Class III Wells

EPA Region 6

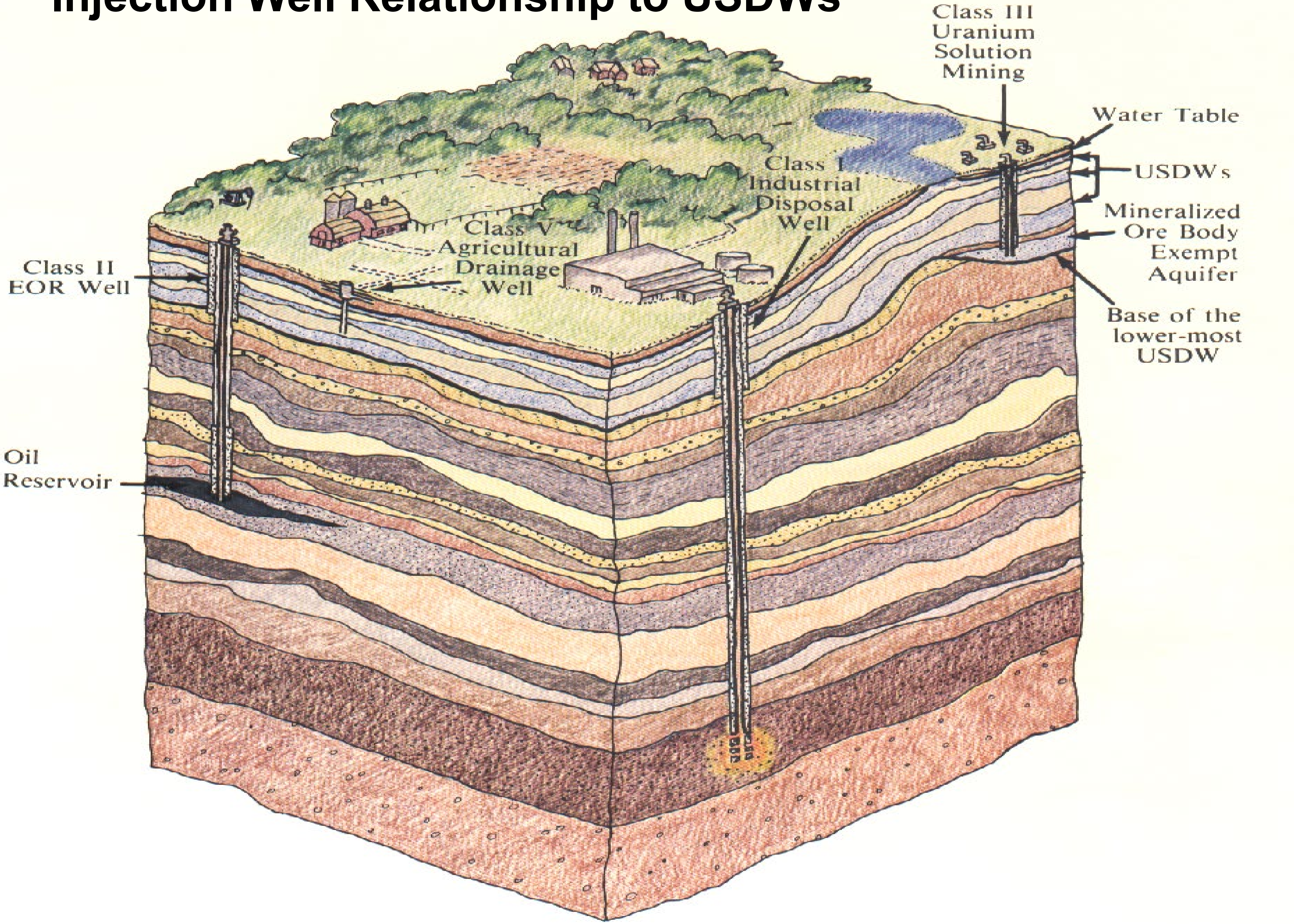
Brian Graves

UIC Land Ban Coordinator

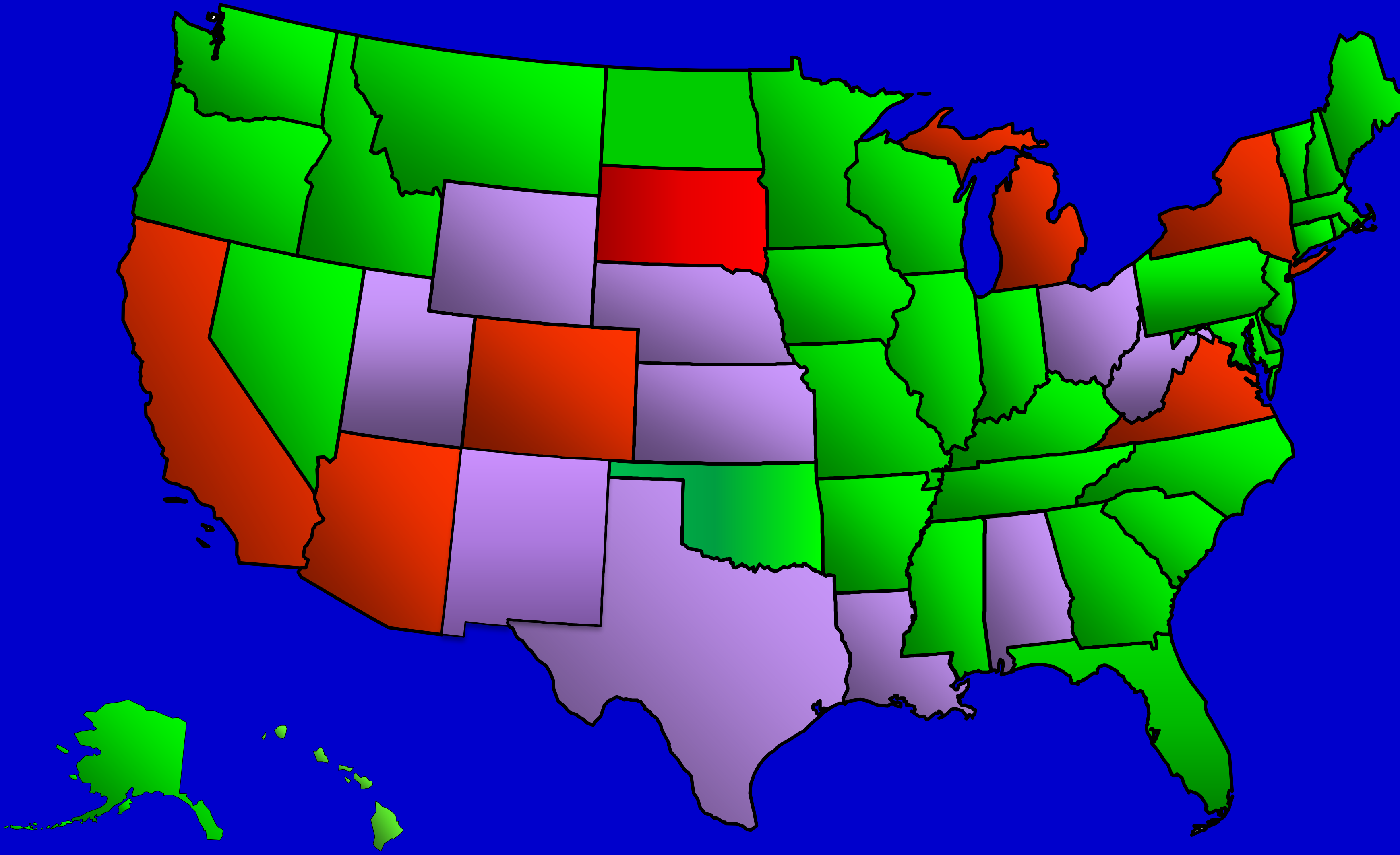
(214) 665-7193

graves.brian@epa.gov

Injection Well Relationship to USDWs



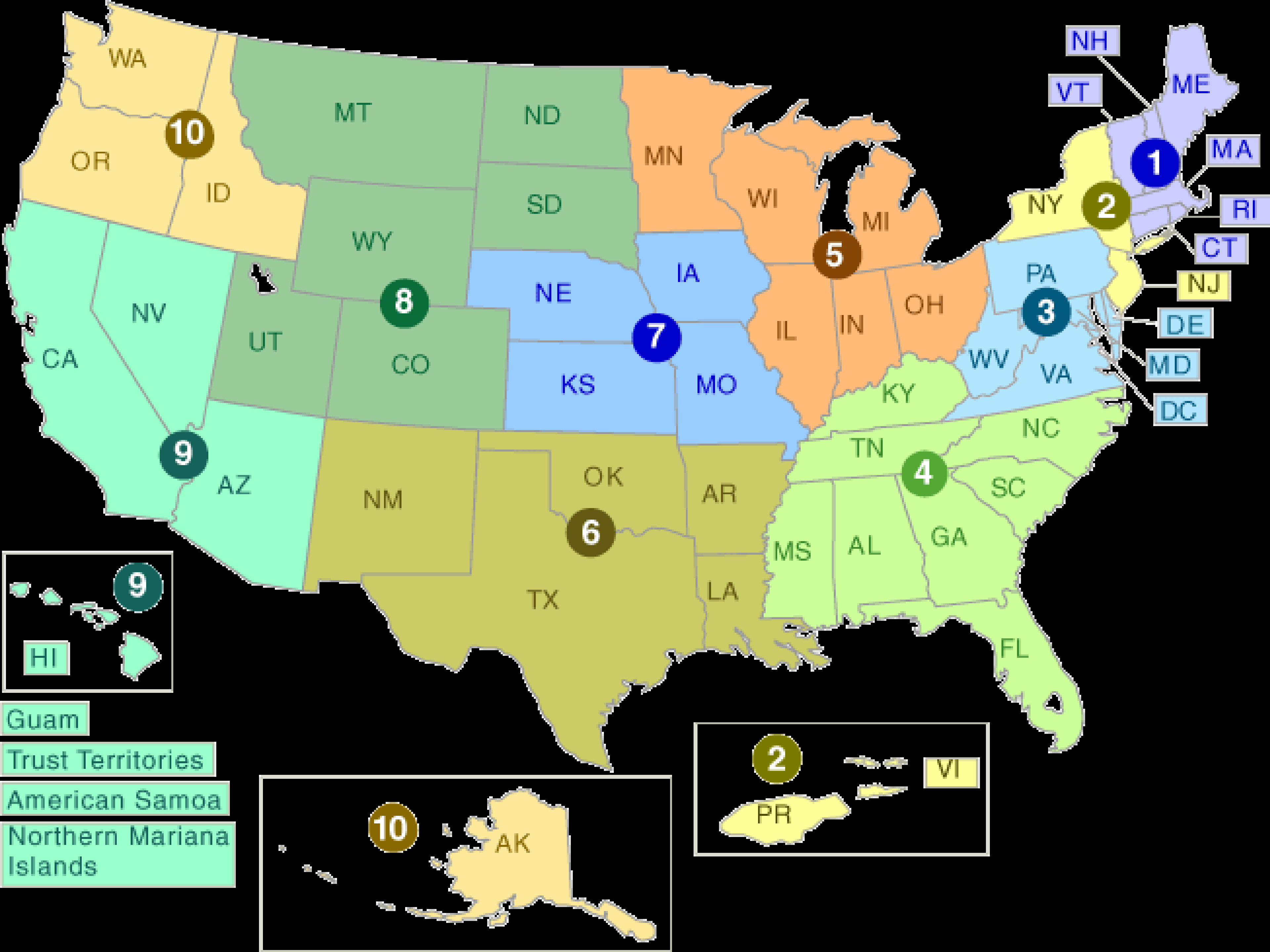
States With Class III Injection Wells



Primacy States with Class III Injection Wells

Direct Implementation States with Class III Injection Wells

States with no Class III Injection Wells



WA
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NV
CA
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AZ
NE
IA
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MN
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MI
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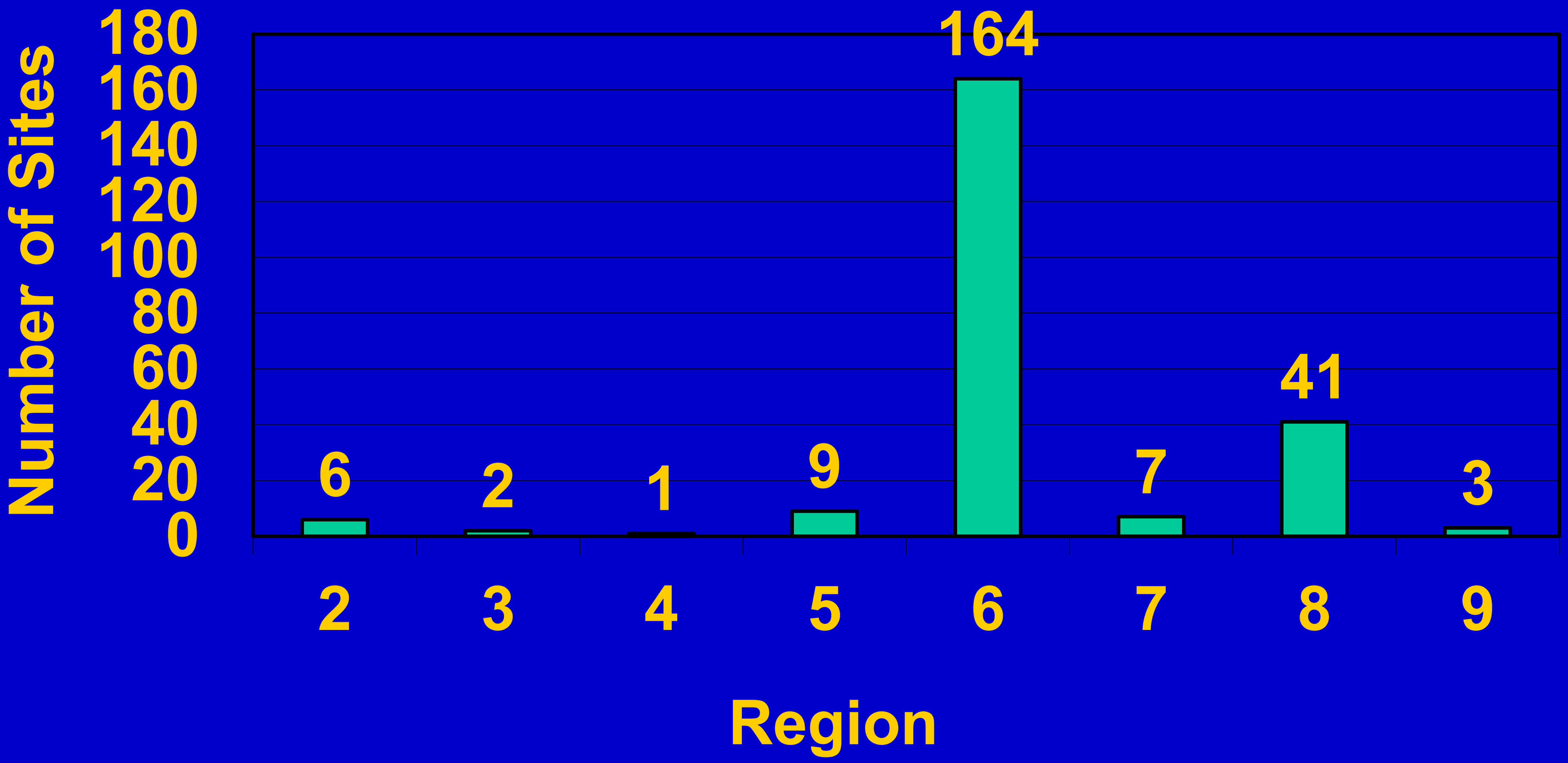
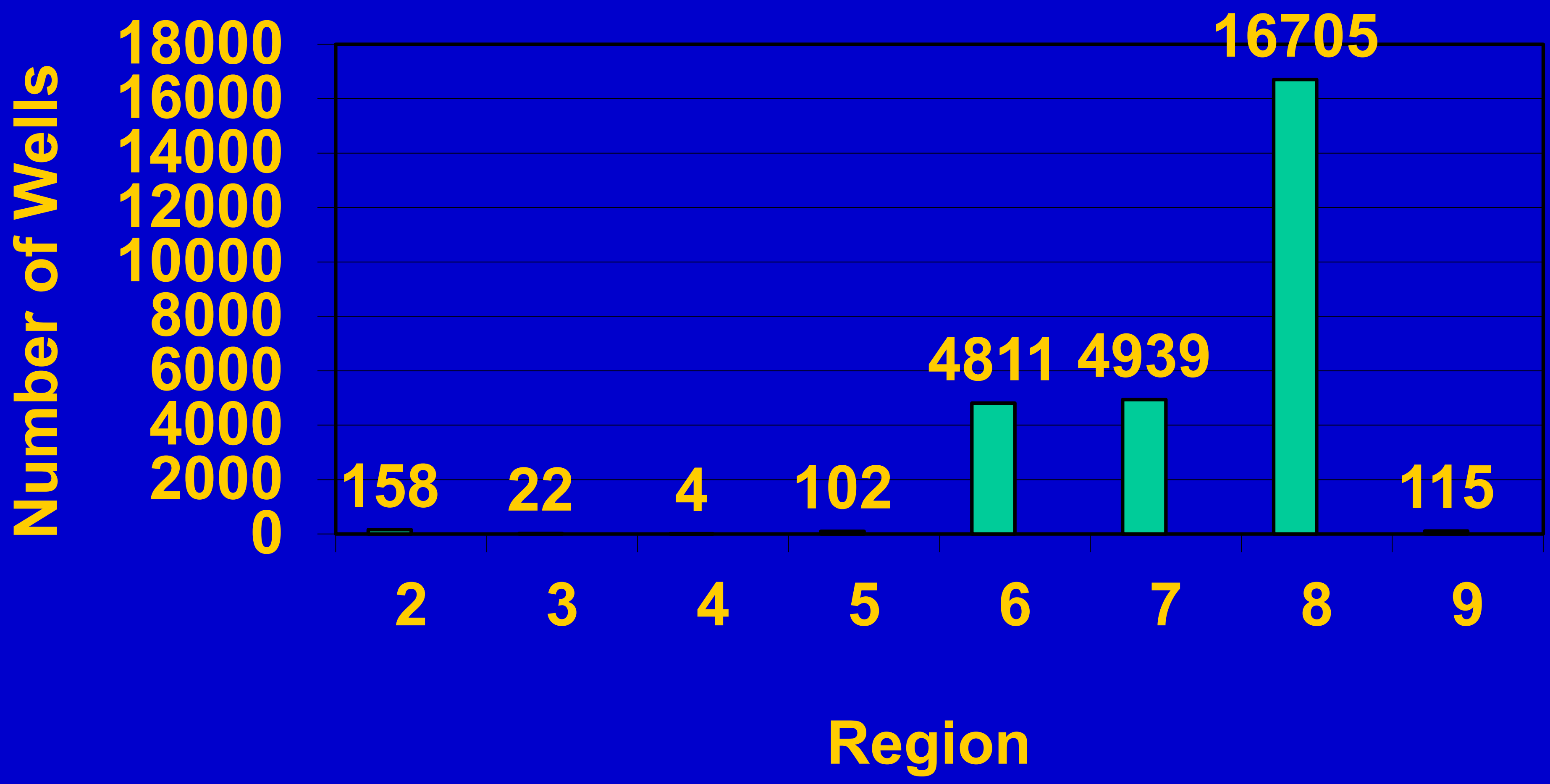
IL
IN
OH
PA
3
WV
VA
KY
TN
NC
SC
4
GA
AL
MS
FL
OK
AR
NM
TX
LA
6
NY
2
NH
VT
ME
1
MA
RI
CT
NJ
DE
MD
DC
9
HI
Guam
Trust Territories
American Samoa
Northern Mariana Islands
10
AK
2
PR
VI

