

GTHT - ____002____

**CORE HOLE
VC-2B**

File

OIL CONSERVATION DIVISION
RECEIVED

Thomas A. Turner
8764 S. Russell Park Road
Salt Lake City, Utah 84121

85 DEC 4 PM 8 52

November 28, 1995

Roy Johnson
Senior Petroleum Geologist
Supervisor District IV
2040 S. Pacheco
Santa Fe, New Mexico 87505

Dear Roy,

The History of Abandonment and your Sundry Notice Form G-103 is enclosed for your approval and file for strat test VC-2B.

Los Alamos and I very much appreciate your help in arriving at a workable procedure for the abandonment of this rather unusually completed well.

We further appreciate your taking the time to meet with us regarding Fenton Hill the week before last. The application for permission to inject at Fenton Hill will be sent to you in the near future.

Yours Truly,



Thomas A. Turner
Consultant at Los Alamos

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501Form G-103
Adopted 10-1-74
Revised 10-1-78

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SUNDRY NOTICES AND REPORTS
ON
GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease	
State <input type="checkbox"/>	Fee <input type="checkbox"/>
6. State Lease No.	

Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application Permit -" (Form G 101) for Such Proposals.)

Type of well	Geothermal Producer <input type="checkbox"/>	Temp. Observation <input checked="" type="checkbox"/>	Stratigraphic
	Low Temp Thermal <input type="checkbox"/>	Injection/Disposal <input type="checkbox"/>	Test

7. Unit Agreement Name

Name of Operator
Los Alamos National Laboratory

8. Farm or Lease Name

Baca Ranch Valles Calder

Address of Operator
Los Alamos, New Mexico, MS-H865, 87545

9. Well No.

VC-2B

Location of Well

10. Field and Pool, or Wildcat

Baca Field

Unit Letter _____ Feet From The _____ Line and _____ Feet From

The _____ Line, Section 3 Township 19N Range 3E NMPM.

15. Elevation (Show whether DF, RT, GR, etc.)

8500' ASL

12. County

Sandoval

Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input checked="" type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	
WELL OR ALTER CASING <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>
OTHER <input type="checkbox"/>	

SUBSEQUENT REPORT OF:

REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG & ABANDONMENT <input type="checkbox"/>
CASING TEST AND CEMENT JOB <input type="checkbox"/>	
OTHER <input type="checkbox"/>	

Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any

Casing Record:

(fish completely filling 3" open hole at 5600')

10-3/4", 40#/ft. K-55 casing cemented in 16" hole at 173"
 6-5/8", 24#/ft. K-55 casing cemented in 9.87" hole at 707"
 CHD-134 rods cemented in 5.5" hole at 2092'. TOC @ 940'
 CHD-101 rods cemented in 4" hole at 5567'. TOC @ 5200'.
 Plugged with cement from 800' to the surface.
 3" open hole to 5780' with top of fish at 5600'

Wellhead: ANSI series 900 12" wellhead with two 2" plugged side outlets equipped with a 12" by 6" ANSI
 series 900 R45. Reduction spool with two 2" side outlets with nipples and valves. As further detailed on the
 attached procedure.

History and Proposal:

This well is presently suspended with the tubing plugged with cement and a fish in the open hole section.
 The wellhead reduction spool is held in place by tubing tension and is un-bolted and eccentric with one stud
 left in place. The well is leaking gas containing hydrogen sulfide at very low rates at the surface between the
 reduction spool and wellhead flanges. It is proposed to abandon the well by hot tapping into, pressure
 testing and sealing each annulus with cement as conditions dictate. It is anticipated that work will
 commence early in October, 1994.

Present Condition of Well:

Completion Date - October 1988
 Total Depth - 5780' KB
 Elevation - Approx. 8500'
 Bottom hole Temperature - 295 C (565 F)

ALL ANNULI AND TUBING SQUEEZED AND
 PLUGGED W/CEMENT TO THE SURFACE AS
 Proposed on 9/25/95. WITNESSED BY
 ROY JOHNSON, NMOCD. See details

attached.

WORK COMPLETED ~~10/11/95~~ 9/26/95.

I hereby certify that the information above is true and complete to the best of my knowledge and belief

SIGNED Thomas TurnerTITLE CONSULTANT AT LOS ALAMOS NMDATE 10/22/95

History of Abandonment

Core Hole VC-2B

Baca Field - Valles Caldera

NE/4 of SE/4 of NW/4 of Sec. 3, T19N, R3E, NMPM

10/10/95

DATE

OPERATION

In preparation for squeeze operations the eccentric, leaking wellhead was jacked up, the flanges and gaskets were redressed and the wellhead was re-seated to stop the leak and secure the well. These operations were conducted with positive pressure supplied air breathing units and safety and Hazmat personnel on site for ambient air monitoring and emergency treatment and evacuation in case of a accidental gas release. After securing the wellhead the concrete pad was removed and a 4' x 4' x 40' trench was dug down slope from the wellhead to allow access for the hot tap equipment and release for any accumulated hydrogen sulfide gas. Safety meetings were conducted with all personnel prior to each days operations.

- | | |
|---------|--|
| 8/11/95 | Rig up welder, blower, Hazmat and Safety personnel. Hook up exhaust hose and bled 6-5/8" x 5-1/2" annulus at 10:43 AM. Had a strong blow for 1.5 min. then well flowed gas containing approximately 4000 ppm H ₂ S throughout the duration of operations. Gas makeup was primarily CO, CO ₂ and H ₂ S. Began welding hot tap guide bracket when water surfaced to blow barrel at 10:49 AM. Total flow was five gallons prior to shut in. Rigged up containment tank and re-bled well at 3:50 PM. Medium blow for 30 sec. then slight continuous gas flow for remainder of operation. Welded hot tap collar and installed and pressure tested drill bit pack off assembly. |
| 9/6/95 | Rigged up drill assembly in packoff and pressured with nitrogen. Drilled one inch hole into the 10-3/4" x 6-5/8" annulus. Retracted bit and closed pack off shut off valve. Rigged up positive displacement pump to annulus tap and pressured well annulus with water. With 3" x 3" triplex pump at 60 spm the annulus pressured to 280 psig after 30 seconds. Various leaks were evident in the piping. Aborted operation to tighten connections. Re-pressured the annulus to 300 psig in 40 seconds. Pressure fell off to 250 psig in 10 minutes. Pumped annulus back to 300 psig with two pump strokes. With a small leak evident at the wellhead connection the pressure |

bled to 279 psig in 30 minutes. The pressure fall-off was less than 10% in 30 minutes and the test was good. Rigged up to drill into annulus #2 (6-5/8" x 5") at 1:30 PM. Drilled into the second annulus at 2:05 PM and lost all nitrogen pressure to annulus. pulled bit, shut off pack-off assembly and conducted injectivity test with water in order to finalize cement slurry design. Rigged up pre-calibrated triplex pump to hot tap assembly and began pumping water to annulus at 21 gpm with 30 psig pump manifold pressure. Well was on a vacuum throughout test. Total injection was approximately 800 gallons. Rigged down hot tap and pressure test equipment and secured location pending availability of personnel and cementing equipment.

9/25/95

Moved in and rigged up cement pump truck, blending skid, bulk truck, sodium silicate tank truck, Hazmat team and Safety Engineer. Mobilized water truck and filled tanks and equipment with Fenton Hill water in preparation for squeeze job. Roy Johnson, Senior Petroleum Geologist and Supervisor District IV of the State of New Mexico Oil Conservation Division was on site to witness the squeeze operations. Began squeezing annulus #2 (6-5/8" x 5") at 4:44 PM. Pumped five barrels of fresh water pre-flush followed by 5 barrels of calcium chloride water to gel sodium silicate followed by 15 barrels of fresh water followed by 10 barrels of sodium silicate to provide purchase for the cement in the lost circulation zones. The sodium silicate was followed by a four barrel fresh water spacer at 5:05 PM which was followed by the squeeze cement slurry. The squeeze cement was made up as follows: (all additive percentages are by weight of the poz/cement blend unless otherwise noted) 35% pozzolon (by weight of cement), 65% Class G cement with 0.2% TIC, 0.5% anti-setting agent, 2.0% high temperature fluid loss agent, 6.0% bentonite, 35% silica flour for high temperature strength stabilization and 0.2% retarder. The cement density was 12.5 lb./gal with 12.38 gal/sack mix water yielding 2.36 cu.ft./sack. began pumping cement at 1.9 Bbl./min. as follows:

<u>Barrels Pumped</u>	<u>Pressure</u>	<u>Comments</u>
10	60/110 psig	at manifold
12	240/320	reduced rate to 1.1 Bbl/min.
18	150/190	
20	200/230	
23	290	
24.7	330	
27.4	390	
29.7	470	
32.2	480	
33.1	490	

33.4	505	
34.4	550	
34.9	580	
35.2	600	reduced rate to 0.75 Bbl/min.
35.5	480	
36.3	515	
36.9	540	
37.5	565	
38.0	590	
38.3	600	reduced rate to 0.5 Bbl/min.
38.5	520	
39.3	530	
39.5	540	
39.9	550	

Followed cement with 0.5 Bbl of water resulting in a final pump pressure of 590 psig. Shut in pump and pressure leveled off at 350 psig. Shut in well and W.O.C. overnight.

9/26/95 Rigged up pump truck and pressure tested 6-5/8" x 5" annulus as follows:

<u>Time</u>	<u>Pressure (psig)</u>
9:18 AM	590
9:29	580
9:30	560
9:43	550
9:46	540
9:48	540

Pressure bleed off in 30 minutes was less than 10% and the test was good. Rigged up hot tap equipment to hot tap annulus #3 (5" x 3 1/2"), pressurized packoff and drilled into annulus #3. Rigged up pump truck and pressure tested annulus #3 to 550 psig after pumping 1-1/4 Bbl.. Leaks were evident in the well head flange taps and the well was bled to 0 psig in one minute. Tightened flange taps and re-pressure tested well as follows:

<u>Time</u>	<u>Pressure (psig)</u>
12:04 PM	410
12:05	405
12:07	400
12:09	395

12:10	392
12:12	390
12:17	380
12:23	370
12:40	350
12:47	340
12:53	334

Slight leaks were evident in the wellhead throughout the test and since during the 30 minute period from 12:23 to 12:53 the pressure drop was less than 10% of the pressure at 12:23, the test was considered good. Cut off well head four feet below grade and discovered that the 5" casing had fallen down-hole commingling annuli #2 and #3. This resulted in both annuli being squeezed with one operation. Topped all casing and annuli with portland cement to displace the final displacement water and provide a solid surface plug. Welded a 1/2" steel plate across all casing stubs and installed marker post in accordance with NMOCD regulations prior to returning site to original grade. Rigged down and moved out equipment.

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8. Farm or Lease Name

Baca Ranch Valles Calder

Address of Operator

Los Alamos, New Mexico, MS-H865, 87545

9. Well No.

VC-2B

Location of Well

Unit Letter NE/4 of SE/4 of NW/4

10. Field and Pool, or Wildcat

Baca Field

Section 3 Township 19N Range 3E NMPM.

15. Elevation (Show whether DF, RT, GR, etc.)

8500' ASL

12. County

Sandoval

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TEMPORARILY ABANDON <input type="checkbox"/>	
REPAIR OR ALTER CASING <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>
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CHD-101 rods cemented in 4" hole at 5567'. TOC @ 5200'.
Plugged with cement from 800' to the surface.
3" open hole to 5780' with top of fish at 5600'

Present Condition of Well:

Completion Date - October 1988
Total Depth - 5780' KB
Elevation - Approx. 8500'
Bottom hole Temperature - 295 C (565 F)

Wellhead: ANSI series 900 12" wellhead with two 2" plugged side outlets equipped with a 12" by 6" ANSI series 900 R45. Reduction spool with two 2" side outlets with nipples and valves. As further detailed on the attached procedure.

History and Proposal:

This well is presently suspended with the tubing plugged with cement and a fish in the open hole section. The wellhead reduction spool is held in place by tubing tension and is un-bolted and eccentric with one stud left in place. The well is leaking gas containing hydrogen sulfide at very low rates at the surface between the reduction spool and wellhead flanges. It is proposed to abandon the well by hot tapping into, pressure testing and sealing each annulus with cement as conditions dictate. It is anticipated that work will commence early in October, 1994.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [Signature] TITLE CONSULTANT TO LANL

DATE 9/28/94

DISTRICT SUPERVISOR

10-4-94

LOS ALAMOS NATIONAL LABORATORY
EES-4

Procedure to Abandon
Core Hole VC - 2B

September 22, 1994

Present condition of well:

Completion Date - October 1988

Total Depth - 5780' KB

Elevation - Aprox. 8500' ASL

Bottom hole temperature - 295 C (565 F)

Location - NE/4 of SE/4 of NW/4 of Sec. 3, T.19N., R.3E.

