

Mr. Roy S. Blickwedel  
 Remedial Project Manager  
 General Electric Company  
 640 Freedom Business Center  
 King of Prussia, PA 19406

November 19, 1999

SUBJECT: OBSERVATION OF WELL ABANDONMENT ACTIVITIES AT THE CHURCH  
 ROCK SITE

Dear Mr. Blickwedel:

On October 26, 1999, staff of the U.S. Nuclear Regulatory Commission (NRC), accompanied by a member of the New Mexico Environment Department, met with United Nuclear Corporation (UNC) staff at the Church Rock uranium mill and tailings site to discuss and observe UNC's well abandonment process. The NRC staff determined that UNC has met the well abandonment requirements of the New Mexico State Engineer Office, as required in the NRC letter dated May 3, 1999, which approved abandonment of the wells.

A summary of the meeting is enclosed. Please contact Ken Hooks, the NRC Project Manager for the Church Rock site, at 301-415-7777, if you have any questions concerning this letter or the enclosure.

Sincerely,

[Daniel Gillen for]

John J. Surmeier, Chief  
 Uranium Recovery and  
 Low-Level Waste Branch  
 Division of Waste Management  
 Office of Nuclear Material Safety  
 and Safeguards

Enclosure: Meeting summary

Docket No. 40-8907  
 License No. SUA-1475

cc: Greg Lyssy, EPA, Region 6  
 Maura Hanning, NMED Superfund  
 Oversight Section  
 Levon Benally, Navajo EPA Superfund  
 Program  
 Russel Edge, DOE Grand Junction  
 Suzie du Pont, Earth Tech  
 Larry Bush, UNC

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NAME	KHooks:cc	<del>URLL</del>	DGillen	JSurmeier				
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

November 19, 1999

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Sincerely,

A handwritten signature in black ink, appearing to read "John J. Surmeier".

John J. Surmeier, Chief  
Uranium Recovery and  
Low-Level Waste Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

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Suzie du Pont, Earth Tech  
Larry Bush, UNC

## MEETING AT CHURCH ROCK SITE WITH UNITED NUCLEAR CORPORATION

**Purpose:** To observe United Nuclear Corporation's (UNC's) well abandonment process at the Church Rock uranium mill and tailings site.

**Date:** October 26, 1999

**Location:** UNC's Church Rock uranium mill and tailings site near Gallup, New Mexico.

**Attendees:** Larry Bush, UNC  
Beiling Lieu, New Mexico Environment Department (NMED)  
Bill Ford, U.S. Nuclear Regulatory Commission (NRC)  
Ken Hooks, NRC

### Discussion:

On October 26, 1999, the U.S. Nuclear Regulatory Commission staff (NRC) and NMED staff members met with representatives of UNC at its Church Rock site to observe the process of abandonment of wells. The meeting was announced and open to the public; however, no member of the public chose to attend the meeting.

Roughly 180 wells, which are not part of the current groundwater corrective action program, were approved for abandonment by NRC letter dated May 3, 1999, after concurrence by the U.S. Environmental Protection Agency, the NMED, and the Navajo Nation Environmental Protection Agency (NNEPA). The NRC letter required that UNC meet well abandonment requirements of the New Mexico State Engineer Office.

The Church Rock site is being reclaimed by UNC under NRC Materials License SUA-1475. The site is a CERCLA site for which the NRC is the lead Federal agency, under a Memorandum of Understanding with the EPA. Through the EPA, reclamation efforts at the site are subject to the review and concurrence, as appropriate, of the NMED and NNEPA.

Prior to beginning the well abandonment process, UNC contacted the New Mexico State Engineer Office concerning specifications and procedures for the well abandonment. As a result, the State Engineer Office provided recommendations and appointed Mr. Larry Bush as its representative for observing and approving the well abandonment (Attachment 1). A short statement of the abandonment process and a list of the wells to be plugged were developed, and the well locations were surveyed (Attachment 2). A short training course was held for the personnel who would be performing the plugging and capping process (Attachment 3).