Class III Well Sites



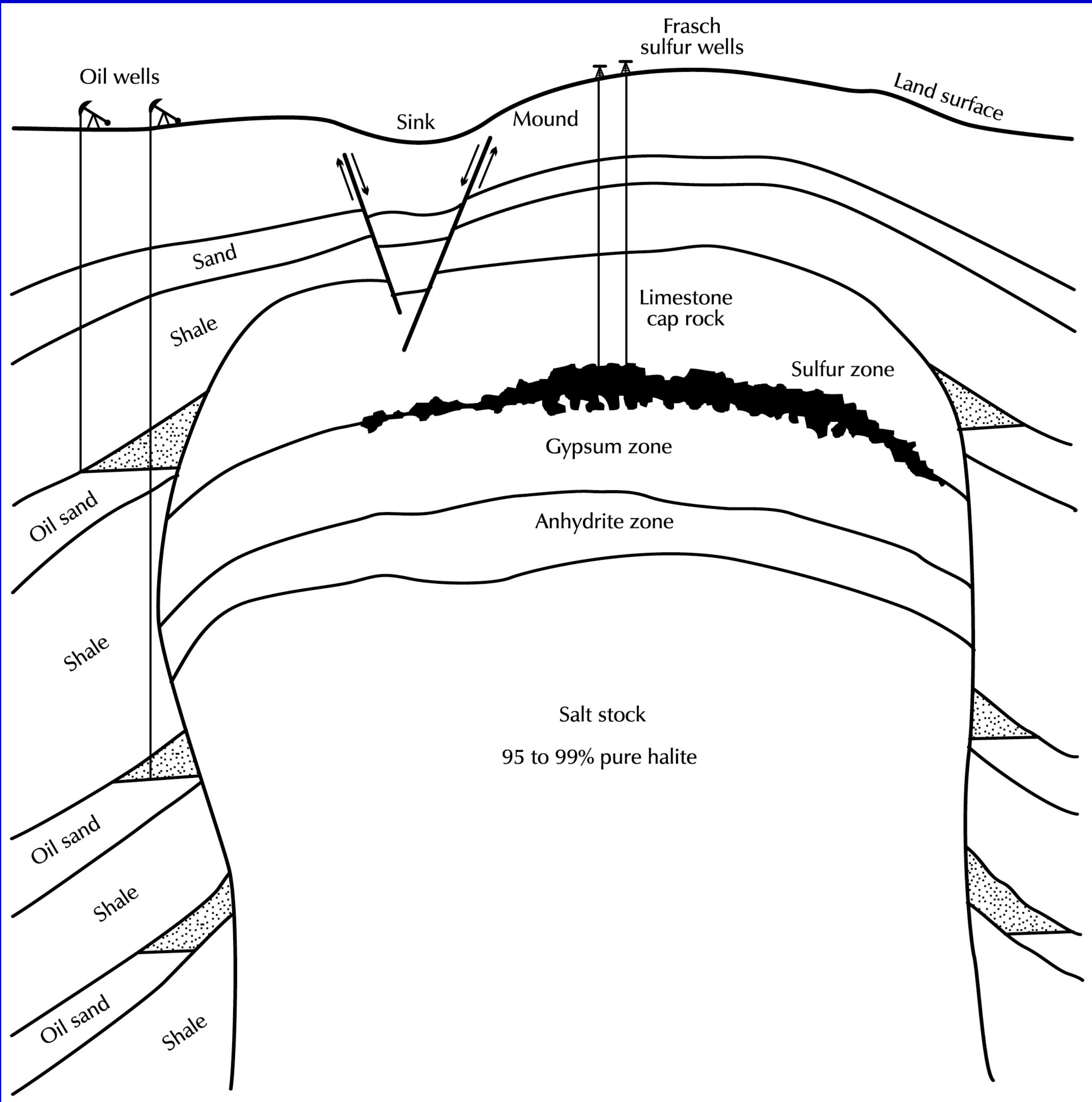
Class III Wells

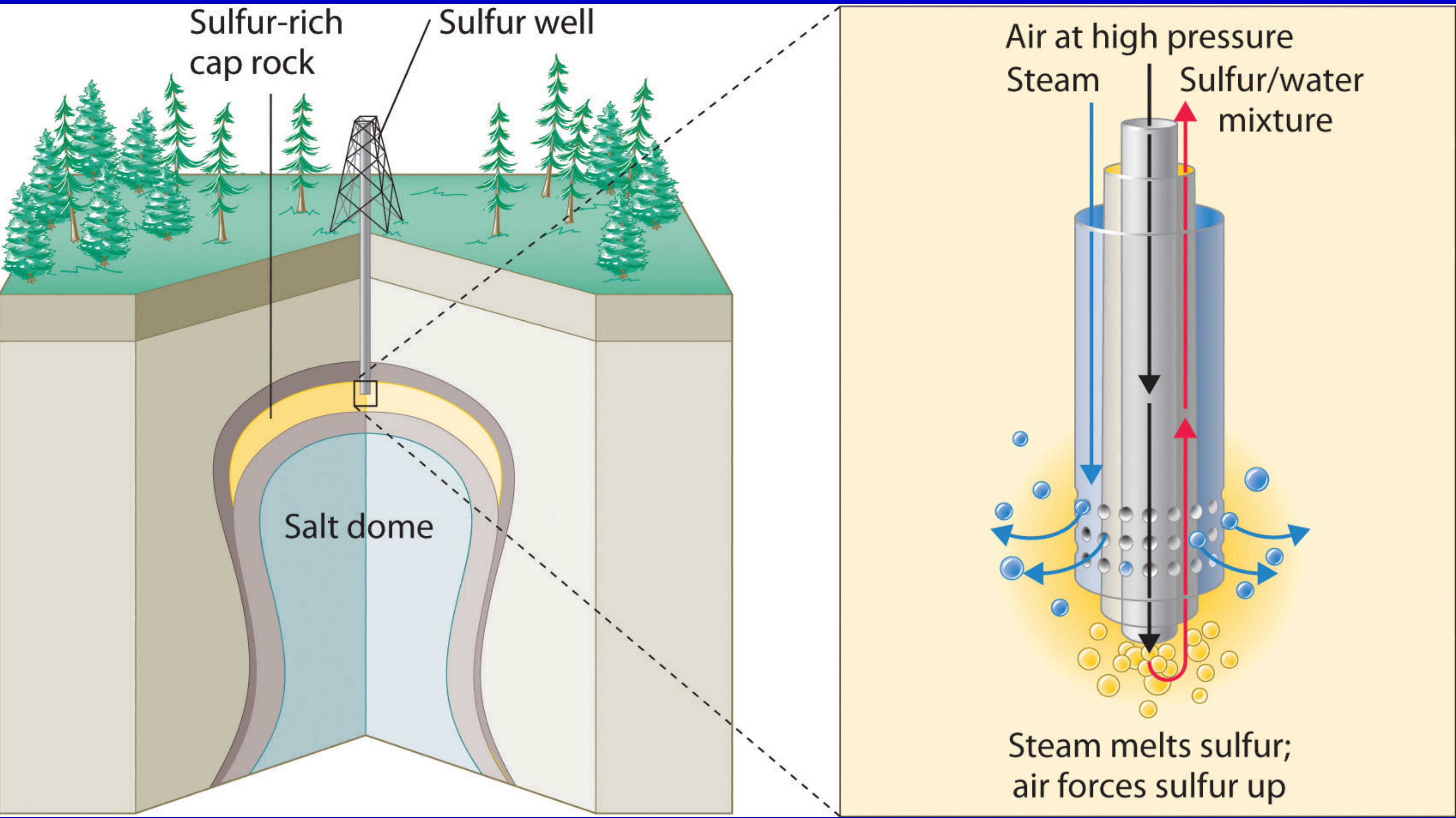


Sulfur

Mining

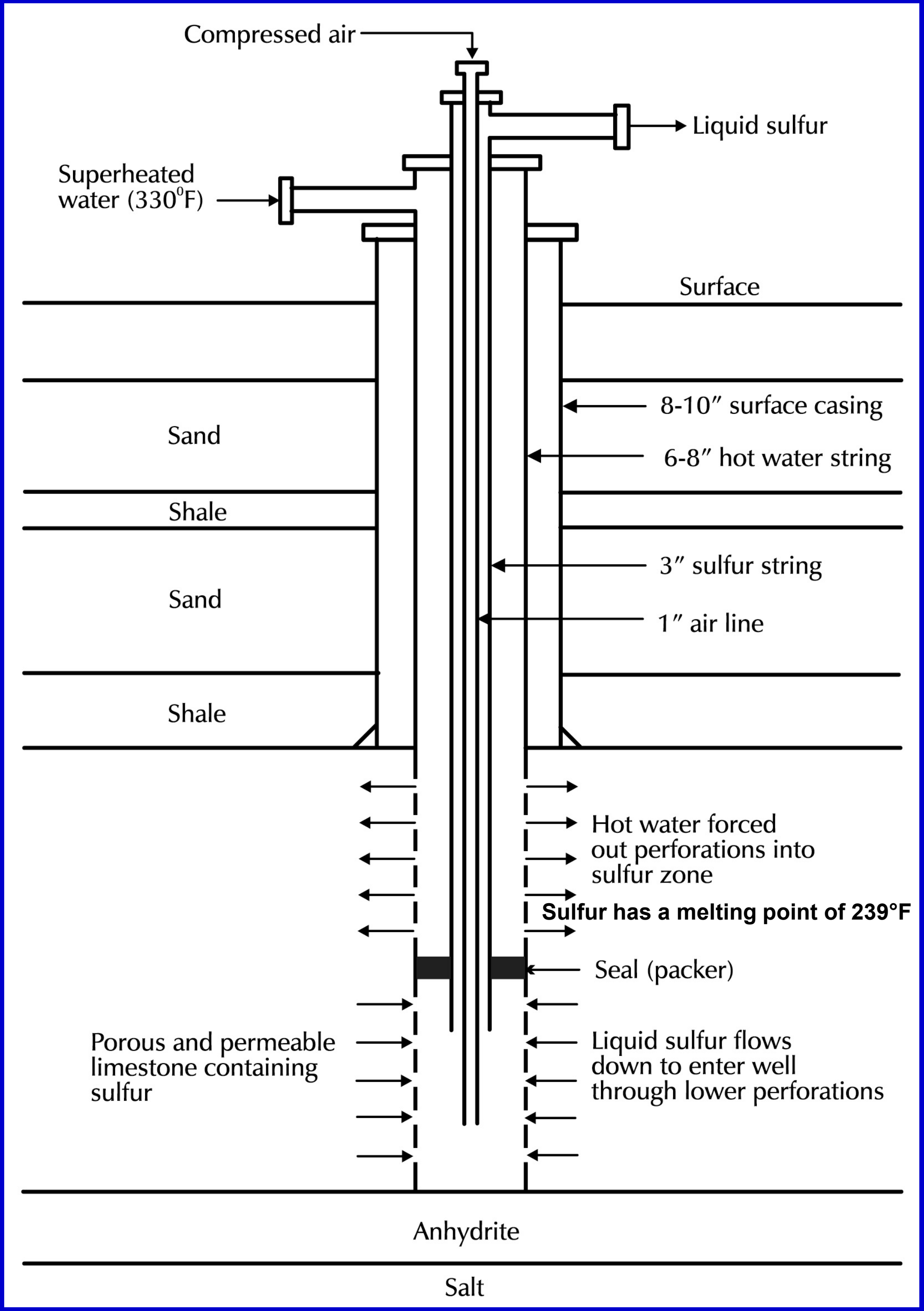
Generalized Cross Section of a Salt Dome



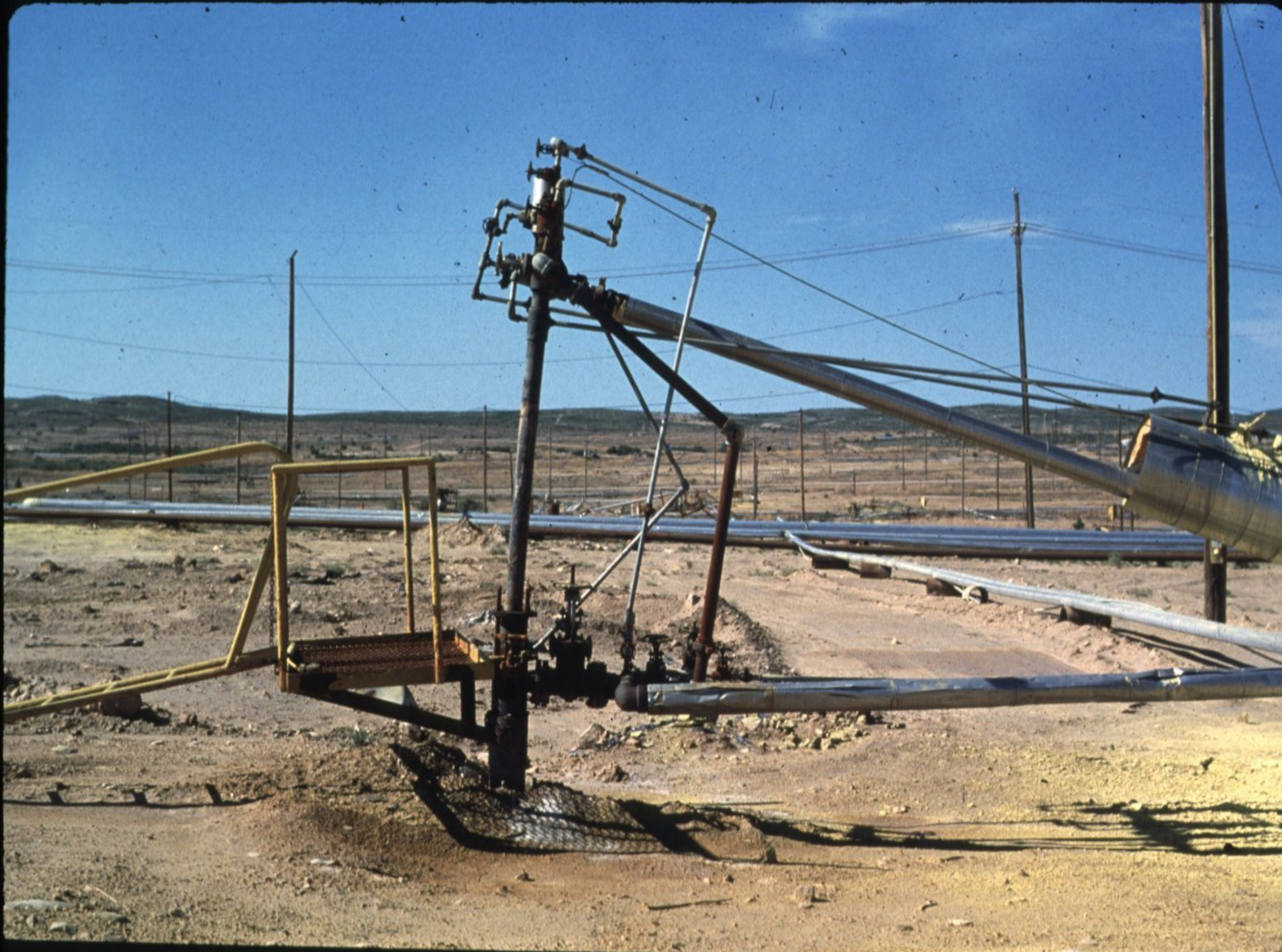


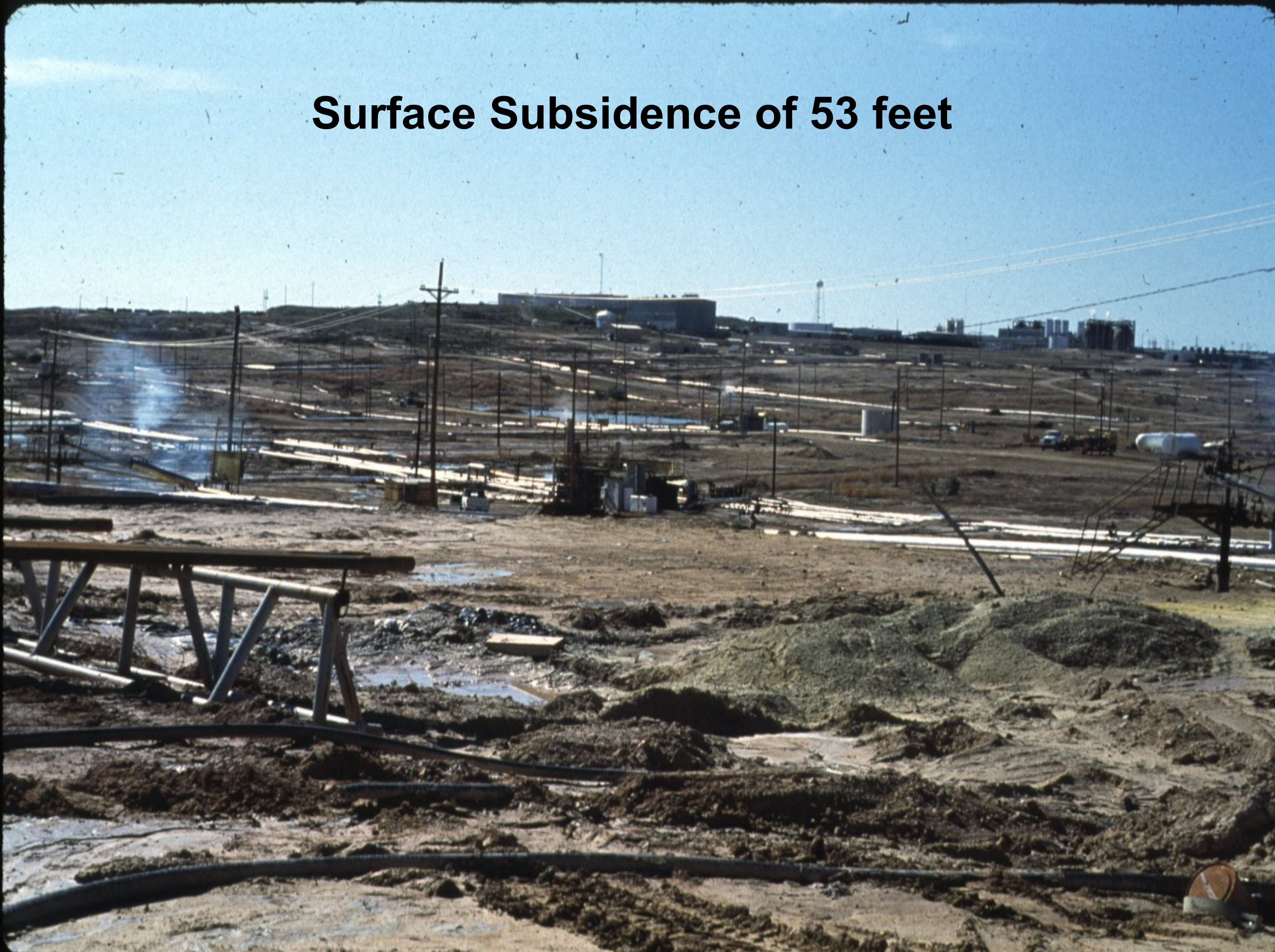
Sulfur-rich
cap rock
Sulfur well
Salt dome
Air at high pressure
Steam
Sulfur/water
mixture
Steam melts sulfur;
air forces sulfur up

Frasch Sulfur Well




DVLX 1089



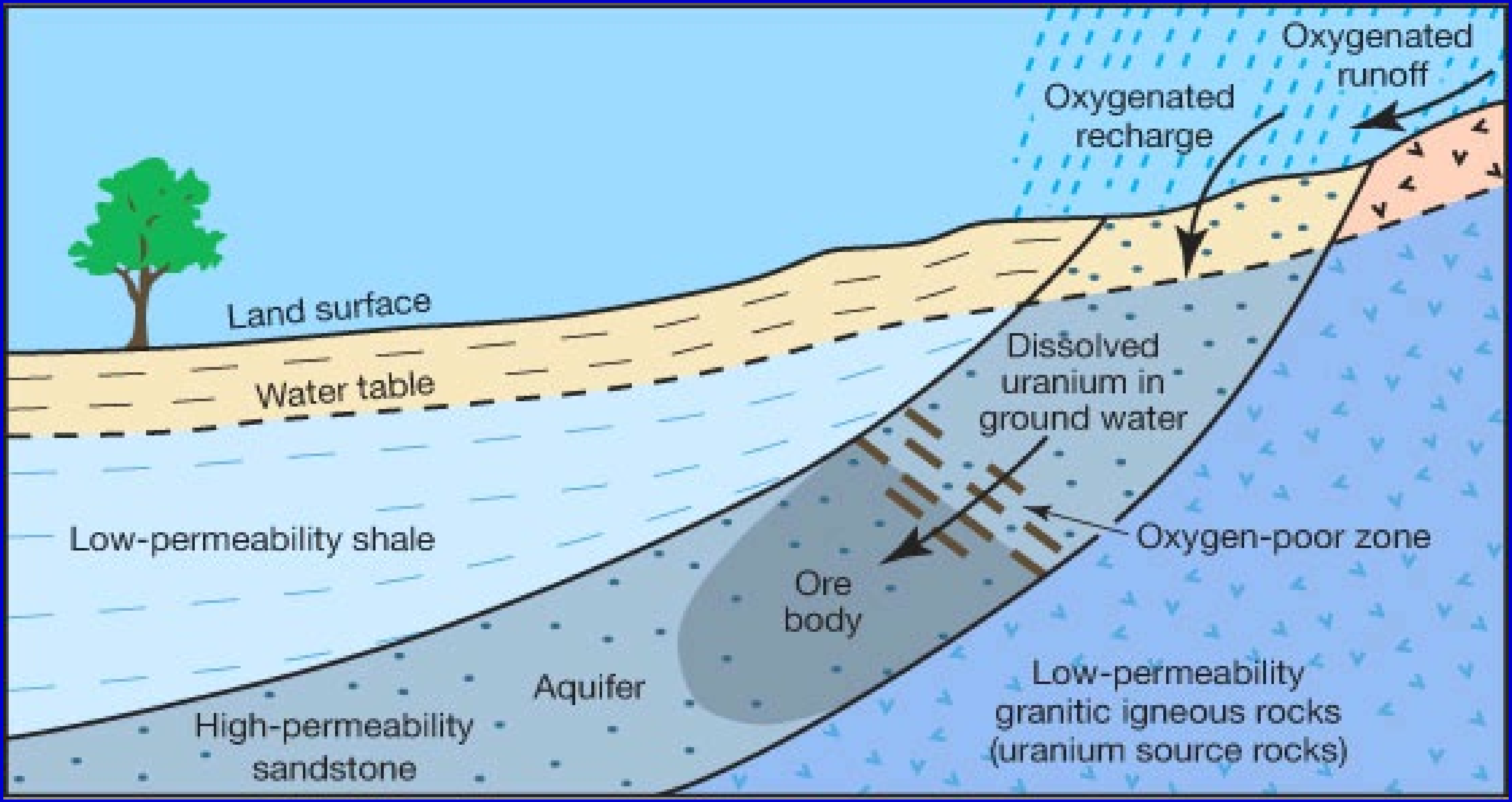

Surface Subsidence of 53 feet

Processed Sulfur in Several Forms

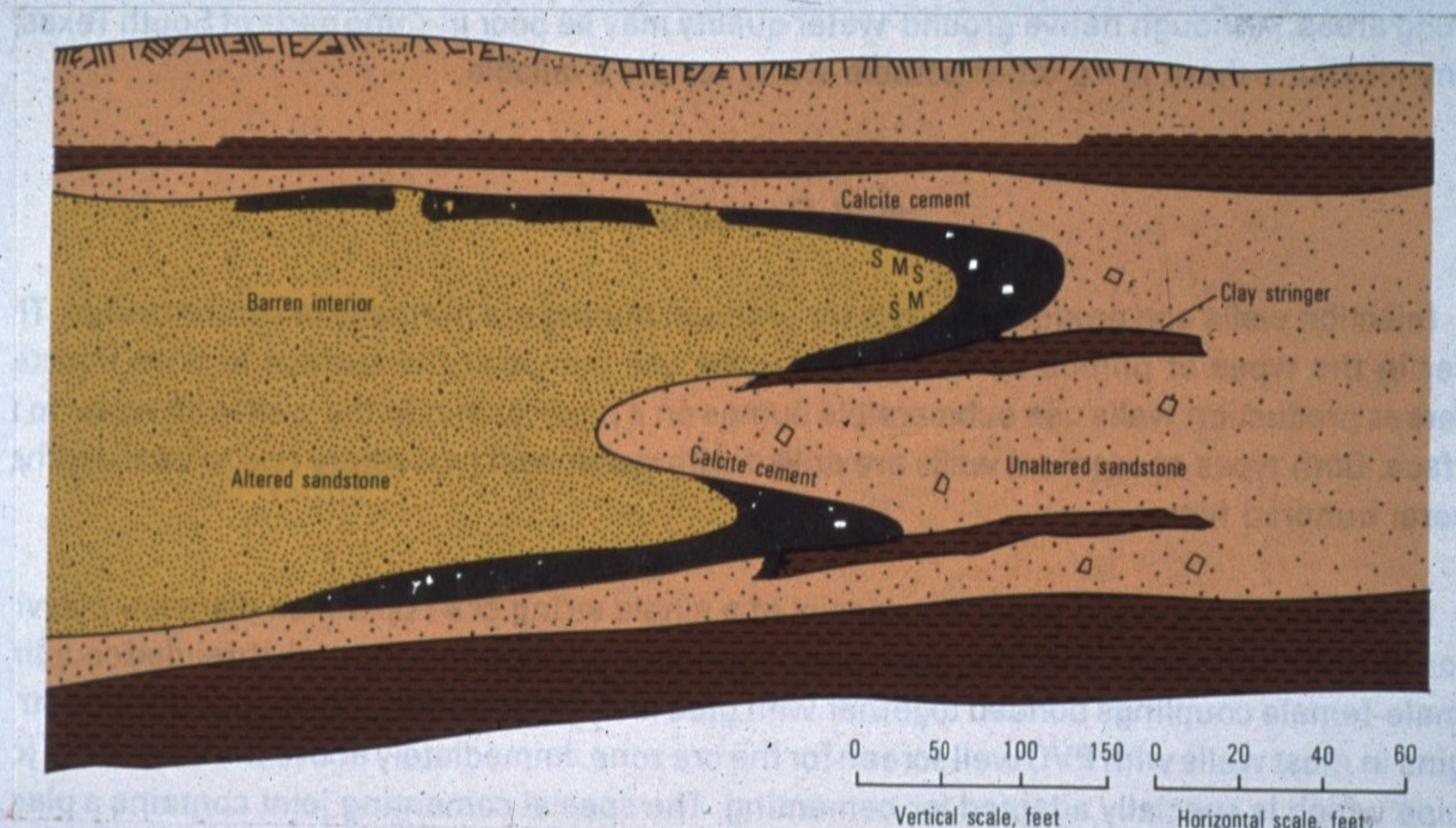
Uranium

Mining

Uranium Deposition



IDEALIZED URANIUM ROLL FRONT DEPOSITS



- Oxidixed Barren Interior
- Unaltered Sandstone
- Siltstone or Claystone
- Uranium Mineralization

- SMS SM — Selenium, Molybdenum } ERRATIC
- Pyrite

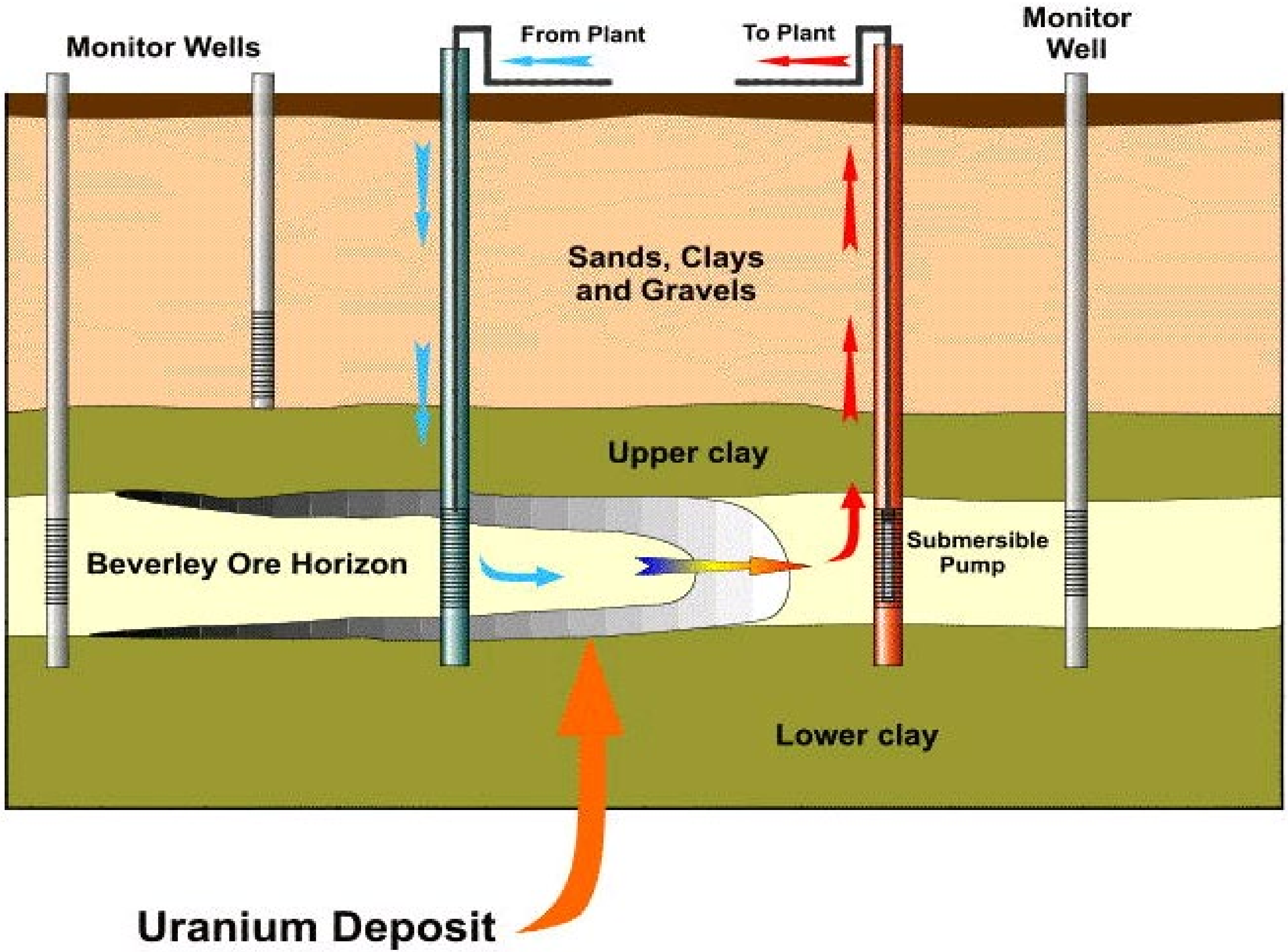
Roll Front Uranium Deposit

- **In situ leach (ISL) uranium mining was first tried on an experimental basis in Wyoming during the early 1960s.**