Casing Record:

(fish completely filling 3" open hole at 5600')

10-3/4", 40#/ft. K-55 casing cemented in 16" hole at 173'

6-5/8", 24#/ft. K-55 casing cemented in 9.87" hole at 707'

CHD-134 rods cemented in 5.5" hole at 2092'. TOC @ 940'. Rod O.D. = 5", I.D. = 4.5"

CHD-101 rods cemented in 4" hole at 5567'. TOC @ 5200', plugged with cement from 800' to the surface. Rod O.D. = 3.7", I.D. = 3.26"

3" open hole to 5780' with top of fish at 5600'

Well head: ANSI series 900, 12" well head with two 2" plugged side outlets equipped with a 12" by 6" ANSI series 900 R45 reduction spool with one 2" side outlet and a 1/2" - gage outlet & valve. Spool fitted with a 6" x 4" ANSI 900 spool w/ two 2" side outlets with nipples and valves, capped with a 4 1/16" R 39 API 5000# valve.

History and Proposal:

This well is presently suspended with the tubing plugged with cement and a fish in the open hole section. The wellhead reduction spool is held in place by tubing tension and is un-bolted and eccentric with one stud left in place. The well is leaking gas containing hydrogen sulfide at the surface between the reduction spool and well head flanges. It is proposed to abandon the well by hot tapping into, pressure testing and sealing each annulus with cement as conditions dictate.

Procedure:

This procedure is organized into four independent operations as follows: (1) resetting and securing the well head; (2) removing the concrete pad; (3) hot tapping the casing below the well head and plugging the well; and (4) cutting off the casing 6' BGL.

1. Resetting and Securing the Well Head

1.1 Equipment Requirements for Resetting the Well Head

- Hazardous Gas Warning Signs to be posted at the entrance to the site, the water storage basin & near the well head.
- Two clearly marked emergency muster areas.
- Approved SCBA's to be located at each muster area.
- Two large first aid kits, one to be located at each muster area.
- Three canister H₂S specific, escape face masks w/ extra canisters.
- Two Oxygen resuscitation units, one to be located at each muster area.
- One wind sock or other wind direction indication device, that is clearly visible from the work and muster areas.
- H₂S detection devices with audible and visible warning devices to be located at the well head and near the pond pump location.
- Personnel electronic H₂S monitors to be worn by all personnel.
- Two portable air horns to be worn by the LANL & contractor site supervisors.

- Orange vests for all site personnel to be worn during hunting season.
- Safety goggles for all power tool operators.
- Portable remote air supply with 3 lines, masks, & emergency escape bottles.

NOTE: Above Items to be supplied by LANL H&S or HAZMAT.

- Rig bug blower
- Generator for bug blower & power tools.
- Chain come-along.
- Casing jacks, power packs.
- R-57 split rings (2)
- Flexataulic gaskets for 12" ANSI 900 RF service. (2)
- 100' of 2" hose to vent well head down wind.
- Stakes, collars & chains to secure all hose ends and connections.
- 1/2" x 1" bell nipple & 100' of 1" hose to vent well head while replacing 2" spool valves & installing 2" bleed line.
- Chisels, hammer & wire brush to clear & clean 12" flange face prior to installation of split R-57 ring gasket.
- 20 1-3/8" x 10 3/4" B-7 studs & 40 1-3/8" B-7 nuts.
- Hard hats, safety shoes and work gloves for all site personnel.
- Pressure gages as follows: 0-100psi and 0 - 200psi w/ 1/2" gage stems & busings from 1/2" x to 3/4" and 1".
- Pump and 2" hose for pond water injection test with fittings to 2" NPT female (100' of 2" hose) and collars, chains & stakes to secure hose ends.
- Suction hose for pond pump.
- 3 - 2" full opening NPT ball valves to replace frozen valves on spools.
- Teflon tape & pipe wrenches.

- 1.2 Hold safety meeting to familiarize all site personnel with site dangers, emergency procedures, muster areas, the operation of H₂S monitors, SCBA equipment, and the work procedure. Canister H₂S specific face masks to be worn by personnel working on the well head during this operation.
- 1.3 **NOTE:** It is likely that a significant gas flow will occur during this operation. Bug blowers should be in place and operating.
- 1.4 Install bleed line on 1/2" valve & bleed well head while installing chaining & staking 2" ball valves and bleed line. Post end of bleed for H₂S warning. Leave well on bleed w/ no more than 30 psi well head pressure during all non-operational periods.
- 1.5 Set the casing jacks over the hole such that they can pull on the uppermost flange, which is currently shifted off the top of the well head. After the casing flange has been lifted up and off of mating flange it will be necessary to re-align the two flanges before lowering them back into contact. While it is possible that this re-alignment will occur by itself, as a backup, a come-along should be hooked from the flange to a fixed point (parked vehicle) so that it can be pulled into line if necessary. The well head flanges will then be cleaned, re-gasketed, re-bolted, and tightened to seal.
- 1.6 Install pressure gage on 1/2" valve and monitor and record pressure build-up when seal is obtained.
- 1.7 Measure & record H₂S concentration at bleed.

2. Cutting and removing the concrete pad.

Eye protection and canister type escape face masks are to be worn during this operation. Extreme care should be taken to avoid damage to the well head or bleed line during concrete removal operations.

- 2.1 Equipment needed:
 - Subcontractor to provide all concrete cutting tools
 - Back hoe to remove cement slabs
 - Hammer drill and carbide tipped bits
 - Concrete type eye bolts
 - Lifting chain, 3/8" x 20'
 - Cutting torch
 - Pick and shovel
 - Safety equipment as outlined in 1.1 above.
 - Dump truck for removal of debris.

- 2.2 Monitor site for soil H₂S at several points surrounding the well pad to check for external subterranean leaks prior to pad removal.
- 2.3 Hold safety meeting instructing all hands as to site dangers, emergency procedures muster areas, and the use of safety and monitoring equipment.
- 2.4 Cut the slab into several pieces in order to completely remove it from the site. Individual slabs should be limited to 5000 pounds weight. Since a cubic foot of concrete weighs about 150 pounds, the surface area of each individual slab should be no larger than 17 square feet. The back hoe can then remove the individual concrete slabs from the area. It may be necessary to lift some of the slabs vertically, to avoid damage to the wellhead. If this is necessary, then the concrete slabs can be drilled and outfitted with eye bolts and the back hoe hooked to the slabs using a chain.
- 2.5 Remove corrugated conductor from around the well & excavate area down slope from well head 3' below the bottom of the well head to allow access to the casing for hot tapping equipment. This excavation should be at least 4' wide, level on bottom and open on the down slope side to avoid possible H₂S accumulation in the work area. Side slopes over 3' tall should be stabilized to 45 degree or shored.

3. Hot tapping the 10 3/4" casing and cementing the annuli.

3.1 Equipment needed.

- Safety equipment as outlined in 1.1 above
- Portable electric welder
- Bug blower
- Custom fabrications and valve assemblies for hot tap:
 - Weld on fitting
 - Weld test plug
 - Riser nipple
 - Tee
 - Pressure gages as outlined in 1.1
 - Full port valves (2)
 - Upper riser nipple
 - Compressed Nitrogen regulator and line
 - 100' feet of 2" diameter discharge hose
 - Custom drilling bit
 - Custom Lubricator stuffing box
 - Electric drill, extra large slow speed
 - 100 GPM minimum water pump, low pressure

Suction and discharge hoses for this pump

Chains & collars for all hose fittings

Cementing contractor

- Bulk -truck for pre-mixed dry cement
- Tank truck w/ sodium silicate solution
- Sacked Calcium Chloride to set sodium silicate
- Water truck (60 Bbl/100 Bbl)
- Pump & Mixing truck
- Chicksan & fittings for Tonto hot tap valve. (2" NPT)
- Back-up centrifugal pump

- 3.2 Hold safety meeting informing all personnel as to the muster area locations, site hazards, and the use of safety and monitoring equipment and emergency action procedures.
- 3.3 Weld the weld on fitting onto the casing. Screw the weld test plug into the weld on flange. (The weld test plug is a plug with a fitting in it so that it can be attached to the nitrogen bottle) hook the compressed Nitrogen to the test plug, and apply nitrogen pressure in 100 psi increments until 500 psi pressure is applied. Once 500 psi has been applied, shut off the Nitrogen valve and monitor the pressure in the system. The pressure must remain steady with less than a 5% pressure drop in 5 minutes.
- 3.4 Once the integrity of the weld on fitting has been determined the remaining items of the hot tapping system can be assembled. Once the entire system is assembled the system should also be pressure checked, using the same procedure as for checking the weld.
- 3.5 Once the drilling system is set up, it must be pressure tested. Since this test will also check the integrity of the lubricator and packing. The test will only be to 250 psi and a maximum bleed off rate of 100 psi down to 150 psi in 5 minutes will be considered the maximum allowed.
- 3.6 Once the system has passed all pressure checks, the Nitrogen flow can be started and the first drilling can be done. When the casing has been drilled through the drilling bit is removed and the system "shut in" the pressure should be checked.
- 3.7 Tap through 10-3/4" casing into the 10 3/4" x 6 5/8" annulus. Bleed Nitrogen blanket, monitor for H₂S and check for flow. If gas is present bleed off monitoring for H₂S and record pressure vs. time to either zero psi or a stabilized minimum pressure. Shut in & record pressure build up until pressure stabilizes.

- 3.8 Attempt to pump into the annulus. If there was no gas flow and the annulus will not take fluids skip to step 3.12 (tap next annulus). If it is possible to pump into this annulus quantify injectivity by monitoring and recording the well head pressure at three separate injection rates. Shut in the 10 3/4" x 6 5/8" annulus and monitor and record pressure fall off after injecting three annulus volumes (112 Bbl.), if possible, to estimate volume requirements for cement job. Maximum pumping pressure - 700psi.
- 3.9 If the above cold water pumping operations have resulted in killing the 10 3/4" x 6 5/8" annulus, carefully remove the plugs in the well head side outlets and install a nipple and valve in each outlet for pumping and monitoring purposes.
- 3.10 Pre-establish water source for cementing operations so that test plugs can be made up with the actual mix water for the determination of pumping times, setting times, strengths, and rheological properties. Anticipated volume requirements & hole conditions are as follows:

<u>Annulus</u>	<u>10 3/4" x 6 5/8"</u>	<u>6 5/8" x 134</u>	<u>134 x 101</u>
3x calculated Vol. from surface To existing T.O.C.	0 to 112 Bbl.	23 Bbl.	61 Bbl.
Expected Temp at Bottom of Job	239/284°F	284°F	554°F
Maximum Pump Pressure	700psi	700psi	1500psi

Move in and rig up cementers to 2" NPT Tonto hot tap valve. Establish rate and pressure by pumping 10 Bbl pre-flush of mix water. Follow pre flush with class H sulfate resistant cement pre-mixed 1 to 1 with Spherelite or Perlite depending on injection test and 35% Silica flour for prevention of cement strength retrogression, 2% gel, 0.5% friction reducer (D-65) and retarders as required for the anticipated annular temperature conditions listed above. Water requirements will depend on whether Spherelite or Perlite is used for density control. If cement "goes away" and there is little change in the injectivity to water after the attempted squeeze, precede squeeze #2 with Sodium Silicate to provide purchase for cement as follows:

5 Bbl	Fresh water
5 Bbl	Calcium Chloride water mixed
	30# Calcium Chloride/Bbl water
10 Bbl	Fresh water
10 Bbl	Sodium Silicate
5 Bbl	Fresh water

Follow with cement mixture as described above and specified by Los Alamos National Laboratory (LANL). Then over flush with 5 cubic feet of water & W.O.C. overnight.

- 3.11 Wait on cement and pressure test when set to insure cement seal integrity. If OK continue with program. If the pressure test leaks off more than 10% in 20 min. re-cement and test until good. Maximum test pressures are as follows: 10 3/4" x 6 5/8" - 700 psi, 6 5/8" x 134 Rod - 700 psi, 134 Rod x 101 rod - 1500 psi.
- 3.12 When the 10-3/4" x 6-5/8" annular seal is established hot tap into the 6-5/8" x 134 rod (5.00") and the 134 Rod x 101 rod (3.80") annuli. Repeating steps 3.7 through 3.11 for each annulus until seals are established. Pump testing volume and maximum pressure for 6-5/8" x 134 rod annulus is 23 Bbl. and 700 psi; for 134 rod x 101 rod annulus use 61 Bbl. and 1500 psi.