The well abandonment process implemented by UNC, essentially grouting the well casings with bentonite mud, cutting the top of the casing off a few feet below the land surface, and capping the wells, meets or exceeds the New Mexico State Engineer Office requirements. The wells are mainly 2 inches in diameter, with some up to 6 inches, and vary from about 20 to 330 feet in depth. The NRC and NMED staff observed the plugging of wells 502C and 600, including filling the existing well casings with bentonite mud and testing of the mud subsequent to filling. UNC will prepare and issue a report subsequent to completion of the well abandonment process.

Enclosure

**ATTACHMENT 1**



STATE OF NEW MEXICO  
STATE ENGINEER OFFICE  
DEMING

THOMAS C. TURNEY  
State Engineer

September 23, 1999

216 S. Silver  
Post Office Box 844  
Deming, New Mexico 88031  
(505) 546-2851  
(505) 546-7452  
FAX: (505) 546-2290

Larry Bush, Manager  
United Nuclear Corporation  
P.O. Box 3077  
Gallup, New Mexico 87305-3077

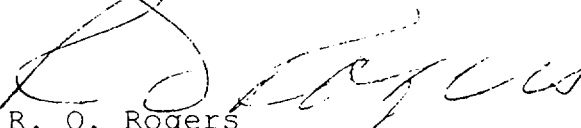
Dear Mr. Bush:

Your letter dated September 2, 1999 requests specifications and test procedures for well plugging in the Valley Alluvium and Gallup Sandstones Zone 3 and Zone 1 in the San Juan structural basin.

Larry Bush, Manager, United Nuclear Corporation, UNC, is hereby designated as official representative for reporting to the State Engineer the plugging of wells referred to above in accordance with procedures adopted by the New Mexico State Engineer, copy enclosed.

Please advise if further discussion would be helpful.

Sincerely,

  
R. Q. Rogers  
Professional Engineer  
District 3 Supervisor

RQR:ed

Procedures adopted by the State Engineer for the plugging and reporting of mine lode discovery or mine drill holes in the San Juan structural basin which do not penetrate formations older than Jurassic.

1. The areal extent of the San Juan structural basin shall be defined as shown on Figure 5 of the State Engineer Technical Report No. 35, Geology and Groundwater Occurrence in Southeastern McKinley County, New Mexico. (Copy of Figure 5 is attached.) The following procedures shall not apply to holes penetrating formations older than Jurassic.

2. Drill holes that are not plugged with cement shall be plugged to the land surface at the time of abandonment with drilling fluids which meet the following specifications:

- (a) ten minute gel strength of at least 20 lbs./100 sq. ft.; and
- (b) filtrate volume not to exceed 13.5 cc.

The above properties shall be determined in accordance with RP 13-B, Sections 2 and 3, (low temperature test), respectively, Standard Procedure for Testing Drilling Fluids, Third Edition, February 1971, American Petroleum Institute. The tests shall be conducted on a drilling fluid sample taken at the hole collar after the total depth of the hole has been reached and all circulation has been completed.

A cement plug may be used at the surface for a top cap.

3. The weight of the drilling fluid left in the drill hole at the time of abandonment shall be sufficient to prevent flow of water into the hole from any aquifer penetrated. In the alternative drill holes may be plugged bottom to top with a neat cement slurry weighing not less than 15 lbs. per gallon; the weight of the neat cement shall be sufficient to prevent flow of water into the hole from any aquifer penetrated.

4. In lieu of direct supervision of the plugging of drill holes by State Engineer Office personnel, the State Engineer may designate as his representative a person who is an employee of the person, firm, or corporation for which the drilling is done, whether under contract or otherwise, and whose qualifications for such designation are acceptable to the State Engineer. Any person seeking to be so designated may file with the State Engineer a statement of his position of employment and qualifications.

