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**Field Implementation Plan to  
Plug and Abandon Boreholes  
LAWS-02, LAWS-03, DT-5A,  
and R-25**

37098



# Field Implementation Plan to Plug and Abandon Boreholes LAWS-02, LAWS-03, DT-5A, and R-25

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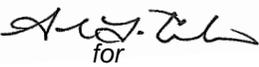
Responsible LANS representative:

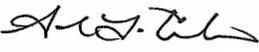
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## 1.0 INTRODUCTION

This field work plan provides technical guidance for field activities associated with the plugging and abandonment of four wells and boreholes located in Los Alamos, New Mexico as shown in Figure 1.0-1. The wells and boreholes associated with this task order are as follows: LAWS-02, LAWS-03, DT-5A, and R-25. Abandonment of all wells and boreholes will be consistent with the requirements and guidelines of Sections IV.B.1.b.v and X.D (Well Abandonment) of the Compliance Order on Consent (the Consent Order).

Specific details including pre-abandonment activities and well construction and abandonment details of the locations are presented below.

## 2.0 PRE-ABANDONMENT ACTIVITIES

The following activities will be conducted prior to subcontractor mobilizing well abandonment crews, material, and equipment onsite.

### 2.1 Removal of Appurtenances

All aboveground and belowground appurtenances will be removed, including pumps, transducers, data loggers, control panels, concrete surface pads, etc, with the exception of those discussed in the Abandonment sections below. Removal of appurtenances will be performed by LANL MSS prior to subcontractor's mobilization to the well or borehole with the exception of downhole sampling systems which will be removed by the well abandonment crew.

### 2.2 Downhole Video, Water-Level and Total-Depth Measurements

Water-level and total-depth measurements will be collected prior to plugging and abandonment of each vertical borehole or well. If unexpected conditions are encountered, video logs may be run by LANL with the LANL geophysical logging trailer to assess the condition of the well or borehole. LANL geophysical and video logging is planned for DT-5A.

### 2.3 Water Sources

The sources for potable water for each location are expected to be as follows:

- LAWS-02 and LAWS-03: Los Alamos County municipal supply source near the Los Alamos County Eco Station on East Jemez Road.
- DT-5A: fire hydrant on State Road 4 near the Interagency Fire Center at Technical Area 49 (TA-49).
- R-25: fire hydrant on Burning Grounds Road.

### 2.4 Elevated Fire Danger

The Plugging and Abandonment project is expected to take place in the summer season with elevated fire danger. Daily work activities will take place on prepared gravel pads and, as such, will be considered

construction sites. A Red Flag Hazard Control Plan has been prepared for the project. The restrictions and controls listed in the hazard control plan will be followed any time a Red Flag alert is issued.

### **3.0 WELL AND BOREHOLE ABANDONMENT**

The locations will be plugged and abandoned per the direction of the NMED workplans and TPMC SOP 5034, Rev. 0, "Monitor Well and RFI Borehole Abandonment". The locations may be plugged and abandoned in any order.

A Well Plugging Plan of Operations will be submitted and approved by the New Mexico Office of the State Engineer (NMOSE) for DT-5A and R-25 prior to plugging and abandonment. Following plugging and abandonment a Plugging Record will be submitted to the NMOSE.

#### **3.1 LAWS-02 and LAWS-03**

##### **3.1.1 Well Construction and Current Conditions**

LAWS-02 is an angled hole drilled at a 45-degree angle under the Los Alamos Canyon weir site. The hole was advanced to 156 ft (length) in two stages. A scalloped 6-in. schedule 80 polyvinyl chloride (PVC) shield was installed in the hole before installing a FLUTE water monitoring system.

LAWS-03 is an angled hole drilled at a 34-degree angle under the Los Alamos Canyon weir site. The hole was advanced to 126 ft (length) in two stages. A perforated 6.5-in. schedule 40 PVC pipe was installed in the hole to 85 ft before installing a FLUTE water monitoring system.

LAWS-02 and LAWS-03 are located near the intersection of Highway 502 and State Road 4.

##### **3.1.2 Plugging and Abandonment**

LAWS-02 and LAWS-03 will be abandoned in similar fashion. A FLUTE technical representative will assist in the removal of the FLUTE liners from the boreholes. The liners will be inflated with compressed air and reeled out of the holes on a specialty piece of equipment designed for the task. Given the length of time the liners have been installed and that the holes are angled, it is difficult to predict how the liners will respond to the removal process. It is assumed that if the liners should separate during removal, the remaining portion(s) in the hole(s) will be abandoned in place.

