texas

16pound cement is used in plugs in Moab, Utah's potassium solution mine

Need to monitor density of brine on a daily schedule

Need to establish subsidence monitoring programs with every permit

Consider solidifying critical caverns of concern. Consider filling with grout, sand, or salt tailings.

Consider a pro-active contingency emergency plan for each brine well.

Wells at highest risk of collapse?

West Edge of basin

Shallow

Broad Roof

Mark Cartwright, Texas Brine

Texas Brine cements to surface four or five strings of casing in production wells with a $13 million price tag.

"Disaster Regulation" suggestion

Roof design should be engineered

Minimum salt back

Volume of cavity should be controlled rather than age of well. Conduct routine MIT, Sonar, and Interface surveys.

Site Characterization

Need mandatory correlating e-logs on permit

Description of overburden

Salt isopach and structure contour maps

Any natural occurring dissolution in the area

Geohydrology

Water aquifers

Potentiometric Surfaces

Area of perceptual Review

Mineral Law

Solution Mining Simulator in Permit (software)

Reverse Mining wells in the area?

Rank risky wells

Re-entry of plugged wells for monitoring purposes

Jefferson Island Sinkhole, 1986 video

If concerned about possible collapse, do not PA, but backfill or solidify cavity to mitigate subsidence.

Need to benchmark all brine wells and plugged wells for subsidence monitoring

Bore hole to place seismic downhole

BW-27 Sonar Problem case study.

Set maximum deviation that will allow sonar tool. If you drill hot and fast, the deviation will allow 19' tool to enter without getting pinched.

BRINE WELL WORK GROUP MEETING SIGN-IN SHEET

26-Mar-09

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New Mexico Oil Conservation Division
UIC Class III Brine Well Evaluation Work Group
Porter Hall (Wendell Chino Bldg.)
1220 South St. Francis Drive, Santa Fe, NM 87505
March 26-27, 2009
(8:00 a.m. – 5:00 p.m.)

FINAL AGENDA

Thursday, March 26, 2009

8:00 - 8:10 a.m. **Welcoming remarks:** OCD Environmental Bureau Chief Wayne Price.

8:10 - 8:15 a.m. **OCD introduction:** OCD Environmental Bureau Jim Griswold states purpose and goal of the work group.

8:15 - 8:30 a.m. **Work group members' introduction:** Members briefly state interest in serving on the work group; and what he/she hopes to bring to the table.

8:30 - 8:50 a.m. **Shallow geology & hydrology of the Delaware/Permian Basin in SE NM (Glenn von Gonten- OCD/ Richard Beauheim- SNL)**

8:50 - 9:05 a.m. **A history of brine well operation & regulation in NM (Jim Griswold- OCD)**

9:05 - 10:00 a.m. **Recent brine well collapses in NM & case studies (Jim Griswold- OCD)** Jims Water Service SE of Artesia on 7/16/2008 & Loco Hills Disposal E of Artesia on 11/3/2008

10:00 – 10:15 a.m. **Break**

10:15 – 10:35 a.m. **Federal discussion (Ray Leissner- EPA)**
EPA oversight capacity and scope of the federal Class III program. First impression federal perspective on suggestions/topics that may arise during the discussions and will identify to the group if an idea

at hand would likely have implications on program approval or revision and what that effort would include. More discussion as needed.

10:35– 11:15 a.m.	**Potential impacts to the WIPP Site? (Chuck Byrum- EPA & Russ Patterson- DOE)** Slide show of subsurface facilities relative to the oil field activities in the region; associated regulatory requirements; and any other relevant issues.
11:15 – 11:45 a.m.	**Sonar Testing in Bedded Salt (Jason McCartney- SOCON Sonar Well Services, Inc.)**
11:45 - Noon	**Developing a research plan to evaluate existing brine wells & to assess potential risk of collapse (George Veni (NCKRI)**
Noon – 1:00 p.m.	**Lunch (on your own)**
1:00 – 1:30 p.m.	**Potash Well Siting, Construction & Operation (Richard Miller- Intrepid Potash)**
1:30 – 2:00 p.m.	**Class II Hydrocarbon Storage Wells- Western Refining L.P.** Siting, construction & operation. Should these types of wells be considered similar to Class III brine wells for potential collapse?
2:00 – 3:00 p.m.	**Current OCD discharge permits requirements for Class II HC Storage & Class III Brine Wells (Carl Chavez- OCD)** Display of OCD discharge permits and current requirements
3:00 – 3:15 a.m.	**Break**
3:15 – 4:00 p.m.	**Brine well strategy/talking points (Carl Chavez- OCD)** Brainstorming
4:00 – 4:30 p.m.	**Miscellaneous (Work Group)**
4:30 – 5:00 p.m.	**Work Group Summary**