5. It shall be necessary to report on each hole as provided for in Section 69-3-6 , NMSA, 1978 and Article 4-21.1 of the State Engineer's rules and regulations. For a hole drilled in this area, it will not be necessary to submit a log if the hole is abandoned as described in 2 and 3 above. A part of such report shall be a sworn affidavit of a person designated as the State Engineer's

representative attesting from his own knowledge to the aforementioned properties of the drilling fluid left in the hole and as to whether or not the hole flowed at the surface. If the hole is plugged with a cement slurry the affidavit shall so state and attest to the weight of the cement slurry used.

If more than one hole is drilled under the supervision of the same designee and the plugging of each hole meets the specifications cited above, then only one affidavit will be required relative to reports submitted at any one time.

6. These adopted procedures do not release any person, firm or corporation drilling a mine drill hole or a mine lode discovery hole more than 10 feet in depth which encounters water from the responsibility of submitting reports on all such holes drilled subsequent to the effective date of Section 69-3-6, MMSA, 1978.

7. The person, firm or corporation for which the hole was drilled shall maintain a record of each drill hole, which record shall include the method of plugging and the properties of the drilling fluid or cement left in the hole. Such records shall be available for review by the State Engineer.

8. The above procedures have been adopted for use only in the San Juan structural basin as defined in paragraph 1 above.

May 11, 1971.



Adopted from Kelley (1950, p.102)  
 (1955, p.231) (1957, p.441)