4. Cutting off the casing.

- 4.1 Equipment required
 - Back hoe
 - Oxy-Acetylene cutting torch unit complete
 - Electric grinder
 - Portable electric welder
 - Cold chisels and 3# hammer
 - Covering lid (10 3/4" x 1/4" mild steel)
 - 4" x 10' steel pipe marker post. (as specified in 4.5 below)
- 4.2 The back hoe must excavate around the casing to a depth of at least 6' 6" and slightly deeper if possible. It may be necessary to excavate 3' down, then step over in a 3' wide ledge, then excavate to 6' right around the casing. The upper 3' wall of the excavation should be shored with the 3/4" plywood and staked in place.
- 4.3 The casing strings must each in turn be cut at a depth of 6' below ground surface. They can be cut using the torch and the pieces broken loose using the chisels and hammer the chisels and hammer will also be needed to penetrate and remove the cement layers between the casing strings.
- 4.4 Prior to cutting through the CHD101 string, the back hoe must be chained to the 6' piece of casing so that it will not fall into the excavation.
- 4.5 Once the casings have all been cut and removed from the excavation, the tops of the casing strings should be ground to approximately the same plane. All annular voids should be topped with cement and the

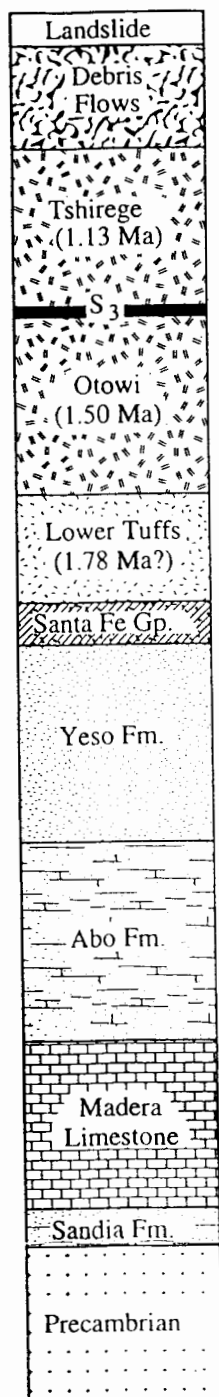
covering lid welded over all 4 casing strings. Weld a 10' x 4" O.D. pipe stub to the plate to extend 4' AGL with the name VC-2B, NE/4 - SE/4 - NW/4 - Sec. 3, T19N, R3E beaded on the pipe as a marker.

NOTE: All operations specified above are in accordance with NMOCD rules G-205C, G-206C, G-200B, G-203A, G-203C-(3) & (4), G-301, G-302, G-207, and G-303A. Notice to the division must be given and approved prior to commencing work and all plugging operations must be witnessed by a representative of the division.

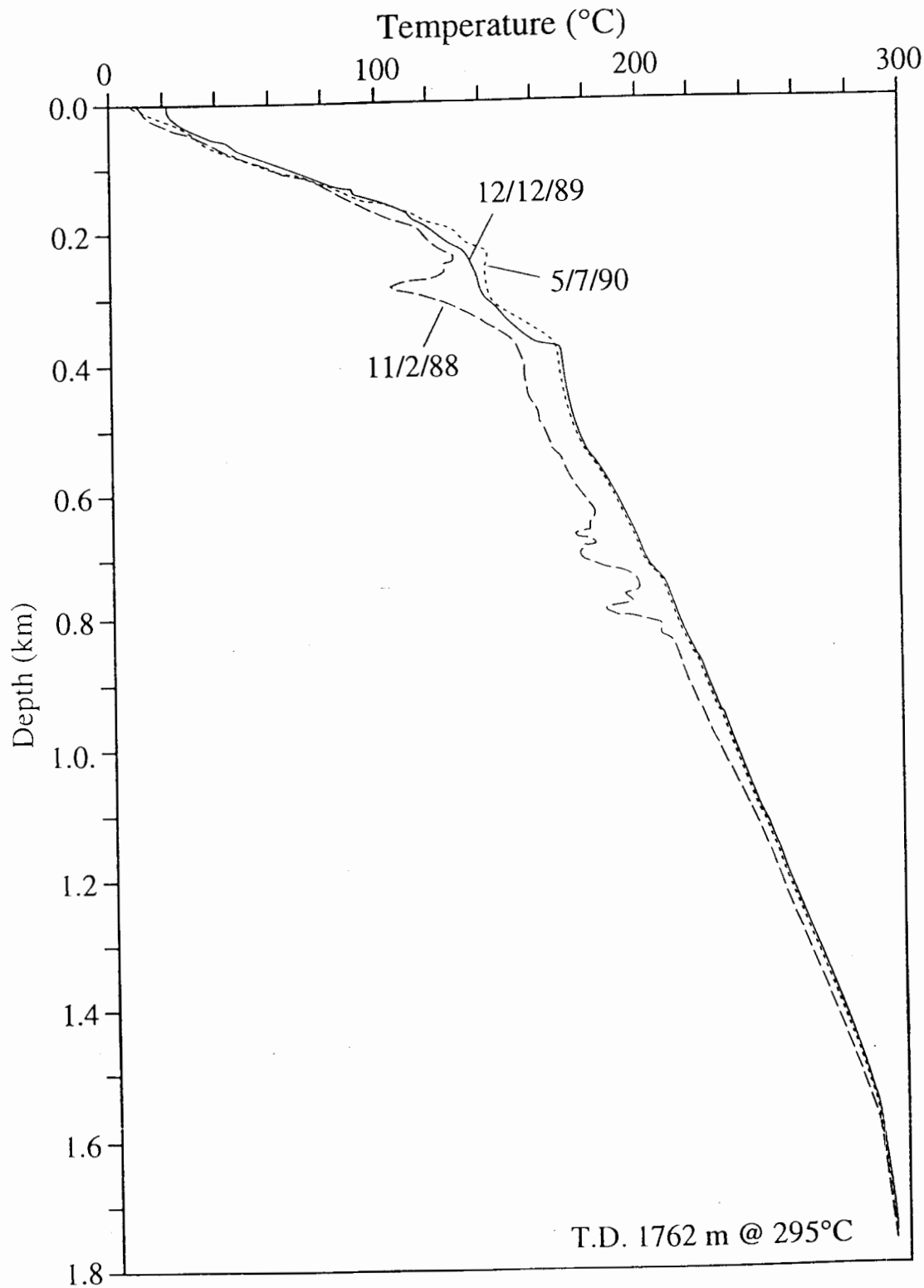
Attachments:

- Location drawing
- Gas chemistry of Sulfur Springs
- Stratigraphy & temperature vs. depth plot
- Well head drawing
- Completion drawing

Stratigraphy



T.D. 1762 m



SAMPLE #	Sulfide in liquid ppm	SO4 in liquid ppm	Moles of CO2	Moles of NH3	Moles of H2S	Moles of Total Sulfur	Moles of H2O Collected	Total Moles of (DRY) Gas	Total Moles of (WET) Gas
VFC93-1	0.01	11.5	0.0996	0.0000006	0.000000	0.000000	0.01	0.1048	0.1134
VFC93-2	42.8	396	0.1758	0.0000007	0.000173	0.000534	0.29	0.1788	0.4700
VFC93-3	97.3	549	0.1681	0.0000014	0.000389	0.000733	0.06	0.1710	0.2328
VFC93-4	14.3	252	0.0446	0.0000010	0.000058	0.000342	0.11	0.0451	0.1581
VFC93-5	253	738	0.1892	0.0000005	0.001057	0.001029	0.48	0.1914	0.6752
VFC93-6a	170	694	0.0234	0.0000005	0.000643	0.000877	0.02	0.0284	0.0506
VFC93-6b	0.01	138	0.1038	0.0000005	0.000000	0.000184	-0.49	0.1043	-0.3866
VFC93-8	0.01	4.5	0.0083	0.0000005	0.000000	0.000006	0.01	0.0132	0.0258

SAMPLE #	Mole % DRY He	Mole % DRY H2	Mole % DRY Ar	Mole % DRY O2	Mole % DRY N2	Mole % DRY CH4	Mole % DRY C2H6	Mole % DRY CO	Mole % DRY CO2	Mole % DRY H2S	Mole % DRY H2S
VFC93-1	0.0000	0.0020	0.0488	1.0641	3.6643	0.0063	0.0000	0.0000	95.1181	0.0000	0.0000
VFC93-2	0.0046	0.1913	0.0146	0.0613	1.0486	0.0479	0.0000	0.0000	98.2975	0.0966	0.0966
VFC93-3	0.0051	0.2599	0.0118	0.0303	0.9166	0.0225	0.0000	0.0000	98.2901	0.2276	0.2276
VFC93-4	0.0024	0.0356	0.0019	0.0023	0.1099	0.0184	0.0000	0.0000	99.0702	0.1290	0.1290
VFC93-5	0.1232	0.1479	0.0083	0.0005	0.3656	0.0239	0.0000	0.0000	98.8532	0.5523	0.5523
VFC93-6a	0.0363	0.1482	0.1439	2.2091	11.6574	0.0538	0.0000	0.0000	82.3727	2.2691	2.2691
VFC93-6b	0.0038	0.1150	0.0024	0.0039	0.1387	0.0174	0.0000	0.0000	99.5406	0.0000	0.0000
VFC93-8	0.0000	0.0000	0.3476	7.3894	29.1091	0.0561	0.0000	0.0000	62.5723	0.0000	0.0000

2 = Footbath Spg

3 = Pony's Spg

4 = Main Fumarole

5 = Mens Bathroom

6 = Woman's Bathroom

VARIOUS SPRINGS @

JOHN CORBANS - Sulphur Springs.

- BEST AVAILABLE

SAMPLE #	Mole % DRY Total Sulfur	Mole % w/o H2O	Total % Head Gas
VFC93-1	0.0000	99.904	98.04
VFC93-2	0.2984	99.965	97.48
VFC93-3	0.4286	99.966	97.33
VFC93-4	0.7589	100.002	101.15
VFC93-5	0.5378	100.061	109.96
VFC93-6a	3.0920	99.715	98.04
VFC93-6b	0.1768	99.999	99.70
VFC93-8	0.0470	99.525	98.73