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8:00 – 9:00 a.m. **Siting Criteria (Work Group)**
Proximity of populated development
Proximity of public roadways
Proximity of utilities including water supply wells
Oil & gas production
Potash mining (Hugh Harvey)
Other brine wells/caverns
Easements
WIPP (Chuck Byrum)
Other infrastructure
Disposition of protectable ground water
Thickness of salt ore layer
Interbedding

9:00 – 9:30 a.m. **Construction Characteristics (Loren Molleur)**
Re-entry of former oil and gas wells
Thickness and lithology of overburden
Borehole geophysical logging
Well Materials
Casing penetration into salt
Cementation of casing
Multi-well operation

9:30 – 10:00 a.m. **Operations (Mark Cartwright)**
Tubing placement
On-site pumping of fresh water
Modes of fresh water injection/brine extraction
Production pressures and rates
Operational lifetime
Closure including possible backfilling of cavern with solid materials

10:00 – 10:15 a.m. **Break**

10:15 – 10:45 a.m. **Monitoring (Work Group)**
Subsidence monitoring
Mechanical integrity testing of casing and cavern (Wayne Price)
Surface assessment

Geophysical methods for determination of cavern size and geometry (Andreas Reitze)
Groundwater quality monitoring

10:45 – 11:15 a.m. **Plug & Abandonment (Work Group)**
Fill brine cavern w/ brine water & cement casing to surface

11:15 – Noon **Collapse Response (James Rutley- BLM)**
Pre-positioning of emergency materials
Immediate public safety
Longer term restriction of access
Property damage (Thaddeus Kostrubala)
Groundwater contamination
Backfilling

Noon – 1:00 p.m. **Lunch (on your own)**

1:00 – 1:30 p.m. **NM Class III Brine Well Regulations (Carl Chavez- OCD)**
WQCC 20.6.2 NMAC

1:30 – 2:00 p.m. **TX Class III Brine Well Regulations (Jim Griswold- OCD)**
Chapter 3: Oil and Gas Division, Rule 3.81

2:30 – 3:00 p.m. **KS Class III Brine Well Draft Regulations (Jim Griswold- OCD)**
Article 46 - Underground Injection Control Regulations

3:00 – 3:15 p.m. **Break**

3:15 – 3:45 p.m. **Suggestions for NM Regulations or Guidelines (WQCC 20.6.2 NMAC) based on KS & TX Regulations**

3:45 – 4:00 p.m. **Industry perspective**

4:00 – 4:15 p.m. **Federal perspective**

4:15 – 5:00 p.m. **State perspective**
Work Group members who provided e-mail addresses will be included on any draft electronic draft documents, regulations, reports, etc. that may follow from our meeting. All work drafts will be posted on "BW-999" on OCD Online.

Work Group Biographies

Richard Beauheim (WIPP): Richard Beauheim is a Distinguished Member of Technical Staff at Sandia National Laboratories, and is currently Lead Hydrologist for the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. From 1984 to 1996, he was the Principal Investigator for the hydrogeological characterization of the WIPP site. He is now coordinating and directing hydrogeologic field studies and hydrology-related performance assessment activities related to the recertification of WIPP. He is an expert on the geology and hydrology of the Delaware Basin, and has several decades' experience with drilling and testing of wells in that area.