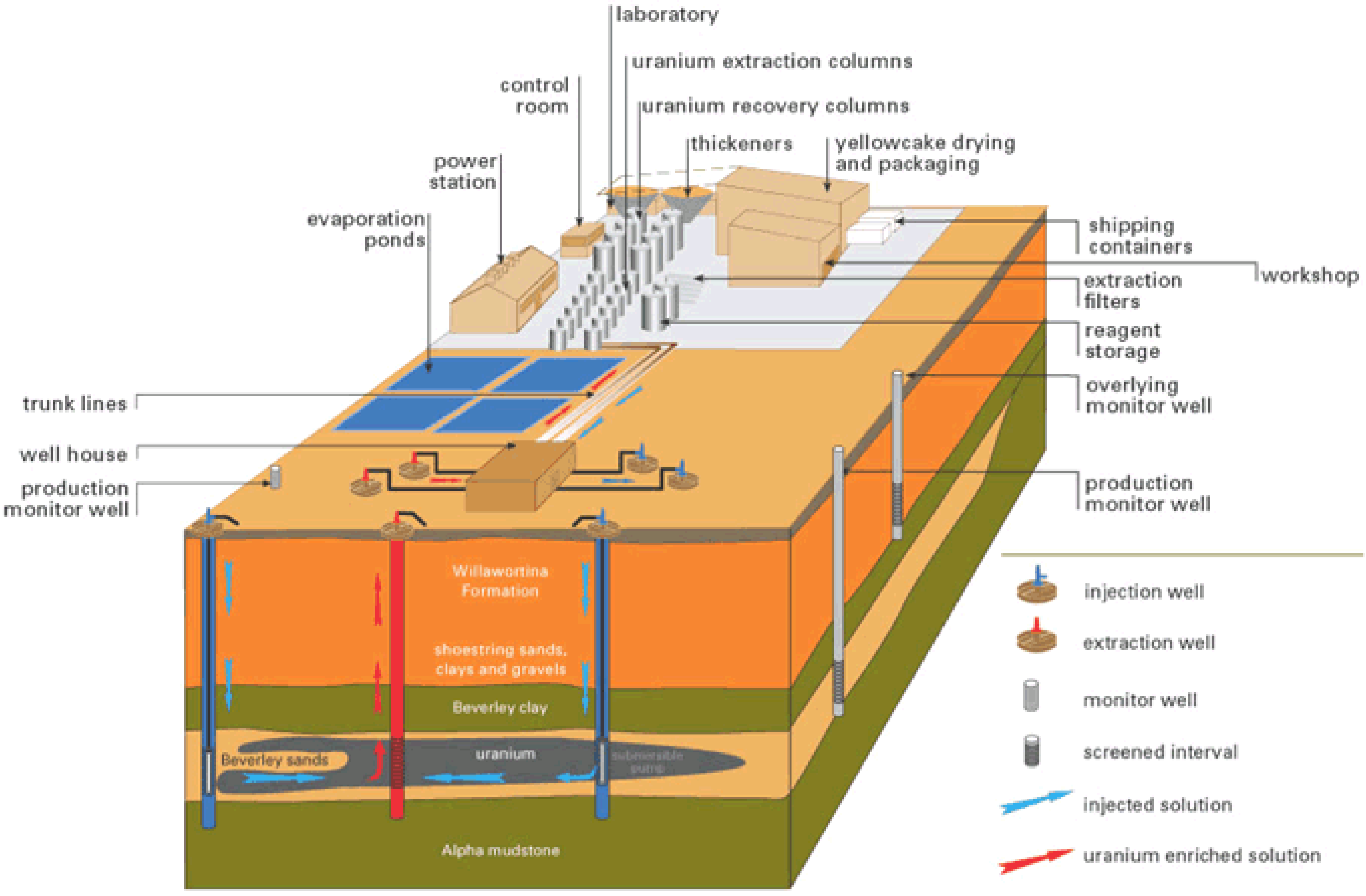
- **The first commercial mine began operating in 1974.**

- **In 2018 50% of world uranium mined was from ISL operations. Today most US uranium production comes from ISL mining.**

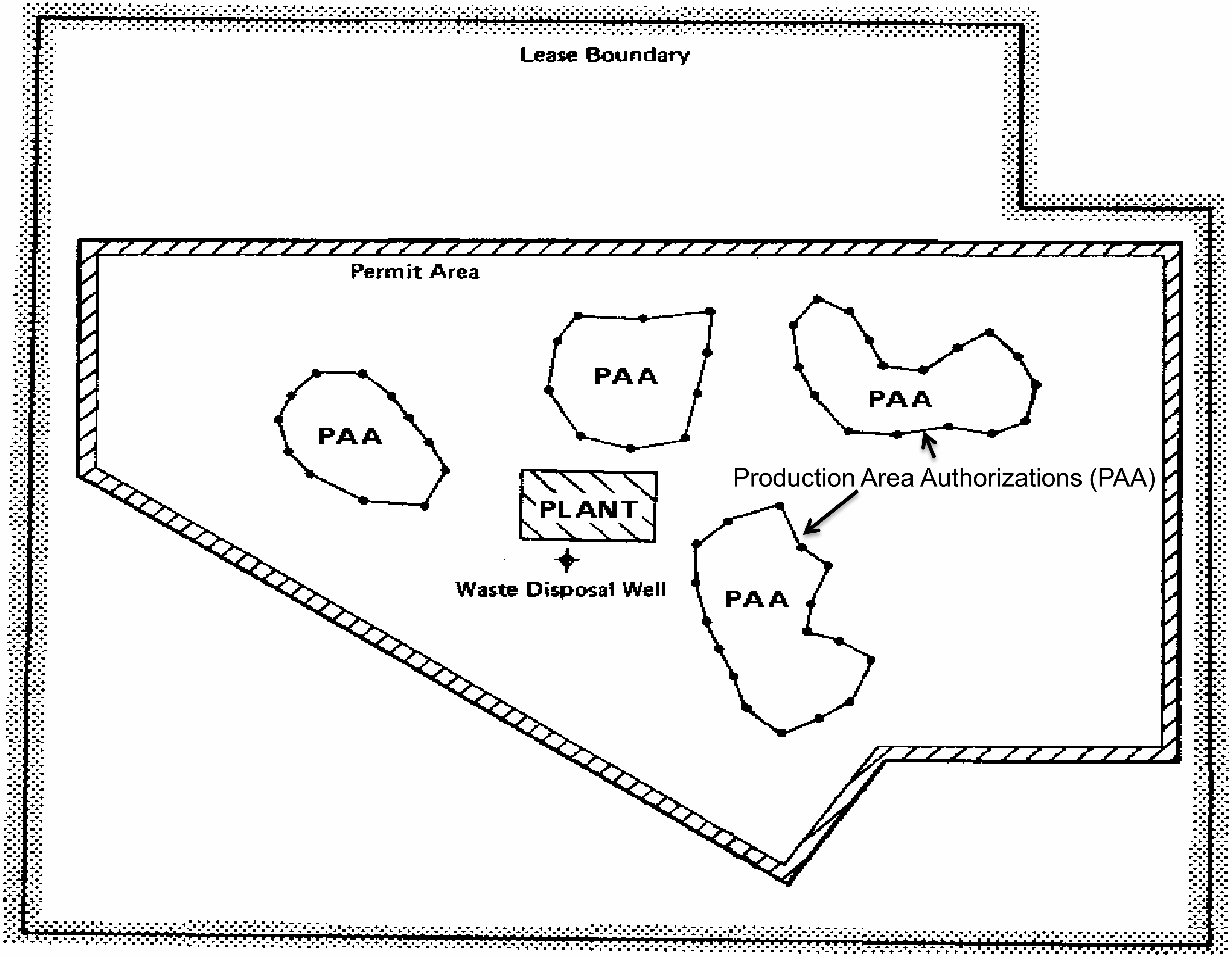
- **Several projects are licensed to operate in Wyoming , Nebraska and Texas. They are small (under 1000 t/yr) but they supply most of the US uranium production. Currently the Texas and Nebraska mines are on standby.**



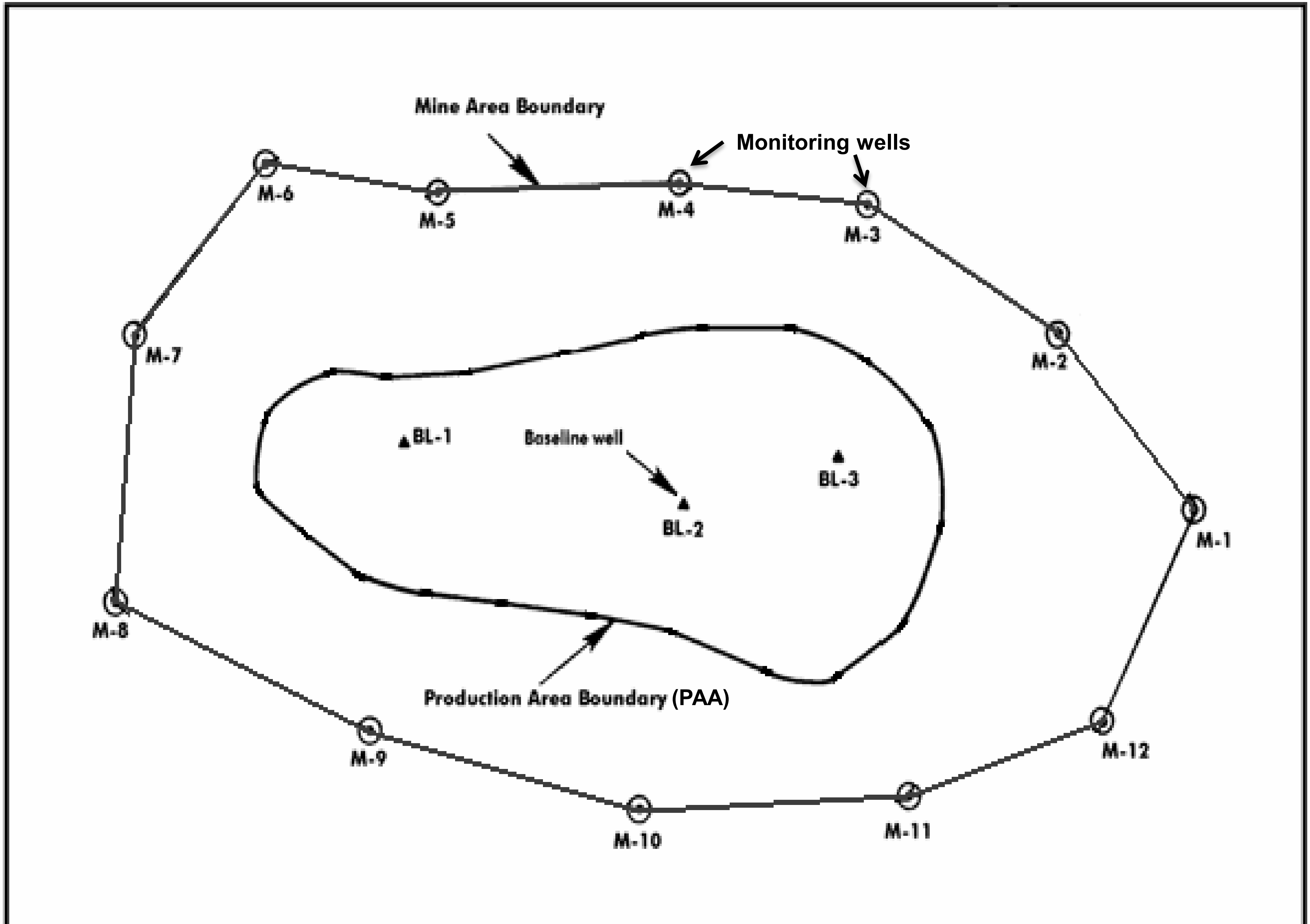
Monitor Wells
From Plant
To Plant
Monitor Well
Sands, Clays and Gravels
Upper clay
Beverley Ore Horizon
Submersible Pump
Lower clay
Uranium Deposit



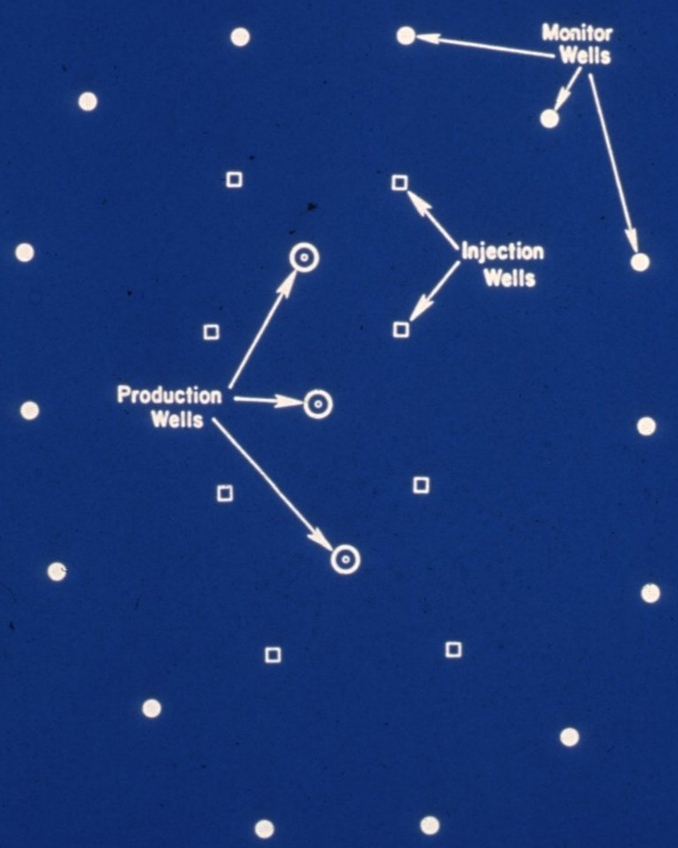
laboratory
uranium extraction columns
control room
uranium recovery columns
thickeners
yellowcake drying and packaging
power station
evaporation ponds
shipping containers
workshop
extraction filters
reagent storage
trunk lines
overlying monitor well
well house
production monitor well
production monitor well
Willawortina Formation
shoestring sands, clays and gravels
Beverley clay
Beverley sands
uranium
Alpha mudstone
injection well
extraction well
monitor well
screened interval
injected solution
uranium enriched solution



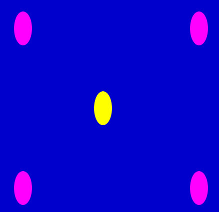
Lease Boundary
Permit Area
PAA
PAA
PAA
Production Area Authorizations (PAA)
PLANT
Waste Disposal Well
PAA


Mine Area Boundary
Monitoring wells
M-6
M-5
M-4
M-3
M-2
M-7
BL-1
Baseline well
BL-3
BL-2
M-1
M-8
Production Area Boundary (PAA)
M-9
M-12
M-10
M-11

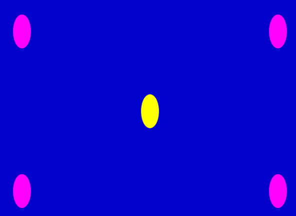
Generalized In-Situ Uranium Mine Plan



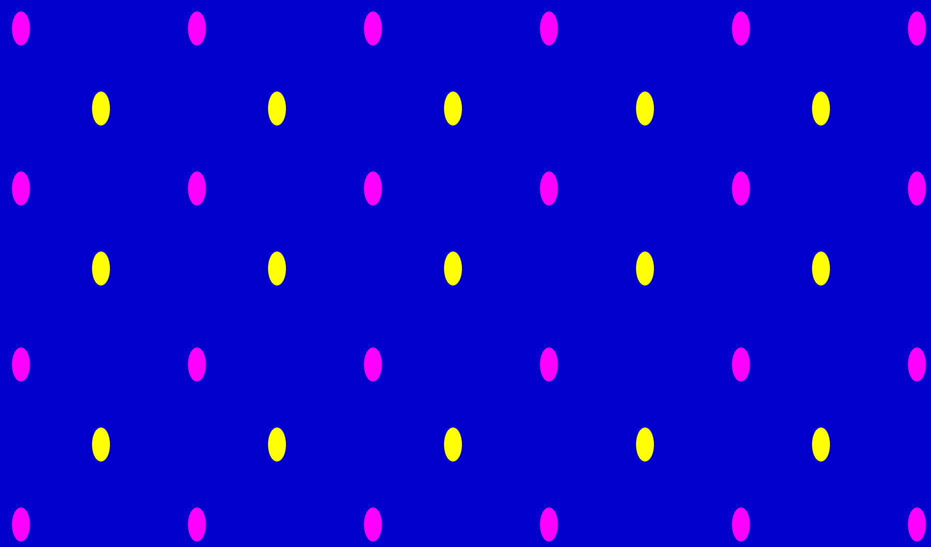
Common Patterns of Injection and Production Wells