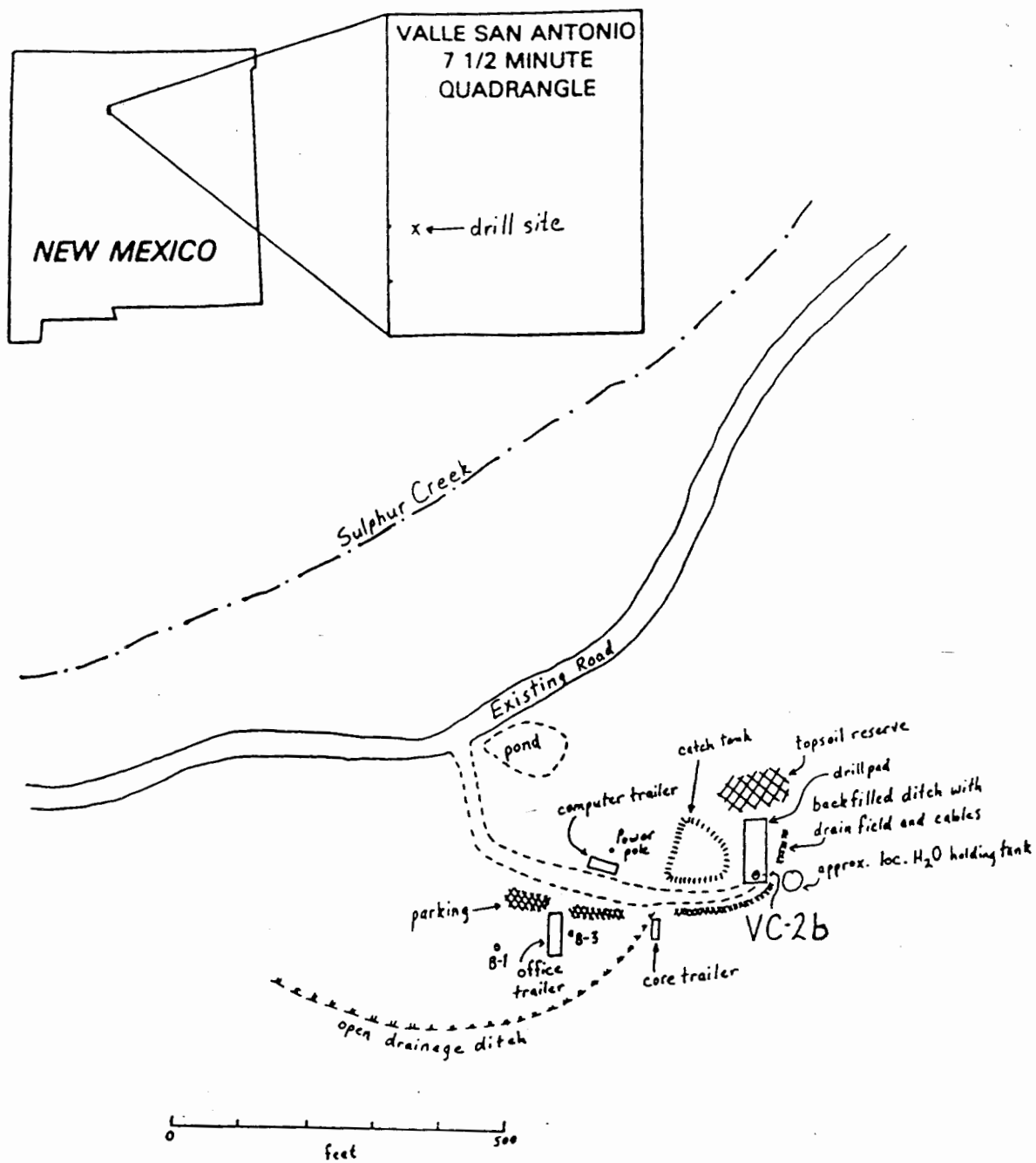
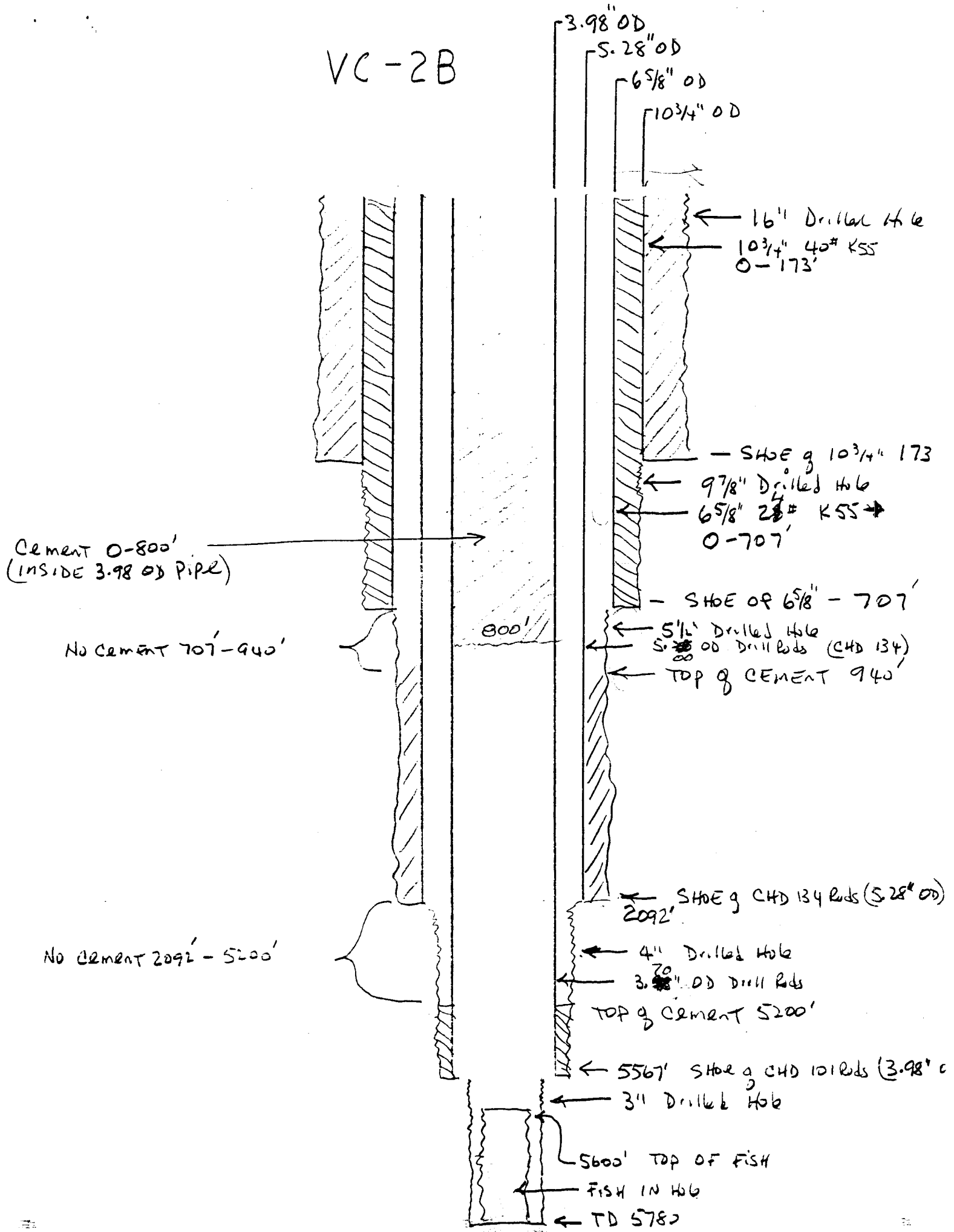


Figure 1: Location of VC-2b project site with detailed sketch map of drill site.

VC-2B



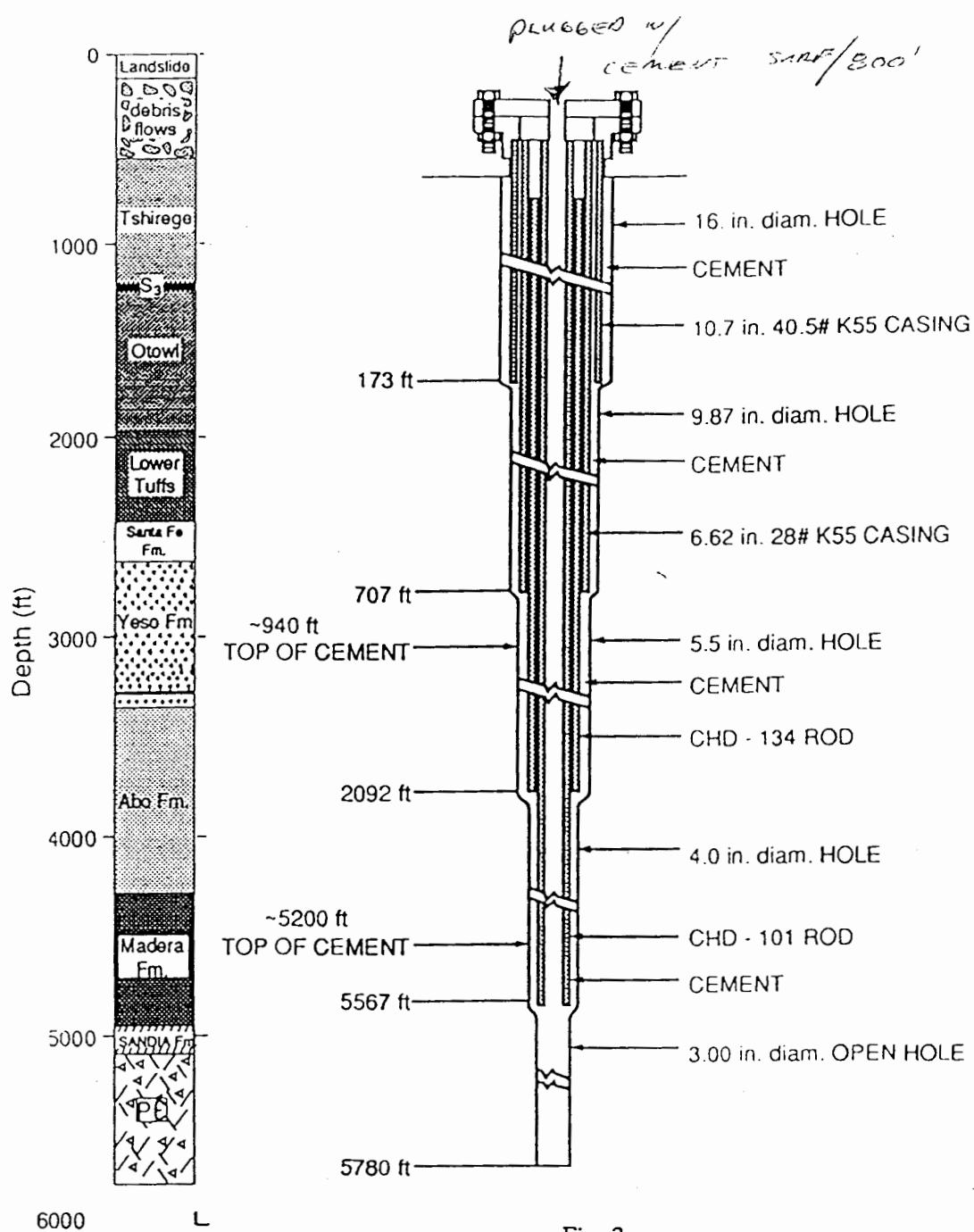
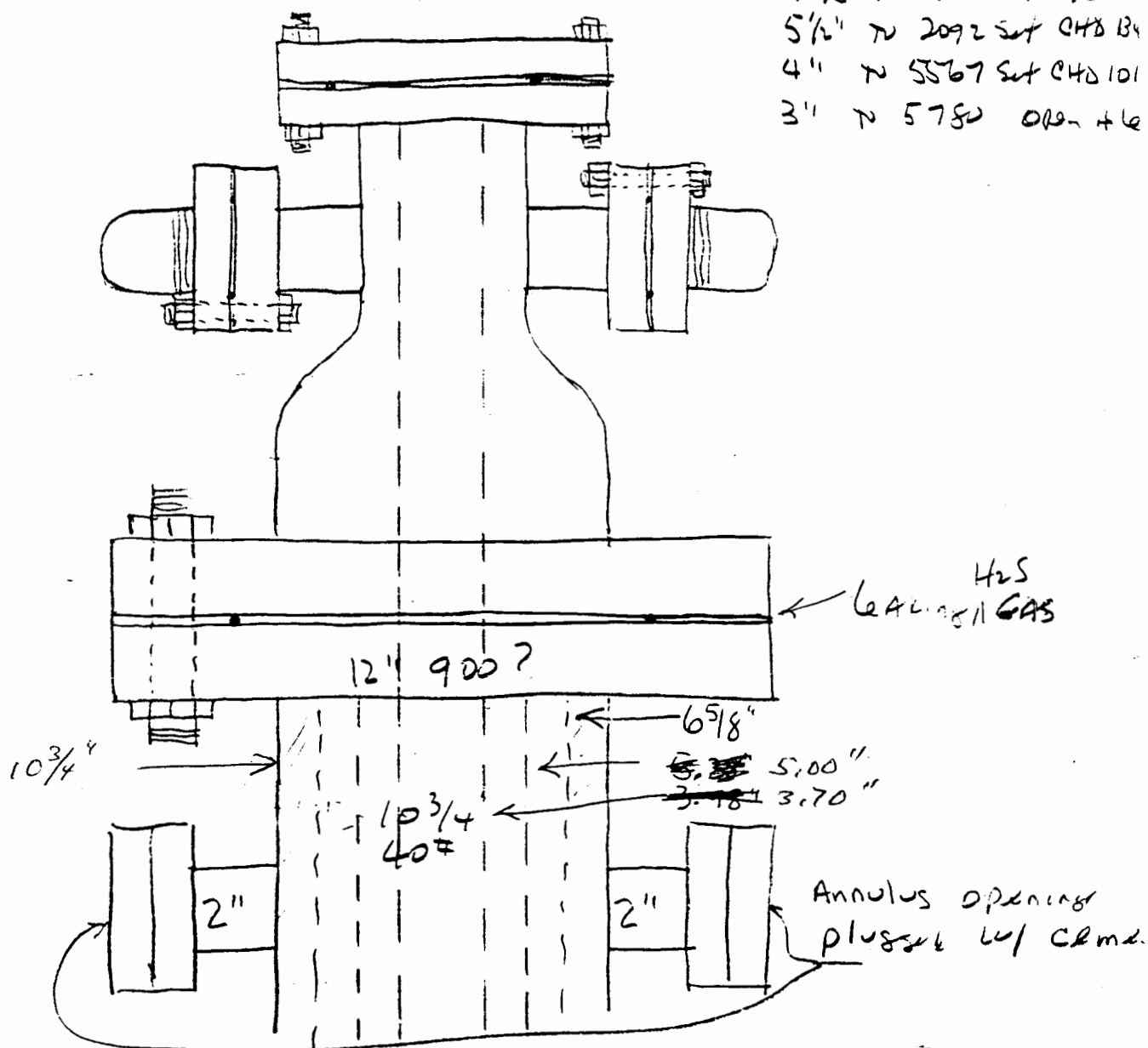


Fig. 3.
Diagram of VC-2B core hole configuration (from Lysne and Jacobson, in press).

LOS ALAMOS - Core Hole VC-2B

B4 Rod 5.28" OD
101 Rod 3.98" OD

Drill Hole
16" TV 173 Set 10" 40"
9 7/8" TV 707 Set 6 5/8" 2"
5 1/2" TV 2092 Set CHD B4
4" TV 5567 Set CHD 101
3" TV 5780 Open + 6



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

P. O. BOX 2088

SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-74
Revised 10-1-78

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SUNDRY NOTICES AND REPORTS
ON
GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease

State ☐Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application Permit -" (Form G-101) for Such Proposals.)

 Type of well: Geothermal Producer ☐ Temp. Observation ☒ Stratigraphic
 Low-Temp Thermal ☐ Injection/Disposal ☐ Test

Name of Operator

Los Alamos National Laboratory

Address of Operator

Los Alamos, New Mexico, MS-H865, 87545

Location of Well

Unit Letter _____ Feet From The _____ Line and _____ Feet From

The _____ Line, Section 3 Township 19N Range 3E NMPM.