Chuck Byrum (EPA): is an environmental scientist with the EPA Office of Radiation and Indoor Air in Washington, DC. He has been involved with WIPP performance assessment in multiple capacities, including waste characterization and WIPP technical lead as well as conducting other general technical reviews of WIPP and regulations development since 1993. Since the WIPP certification decision, he has been the Technical Lead working on WIPP performance assessment, WIPP site continued compliance of Subpart A, and monitoring programs and is leading the effort to prepare for the second re-certification in 2009. Before coming to EPA he worked for almost fifteen years in oil exploration, first will Shell Oil and finally with Meridian Oil.

Carl Chavez (OCD): is an Environmental Engineer (August 2005 to present) with the Environmental Bureau, Oil Conservation Division, Energy, Mineral & Natural Resources Department in Santa Fe, New Mexico. He graduated from New Mexico State University with a bachelor's degree in Geological Sciences and a minor in Economics in 1986. He attended the California State Polytechnic University in Pomona, California, in the Mechanical Engineering-Petroleum Option Program. He has been the permit writer and inspector for oil & gas refineries in New Mexico. He led the OCD's primacy initiative for the NPDES and storm water program. He served as the OCD's Quality Assurance/Quality Control Officer and as inspector for the OCD UIC Program in New Mexico. He has provided technical assistance and testified as an expert witness at OCD environmental regulatory hearings.

He worked as an Environmental Scientist/Specialist (March 2004 to August 2005) for the New Mexico Environment Department, Hazardous Waste Bureau, Waste Isolation Pilot Plant (WIPP) Group in Santa Fe, New Mexico. He evaluated hydrogeologic and/or ground water detection monitoring reports from WIPP for compliance with the WIPP Permit; EPA ground water monitoring requirements; and RCRA hazardous waste regulations. He lead comprehensive groundwater monitoring evaluations of field environmental sampling procedures and methods; five-year regulatory review of the WIPP Permit and ground water monitoring program; assessments, investigations and

cleanup actions; evaluations of air ventilation monitoring reports, head space gas sampling of waste drums and other technical permit related projects. He participated in RCRA waste characterization audits/inspections with the USEPA and Carlsbad Technical Assistance Group at hazardous waste generator facilities across the U.S. to confirm compliance with hazardous waste provisions of the WIPP Permit, i.e., Waste Analysis Plan, Waste Acceptance Criteria, etc. He spent from 1989 to 2004 working in various environmental programs for the Michigan Department of Natural Resources-DNR (which later became the Department of Environmental Quality-DEQ) in Lansing, Michigan.

Mike Cochran (Chief Geologist for Kansas Department of Health and Environment): has been instrumental and provided information regarding the state of Kansas' issues with sodium brine well failures and remediation efforts.

Daniel Ferguson (DOE): Oversees the activities related to the hydrology program at the Waste Isolation Pilot Plant (WIPP) Site. He provides technical oversight of the hydrology program to ensure the integration and coordination of work activities of the management and operating contractor and Sandia National Laboratories.

Jim Griswold (OCD): Jim is relatively new to OCD having come on board as a hydrologist in April of 2008 after more than 25 years in private industry. His primary professional focus has been on the investigation and remediation of soil and groundwater contaminants, but also has extensive experience in groundwater flow modeling, open-hole geophysical logging, uranium exploration, potash production, water rights development, plasma and atmospheric physics. He is a graduate of NM Tech. Along with his oversight of remedial efforts utilizing that portion of severance taxes dedicated to the Reclamation Fund under the NM Oil & Gas Act, Jim is now involved in the UIC program.

David Herrell (BLM): I was born in Carlsbad, NM in 1955. Graduated from Carlsbad High School in 1973 and New Mexico State University with a Bachelor of Geological Science in 1980. Served in the United States Army and attended Officer's Candidate School where he received a commission as a 2nd Lieutenant. He served in various staff and command positions and retired as a Lieutenant Colonel after 26 years of service. After retirement from the military, he was employed by the State of New Mexico as a patrolman with the New Mexico State Police, where he served for 8 years. While in the New Mexico State Police, he served as an Emergency Response Officer (ERO) and handled numerous hazardous materials spills and other incidents. He is now employed by the Bureau of Land Management as the Hazardous Materials Specialist and Safety Officer for the Carlsbad Field Office. I was involved in the Incident Command Center at both of the recent brine well collapses in southeast New Mexico.