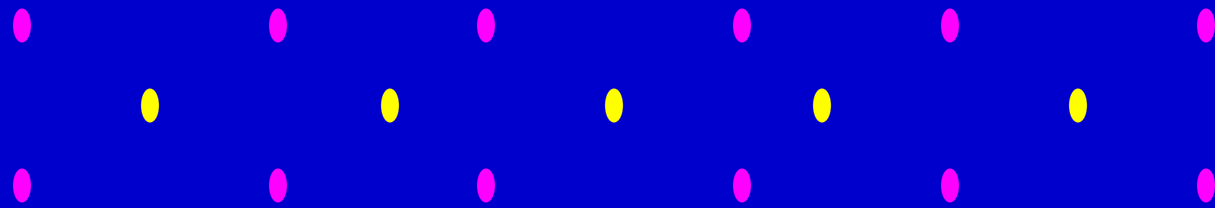
Five spot pattern



Staggered line drive pattern



Multiple five spot pattern



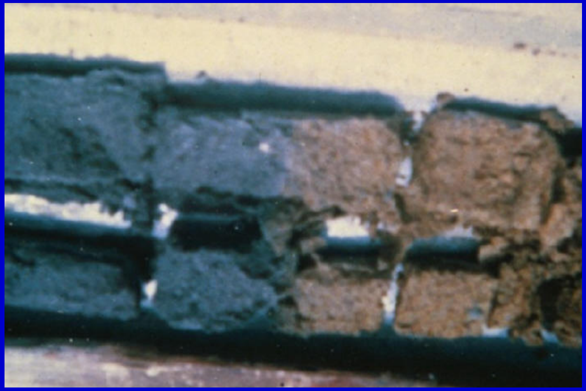
Multiple staggered line drive pattern

In situ wellfield with numerous injection and extraction wells

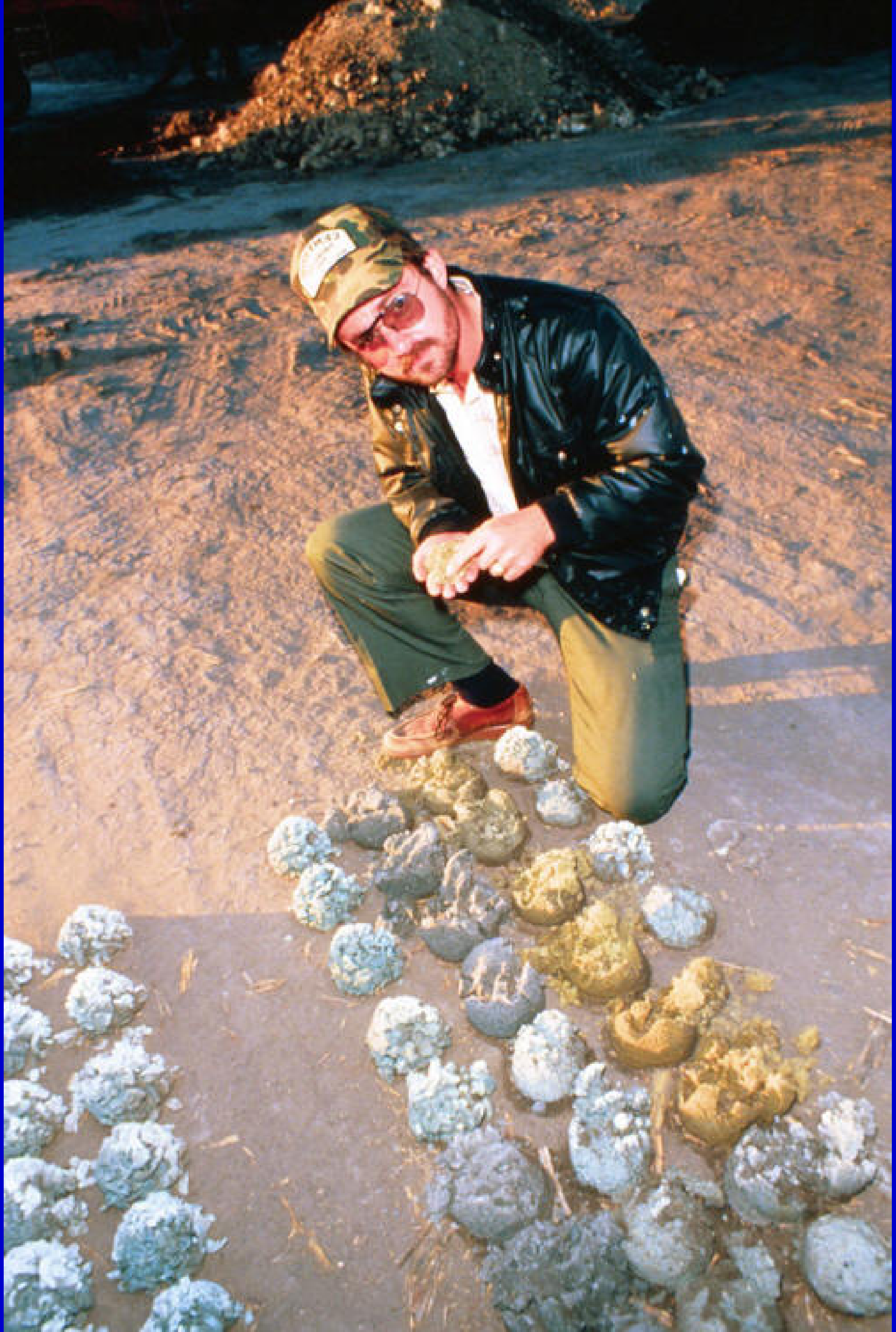
Open Pit Uranium Mine

Drilling Rigs

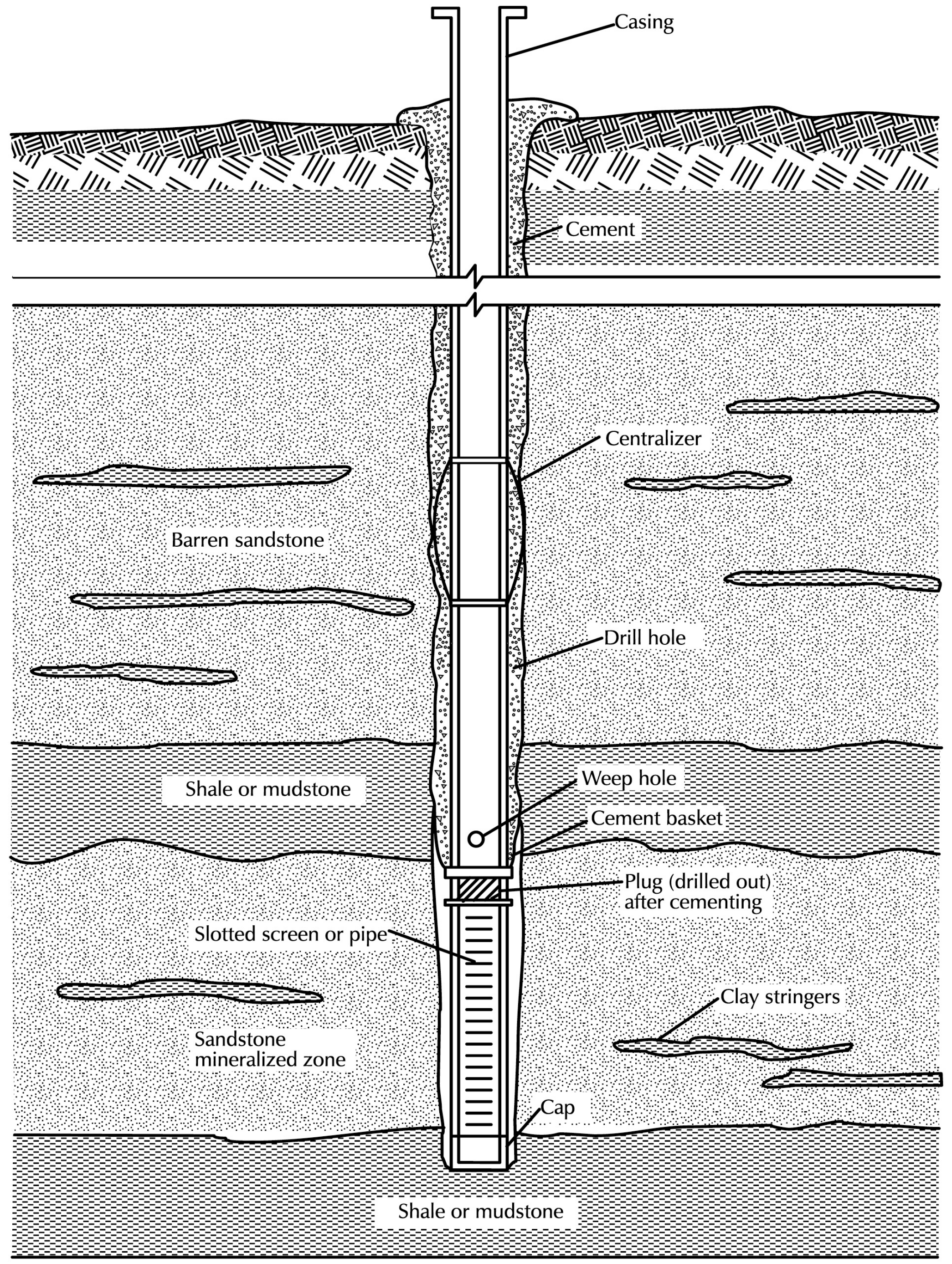
Well Core

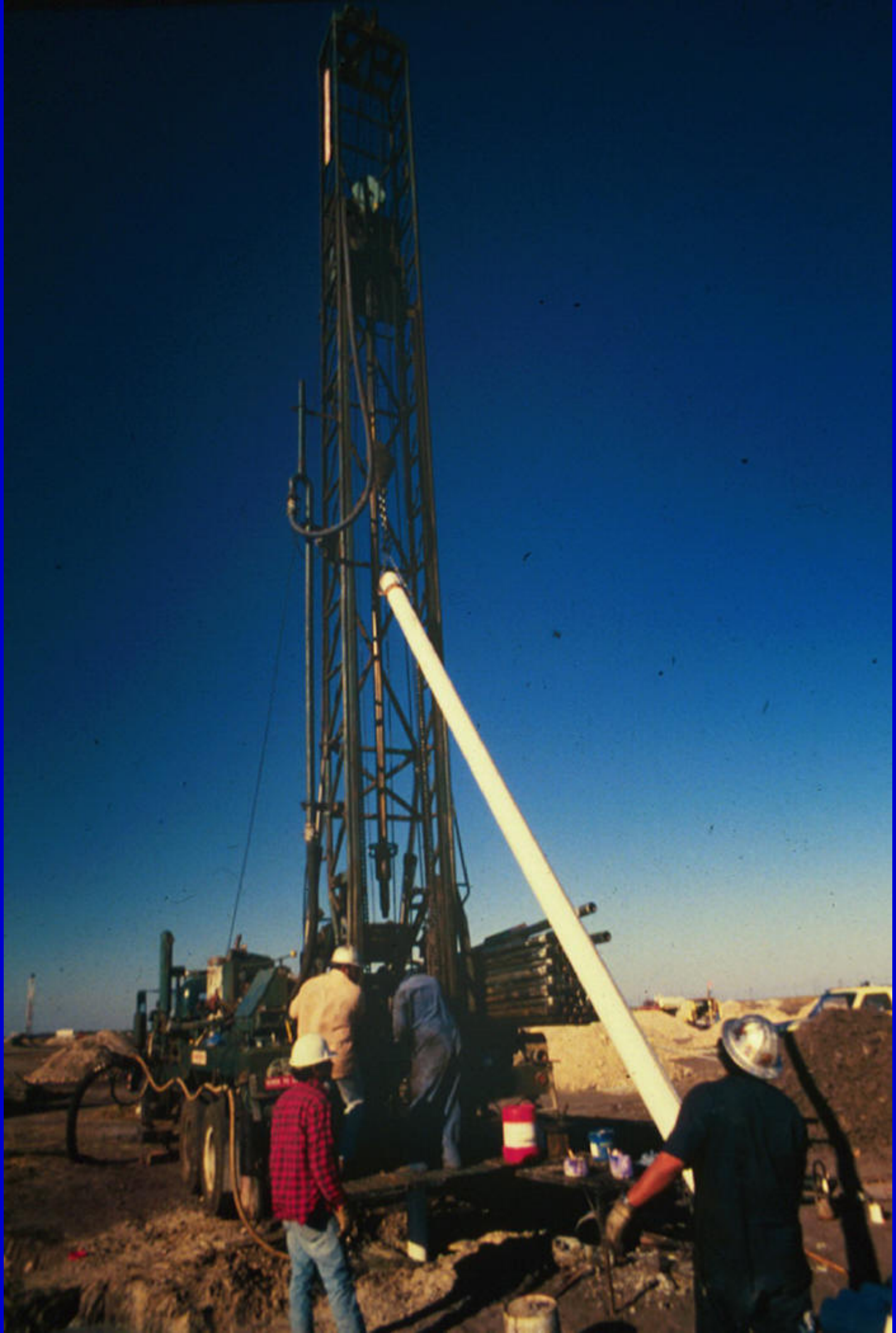


Drill Cuttings



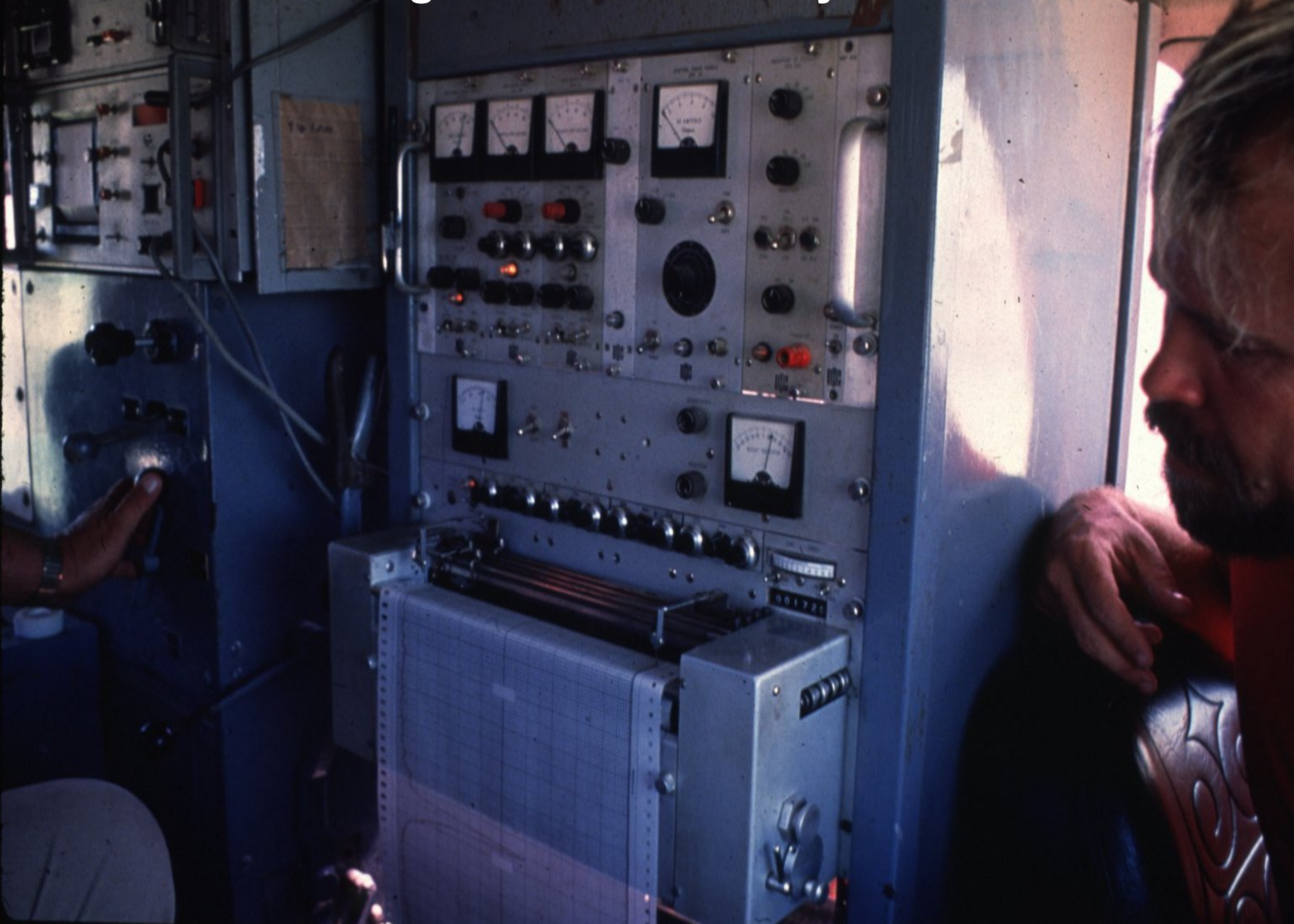
Uranium Mining Well





Single Point Resistivity wireline truck

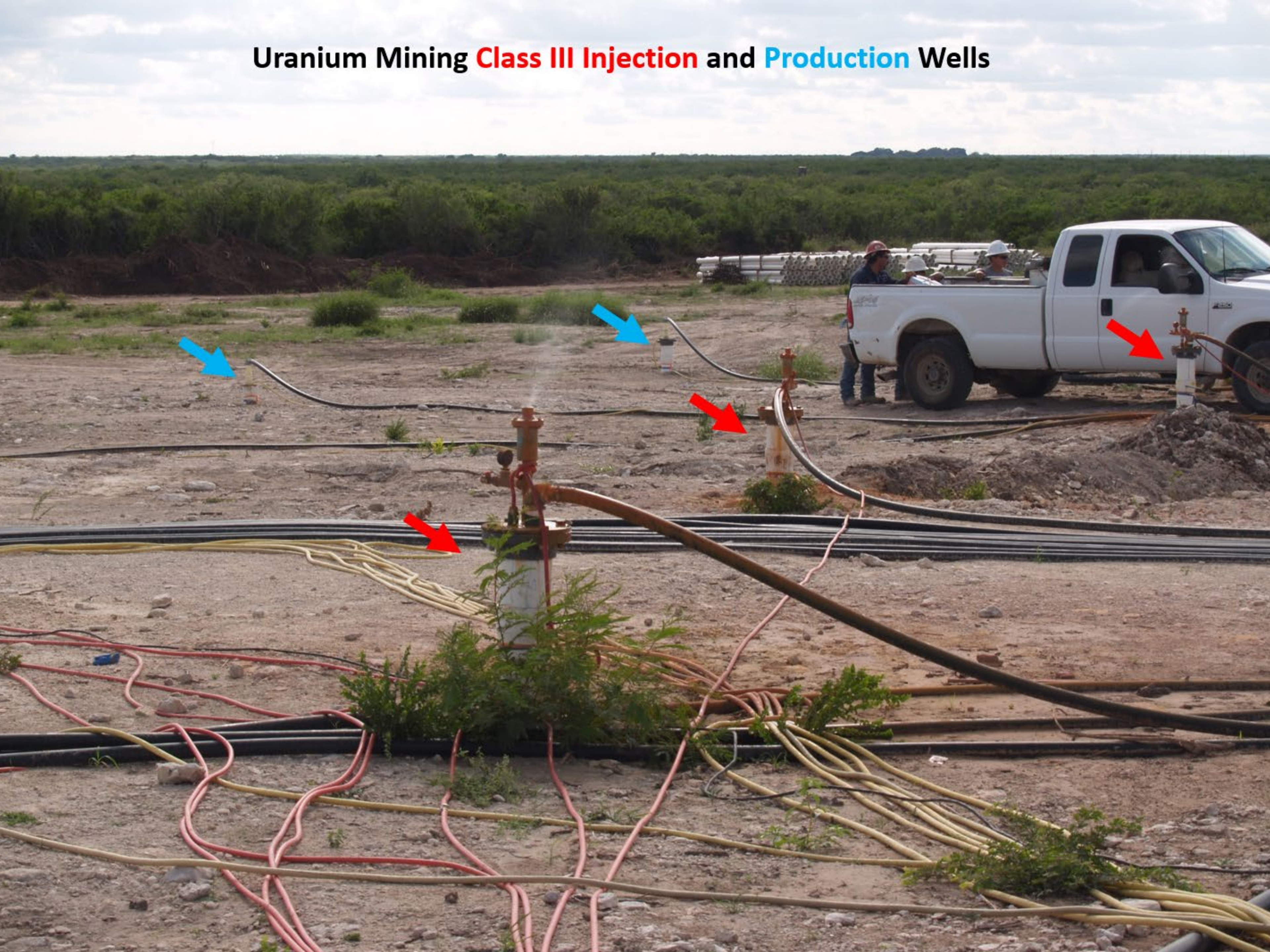
Single Point Resistivity Test

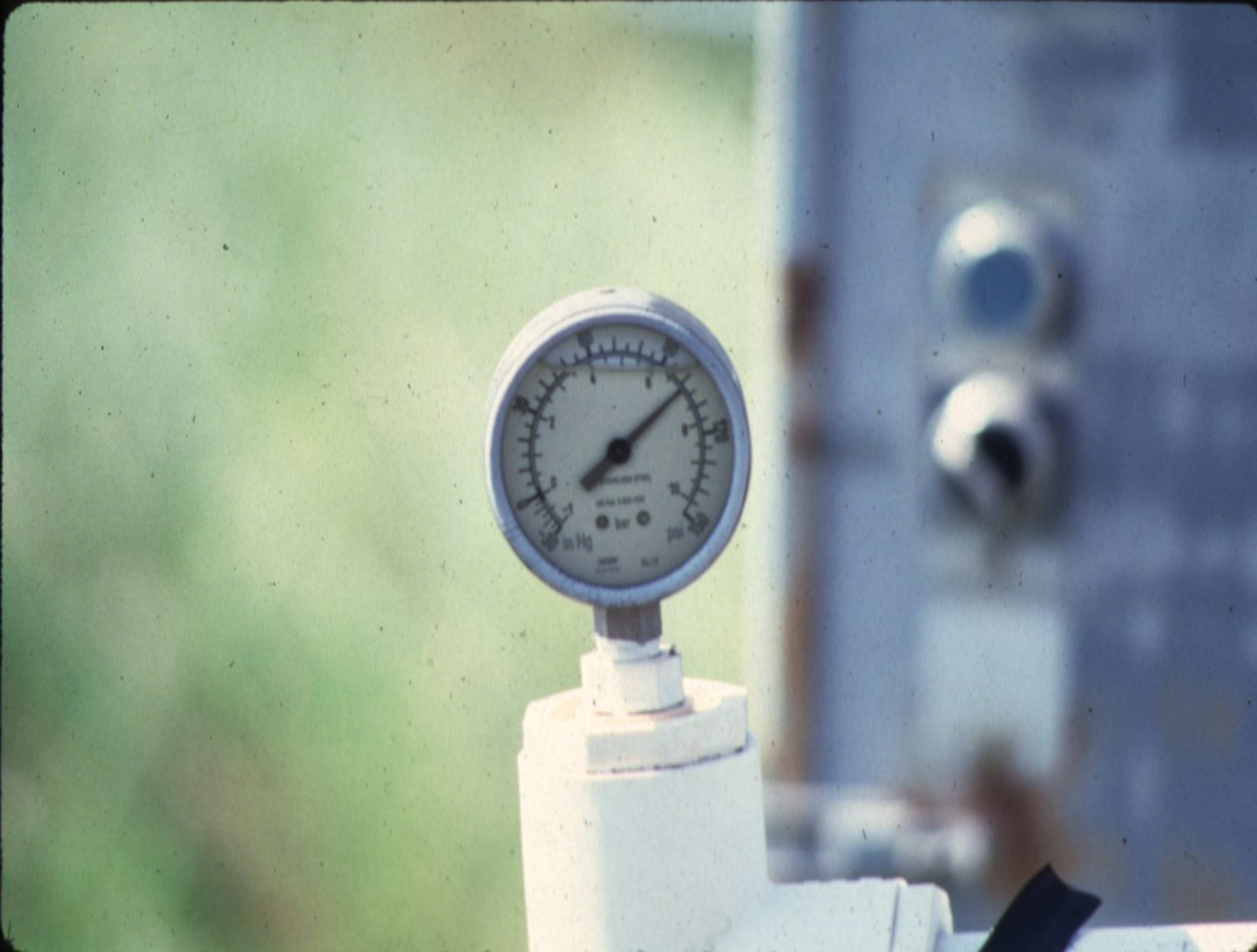


Testing a Well
to Make Sure it
Will Produce Water

Flow Lines and Meters

Uranium Mining Class III Injection and Production Wells




in Hg
bar
psi

300
200
400
PRESSURE 360
100
0
600
EOA 2


S7147

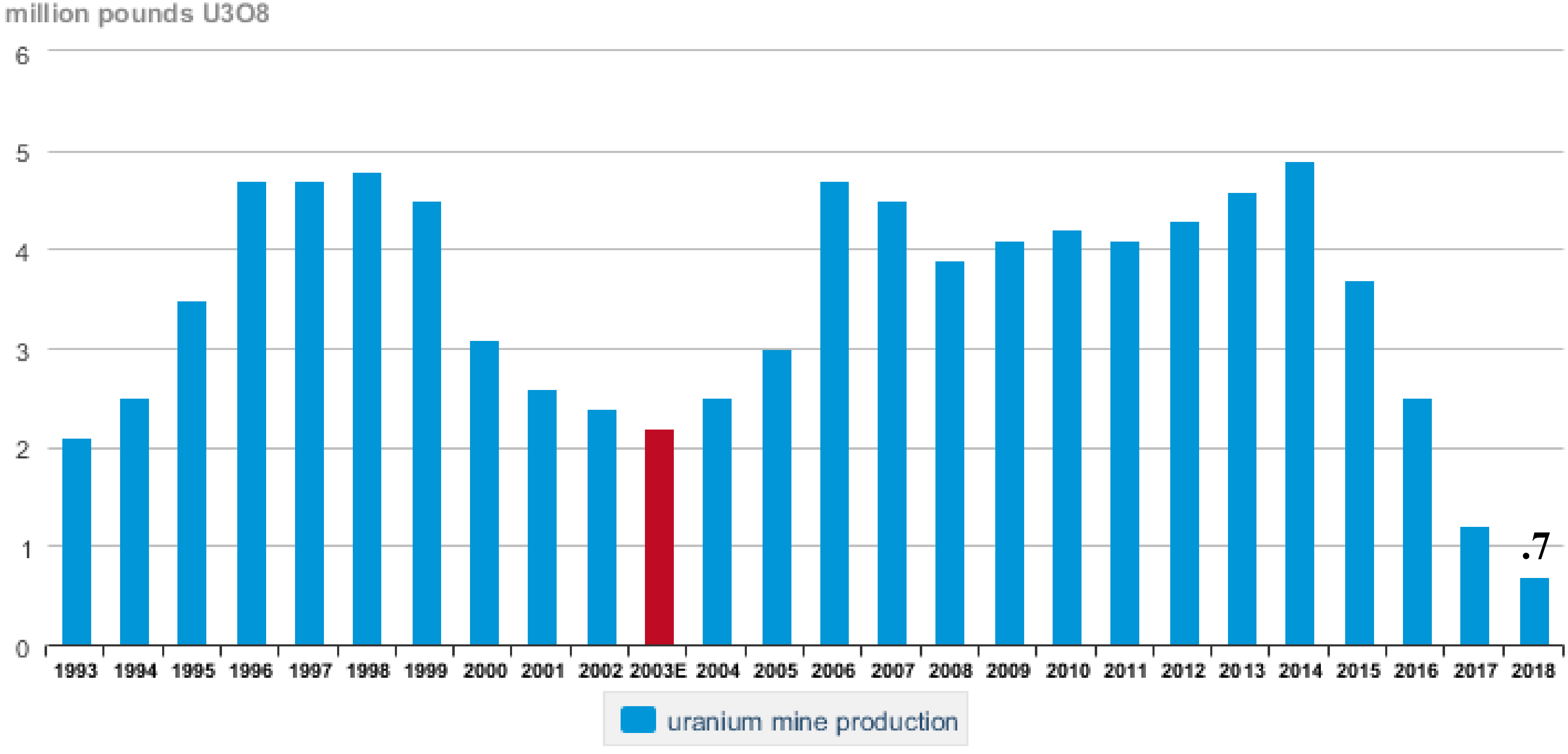
Reverse Osmosis Equipment

- **After recovery of the uranium, the barren solution may be run through a reverse osmosis process and it is then re-fortified with oxidant before being returned to the wellfield via the injection wells.**
- **A small flow (about 0.5%) is bled off to maintain a pressure gradient in the wellfield and this, with some solutions from surface processing, is treated as waste. This waste water contains various dissolved ions such as chloride, sulfate, sodium, radium, arsenic and iron from the orebody.**
- **This bleed of process solution ensures that there is a steady flow into the wellfield from the surrounding aquifer, and serves to restrict the flow of mining solutions away from the mining area.**

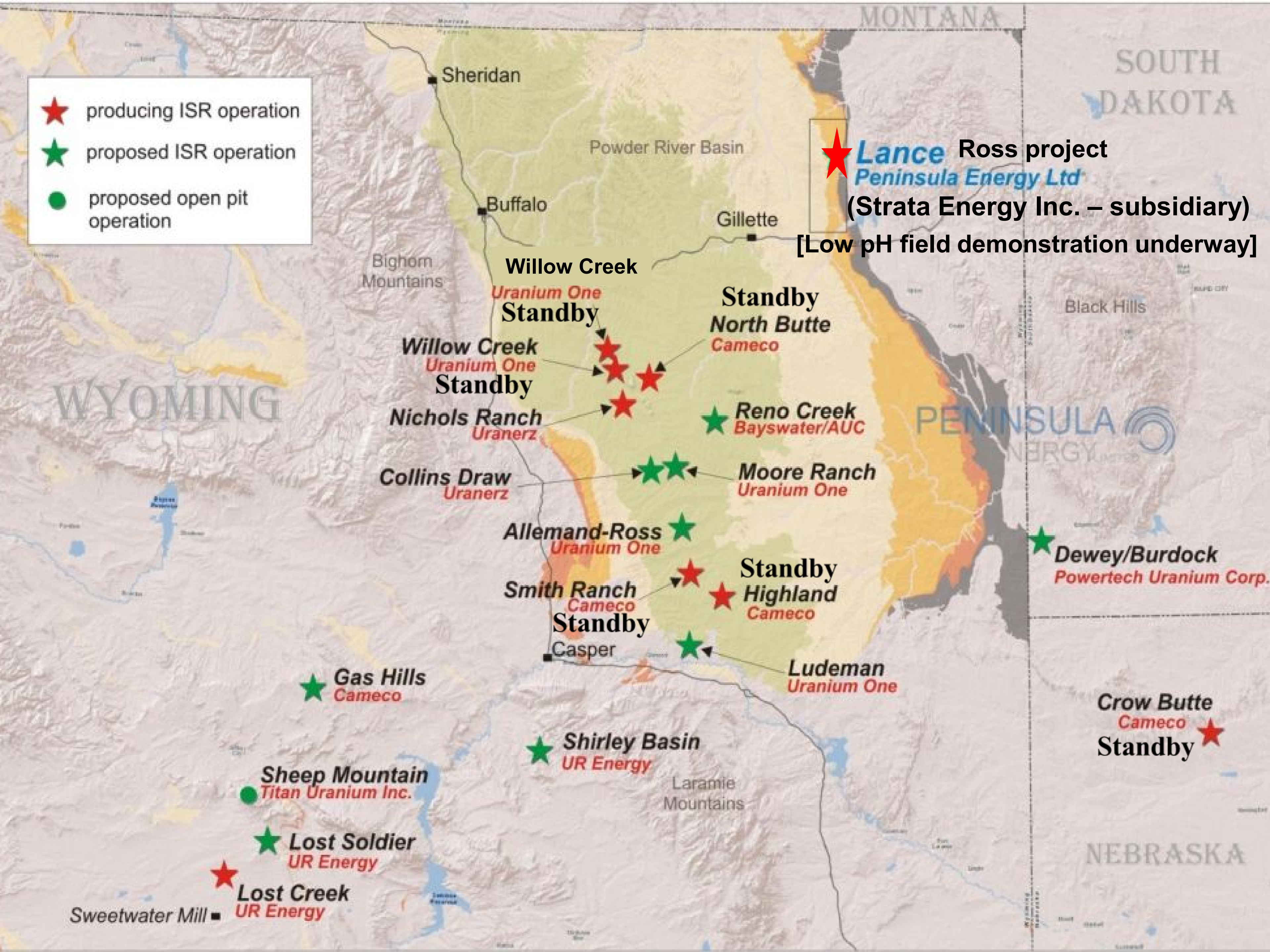
Liquid Oxygen Storage Tank

Uranium Price $/pound

U.S. mine production of uranium, 1993–2018



Sources: U.S. Energy Information Administration 1993-2002-Uranium Industry Annual 2002 (May 2003), Table H1 and Table 2.
2003-2018 data from Form EIA-851A, *Domestic Uranium Production Report* (2003–18).
E= estimated data.



producing ISR operation
proposed ISR operation
proposed open pit operation
MONTANA
SOUTH DAKOTA
WYOMING
NEBRASKA
Sheridan
Buffalo
Gillette
Casper
Powder River Basin
Bighorn Mountains
Black Hills
Laramie Mountains
Lance
Peninsula Energy Ltd
Ross project
(Strata Energy Inc. – subsidiary)
[Low pH field demonstration underway]
Willow Creek
Uranium One
Standby
Standby
North Butte
Cameco
Willow Creek
Uranium One
Standby
Nichols Ranch
Uranerz
Reno Creek
Bayswater/AUC
Collins Draw
Uranerz
Moore Ranch
Uranium One
Allemand-Ross
Uranium One
Smith Ranch
Cameco
Standby
Standby
Highland
Cameco
Ludeman
Uranium One
Dewey/Burdock
Powertech Uranium Corp.
Crow Butte
Cameco
Standby
Gas Hills
Cameco
Shirley Basin
UR Energy
Sheep Mountain
Titan Uranium Inc.
Lost Soldier
UR Energy
Lost Creek
UR Energy
Sweetwater Mill
PENINSULA ENERGY

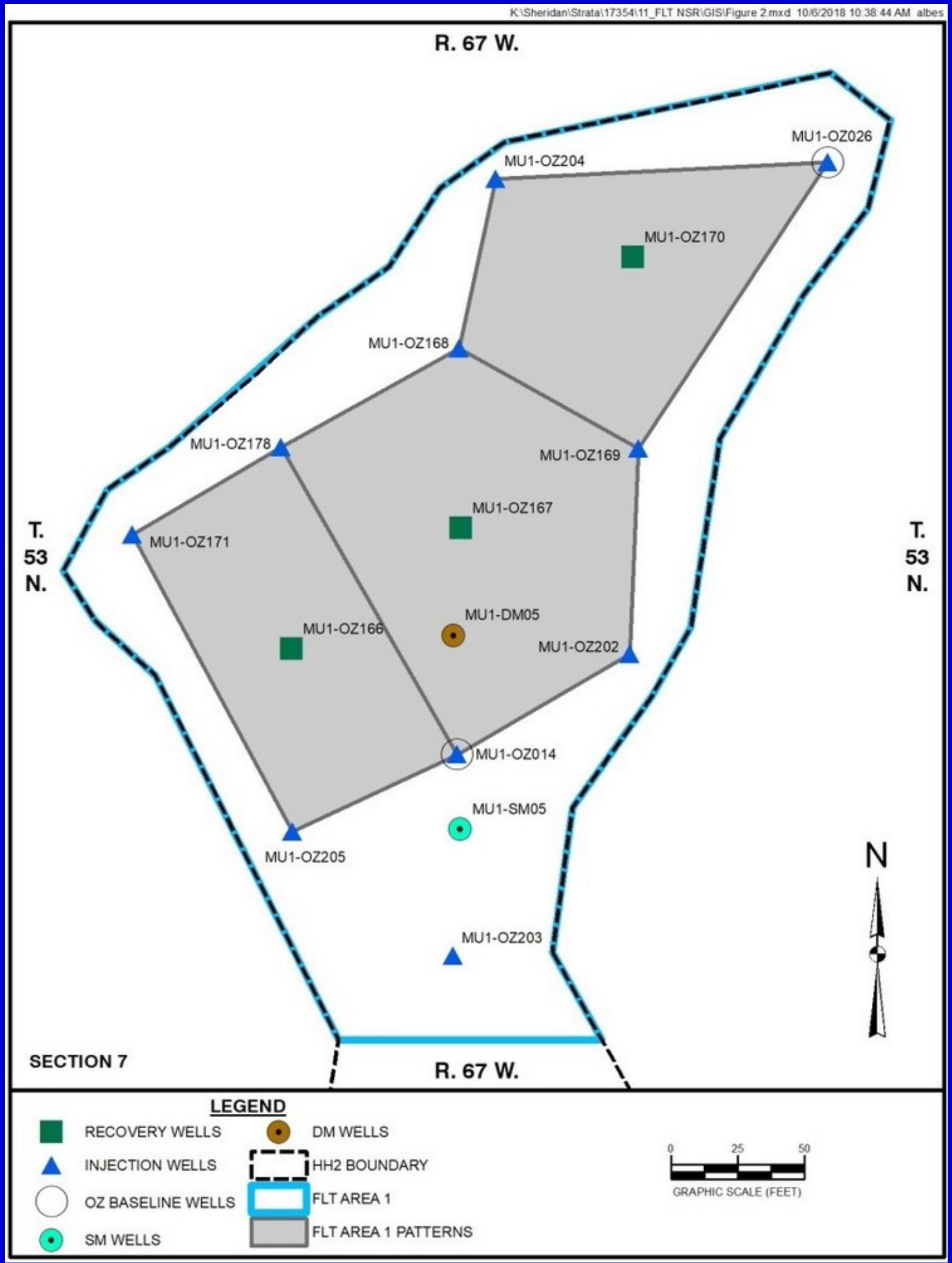
Peninsula (Strata Energy) Lance Ross Project

Wellfields and Header Houses - Mine Unit 1

Header House Interior - Lance Projects

Low pH Field Demonstration Wellfield Patterns Ross Project

Use sulphuric acid to reduce the mining area pH to around 2



Crow Butte (on standby) - Well field operations foreman monitors the flows from each of the ISL production wells from the well house.