15. Elevation (Show whether DF, RT, GR, etc.)

8500' ASL

7. Unit Agreement Name

8. Farm or Lease Name

Baca Ranch Valles Calder

9. Well No.

VC-2B

10. Field and Pool, or Wildcat

Baca Field

12. County

Sandoval

Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

 REFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☒
 TEMPORARILY ABANDON ☐
 ALTER OR ALTER CASING ☐ CHANGE PLANS ☐
 OTHER ☐

SUBSEQUENT REPORT OF:

 REMEDIAL WORK ☐ ALTERING CASING ☐
 COMMENCE DRILLING OPNS. ☐ PLUG & ABANDONMENT ☐
 CASING TEST AND CEMENT JOB ☐
 OTHER _____

Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any

Casing Record:

(fish completely filling 3" open hole at 5600')

 10-3/4", 40#/ft. K-55 casing cemented in 16" hole at 173"
 6-5/8", 24#/ft. K-55 casing cemented in 9.87" hole at 707"
 CHD-134 rods cemented in 5.5" hole at 2092'. TOC @ 940'
 CHD-101 rods cemented in 4" hole at 5567'. TOC @ 5200'.
 Plugged with cement from 800' to the surface.
 3" open hole to 5780' with top of fish at 5600'
Present Condition of Well:
 Completion Date - October 1988
 Total Depth - 5780' KB
 Elevation - Approx. 8500'
 Bottom hole Temperature - 295 C (565 F)

Wellhead: ANSI series 900 12" wellhead with two 2" plugged side outlets equipped with a 12" by 6" ANSI series 900 R45. Reduction spool with two 2" side outlets with nipples and valves. As further detailed on the attached procedure.

History and Proposal:

This well is presently suspended with the tubing plugged with cement and a fish in the open hole section. The wellhead reduction spool is held in place by tubing tension and is un-bolted and eccentric with one stud left in place. The well is leaking gas containing hydrogen sulfide at very low rates at the surface between the reduction spool and wellhead flanges. It is proposed to abandon the well by hot tapping into, pressure testing and sealing each annulus with cement as conditions dictate. It is anticipated that work will commence early in October, 1994.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED _____ TITLE _____

DATE _____

LOS ALAMOS NATIONAL LABORATORY

ESS -1

Preliminary Procedure to Abandon

Core Hole VC - 2B

August 23, 1993

Present condition of well:

Completion Date - October 1988

Total Depth - 5780' KB

Elevation - Aprox. 8500'

Bottom hole Temperature - 295 C (565 F)

Casing Record;

(fish completely filling 3" open hole at 5600')

10-3/4", 40#/ft. K-55 casing cemented in 16" hole at 173'
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History and proposal:

This well is presently suspended with the tubing plugged with cement and a fish in the open hole section. The wellhead reduction spool is held in place by tubing tension and is un-bolted and eccentric with one stud left in place. The well is leaking gas containing hydrogen sulfide at the surface between the reduction spool and wellhead flanges. It is proposed to abandon the well by hot tapping into, pressure testing and sealing each annulus with cement as conditions dictate.

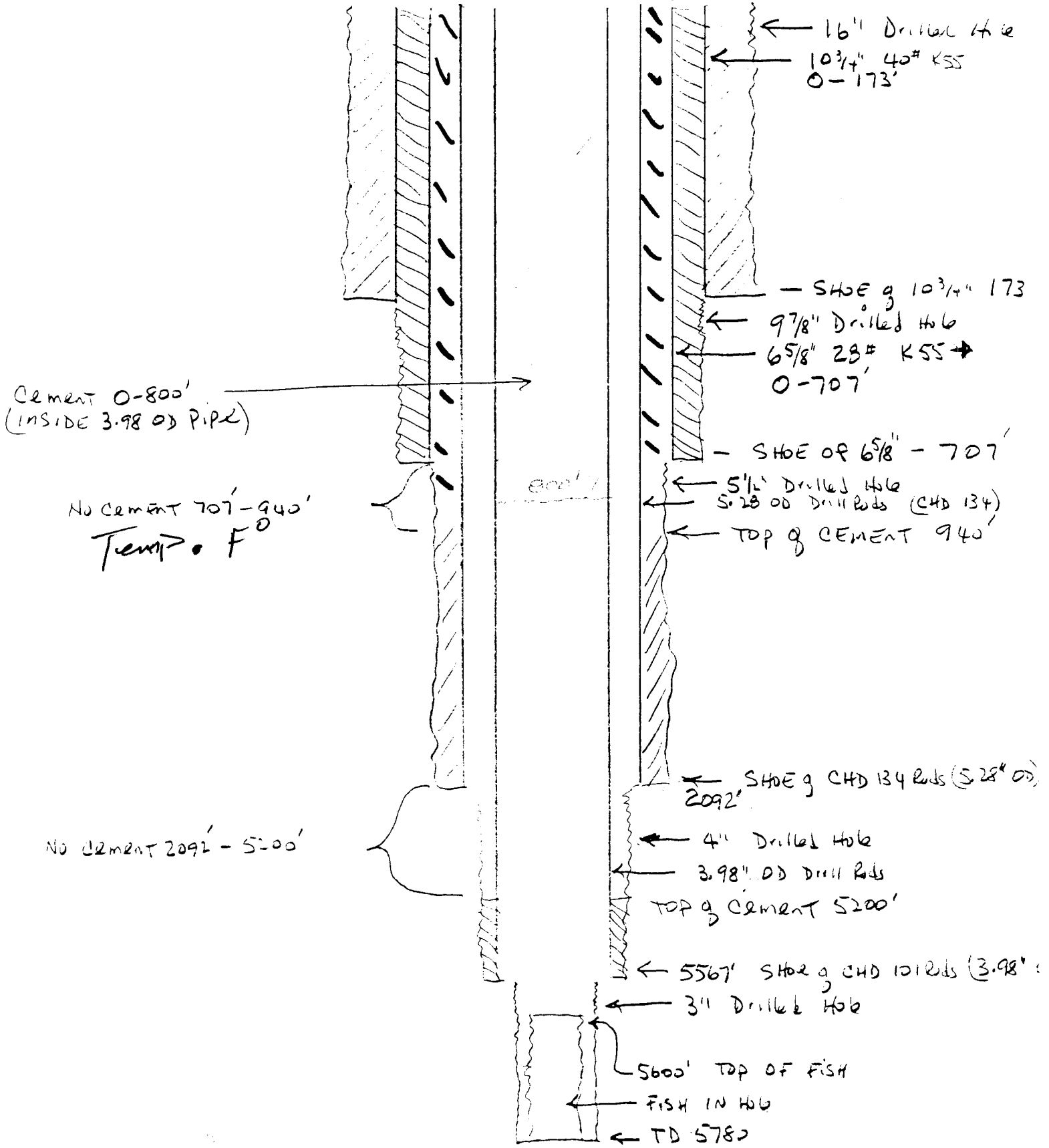
Procedure:

1. Move in water tank and pump and rig up to the 2" side outlets on the wellhead reduction spool. Center and bolt (or weld if necessary) spool to wellhead. Hold hydrogen sulfide safety meeting and familiarize all personnel with the use of Scott air packs and hydrogen sulfide monitors.

2. Move in and install hot tap equipment below wellhead on 10-3/4" casing. Excavate around wellhead if necessary.
3. Tap through 10-3/4" casing into 10-3/4" X 6-5/8" annulus and measure pressure. If gas is present, bleed off if possible and monitor pressure build up.
4. Attempt to pump into the annulus. If annulus will not take fluids skip to step #8 (tap next annulus). If it is possible to pump into this annulus quantify injectivity by monitoring and recording the wellhead pressure at three separate injection rates. Shut in annulus and monitor and record pressure fall off after injecting three wellbore volumes (if possible) to estimate volume requirements for cement and sodium silicate.
5. If the above cold water pumping operations have resulted in killing the well carefully remove the 2" plugs in the reduction spool side outlets and install a nipple and valve for pumping and monitoring purposes.
6. Move in and rig up cementers and cement annulus using sodium silicate for purchase if necessary as determined by injection testing operations. Use light weight 45% silica flour cement. Exact cement composition, spacers and procedure to be determined from wellbore conditions. Overflush cement with 5 cubic feet of water.
7. Wait on cement and pressure test when set to insure cement seal integrity. If OK continue with program. If the pressure test leaks off more than 10% in 20 min. re-cement and test until good.
8. When the 10-3/4" X 6-5/8" annular seal is established hot tap into the 6-5/8" X 134 rod (5.28") and 101 rod (3.98") annuli. Repeat steps #4 through #7 until seal is established.
9. Cut off wellhead six feet below ground level and weld a steel plate across all casing stubs. Install a steel pipe extending above grade marked as stipulated by NMOCD requirements.

NOTE: All operations to be in accordance with NMOCD rules G-205C, G-206C, G-200B, G-203A, G-203C-(3) & (4), G-301, G-302, G-207, and G-303A. Notice to the division must given and approved prior to commencing work and all plugging operations must be witnessed by a representative of the division. This procedure is a outline and must be technically expanded prior to commencing work.

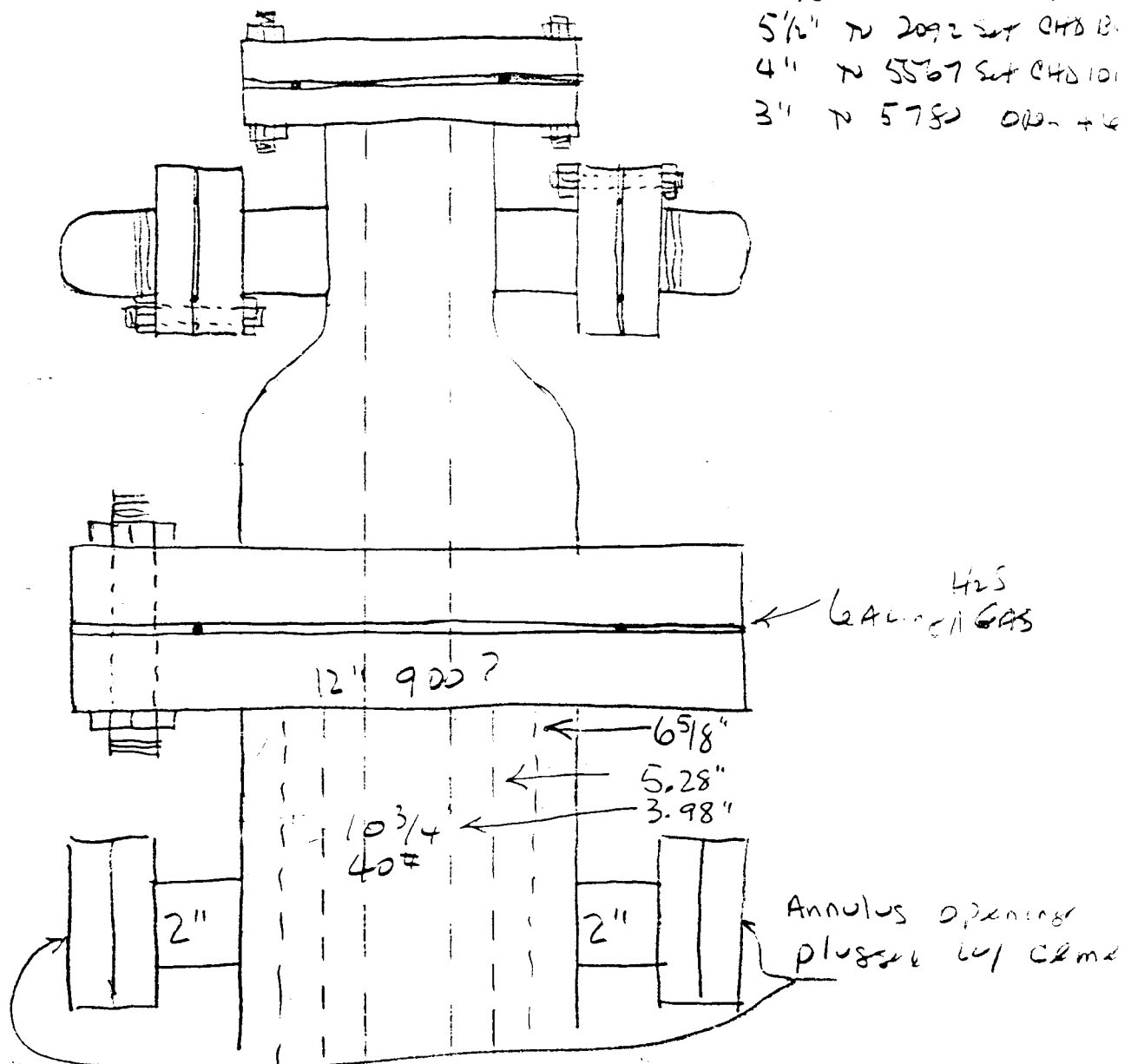
Fax #
 667-7977
 VC-2B



LOS ALAMOS - CORE HOLE VC-2B

B4 Rod 5.28" OD
101 Rod 3.98" OD

DEVELOP HOLE
16" TV 173 Set 10" 40"
9 7/8" TV 707 Set 6 5/8" 2"
5 1/2" TV 2092 Set CHD B.
4" TV 5567 Set CHD 101
3" TV 5782 O.D. + 4