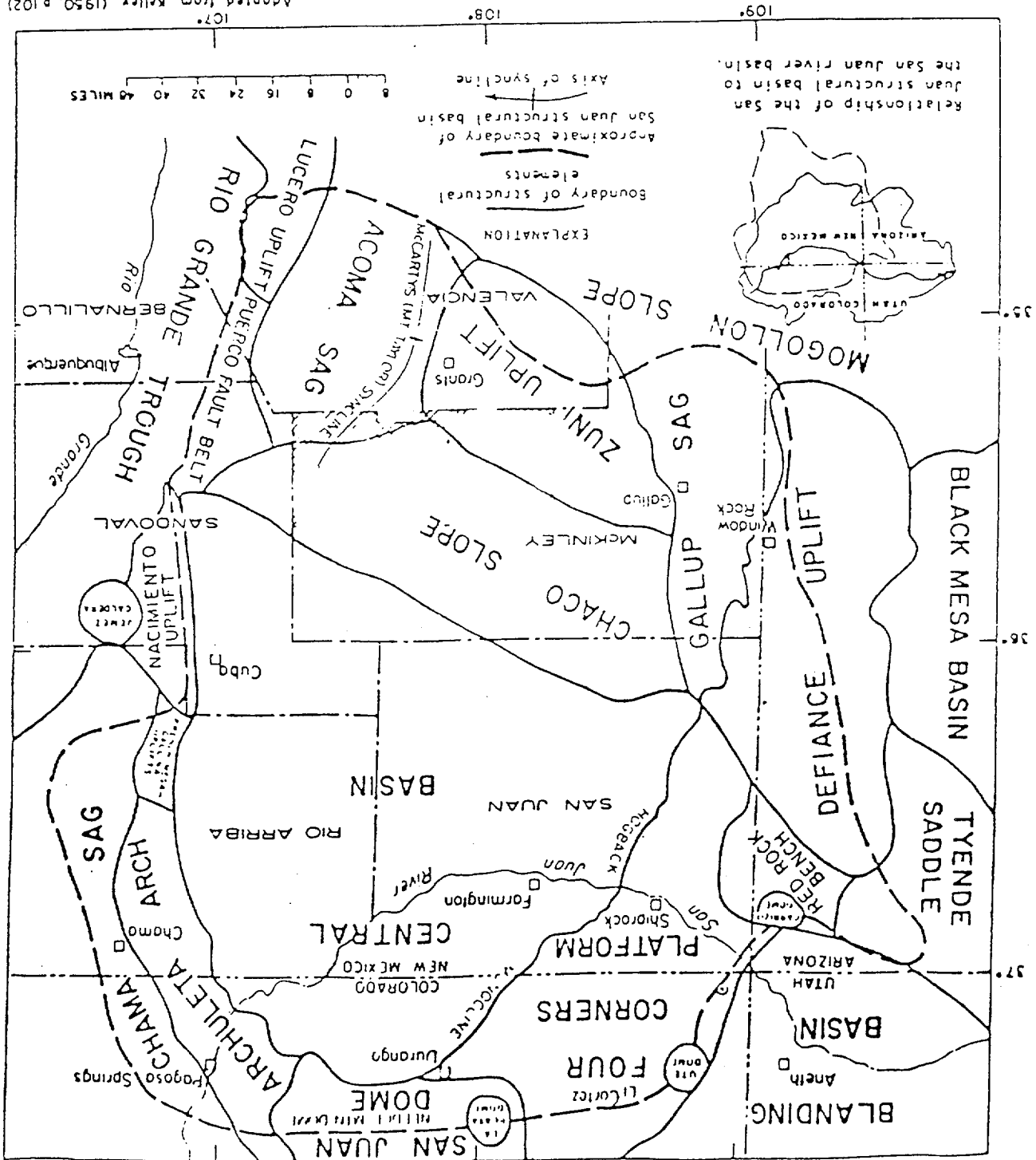


FIGURE 5. -- Elements of the San Juan structural basin.

**ATTACHMENT 2**

## **Well Abandonment**

A master list of all the wells to be plugged was created containing the hole depth, screen depth(as needed), and the hole diameter. This list will be used as a master for all other activities concerning the well abandonment and was compiled from the approved abandonment request.

All wells were surveyed to insure the correct well was to be filled. The coordinates and elevations were both checked. Each well in the field was marked with the well number as indicated from the survey results. These wells were marked as bright orange to facilitate location.

Each well will have a 1 in. diameter hose inserted to the bottom. A State of New Mexico approved TD mud will then be pumped into the well to displace any water, which might be present. The well will then be filled to the top with the abandonment mud. The filling will continue until a mud meeting specifications has displaced any other fluids, which might exist.

A sample of the final mud will be tested to insure it meets the State requirements of 13.5cc fluid loss or less in ten minutes and a gel strength of 20 lbs./100 sq. ft.

The well will then have the casing cut-off below ground level and a cap glued onto the casing. The well location will then be buried to cover the cap.

Sheet1

Hole Number	Hole Diameter	Hole Depth	Hole Number	Hole Diameter	Hole Depth
0001 D	2"	125'	202	2"	64'
0002 D	2"	90'	203	2"	118'
0003 D	2"	64'	204	2"	108'
0004 D	2"	74'	205	?	119'
0007 D	2"	80'	301	4.5"	172'
0010 D	2"	89'	302	4.5"	180'
0011 D	2"	64'	303	4.5"	182'
0015 DM	2"	136'	304	4.5"	180'
0017 DM	2"	135'	306	4.5"	162'
0019 DM	2"	125'	307	4.5"	149'
0020 DM	2"	125'	308	4.5"	170'
0024 D	2"	125'	309	4.5"	180'
0027 A	2"	65'	310	4.5"	182'
0028 D	2"	100'	312	4.5"	190'
0030 D	2"	65'	313	4.5"	180'
0033 M	2"	140'	315	4.5"	200'
0034 M	2"	150'	317	4.5"	183'
0035 M	2"	180'	318	6"	82'
0099 A	2"	70'	319	4.5"	203'
0101 A	2"	65'	320	6"	85'
0102 A	2"	110'	403	2"	285'
0103 A	2"	120'	404	2"	159'
0104 D	2"	84'	405	2"	157'
0105 A	2"	49'	406	2"	156'
0109 A	2"	32'	407	2"	162'
0110 D	2"	110'	409	2"	260'
0111 D	2"	128'	415	2"	185'
0112 A	2"	30'	422	6"	165'
0113 A	2"	30'	423	2"	175'
0114 D	2"	95'	426	2"	153'
0116 D	2"	180'	427	2"	156'
0117 D	2"	120'	428	2"	168'
0118 D	2"	110'	429	2"	173'
120	2"	157'	430	2"	179'
121	2"	90'	431	2"	180'
125	2"	120'	432	2"	150'
127	2"	140'	433	6"	155'
129	2"	242'	434	2"	151'
132	2"	200'	436	2"	173'
0135 A	2"	220'	437	2"	178'
138	2"	303'	438	6"	175'
139	2"	330'	439	2"	175'
144	2"	323'	443	6"	175'
145	2"	310'	448	2"	210'
146	2"	313'	449	2"	75'
147	2"	300'	450 B	2"	72'
153	2"	25'	502 C	2"	180-123'
154	2"	19'	503 A	2"	248'
155	2"	41'	503 B	2"	178'