He has an understanding of the basic geology of the area and the processes associated with these collapses.

Courtney Herrick (SNL): I am in the technical lead for the geotechnical / rock mechanics group down here at Sandia National Laboratories Carlsbad Field Office, 4100 National Parks Highway, Carlsbad, NM. I have been working here at WIPP for 4 years. We are presently poking around with some rock mechanics models.

Dave Hughes (Washington Regulatory and Environmental Science- WRES): has an extensive knowledge of the Delaware Basin of New Mexico and West Texas and maintains the Geographic Information System for the Department of Energy's Waste Isolation Pilot Plant. Also attached is the background information for Mr. Russ Patterson with the DOE Carlsbad Field Office.

Brad Jones: (OCD): is an environmental engineer with the Oil Conservation Division's Environmental Bureau since July 2006. His primary duties include the review of permit applications, permit modifications, and closure plans under Part 17 (the pit rule) and Part 36 (the surface waste management rule); review of ground water and hydrostatic test discharge permit applications, modifications, and renewals under the Oil and Gas Act and Water Quality Control Commission regulations; and training and outreach on Part 17, Part 36 and discharge permits. Currently, his focus has been in the creation of rules and policies and training staff, operators, consultants, and the public of the implementation of new environmental rules. He holds a Bachelor of Science degree in Environmental Health Science from the University of Georgia. He has over 10 years of environmental regulatory experience, mainly as a regulator but also some in industry.

Prior to joining the Oil Conservation Division (OCD) he worked as an Environmental Specialist in the Solid Waste Bureau – Permit Section of the New Mexico Environment Department for approximately four years. He was involved in the permitting of landfills, solid waste facilities. He oversaw ground water monitoring programs and investigations for those facilities. Prior to that he worked as an Environmental Specialist I in the Florida Department of Health, where he designed, permitted, inspected and approved on-site sewage systems. For a short period, He worked as an Environmental Scientist for Redemption Environmental, Inc., a small consulting firm in Tampa, Florida where he performed site investigations, remediation programs, and cleanups of underground storage tank contamination sites. He worked as an Environmental Health Specialist II for the Island County Health Department in Coupeville, Washington, under a state granted funded position that involved overseeing solid waste programs, voluntary cleanup programs, investigations of contaminated sites, and the cleanup of meth lab

sites. He worked as an Environmental Specialist I at the Florida Department of Health where I oversaw the implementation of several environmental programs.

Ross Kirkes (DOE): Mr. Kirkes provides environmental consulting services, primarily to DOE contractors and laboratories. He supports the development of compliance demonstrations and applications and he has provided significant input to the implementation of programs to ensure ongoing compliance with the provisions of environmental regulatory approvals. Mr. Kirkes has over 15 years negotiating compliance issues with various environmental regulatory agencies for the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. Mr. Kirkes was instrumental in the development and production of the demonstration of compliance that led to the U.S. Environmental Protection Agency (EPA) certification of the WIPP. Mr. Kirkes combines his regulatory experience and knowledge of the regional petroleum industry to ensure that future human activities such as petroleum and potash exploitation are accurately represented in WIPP performance demonstrations and assessments.

Ray Leissner (EPA): Graduated from Sam Houston State University with a B. S. in Ag Business in 1976. Ray entered the field of underground injection control in 1984 working for the Railroad Commission (RRC) of Texas in Austin while attending class at the University of Texas. He graduated with a B. S. degree in Petroleum Engineering from the University in 1986 and worked full time at the RRC until 1988 wherein he accepted a position with the Environmental Protection Agency, Region 6, Dallas. Initially working in the Region's direct implementation UIC program for the Osage Mineral Reserve in Osage county Oklahoma, Ray is now senior program manager in the Region's State UIC oversight program. This position involves him with all of the state UIC programs in the Region and he directly oversees the RRC.