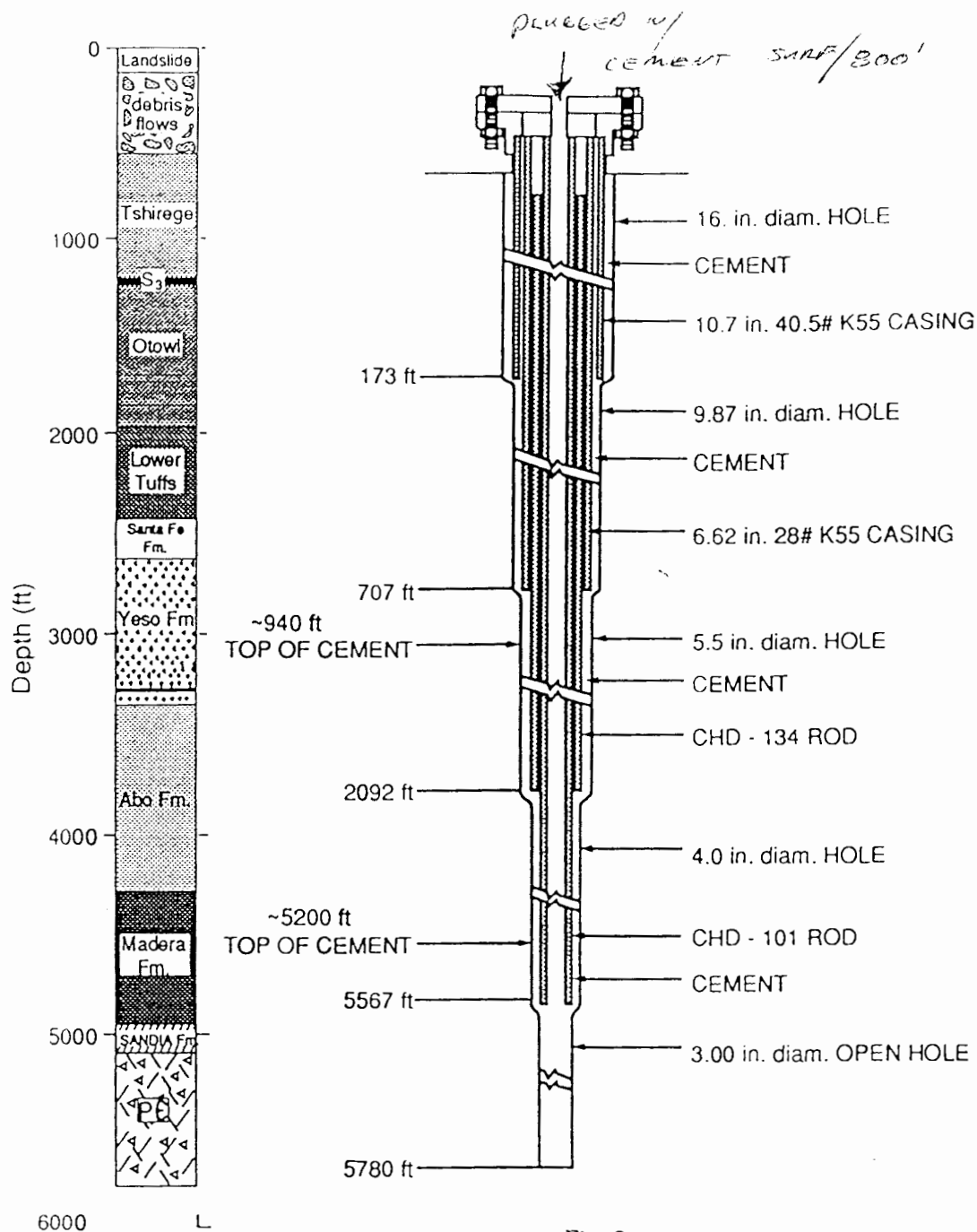


Fig. 3.

Diagram of VC-2B core hole configuration (from Lysne and Jacobson, in press).

IV. RESULTS

The results of the environmental sampling program are presented in Tables A-I - A-V in the Appendix. A regional survey of springs in the Jemez Mountains is included with the suite of samples collected from sites in the Sulphur Springs area. Figure 4, a boron vs chloride plot of regional waters, displays the trend that is repeated for most conservative elements in the survey.

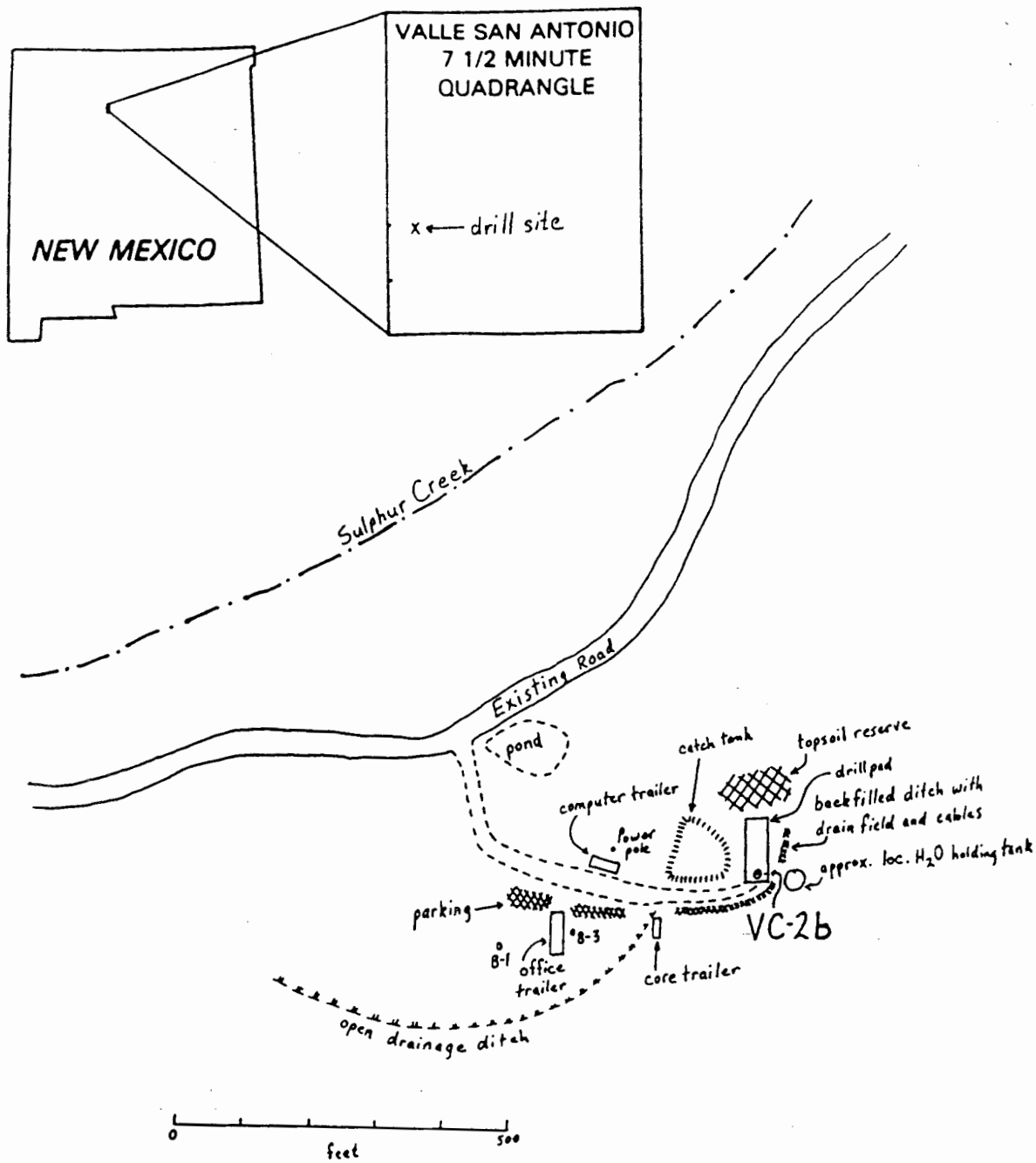


Figure 1: Location of VC-2b project site with detailed sketch map of drill site.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

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SANTA FE, NEW MEXICO 87501Form G-103
Adopted 10-1-74
Revised 10-1-78

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SUNDRY NOTICES AND REPORTS
ON
GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease	
State <input type="checkbox"/>	Fee <input type="checkbox"/>
5.a State Lease No.	

Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application Permit -" (Form G-101) for Such Proposals.)

Type of well	Geothermal Producer <input type="checkbox"/>	Temp. Observation <input checked="" type="checkbox"/>	Stratigraphic
	Low-Temp Thermal <input type="checkbox"/>	Injection/Disposal <input type="checkbox"/>	Test

7. Unit Agreement Name

Name of Operator

Los Alamos National Laboratory

8. Farm or Lease Name

Baca Ranch Valles Calder

Address of Operator

Los Alamos, New Mexico, MS-H865, 87545

9. Well No.

VC-2B

Location of Well

10. Field and Pool, or Wildcat

Baca Field

Unit Letter _____ Feet From The _____ Line and _____ Feet From

The _____ Line, Section 3 Township 19N Range 3E NMPM.

15. Elevation (Show whether DF, RT, GR, etc.)

8500' ASL

12. County

Sandoval

Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input checked="" type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>
ALTER OR ALTER CASING <input type="checkbox"/>	OTHER <input type="checkbox"/>

SUBSEQUENT REPORT OF:

REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG & ABANDONMENT <input type="checkbox"/>
CASING TEST AND CEMENT JOB <input type="checkbox"/>	OTHER <input type="checkbox"/>

Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any

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(fish completely filling 3" open hole at 5600')

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Elevation - Approx. 8500'
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I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED _____

TITLE _____

DATE _____

LOS ALAMOS NATIONAL LABORATORY

ESS -1

Preliminary Procedure to Abandon

Core Hole VC - 2B

August 23, 1993

Present condition of well:

Completion Date - October 1988

Total Depth - 5780' KB

Elevation - Aprox. 8500'

Bottom hole Temperature - 295 C (565 F)

Casing Record;

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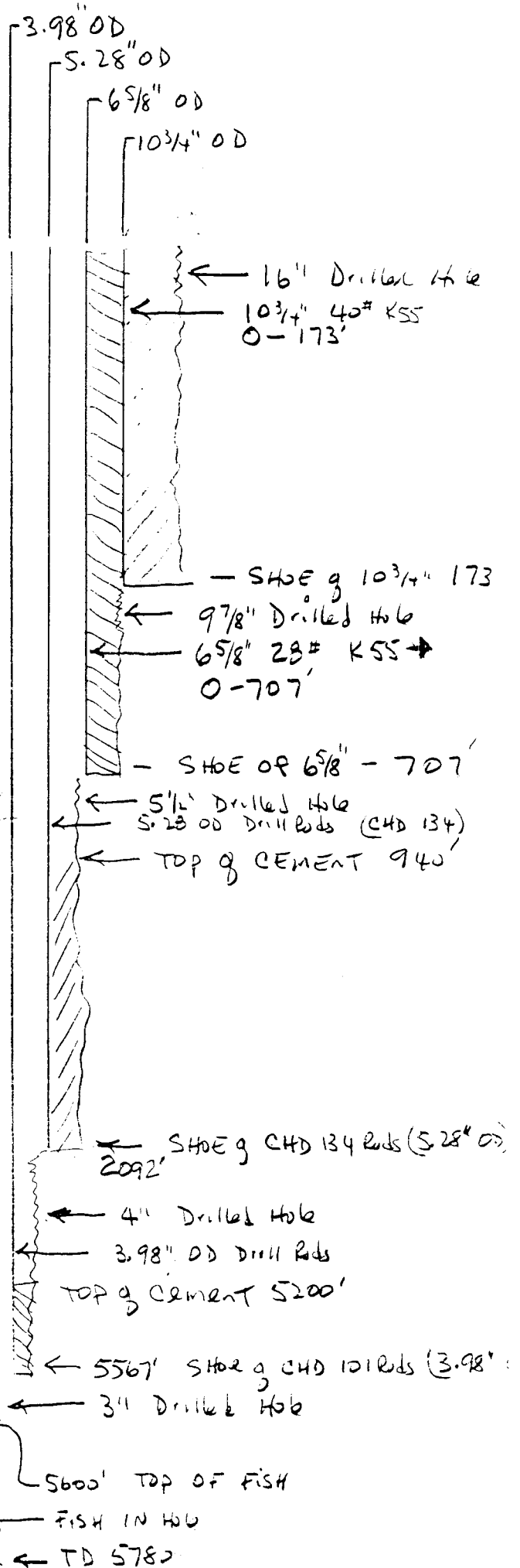
NOTE: All operations to be in accordance with NMOCD rules G-205C, G-206C, G-200B, G-203A, G-203C-(3) & (4), G-301, G-302, G-207, and G-303A. Notice to the division must given and approved prior to commencing work and all plugging operations must be witnessed by a representative of the division. This procedure is a outline and must be technically expanded prior to commencing work.