- **Crow Butte was the first uranium mine in Nebraska - discovered in 1980 and began production in 1991.**

- **Crow Butte has used ISL to extract about 11.8 million pounds of uranium**

- **In the second quarter of 2016, Cameco made the decision to curtail production and defer all wellfield development at its U.S. operations so commercial production has ceased.**

Smith Ranch Mine Integrity Test

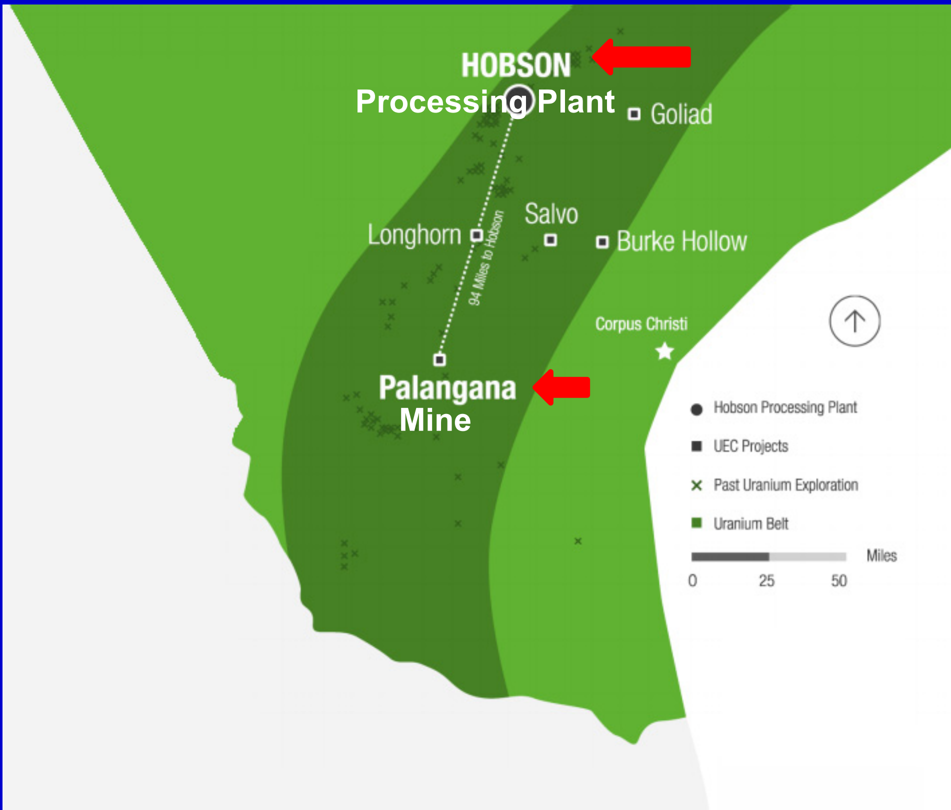
Smith Ranch

Nichols Ranch Wellfield

Submersible Pumps

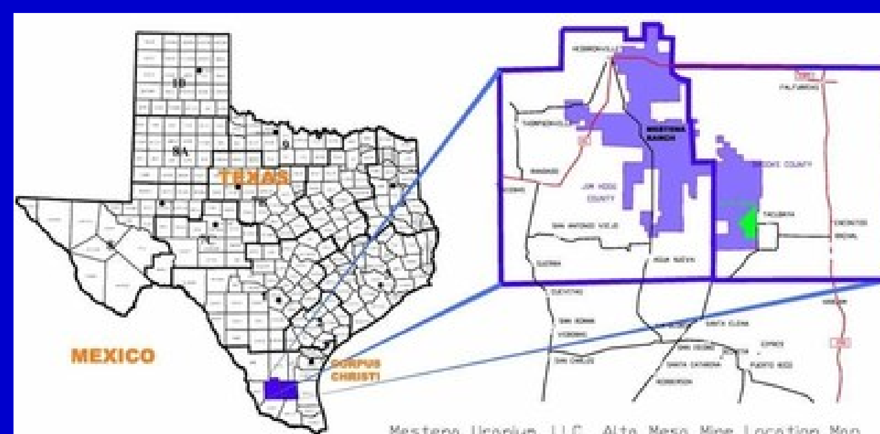
Monitoring Well


SAN ANTONIO
CHEVRON "Panna Maria" Producing Mill and Surface Mines
CHEVRON "Jack Pump" Surface Mines
CITIES SERVICE "Duderstadt" abandoned
CONQUISTA "Thomas" surface mine
TEXURA "Zunker - Lysey" abandoned
SOLUTION ENGINEERING "S W Tailing Ponds" Remedial Action site
CONOCO - PIONEER "Conquista" mill and surface mines
EVEREST "Hobson" restoration
TEXACO- "Hobson" Production Plant and Engineering
Guadalupe River
San Antonio River
Frio River
Nueces River
MOBIL "Neil" Restoration
WYOMING MINERAL "Benham"
I.E.C. "Pawnee" Restoration
I.E.C. "Zamzow"
Wyoming Mineral "Lamprecht" Restoration
EXXON "Felder"
USS- NM "Clay West" Restoration
ANACONDA "Rhodes Ranch" Surface Mines
EVEREST "Mt Lucas" Restoration
U.S. STEEL "Burns" Restoration
MOBIL "Piedre Lumbre Brelum" restoration
Nueces River
WYOMING MINERAL "Bruni" (WESTINGHOUSE)
U.R.I. "Benavides" Restoration
CHEVRON "Palangane" Restoration
UREX "Santonino" pilot test
MOBIL "Holiday - El Mesquite" Restoration
U.R.I. "Kingsville Dome"
GULF OF MEXICO
LAREDO
TOTAL "West Cole"
EVEREST "Las Palmas" Restoration
MOBIL "O Hern"
CAITHNESS "McBryde" Restoration
CAITHNESS "Silver Lake" Restoration
URI "Bruni"
URI "Gray"
CONOCO "Trevino" Restoration
CONVENTIONAL STRIP MINE
IN-SITU LEACH SITE



Texas ISL Mines and Processing Plants on Standby

Alta Mesa mine



Kingsville Dome – Goliad 600 – 750’ (1988)

Undergoing Restoration

Goliad 420 – 810’

Ion exchange columns at a Texas ISR operation

Ion exchange resin beads used in the ISR process

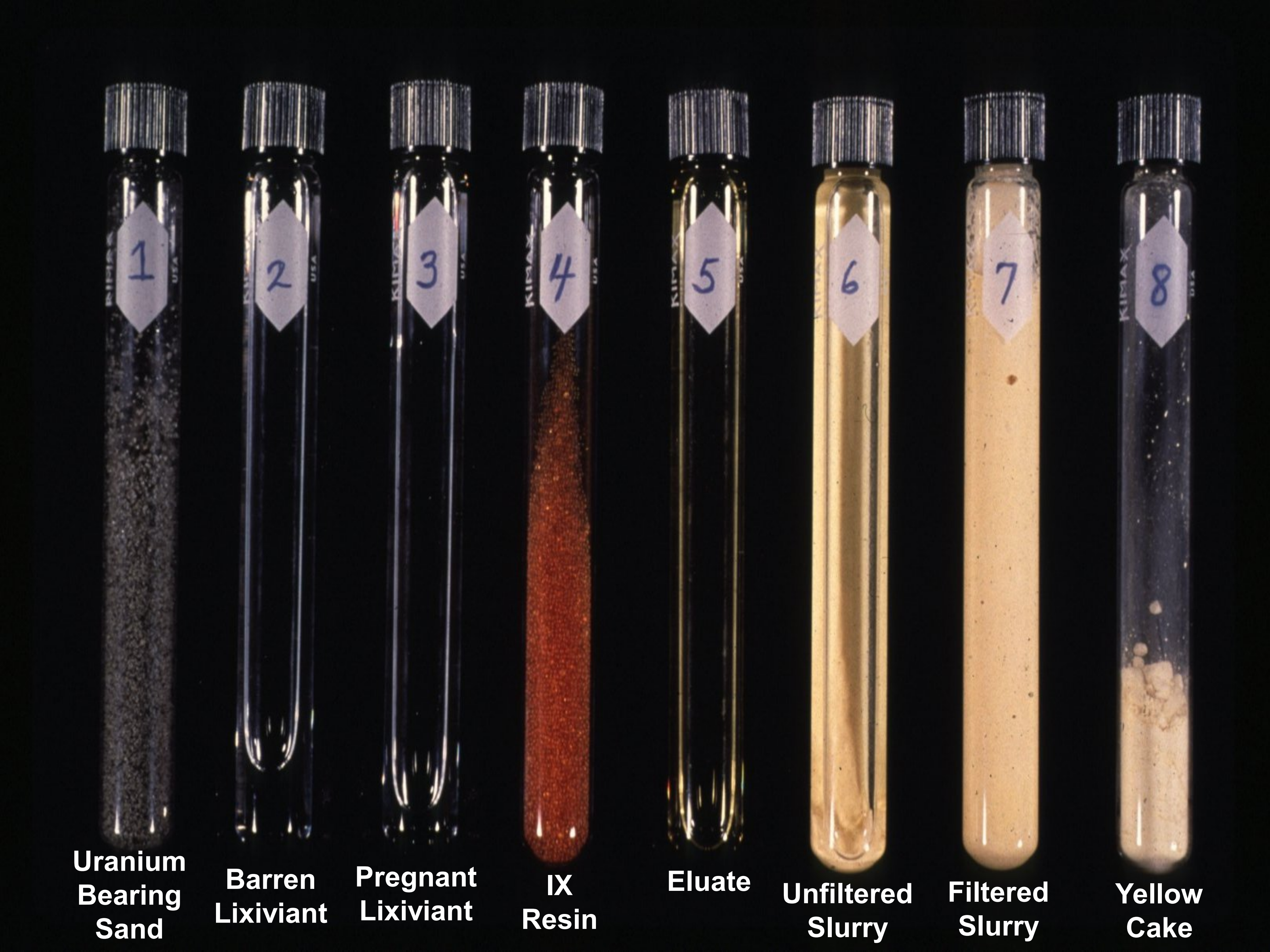
Precipitation of uranium

Filter Press

Employee removing uranium from a filter press

Zero-emission Rotary Vacuum Dryer


43
43
43


1
2
3
4
5
6
7
8
Uranium Bearing Sand
Barren Lixiviant
Pregnant Lixiviant
IX Resin
Eluate
Unfiltered Slurry
Filtered Slurry
Yellow Cake

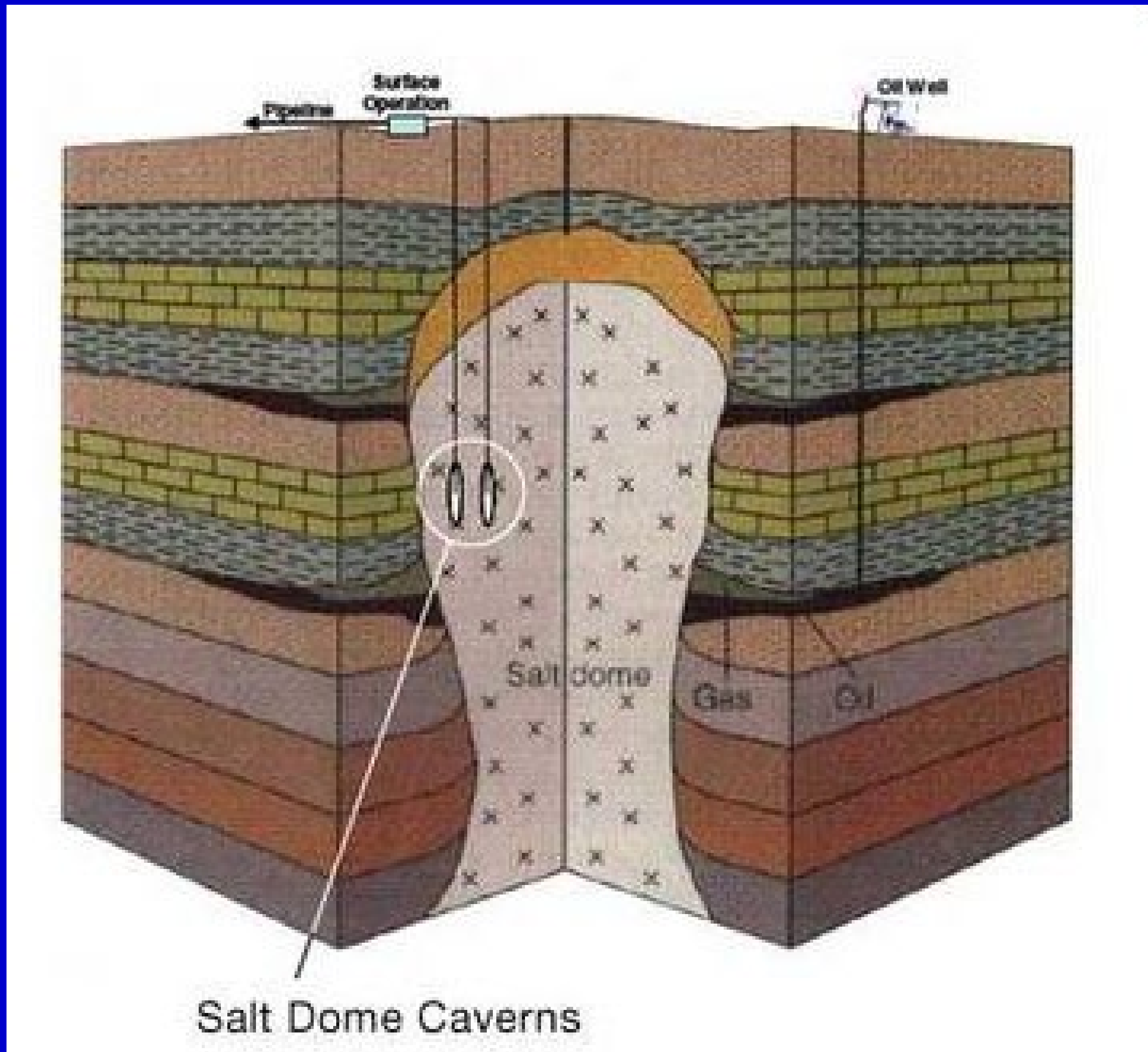
Yellowcake Uranium in Barrel for Shipping
One Barrel weighs about 880 pounds

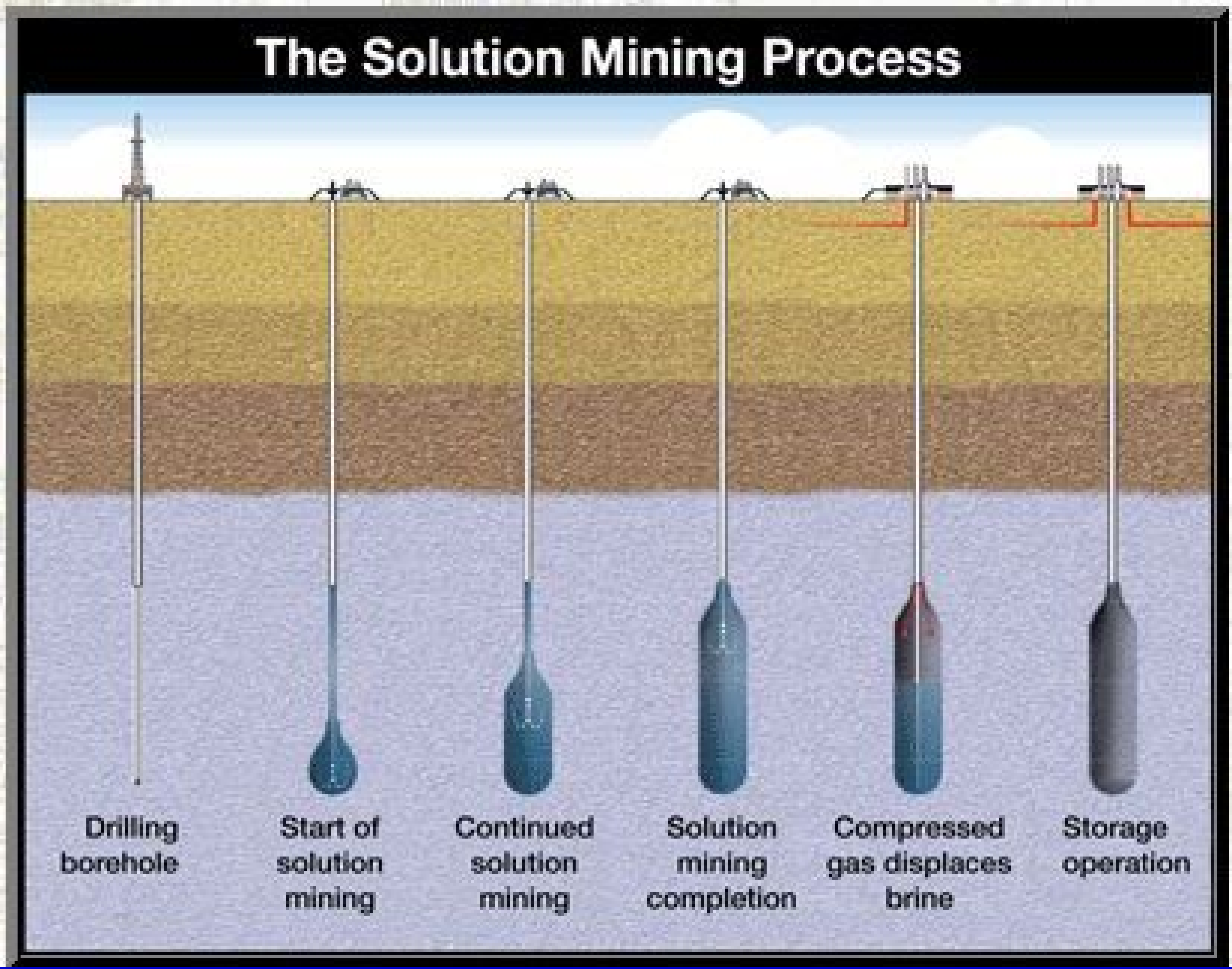
Class I Nonhazardous Disposal Well

Brine

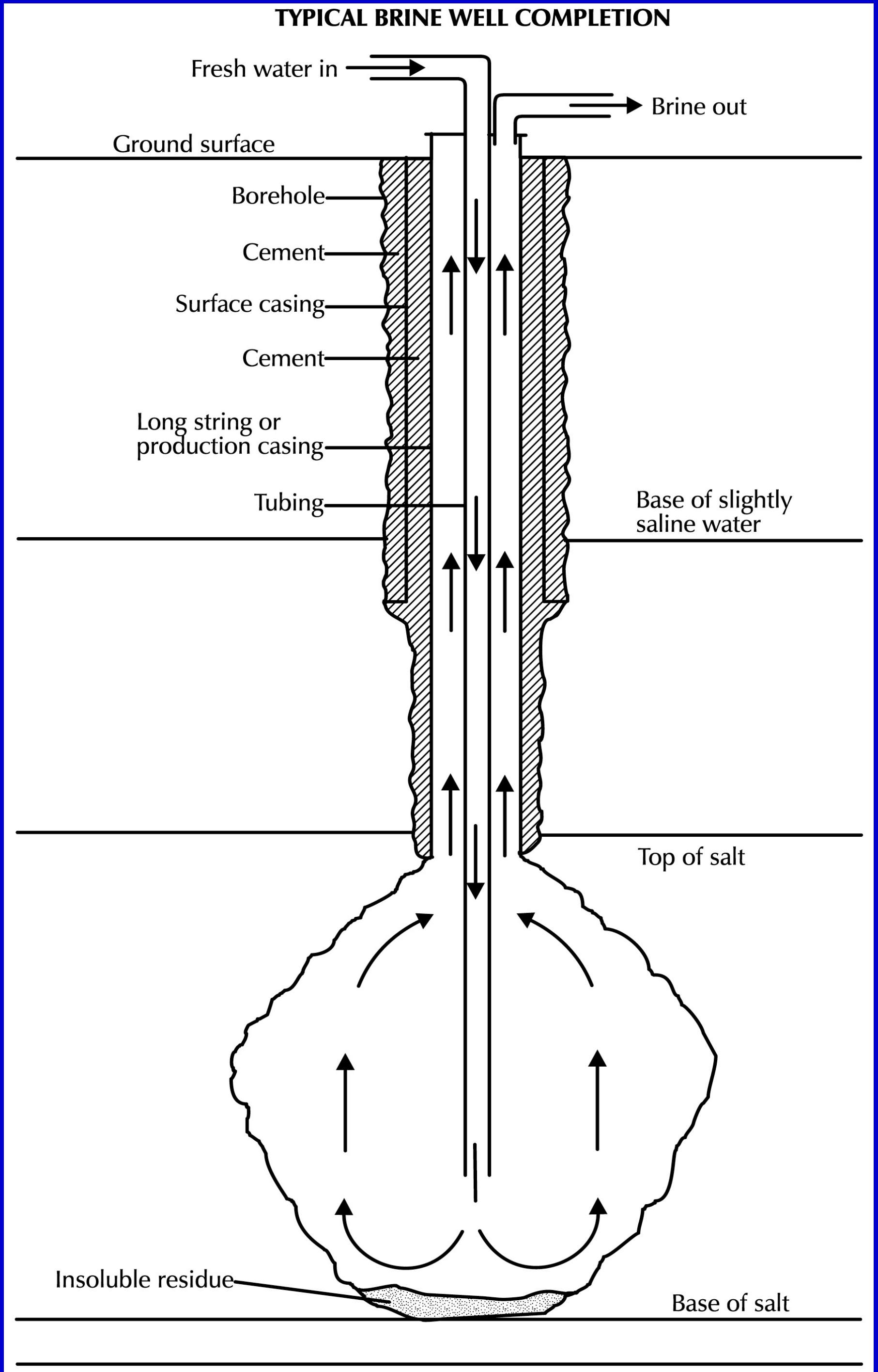
Mining

Solution Brine Mining




The Solution Mining Process
Drilling borehole
Start of solution mining
Continued solution mining
Solution mining completion
Compressed gas displaces brine
Storage operation