Richard Miller (Intrepid Potash): Has worked for Intrepid Potash in Denver with Hugh Harvey since 2001. His duties include assisting Hugh with design, permitting, construction, and operation of 12 Class III injection wells in Moab that are used for injection/extraction of solution mining fluids.

Loren R. Molleur (Key): Grew up in Tatum, New Mexico. Graduated from high school in 1966. Attended New Mexico Junior College in Hobbs, New Mexico in 1968-1969. Worked for Amoco Production Company from 1970-81. Started with Amoco in Artesia, New Mexico in 1970 working in the Empire Abo Gas Plant. Transferred to Hobbs, New Mexico in 1973 and worked for the production group until transferring to Andrews, Texas in 1976. While in Andrews, I worked with the production group as well as the drilling and work over group. I retired from Amoco in January of 1981 and went into the trucking business. Was co-owner of L & L Trucking Company from 1981 until it was sold in October of 1997 Work for Key Energy managing their trucking business in the Permian Basin and New Mexico for the past 7-8 years.

Russ Patterson (DOE): Is the Compliance Certification Manager and works closely with the Environmental Protection Agency and is very knowledgeable about the geology of the Delaware Basin and also EPA's Environmental Regulations.

Wayne Price (OCD): Is the Environmental Bureau Chief of the Oil Conservation Division, Energy, Minerals & Natural Resources Department in Santa Fe, New Mexico (1993-present). He earned a Bachelor of Science Degree in Electrical Engineering from New Mexico State University in 1969. He worked in the OCD Hobbs District office as an environmental engineer, witnessing and evaluating mechanical integrity tests (MIT's) for EPA Class II and III wells, maintained files for discharge permits, processed C-141 spill reports, and C-138 waste management approvals. He inspected OCD-regulated facilities, collected soil and water samples, performed well logging, processed APDs, analyzed lab reports, reviewed and evaluated remediation plans, and provided training to industry on OCD rules, regulations and guidelines. As the Environmental Bureau Chief, he has managed bureau staff in their duties: oversight, inspection, and permitting of the state's oil refineries, crude oil pump stations, EPA UIC Class I (oilfield exempt, non-exempt non-hazardous waste disposal well), II (hydrocarbon storage), III (brine well), and V (geothermal well), gas plants, gas compressor stations, oilfield service companies, and the management of over 400 active remediation and abatement plans throughout the state. He has served as a technical expert witness concerning environmental and regulatory issues including evaluation and use of vadose zone and ground water modeling. He has served in the New Mexico Water Quality Control Commission that presides over the state's water rules and regulations.

He worked for Unichem International from 1983 to 1993 where he was manager of engineering and environmental projects for Unichem's domestic operations. He provided project oversight, maintained cost controls, prepared budgets and supervised technical employees for engineering and environmental operations throughout the continental United States. Projects included the design, construction, start-up of chemical plants, abatement of contaminated sites, and environmental permitting. He implemented environmental best management practices and waste management policies for Unichem's company-wide operations. He also created a permit tracking system for all ground water discharge, air quality, NPDES, storm water, SPCC, RCRA, and local permits. He also worked in the oil field as a roustabout and drilling rig roughneck during summers when he was not attending college.

James Rutley (BLM): I was born in Detroit, Michigan in 1964. Graduated from Roswell Goddard High School in 1983 and New Mexico State University in 1989 with a Bachelor of Science in Geology. Worked two years in the Permian Basin as a mud logger before beginning a career in potash. After 15 years, resigned from Mosaic as a Surface Production General Foreman to pursue work at the BLM. Works as a BLM geologist in

the Carlsbad Field Office and am responsible for performing potash mine inspections and sodium site inspections. Wrote mineral reports and permit APD's in the potash basin. After the first sink hole on Hagerman Cutoff, Dave Herrell and I began researching all federal sodium wells both abandoned and current- mapping their relationship to municipal and transportation systems. Identified several potential wells that could have catastrophic consequences because of their proximity to both systems.