Sheet1

Hole Number	Hole Diameter	Hole Depth	Hole Number	Hole Diameter	Hole Depth
504 C	2"	107'	649	2"	50'
504 D	2"	68'	650	2"	56'
505 B	2"	107'	652	2"	20'
505 C	2"	105'	655	2"	56'
505 D	2"	105'	656	2"	55'-46'
506 A	2"	220'	657	2"	60'
506 D	2"	130'-80'	663	2"	57'
507 A	2"	175'	664	2"	79'
507 B	2"	100'	665	6"	200'
507 C	2"	100'-59'	666	6"	200'
508 A	2"	170'-150'	667	2"	63'-45.5'
508 B	2"	86'	668	2"	106'-65'
508 C	2"	84'-56'	669	6"	185'
511 AD	2"	100'	670	6"	193'
511 D	2"	35'	672	6"	193'
514 AD	2"	115'	673	6"	182'
514 D	2"	75'	B 0003	2"	41'
520	2"	127'	B 0004	2"	39'
521	2"	60'	B 0006A		?
522	2"	65'	DH 4	2"	50'
523	2"	60'	DH 10	2"	50'
525	2"	40'	DH 11A	2"	25'
600	5"	115'	DH 12	2"	30'
603	5"	136'	EPA 06	4"	170'
606	6"	193'-167'	EPA 16	6"	185'
607	6"	195'-169'	EPA 19	4"	212'
609	6"	112'	EPA 20	4"	75'
610	6"	124'-98'	EPA 21	4"	62'
611	6"	192'-165'	EPA 24	4"	95'
612	6"	195'-172'	EPA 26	4"	90'
618	6"	182'-158'	GWD 1	2"	135'
620	6"	161'-138'	HF 1	4"	210'-185'
621	6"	178'-154'	HF 2	4"	201'-137'
622	6"	176'-140'	KM-EID	2"	66'
623	6"	194'-165'	NR 01		NOT TO BE PLUGGED
625	6"	65'	NR 02		
626	6"	84'			
628	2"	63'			
629	2"	62'			
630	2"	60'			
631	2"	85'			
636	6"	184'			
637	6"	55'			
638	2"	55'			
640	6"	63'-54'			
641	6"	64'-57'			
643	6"	52'			
647	2"	55'			
648	2"	52'			

**ATTACHMENT 3**

**DON DURHAM**  
6510 E MAIN, FARMINGTON, NM 87402  
505-327-3205

October 7, 1999

To start the plugging project on United Uranium water wells, we held a Drilling Mud School Seminar to teach the plugging crews, Wayne Smith Drilling Co., API Drilling mud testing procedures and standards; water loss, weight, P.V. YP and gel strengths. Also attending were Lawrence Busch and General Electric personnel.

Take 600 RPM and 300 RPM reading on Baroid Rheometer

Example:	600	60	
	300	<u>40</u>	
		20	Plastic Viscosity
		20	Yield Point

Take initial gel reading 2 and let set for 10 minute gels. Turn meter at 3 RPM and note where gels break.

2/24

Demonstrated us of Baroid filter press.

Let set on 100 PSI for 30 minutes and report fluid in direct CC volume or run a field check on 7.5 minutes and double the CC's.

Discussed formula to mix mud at mud plant.

15# bbl gel  
.1# /bbl polymer  
.05# / bbl caustic

for a 50 - 60 Viscosity mud with a 20+ 10 minute gels and a below 13.0cc water loss.