VC-2B

Cement 0-800'
(INSIDE 3.98" OD PIPE)

No Cement 707'-940'

No Cement 2092'-5200'

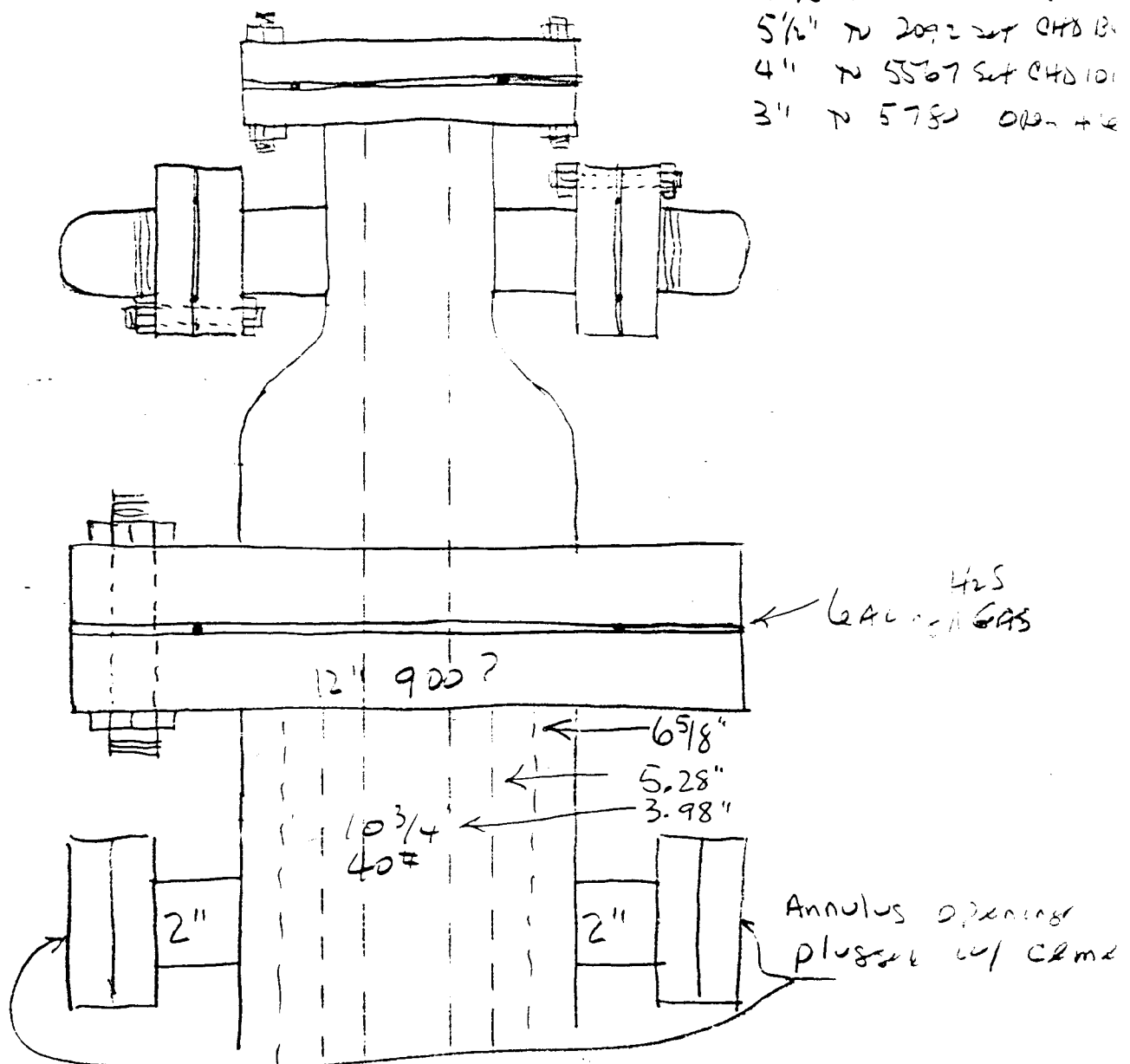


LOS ALAMOS - CORE HOLE VC-2B

B4 Rod 5.28" OD
101 Rod 3.98" OD

DEVELOP HOLE

16" TV 173 Set 10" 40"
9 7/8" TV 707 Set 6 5/8" 2
5 1/2" TV 2092 Set CHD B
4" TV 5567 Set CHD 101
3" TV 5780 O.D. + 6



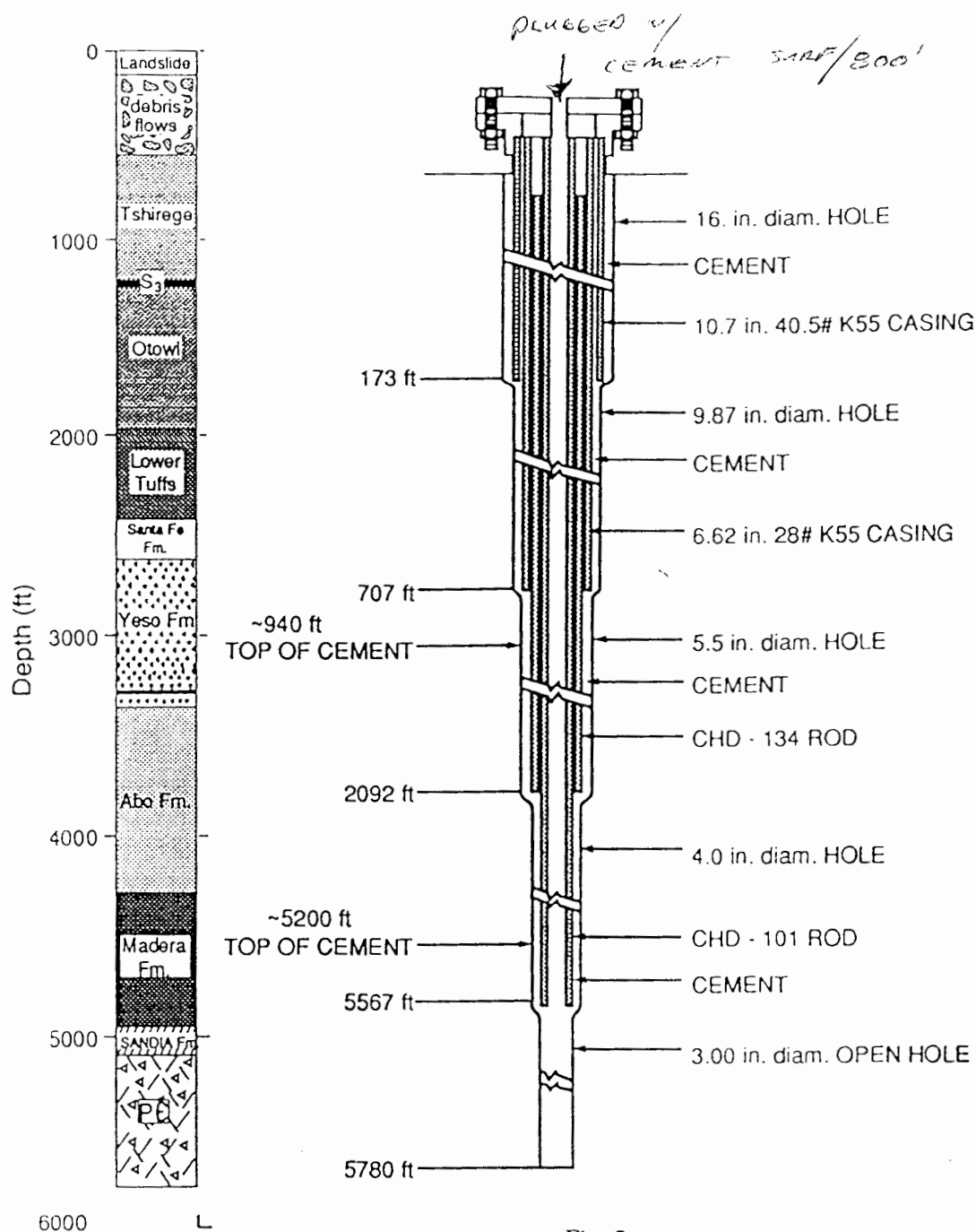


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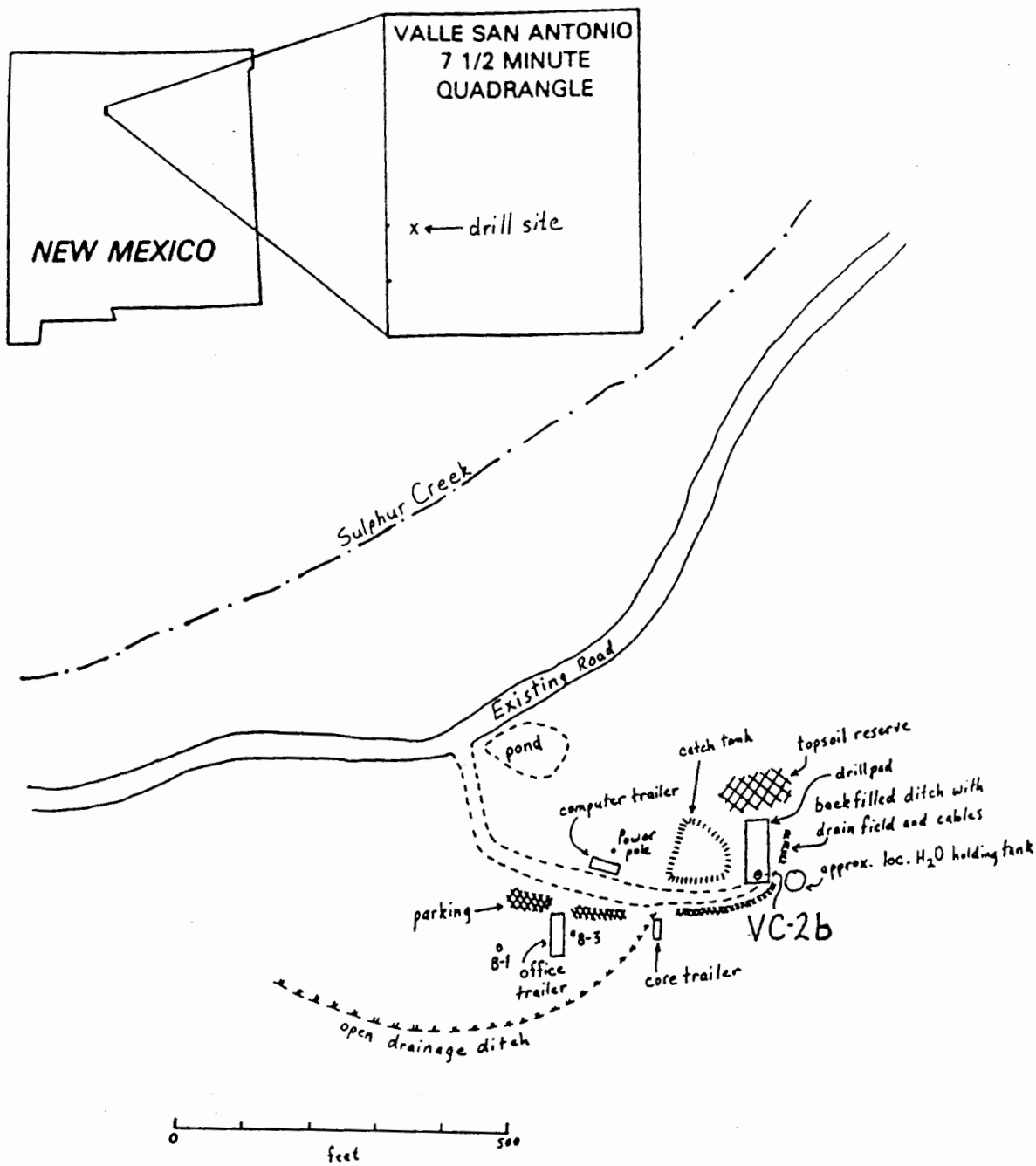


Figure 1: Location of VC-2b project site with detailed sketch map of drill site.

Los AlamosLos Alamos National Laboratory
Los Alamos, New Mexico 87545**memorandum**

TO: A. Velarde, MAT-11/P274

DATE: July 24, 1990

THRU: W. A. Morris, EES-1 Group Leader

MAIL STOP/TELEPHONE: D462/7-7590
D462/7-8060

FROM: F. Goff

SYMBOL: EES-1

SUBJECT: SCOPE OF WORK FOR PR#M9640

The scope of work for the perforation job on core hole VC-2B is as follows:

I. Condition of Well

- a. VC-2B is located about 1/4 mile northwest of Sulphur Springs, Valles caldera, New Mexico (map attached) and was completed in November, 1988. Access is by Forest Service Road and private road.
- b. The well is 5780 ft deep and cased with HQ drill rods having an I.D. of 3.00 in. to depth of 5560 ft from surface.
- c. The well has a 1500 psi 4 in. gate valve at the surface with flow and kill lines.
- d. The temperature log (attached) shows VC-2B is 565°F (295°C) at the bottom of the well.