Brine Mining Well



Brine Mine Wellhead

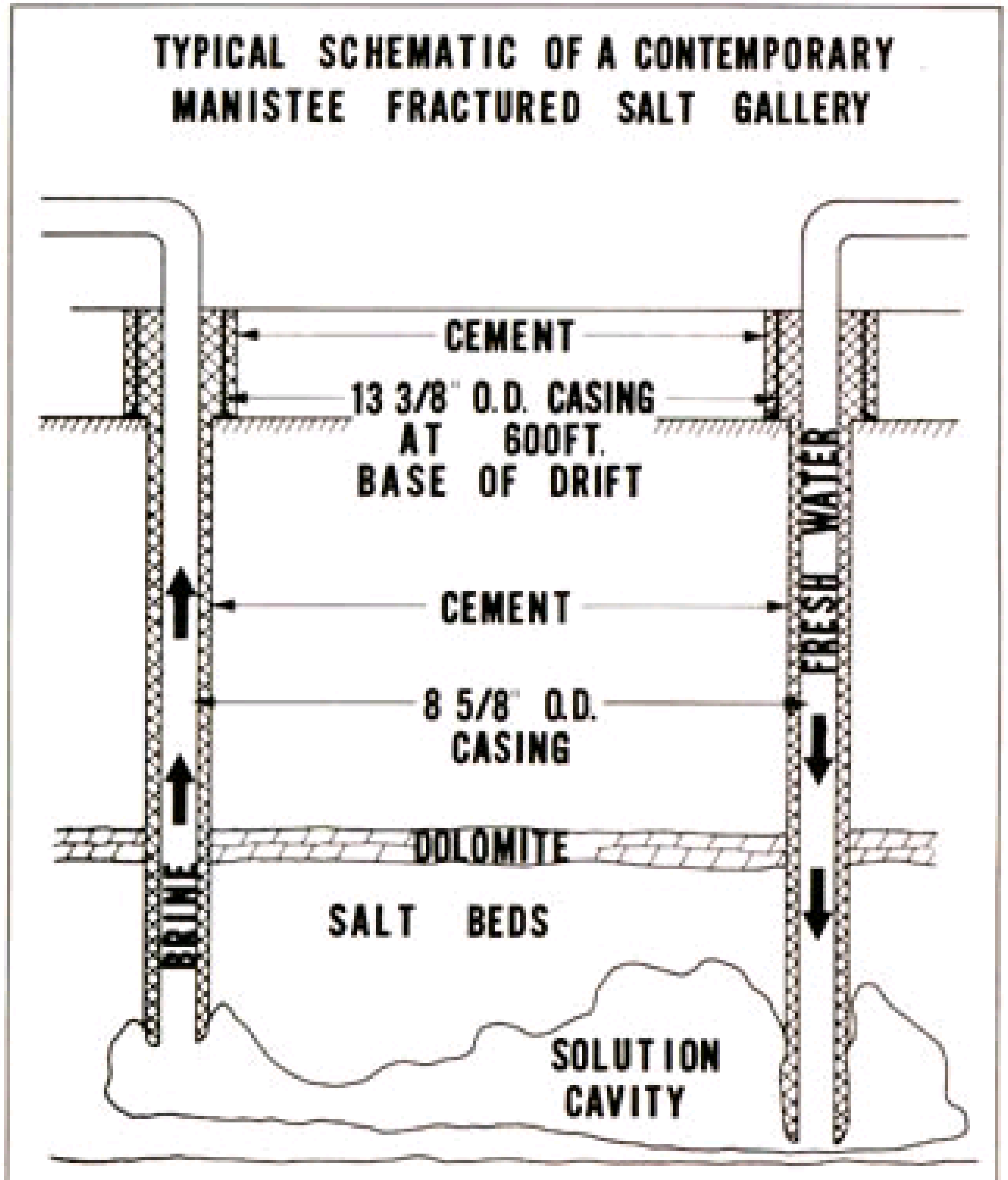
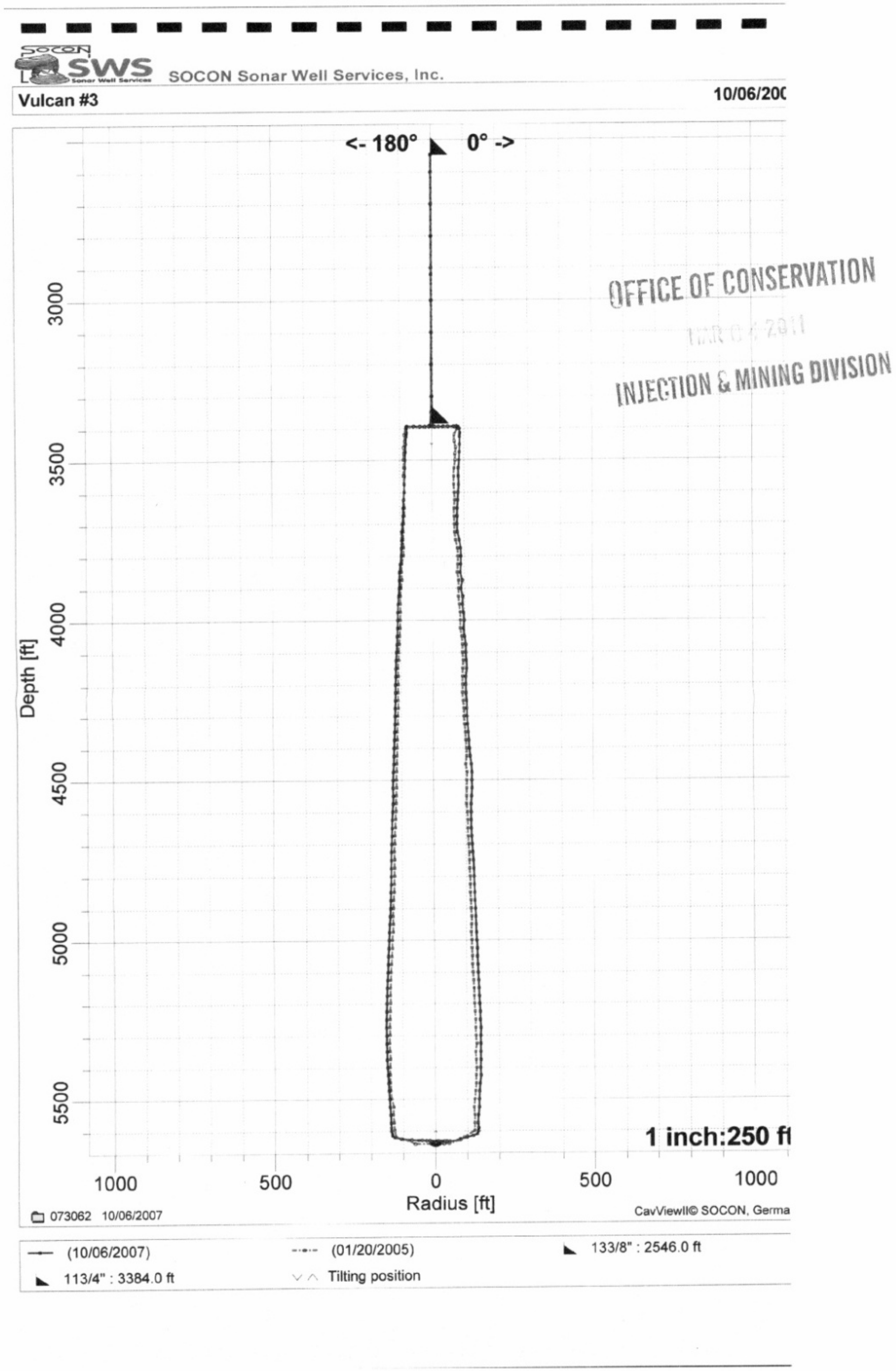

TYPICAL SCHEMATIC OF A CONTEMPORARY
MANISTEE FRACTURED SALT GALLERY
CEMENT
13 3/8" O.D. CASING
AT 600FT.
BASE OF DRIFT
CEMENT
FRESH WATER
8 5/8" O.D.
CASING
DOLOMITE
SALT BEDS
BRINE
SOLUTION
CAVITY

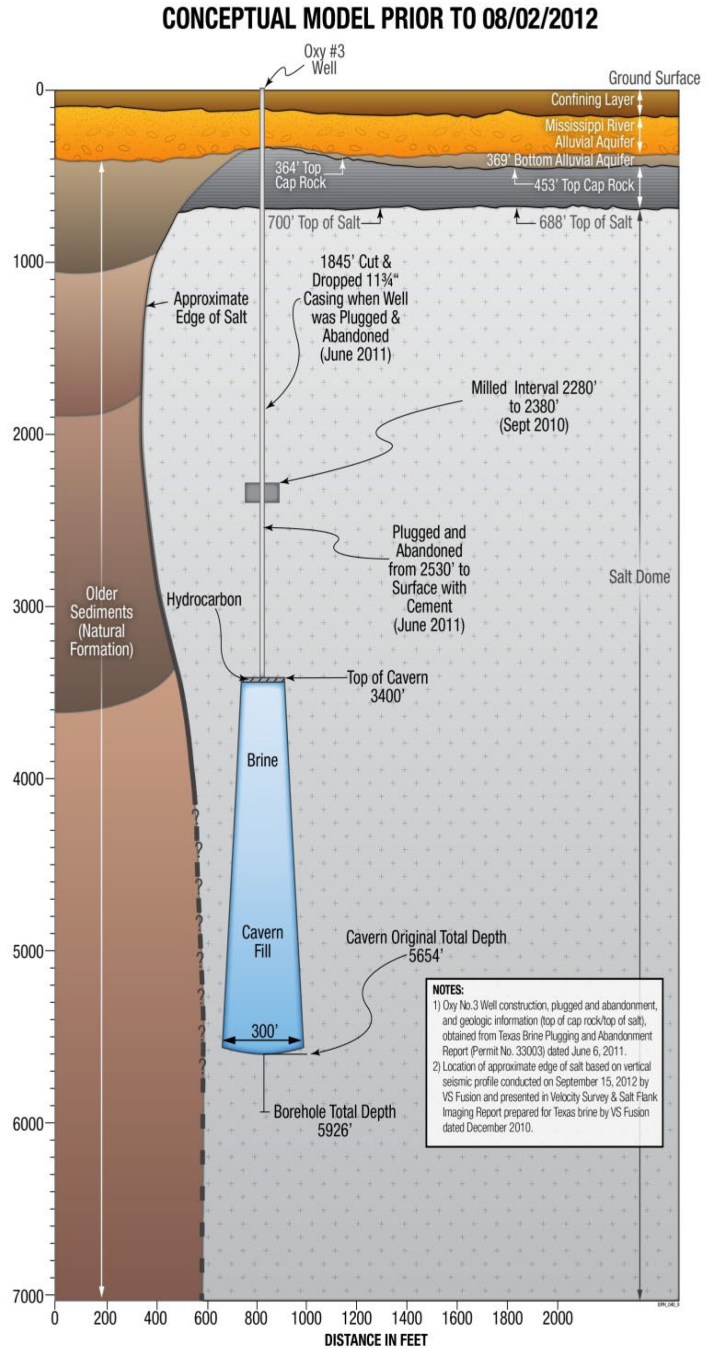
FIGURE NO. 2

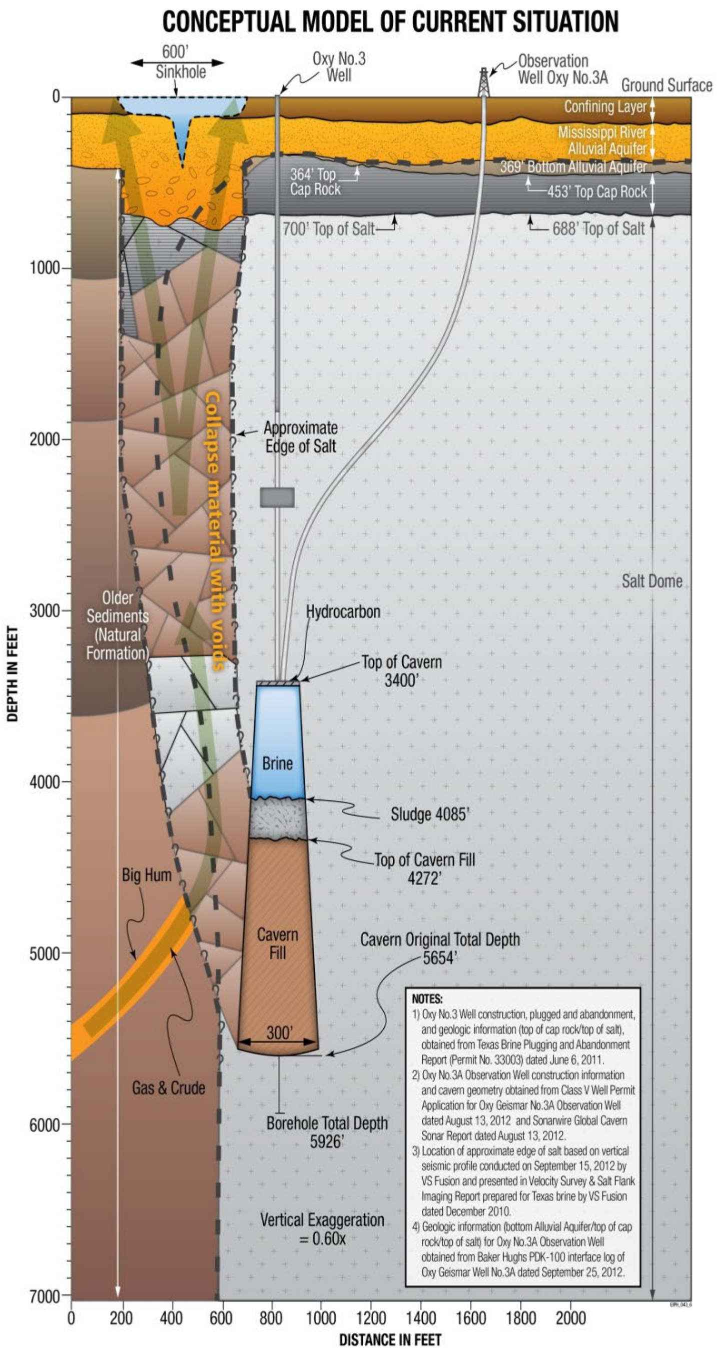
Sonar Survey Of a Brine Mining Cavern



Bayou Corne - Louisiana

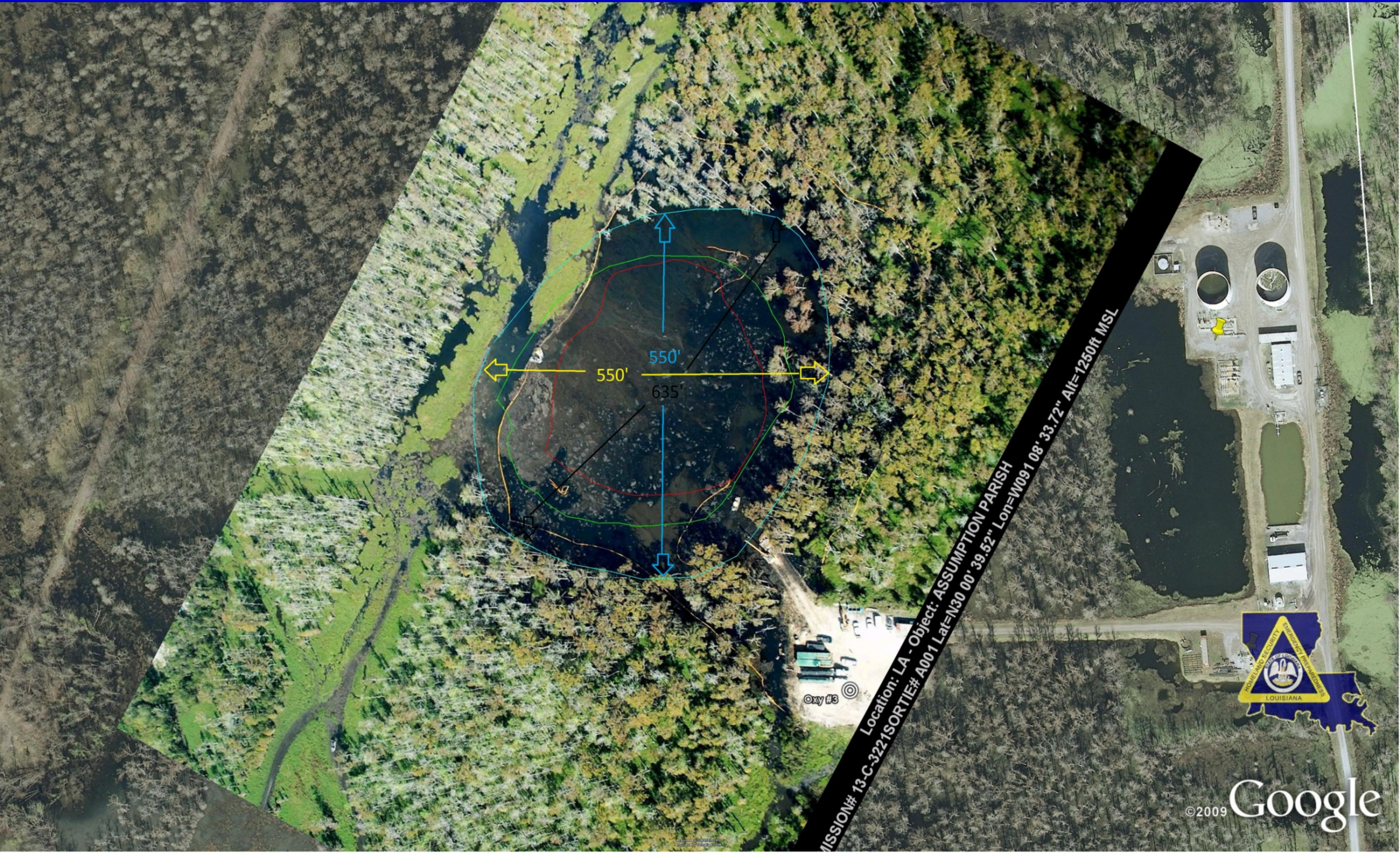
8/3/12


CONCEPTUAL MODEL PRIOR TO 08/02/2012
Oxy #3 Well
Ground Surface
Confining Layer
Mississippi River Alluvial Aquifer
364' Top Cap Rock
369' Bottom Alluvial Aquifer
453' Top Cap Rock
700' Top of Salt
688' Top of Salt
1845' Cut & Dropped 11¾" Casing when Well was Plugged & Abandoned (June 2011)
Approximate Edge of Salt
Milled Interval 2280' to 2380' (Sept 2010)
Plugged and Abandoned from 2530' to Surface with Cement (June 2011)
Salt Dome
Older Sediments (Natural Formation)
Hydrocarbon
Top of Cavern 3400'
Brine
Cavern Fill
Cavern Original Total Depth 5654'
300'
Borehole Total Depth 5926'
NOTES:
1) Oxy No.3 Well construction, plugged and abandonment, and geologic information (top of cap rock/top of salt), obtained from Texas Brine Plugging and Abandonment Report (Permit No. 33003) dated June 6, 2011.
2) Location of approximate edge of salt based on vertical seismic profile conducted on September 15, 2012 by VS Fusion and presented in Velocity Survey & Salt Flank Imaging Report prepared for Texas brine by VS Fusion dated December 2010.
0
1000
2000
3000
4000
5000
6000
7000
0 200 400 600 800 1000 1200 1400 1600 1800 2000
DISTANCE IN FEET


CONCEPTUAL MODEL OF CURRENT SITUATION
600'
Sinkhole
Oxy No.3 Well
Observation Well Oxy No.3A
Ground Surface
Confining Layer
Mississippi River Alluvial Aquifer
364' Top Cap Rock
369' Bottom Alluvial Aquifer
453' Top Cap Rock
700' Top of Salt
688' Top of Salt
Collapse material with voids
Approximate Edge of Salt
Salt Dome
Older Sediments (Natural Formation)
Hydrocarbon
Top of Cavern 3400'
Brine
Sludge 4085'
Top of Cavern Fill 4272'
Big Hum
Cavern Fill
Cavern Original Total Depth 5654'
300'
Gas & Crude
Borehole Total Depth 5926'
Vertical Exaggeration = 0.60x
NOTES:
1) Oxy No.3 Well construction, plugged and abandonment, and geologic information (top of cap rock/top of salt), obtained from Texas Brine Plugging and Abandonment Report (Permit No. 33003) dated June 6, 2011.
2) Oxy No.3A Observation Well construction information and cavern geometry obtained from Class V Well Permit Application for Oxy Geismar No.3A Observation Well dated August 13, 2012 and Sonarwire Global Cavern Sonar Report dated August 13, 2012.
3) Location of approximate edge of salt based on vertical seismic profile conducted on September 15, 2012 by VS Fusion and presented in Velocity Survey & Salt Flank Imaging Report prepared for Texas brine by VS Fusion dated December 2010.
4) Geologic information (bottom Alluvial Aquifer/top of cap rock/top of salt) for Oxy No.3A Observation Well obtained from Baker Hughs PDK-100 interface log of Oxy Geismar Well No.3A dated September 25, 2012.
DEPTH IN FEET
0
1000
2000
3000
4000
5000
6000
7000
0 200 400 600 800 1000 1200 1400 1600 1800 2000
DISTANCE IN FEET