Dan Snow (Lotus L.L.C.): He graduated from Lovington High School, Lovington, NM in 1976. He graduated with a BS Mechanical Engineering from New Mexico State University in December of 1980. He worked for Amoco Production Company from 1980 to 1984. His responsibilities included advanced training, operations in Petroleum Engineering, Production Engineering, Drilling Engineering, Drilling Foreman and Drilling Engineer Senior Grade. Involved in all areas of Oil and Gas associated with Amoco Production Company, Andrews District Office. He worked for an independent oil producing company in the Permian Basin from 1984 to 1990 working in all phases of the oil and gas industry including production management. His areas of operations included field areas from the Permian Basin to Northern Rocky Mountain States. His responsibilities included engineering of drilling projects, production projects, and vertical management of all personnel from contract to upper level supervisors associated with job scope. He is currently the Owner of Snow Oil & Gas Inc, Lotus LLC, Fluid Transports Inc, TransRam LP and LLC. He instituted the first integrated mid-continent transportation and waste management companies for the oil and gas industry to address all needs of oil and gas producers. This resulted in a patented process utilizing bedded salt deposits for the disposal of all wastes generated by oil and gas exploration, or production streams. He designed and implemented an integrated pipe cleaning system for the removal of NORM.

George Veni (NCKRI): is the Executive Director of the National Cave and Karst Research Institute (NCKRI) and an internationally recognized hydrogeologist specializing in caves and karst terrains. He received his Master's degree from Western Kentucky University in 1985 and his Ph.D. from the Pennsylvania State University in 1994. Prior to NCKRI, he owned and served as principal investigator of George Veni and Associates for more than 20 years. Much of his work has been in Texas, but he has also conducted extensive karst research throughout the United States and in several other countries. He has served as the Executive Secretary of the National Speleological Society's Section of Cave Geology and Geography for 11 years and President of the Texas Speleological Survey for 13 years, and has served as a member of the governing board of the International Union of Speleology since 2002 and as Chairman of the 15th International Congress of Speleology. He serves as a doctoral committee advisor for geological and biological dissertations at The University of Texas and teaches karst geoscience courses as an adjunct professor for

Western Kentucky University. Three cave-dwelling species have been named in his honor. He has published and presented over 170 papers, including four books, on hydrogeology, biology, and environmental management in karst terrains.

Glenn von Gonten (OCD): is a Senior Hydrologist with the Environmental Bureau, New Mexico Oil Conservation Division, Energy, Minerals and Natural Resources Department. He has a B.S. in Geology from Texas A&M University and a M.S. in Geology from the University of Texas at Arlington. He has more than 30 years of experience as a geologist and has worked as an environmental regulator responsible for the investigation and remediation of contamination sites for the past 14 years. His responsibilities with the OCD include: supervising, reviewing, and approving professional hydrogeologic investigative work plans and reports to determine actual or potential threats to ground water from the past, current or proposed activities of oil and gas industry; supervising, reviewing, and approving remediation and abatement plans and reports; and, performing professional hydrologic, geologic, and engineering work related to the OCD's environmental protection efforts under the Oil and Gas Act and OCD rules and regulations.

From 1999 to 2005, he supervised staff in permitting and overseeing corrective action at RCRA regulated U.S. Department of Defense (DOD) installations and sites in the Hazardous Waste Bureau of the New Mexico Environment Department. From 1993 to 1999, he issued RCRA permits with corrective action requirements in the Virginia Department of Environmental Quality. From 1977 to 1991, he worked in the oil and gas industry as a geologist.

Veronica Waldram was raised in Carlsbad, NM. Earned a Bachelor of Science degree in Environmental Management from College of the Southwest (now named, University of the Southwest). Currently a Regulatory Compliance Specialist for Navarro Research and Engineering. Navarro is a technical assistance contractor to the Department of Energy, Carlsbad Field Office. Review the managing and operating contractor's regulatory reports and documents for environmental compliance. Before Navarro, worked as a subcontractor to Los Alamos National Laboratory-Carlsbad Operations. Was a member of the Site Generator Interface Team that assisted the National TRU Program with their activities at 23 DOE facilities throughout the United States. We assisted in certifying the characterization, treatment, packaging and transportation programs of TRU waste destined for disposal at WIPP.

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