II. Perforation Job

- a. We want five (5) horizons perforated as follows:

1. 4770 ft (540°F)
2. 3245 ft (450°F)
3. 2550 ft (405°F)
4. 2250 ft (390°F)
5. 2175 ft (385°F)

*Fish stuck below
perforation.*

- b. We will need five (5) perforating guns each 10 ft long having twenty (20) shots (jets) per gun with 180° phasing. These guns must be capable of operation at temperatures as hot as 560°F to ensure success of the project.

ABSTRACT

VC-2B, the third Continental Scientific Drilling Program (CSDP) corehole in the Valles caldera, was completed in October 1988 at a depth of 5780 ft (1761.7 m) and a bottom-hole temperature of nearly 300°C. Drilled in the Sulphur Springs area, in the west-central portion of the caldera, VC-2B penetrated most of the thick, Valles intracaldera ignimbrite sequence as well as precaldera basement rocks ranging in age from Miocene to Precambrian. Major units intersected are as follows: 0-113.5 ft (0-34.6 m) -- landslide debris; 113.5-551.6 ft (34.6-168.2 m) -- interstratified debris-flow deposits and epiclastic sedimentary rocks (<1.12 Ma); 551.6-1196.8 ft (168.2-364.8 m) -- Tshirege Member of the Bandelier Tuff (1.12 Ma); 1196.8-1221 ft (364.8-372.1 m) -- S₃ clastic deposits (1.45-1.12 Ma); 1221-1965.2 ft (372.1-599 m) -- Otowi Member of the Bandelier Tuff (1.45 Ma); 1965.2-2434 ft (599-741.8 m) -- Lower Tuffs (2.8 Ma, possibly as old as 3.6 Ma); 2434-2619 ft (741.8-798.2 m) -- Santa Fe Group sandstone (Miocene); 2619-3435.5 ft (798.2-1046.9 m) -- Permian Yeso Formation; 3435.5-4252 ft (1046.9-1295.9 m) -- Permian Abo Formation; 4252-4962.8 ft (1295.9-1512.6 m) -- Pennsylvanian Madera Limestone; 4962.8-5113 ft (1512.6-1558.4 m) -- Pennsylvanian Sandia Formation; 5113-5780 ft (1558.4-1761.7 m) -- Precambrian quartz monzonite.

Whereas much of the intracaldera volcanic sequence and the deep Precambrian quartz monzonite have been extensively fractured and brecciated (both tectonically and hydrothermally), intervening Paleozoic strata have undergone little structural disruption. This disparity is mirrored by the distribution and intensity of hydrothermal alteration and vein mineralization.

Rocks in the upper 800 m and lower 250 m of VC-2B are extensively altered, brecciated and veined. The Paleozoic rocks between these zones are essentially unaltered and only sparsely veined. Alteration in near-surface landslide debris is in part pre-slide in age. Below the slide, sericitic alteration -- illitic, mixed-layer illite/smectite changing with depth to illite -- prevails to a depth of about 300 m; this alteration is overprinted by kaolinization to a depth of 55.8 m. Chlorite-sericite (illite) alteration prevails between 300 and 800 m. Deep alteration is primarily propylitic, but the upper 12.5 m of the Precambrian quartz monzonite is intensely chlorite-sericitized. Near the contact with the quartz monzonite, siliciclastic rocks of the Pennsylvanian Sandia Formation have the appearance of calc-silicate hornfels, complete with large, tabular, translucent gray, sieve-textured porphyroblasts rimmed with chlorite. Preliminary petrographic examination of these rocks, however, has so far revealed no secondary phases indicative of high-temperature

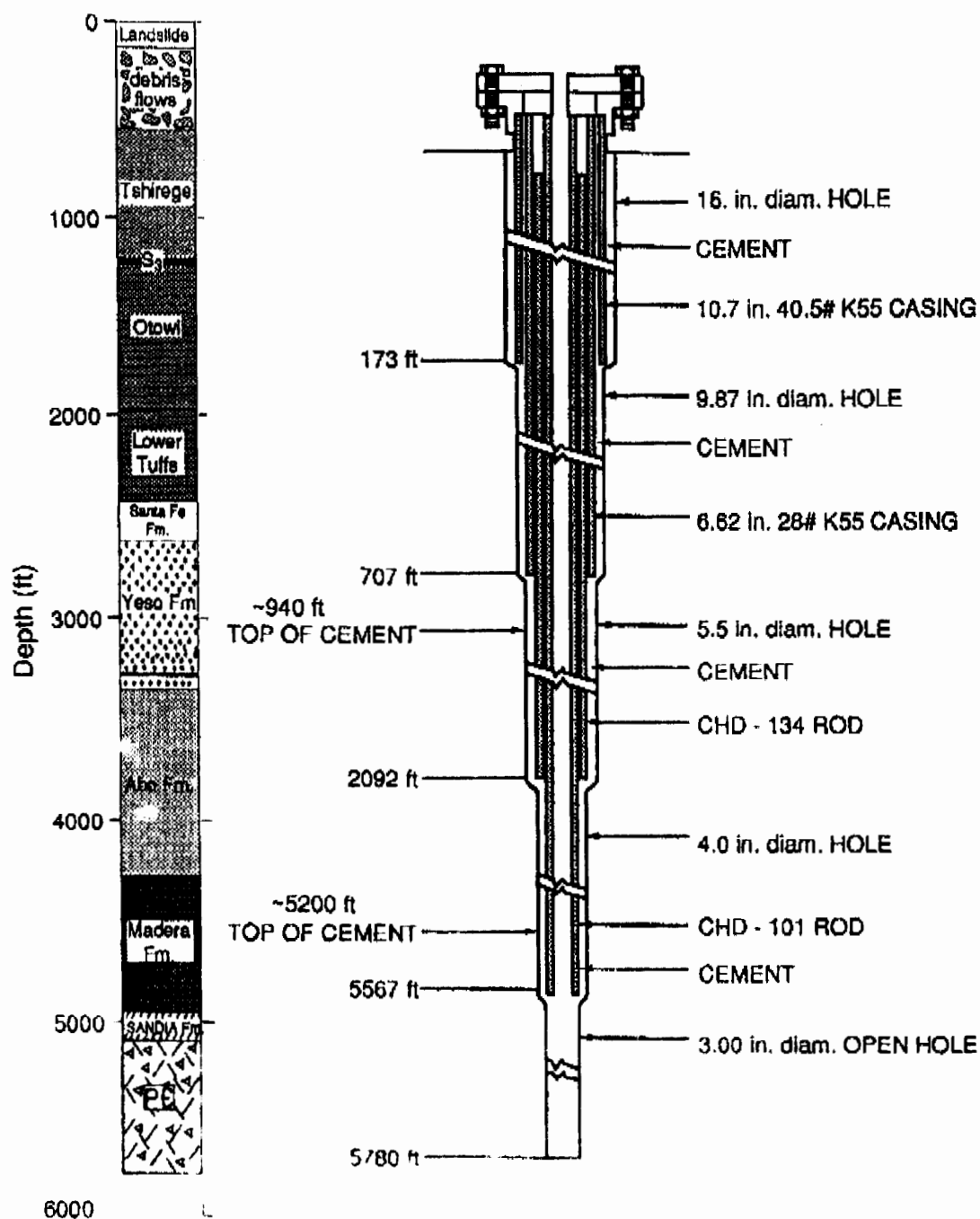


Fig. 3.

Diagram of VC-2B core hole configuration (from Lysne and Jacobson, in press).

IV. RESULTS

The results of the environmental sampling program are presented in Tables A-I - A-V in the Appendix. A regional survey of springs in the Jemez Mountains is included with the suite of samples collected from sites in the Sulphur Springs area. Figure 4, a boron vs chloride plot of regional waters, displays the trend that is repeated for most conservative elements in the survey.

Los AlamosLos Alamos National Laboratory
Los Alamos, New Mexico 87545**memorandum**

TO: A. Velarde, MAT-11/P274

DATE: July 24, 1990

THRU: W. A. Morris, EES-1 Group Leader

MAIL STOP/TELEPHONE: D462/7-7590
D462/7-8060

FROM: F. Goff

SYMBOL: EES-1

SUBJECT: SCOPE OF WORK FOR PR#M9640

The scope of work for the perforation job on core hole VC-2B is as follows:

Condition of Well

- VC-2B is located about 1/4 mile northwest of Sulphur Springs, Valles caldera, New Mexico (map attached) and was completed in November, 1988. Access is by Forest Service Road and private road.
- The well is 5780 ft deep and cased with HQ drill rods having an I.D. of 3.00 in. to depth of 5560 ft from surface.
- The well has a 1500 psi 4 in. gate valve at the surface with flow and kill lines.
- The temperature log (attached) shows VC 2B is 565°F (295°C) at the bottom of the well.

Perforation Job

- We want five (5) horizons perforated as follows

1. 1000-1100 ft
2. 1100-1200 ft
3. 1200-1300 ft
4. 1300-1400 ft
5. 1400-1500 ft

*Perforation
to be done*

- We will use two (2) perforating guns each 10 ft long having twenty (20) shots (jets) per gun with 180° phasing. These guns will be capable of operation at temperatures as hot as 560°F to 600°F for the project.

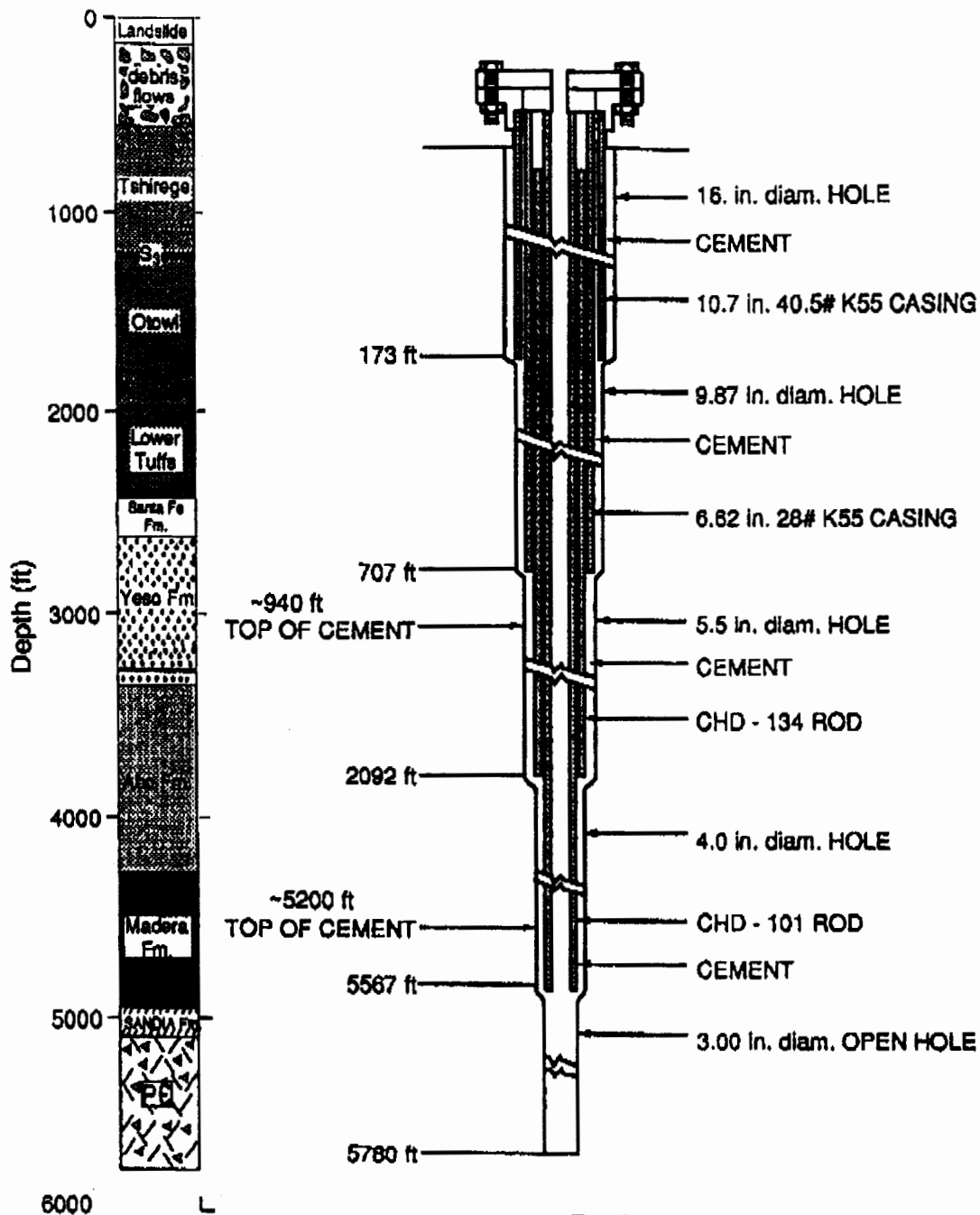


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