Assumption Parish OHSEP, 08/21/2012

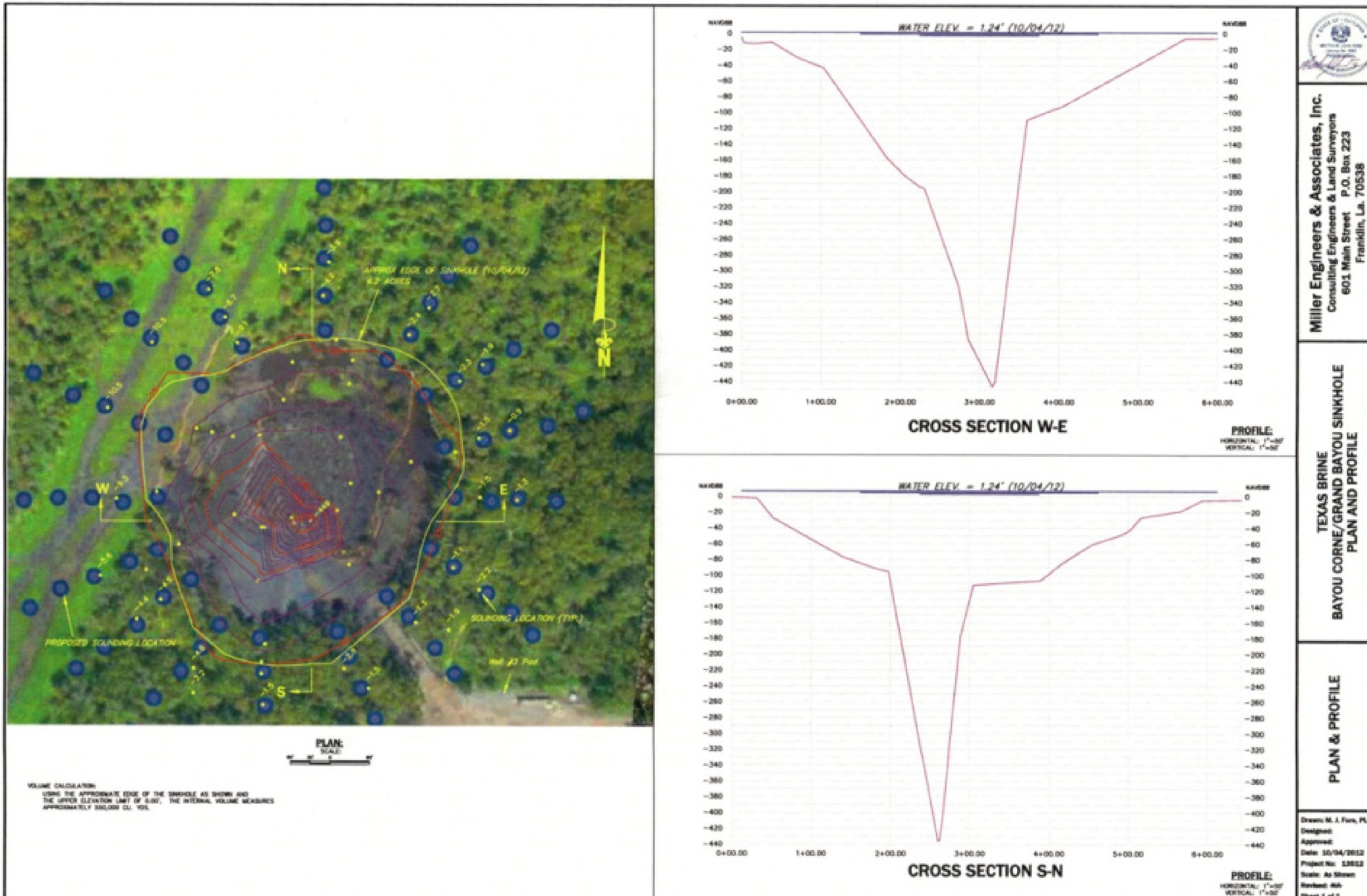


Sinkhole Dimensions 10-12-12

sinkhole_profile_100412_fi_493.pdf

Oct

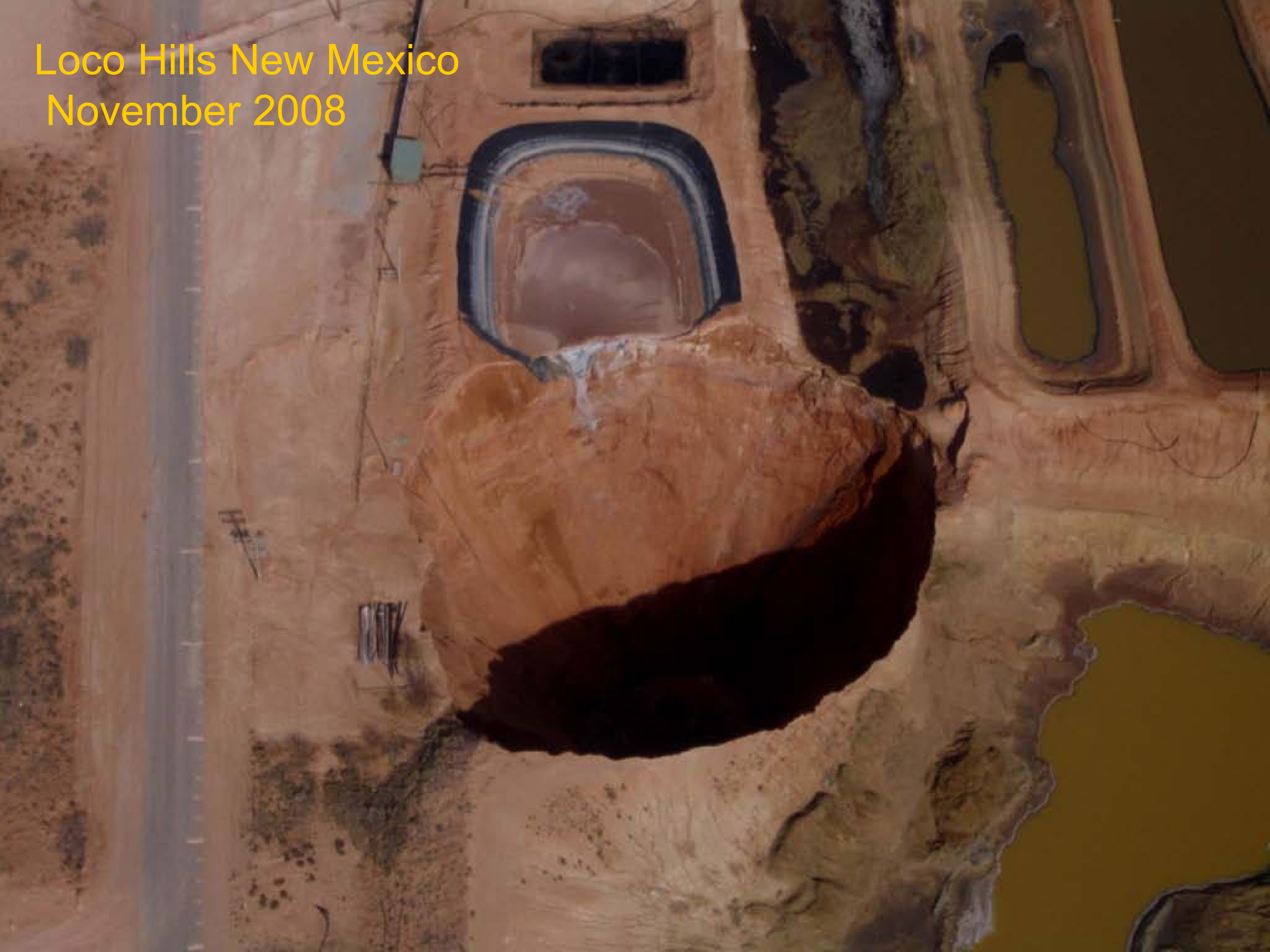





6/11/14 Flyover

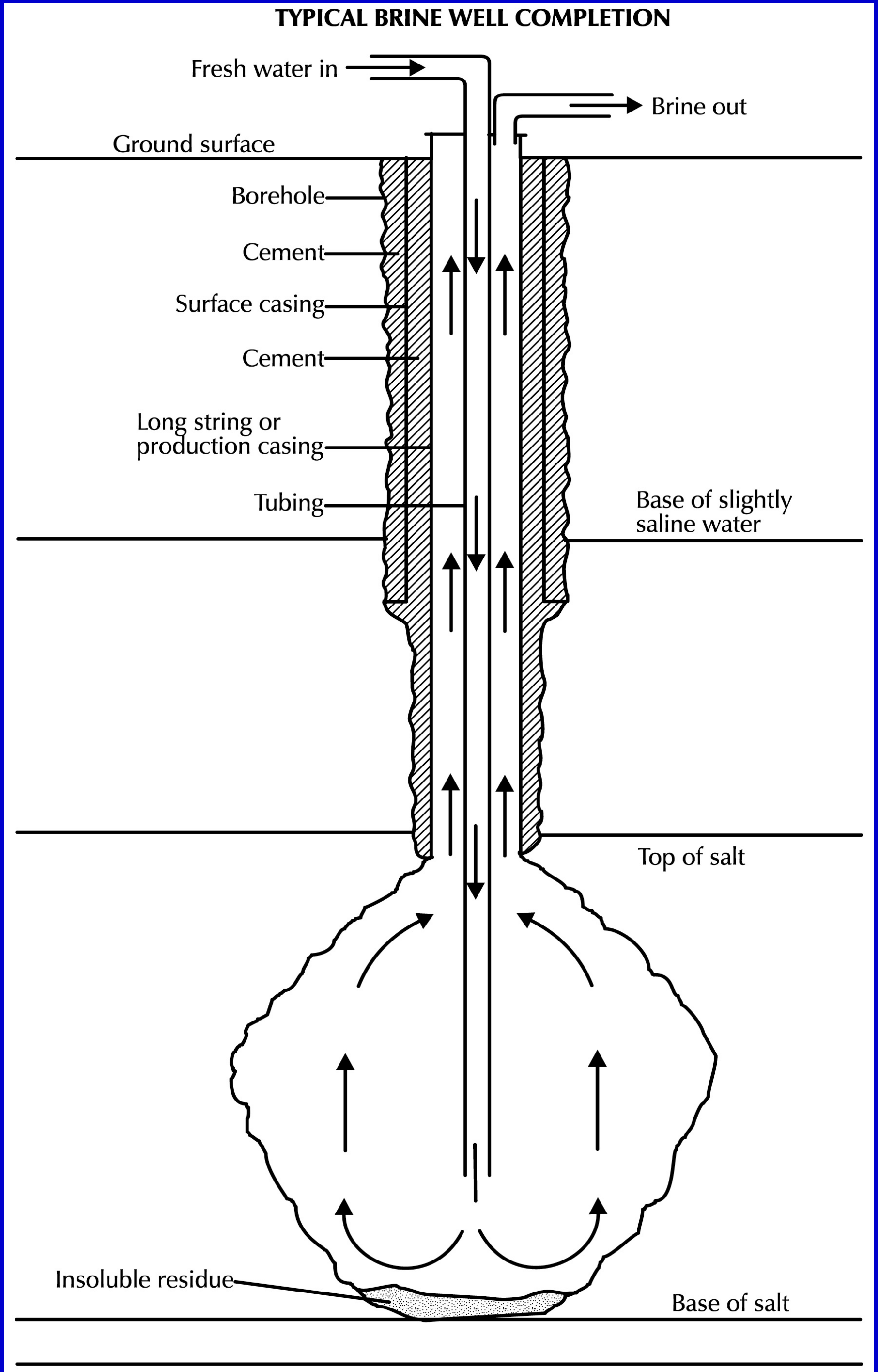
Approximately 31 acres

Jim's Water Service
New Mexico
July 2008

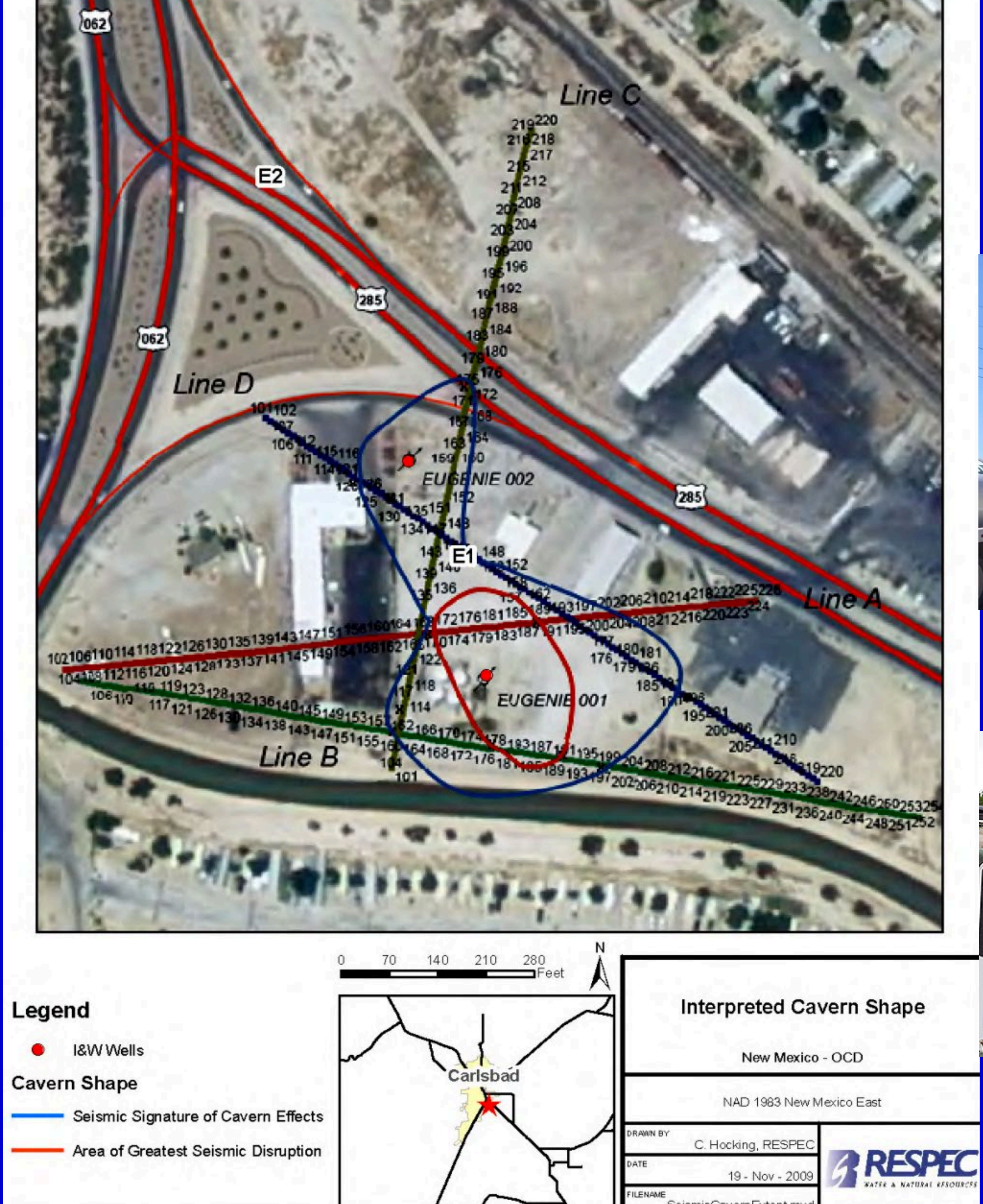

Loco Hills New Mexico
November 2008


Denver City, Texas
07/28/2009

Brine Mining Well



Carlsbad NM Brine Mine

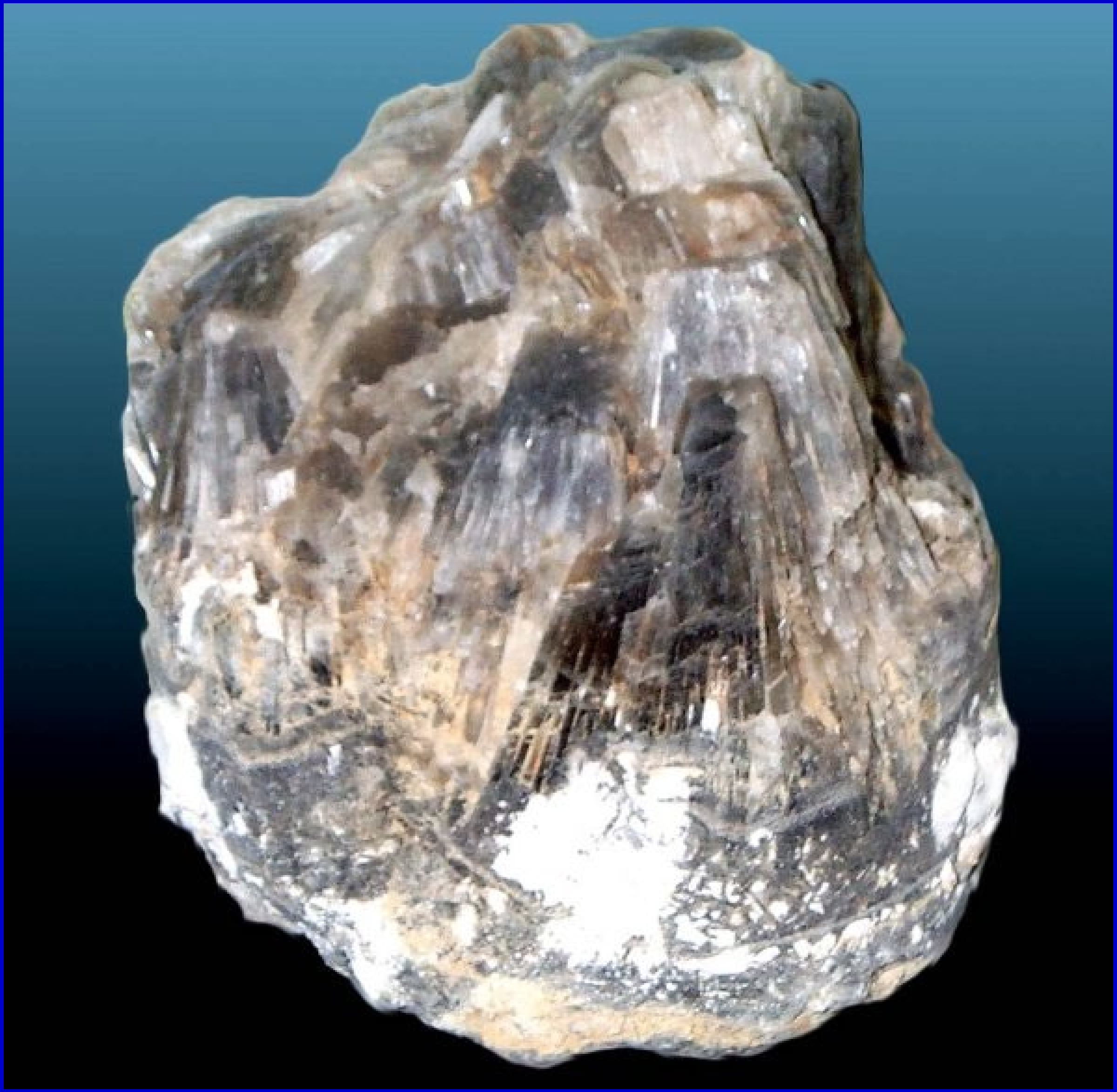


Sodium Sulfate Well

Sodium Sulfate is used in detergents and paper pulping

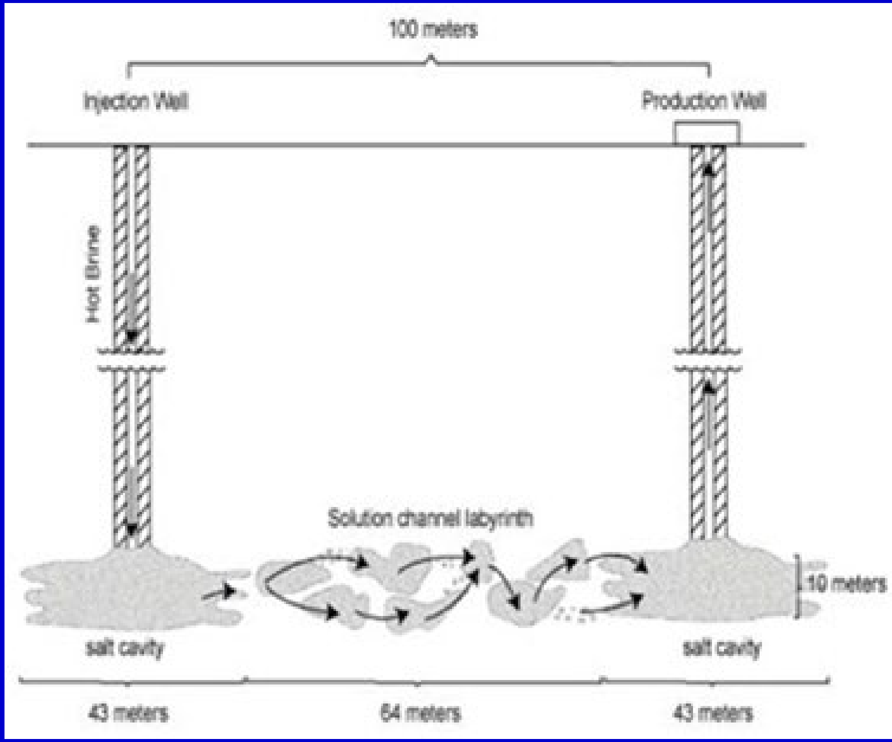
Sodium Sulphate Reservoir and Plant

Nahcolite ($NaHCO_3$) (Sodium Bicarbonate) Mineralization



Nahcolite Solution Mining Wellhead

Potash Solution Mining



Potash refers to potassium compounds with the most common being potassium chloride (KCl). Potash is also used in fertilizers.

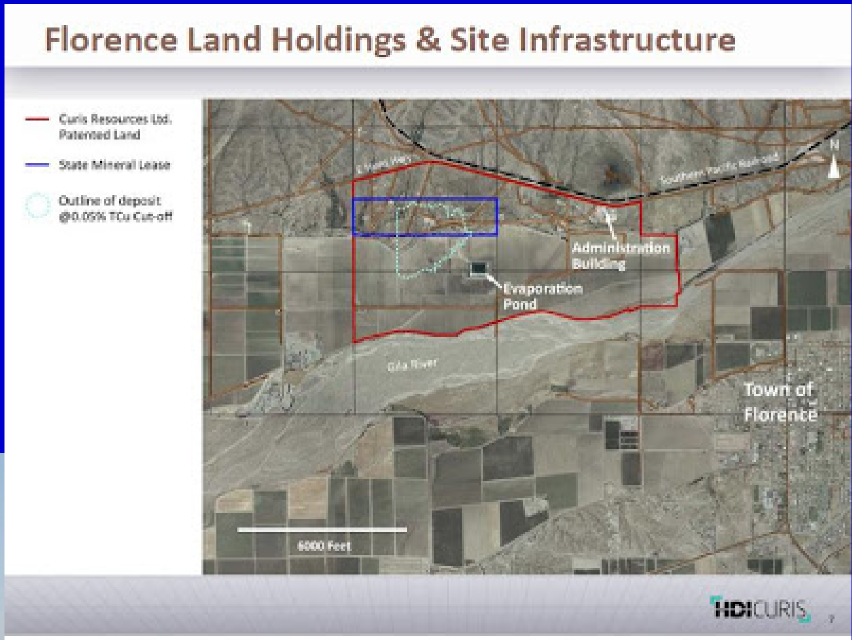
Potash Core Holbrook , AZ

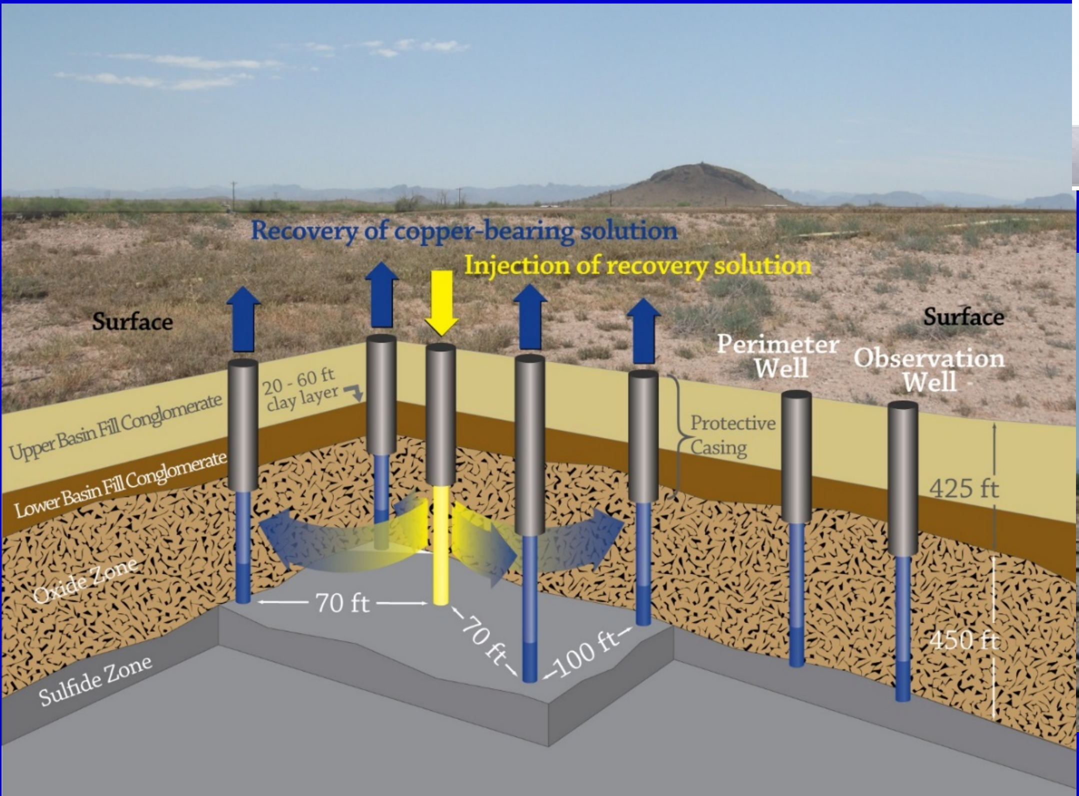
Potash Core Holbrook , AZ

Copper Solution Mining

The Florence Arizona Copper Project could produce as much as half of the 2.8 billion pounds of copper reserves at the 400 - 1200 foot deep deposit.

Dilute sulfuric acidic solutions (.5%) are introduced to the copper-bearing ores, causing dissolution of soluble copper minerals






1575 W. Hunt Hwy
FLORENCE
COPPER PROJECT

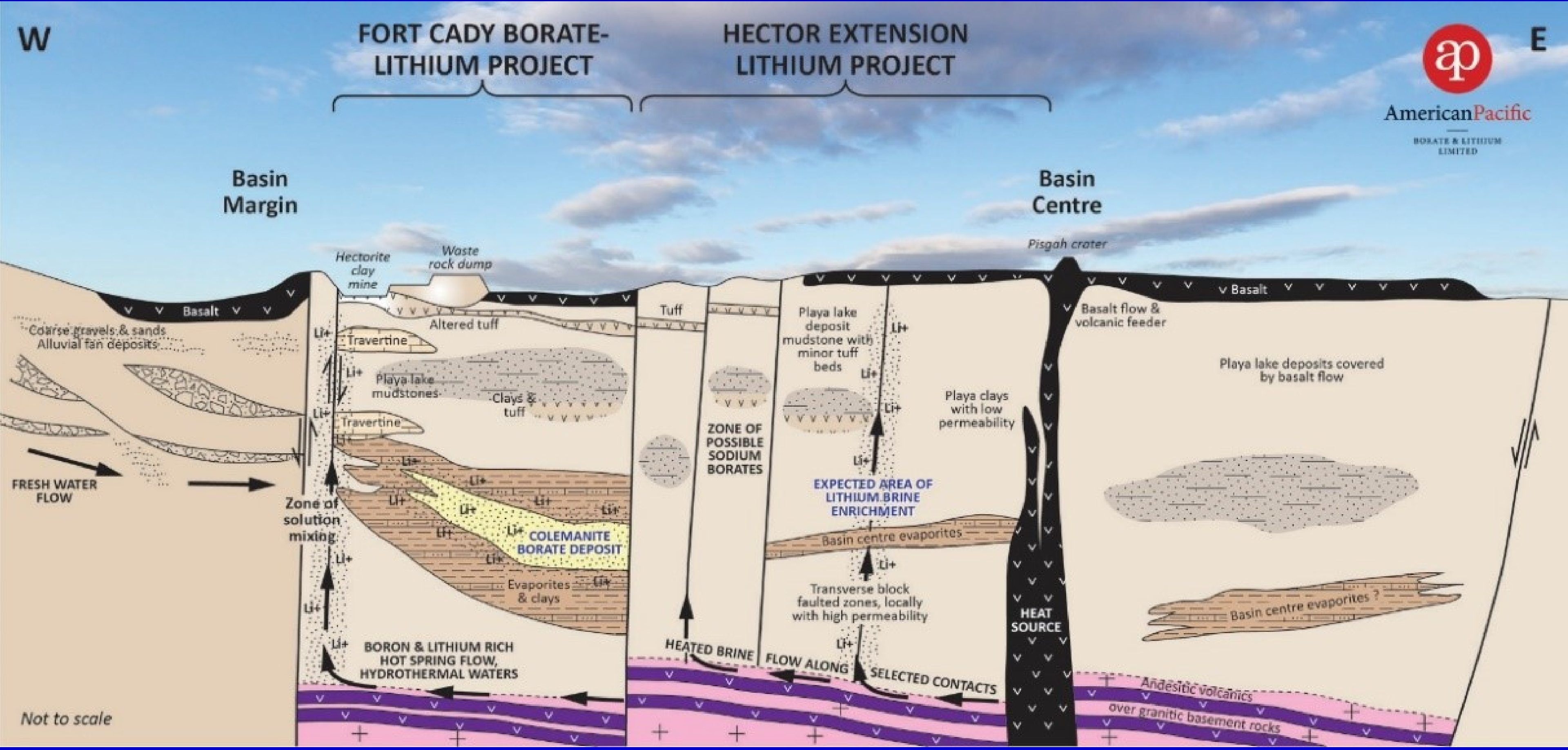
4 injection wells and 9 producing wells


Arizona

830E
15

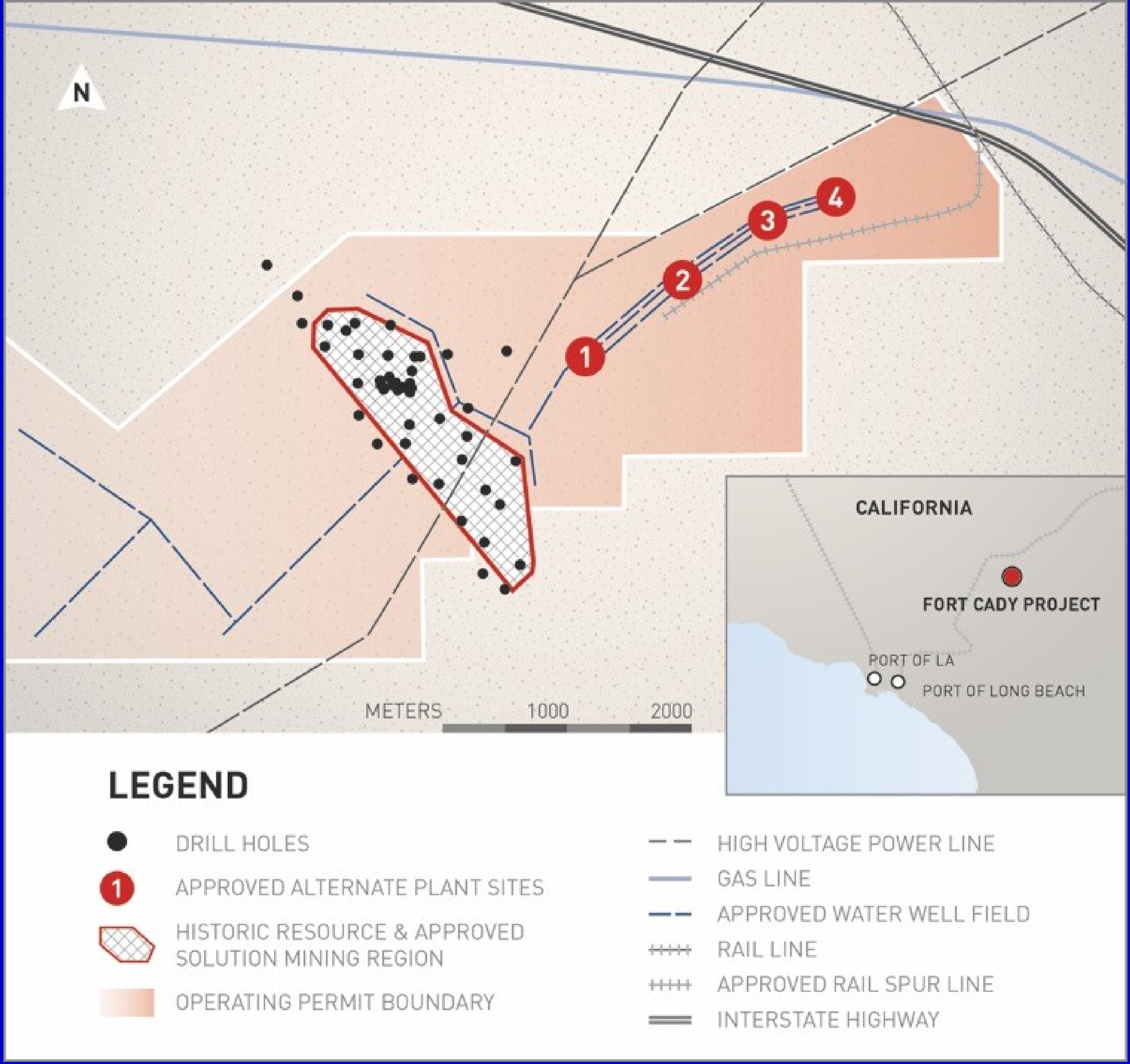
6416
930E
KOMATSU
6416


Fort Cady ISL Borate Mine in the Hector Basin CA Mojave Desert



Mineralization occurs in lake sediments & Miocene evaporites. The colemanite is fine-grained crystals in beds and bands within the anhydrite-rich part of the evaporite.

The deposit averages 118 feet thick at an average depth of 1,350 feet and covers an area of 384 acres.



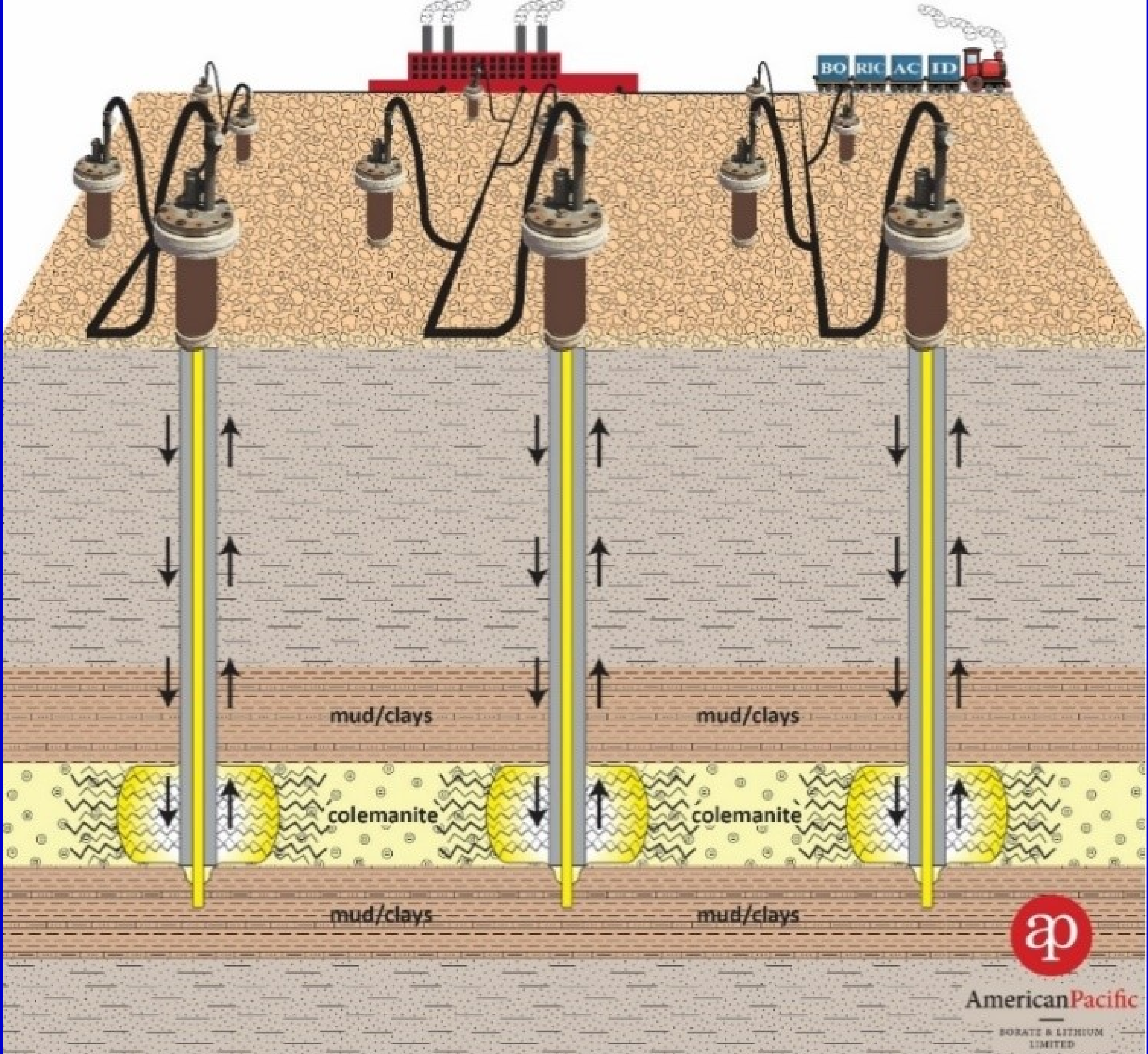
Currently there are 104 operating wells

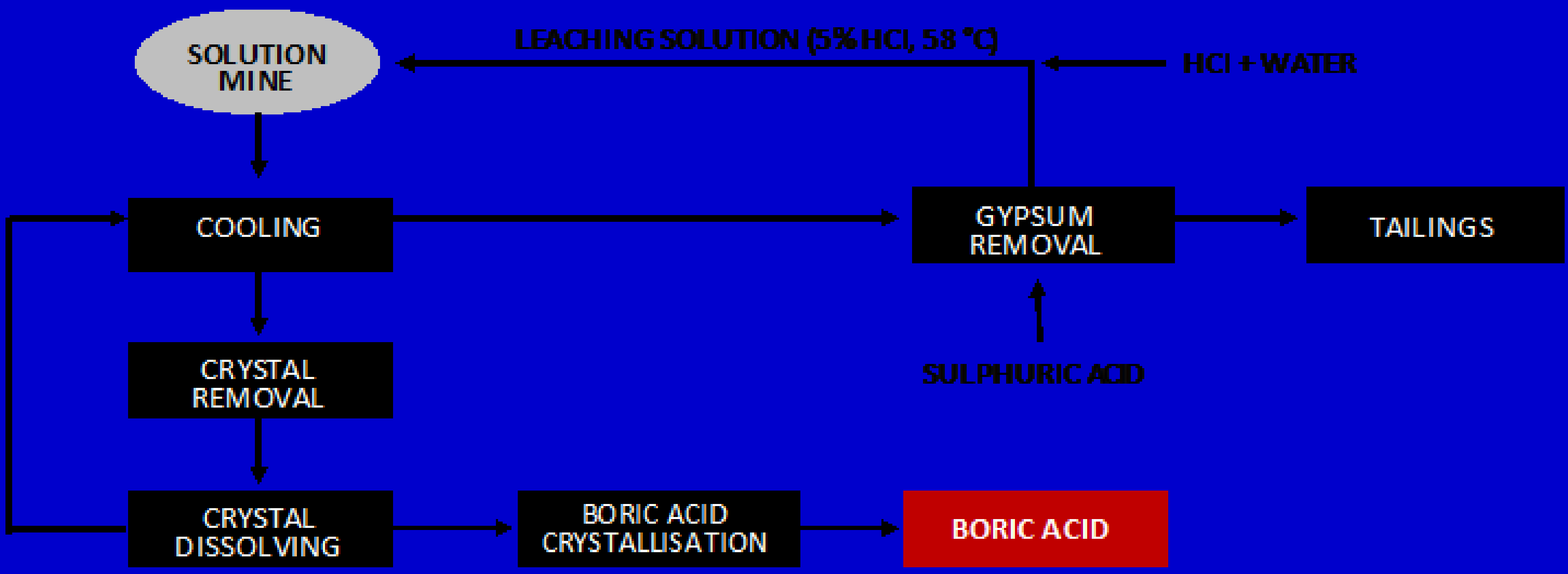
Fort Cady Site in October 2017 showing drilling activity, and pilot plant in the background.

The recovery of boron from the colemanite mineral is accomplished by injecting a weak acid solution (no more than five percent hydrochloric acid, sulfuric acid, or a mixture of both in a water solution) into the ore body.

The acid reacts with the alkaline nature of the ore body to recover a mixture of borate product and calcium chloride which is dissolved in solution as products of the chemical reaction.

This solution is withdrawn from the well and pumped to the process plant where borate crystals are precipitated.


BO RIC AC ID
mud/clays
mud/clays
colemanite
colemanite
mud/clays
mud/clays
AmericanPacific
BORATE & LITHIUM LIMITED



The remaining formation would be a porous matrix of clays and insoluble minerals. The void space that would result from the leaching process would constitute less than 12 percent of the formation, and the void space would ultimately contain water, therefore subsidence is not expected to occur.

Borate Uses

DETERGENTS

Used as a cleaning and bleaching agent to increase the performance of products.

FLAME RETARDENT

Used in all dry powder fire extinguishers and fire retardant paints

WOOD TREATMENT

Used in wood as a preservative preventing decay; slows and suppresses the spread of flames if burning occurs.

NUCLEAR REACTORS

Absorbs neutrons increasing nuclear reactor safety.

PERSONAL CARE PRODUCTS

Borate properties control bacteria and fungi in personal care products and significantly improve cleaning action.

Class III Construction

- Cased and cemented to prevent fluid migration into or between USDWs
- Casing and cement designed for life expectancy of the well
- Information required for naturally water-bearing injection zone formations
  - Fluid pressure
  - Fracture pressure of the formation
  - Physical and chemical characteristics of the formation fluid

Class III Operation

- Can’t inject between outermost casing protecting USDWs and the wellbore
- Maximum injection pressure must be below fracture pressure
- Pump test uranium mines
- Most Class III solution mining wells use fresh water as the “mining” fluid

Class III Monitoring

- Mechanical integrity testing
  - Brine mining after initial test every 5 years
  - Uranium, sulfur – after an initial test, since theoretical well life < 5 years, no MIT required by regulation
- Monitoring injection zone
  - Fluid levels – semi-monthly
  - Ground water parameters – semi-monthly
- Monitoring wells monitored quarterly

Class III Inspection

- Look over general condition of wellfield
  - Transmission lines
  - Tanks
  - Wellheads
  - Ponds
  - Grass cut?
- Injection pressure (wellhead gauge) complies with permit (must be below fracture pressure)
- Monitor injection fluids frequently enough to determine characteristics
- Injection rate and volume comply with permit limits

Class III Inspection

- Evaporation and holding ponds
  - Adequate freeboard
  - Leak detection system
- Monitoring wells (if any)
  - Fluid levels and ground water parameters (excursions)

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ)
Critical Infrastructure Division
Underground Injection Control (UIC) Class III Permits Investigation Checklist

Permittee's Name and Mailing Address____________________

Telephone information____________________ Fax Information____________________

Permittee's representative/ Title____________________

Purpose and Scope of Inspection____________________

____

____

Inspection Location(s)____________________ Inspection Date (s)__________

Inspection Type ___Routine ___Pre-Permit ___Initial ___Special ___Announced ___Unannounced

Type of Permit ____________________ Permit No. __________

Date Issued/Amended____________________ Type of Project__________

TCEQ Region____________________ TCEQ Inspector(s)/Office__________

Inspector/Date/Results of Previous Inspection____________________

Comments: ____________________

____

Results of this Inspection ___In Compliance ___Violation(s) ___Enforcement Action Needed

___Recommendation(s)

Comments____________________

____

Areas of Concern from previous inspection____________________

____

Areas to receive special attention at the next inspection____________________

____

Note: All information stated on this inspection checklist resulted from records inspection, the inspector's observations, and/or statements and representations made by the employees present at the time of inspection.

Inspector________________________________ Reviewed by________________________________

Date of Report______________________ Date Reviewed____________________________

GENERAL INFORMATION

Site Security and Operating hours____
____

Type of Processing and Description____
____
____

No. of Production Area Authorization (PAA) / Average Depth of PAA ____________________________________
____

Average Depth of Injection/production Wells / Type of Casing______________________________________
____

Average Depth of Monitor / Baseline Wells / Type of Casing_______________________________________

Current Status of Operations____
____
____

Method of Wastewater Storage prior to Injection

_______Surface Impoundment (Ponds) _________Wastewater Storage Tank

_______No. of ponds _______No. of wastewater Storage tanks

Method of liquid Waste disposal ____Class I WDW ____Irrigation ____Surface Discharge

Disposal Permit No. ______________________

Comments:____
____

Method of solid waste disposal ___on site ___off site

On site solid waste pit(s)? ___NA ___Yes ___No

Comments:____
____

Does the permittee have a valid radioactive material license from TCEQ for covering the handling processing, and disposal of radioactive materials?

___NA ___Yes ___No

Comments: ____

____

RECORDS

Are the current copies of the UIC rules, Class II Permit(s), and notices concerning previous inspection on file?

___NA ___Yes ___No

Comments: ____

____

CONSTRUCTION REQUIREMENTS

New Class III wells since the last investigation? ___NA ___Yes ___No

Is the permittee in compliance with construction requirements (Casing and Cementing, Alterations to Construction Plans, Logs and Tests, Deviation Checks, Mechanical Integrity Tests, Additional Logs and Tests, Construction and Testing Supervision)? 30 TAC §331.82

___NA ___Yes ___No

Comments: ____

____

____

OPERATING REQUIREMENTS

Describe method(s) used by the permittee for confining of mining solution in a production zone____________

____

Injection pressure at the wellhead in accordance with permit requirement? 30 TAC §331.82

___NA ___Yes ___No

Maximum allowable injection pressure (0.4 psi/foot of well depth) marked on each injection well or on injection manifold? (This is a permit requirement)

___NA ___Yes ___No

Comments: ____

____

Maximum allowable injection pressure at the wellhead in compliance with permit requirements?

___NA ___Yes ___No

Comments: ____

____

Has the permittee injected between the outermost casing protecting USDWs and the wellbore? 30 TAC §331.83(b)

___NA ___Yes ___No

Comments: ____

____

MONITORING REQUIREMENTS

Parameter Chosen to measure water quality (Control Parameter) 30 TAC §331.84(c)

___Uranium ___Sulfate ____Conductivity ____Chloride ____Alkalinity ____Other

Are the monitor wells completed in the injection zone monitored for fluid levels and chosen parameters twice a month at two weeks interval?

___NA ___Yes ___No

Comments: ____

____

Is the permittee required to comply with the monitoring requirements specified in 30 TAC §331.82(h) (Construction Requirements) 30 TAC §331.84(f)

___NA ___Yes ___No

Comments: ____

____

Are all monitor wells for permit/production areas sampled by the permittee at least twice a month at two weeks intervals? 30 TAC §331.84©

___NA ___Yes ___No

Comments: ____

____

Are the water samples analyzed for control parameters by the second working day and reported as required in §331.85(e)?

___NA ___Yes ___No

Comments: ____

____

Are the samples analyzed off site by a third party laboratory or on site by the permittee?

___NA ____Off site _____On site

Name of the laboratory and location ____

Comments: ____

____

Are there any water wells within 1/4 mile of the injection site? 30 TAC §331.84(d)

___NA ___Yes ___No

Is the permittee monitoring the specified wells within 1/4 mile of the injection site every three months? 30 TAC §331.84(d)

___NA ___Yes ___No

Comments: ____

____

Injection fluid analyzed for physical and chemical characteristics with sufficient frequency? 30 TAC §331.84(a)

___NA ___Yes ___No

Comments: ____

____

Are the injection pressure, injection volumes, and production volume recorded? 30 TAC §331.84(b)

___NA ___Yes ___No

Comments: ____

____

Are pressure gauges on each injection well or on injection manifold? 30 TAC §331.84(e)

___NA _______On each injection well _____on injection manifold

Comments: ___

___

Ponds/Waste Storage Tanks

Monitoring frequency:

Pond: Liner___ Leak Detection System ___ Freeboard ___

Transmission lines ___

Tank condition ___ Level___

Is permittee in compliance with the inspection requirements ___Yes ___No

Comments: ___

___

MONITOR WELL EXCURSION

Are there any excursions since the last investigation?

___NA ___Yes ___No

(Monthly Remedial Action Report (30 TAC §331.85(f), Groundwater Analysis Report (30 TAC §331.85(g) & 30 TAC §331.106(2)) , Verifying Analysis (30 TAC §331.105(3)), Sampling Frequency when Mining Solutions present (30 TAC §331.105(4)), Remedial Action for Excursion (30 TAC §331.106), Notification (30 TAC §331.106(1)), Clean-Up (30 TAC §331.106 (A) and (B))

Is the permittee in compliance with the above requirements?

___NA ___Yes ___No

Comments: ___

___

GROUNDRESTORATION

Are the PAAs for each mine area contain a restoration table?
30 TAC §331.107(a)

___NA ___Yes ___No

Comments: ___

___

Has the permittee notified the Commission when the mining of a production area was completed?

30 TAC §331.107(b)

___NA ___Yes ___No

Comments: ____

Has the aquifer/groundwater restoration conducted by the permittee after mining completion? 30 TAC §331.107(b)

___NA ___Yes ___No

Comments: ____

Is the aquifer/groundwater restoration for each mine area accomplished in accordance with the timetable specified in currently approved mine plan? 30 TAC §331.107(c)

___NA ___Yes ___No

Comments: ____

Are the semi-annual restoration progress reports submitted by the permittee to the commission? 30 TAC §331.107(d)

___NA ___Yes ___No

Comments: ____

Is the stability sampling performed by the permittee during restoration, as required 30 TAC §331.107(e)

___NA ___Yes

Comments: ____

Are the restoration values listed in the restoration table for a production area achieved by the permittee? 30 TAC §331.107(f)

___NA ___Yes ___No

Comments: ____

Has the permittee submitted a restoration table amendment to the Commission?

___NA ___Yes ___No

Comments: ____

____

CLOSURE STANDARDS / PLUGGING AND ABANDONMENT

Has the permittee plugged and abandoned any well since the last investigation?

___NA ___Yes ___No

Is the permittee in compliance with the plugging and abandonment requirements?

(30 TAC §331.46(d), 30 TAC §331.46(i), 30 TAC §331.144(Approval of Plugging and Abandonment / Certification from the Owner or Operator and an Independent Registered Professional Engineer for Plugging and Abandonment)

___NA ___Yes ___No

Comments: ____

SPILLS / INCIDENTS

Have there been any spill / incidents since the last investigation?

___NA ___Yes ___No

Comments: ____

____

Is the permittee in compliance with spill / incidents reporting requirements to the Commission?

___NA ___Yes

Comments: ____

Alarm System

Describe Permittee's Alarm System for the processing plant/production Areas ______________________________

____

Frequency of Alarm Test by the Permittee ______________________________

Date of recent Alarm Test and the results ______________________________

____

REPORTING REQUIREMENTS

Is an updated map for all newly constructed or newly discovered wells submitted by the permittee annually to the Executive Director?
30 TAC §331.85(a) ___NA ___Yes

Comments: ____

Are results of required monitoring maintained on site?
30 TAC §331.85(b)

___NA ___Yes

Comments: ____

Are results of mechanical integrity test and any other periodic test reported to the executive director?
30 TAC §331.85(c)

___NA ___Yes

Comments: ____

Is monitoring reported on a project or field basis?
30 TAC §331.85(d)

NA ___Yes

Comments: ____

Are the monitoring data for monitor wells completed in the injection zone reported quarterly to the Executive Director no later than 10th day following report period?
30 TAC §331.85(e)

___NA ___Yes

Comments: ____

REPORTS TO THE COMMISSION

Is the permittee in compliance with the reporting requirements to the Commission?

___NA ___Yes ___No

Comments: ____

FINANCIAL ASSURANCE FOR CLASS III WELLS

Is the permittee in compliance with the financial assurance requirements?

30 TAC §331.15 (Financial Assurance for Class III Wells), 30 TAC §37.7301-7051 (Financial Assurance for UIC Wells), 30 TAC §331.142(Financial Assurance for Plugging and Abandonment), 30 TAC §331.143 (Cost Estimate for Plugging and Abandonment)

___NA ___Yes ___No

Comments: ____

____

OBSERVATIONS DURING SITE AREA INSPECTION

Date and Company Representative (including Title) present during site inspection ____________________

____

Automatic Shutoff Systems for the processing plant/production areas ___NA ___Yes ___No

If yes, describe the system ____

PRODUCTION AREA S (PAs)/ WELL FIELDS

Condition of PAs:
Overgrown Vegetation (safety hazard), Well accessible for inspection/sampling, unwanted debris in the PAs, any activities (well construction, exploration activities, plugging activities, sampling etc.) in progress, while inspecting a PA, **request the permittee to demonstrate how the permittee confines the mining solution for a specific PA; include** any other observations, including safety hazards.

PRODUCTION / INJECTION / MONITOR WELLS/BASELINE Wells

Condition of wells:

Wells capped (include type of cap), cemented to the surface, labeled, integrity of the well (i.e, aboveground casing intact, wiggle to determine if the well is broken below the surface)

Comments: ____

____

Pressure gauges on each injection well or on injection manifold? ____________________
Maximum allowable injection pressure marked on each injection well or on injection manifold?

___NA ___Yes ___No

Comments: ____

____

Maximum allowable injection pressure in compliance with rule/permit requirements?

___NA ___Yes ___No

Comments: ____

____

TRANSMISSION LINES

Are transmission lines buried or above ground? ____________________

Type________________

Method of Monitoring: ___Visual inspection ___Other

Condition of transmission lines during the investigation? ____Leaks ____Broken ____Other

Comments:____

____

Wastewater Storage Method

__________Pond __________Tanks

__________No. of Ponds ________No. of Tanks

Pond:

Depth in FT_______________ Dimensions in FT_____________________

No. of Leak Detection System (LDS)___________ Type of LDS________________________

Fluid detected ______Yes ______No **(Permittee should check the LDS in presence of the investigator)**

________Single Liner ___________Double Liner

Condition of the Liner____

Pond Freeboard marked on the liner or on a stick located in the middle of the pond (describe)

____

Pond Freeboard in compliance with permit requirement ________Yes ________No

Comments:____

____

Wastewater Storage Tank

Capacity in Gallons_____________ Length in FT______________ Diameter in FT____________

Type ____

Tank Equipped with Level Indicator? ________Yes ________No

Alarm goes off when tank reaches certain level? ________Yes ________No

Tank level monitored from a control room? ________Yes No ________

Frequency of monitoring____

Condition of tank(s) ____

Comments: ____

____

Groundwater Sampling

Samples collected during the investigation?

___NA ___Yes ___No

Sample Type___________________________ No. of samples_________________

Sample Location

Comments: ____

____

Photos

Photos taken during the investigation?

___NA ___Yes ___No

Comments: ____

____