Following removal of the liners, the angled boreholes will be pressure grouted with neat cement grout from bottom to top. Since the boreholes are angled and shallow, the abandonments will largely be performed by hand (i.e. no rig or hoist). A 1-in. PVC tremie pipe will be installed to the bottom of each hole. Neat cement will be pumped through the tremie pipe and emplaced in the boreholes from the bottom upward to approximately 1 ft bgs. The PVC tremie pipe(s) may be abandoned in place within the boreholes.

Well construction details and the proposed abandonment dispositions for LAWS-02 and LAWS-03 are shown on Figures 3.1.2a and 3.1.2b

Following abandonment, the steel protective surface casings will be cut off level with the existing concrete surface pad. Cutting off and removing the surface casings may be performed earlier in the abandonment process if the field crew prefers. The top 2 ft of the boreholes will be filled with concrete and will be

leveled to the existing grade of the surface pad. A survey pin will be embedded in the concrete and the locations will be surveyed.

## **3.2 DT-5A**

### **3.2.1 Well Construction and Current Conditions**

Test well DT-5A was installed in January 1960 by the U.S. Geological Survey. The well is constructed of 525 ft of 12-in.-diameter steel casing cemented in place. Inside the 12-in. casing is 1821 ft of 8-in. diameter steel casing with a total of 220 ft of torch-cut slots throughout the area from 1172 to 1821 ft below ground surface (bgs). There is no information on backfilling, and it is assumed that native material makes up the backfill.

DT-5A is currently outfitted with a submersible pump installed on stainless steel drop pipe.

DT-5A is located in LANL TA-49 within Area 5 in close proximity to Material Disposal Area (MDA) AB.

### **3.2.2 Plugging and Abandonment**

DT-5A will be abandoned by use of an air rotary drilling rig and associated equipment. The removal of the sampling system may be carried out with a pump hoist before the mobilization of the air rotary rig.

The submersible pump, stainless steel drop pipe, electrical cable, and any associated sampling system components will be removed from the well. The well will be video and gamma logged by LANL upon removal of the sampling system in order to document pre abandonment conditions.

After logging, bentonite chips will be installed via tremie pipe from the well's total depth to approximately 540 ft bgs. Then, a pneumatic casing cutter will be installed in the 8-in. casing to 520 ft bgs and the 8-in. casing will be cut off and removed from the borehole. The extracted casing will be continuously screened for radiation as it is removed from the hole. After removing the upper 520 ft of 8-in. casing, a tremie pipe will be installed and the remaining portion of the hole will be filled with neat cement to approximately 1 ft bgs.

Well construction details and the proposed abandonment disposition for DT-5A is shown on Figure 3.2.2.

Following abandonment, the 12-in. surface casing will be cut off level or slightly below the existing ground surface. The upper 2 ft of the borehole will be filled with concrete and will be mounded slightly above grade to promote storm water runoff. A survey pin will be embedded in the concrete and the location will be surveyed.

## **3.3 R-25**

### **3.3.1 Well Construction and Current Conditions**

Well R-25 was advanced to a depth of 1942 ft bgs in 1999 and 2000 and completed as a nine screen stainless-steel monitoring well. The well is constructed of 4.5-in.-inside diameter schedule 40, 304 stainless-steel riser with 10 slot rod-based wire-wrapped screens. All drill casing was removed from the borehole during well construction, except for a 70-ft section of 13 3/8-in.-diameter casing that was abandoned in place from 508 to 578 ft bgs.

R-25 is currently outfitted with a Westbay multi zone sampling system that includes PVC casing, 26 packers, and 43 sampling and pumping ports.

R-25 is located in LANL TA-16.

### 3.3.2 Plugging and Abandonment

R-25 will be abandoned by use of an air rotary drilling rig and associated equipment. The removal of the Westbay sampling system may be carried out with a pump hoist before the mobilization of the air rotary rig.

A Westbay technical representative will assist in the initial effort of removing the Westbay system. The Westbay representative will make all the necessary packer deflations and buoyancy adjustments before any attempts are made at pulling the system upward. The removal of the Westbay sampling system is anticipated to be problematic. For this reason, a Weatherford fishing specialist will be made available to assist in removing the Westbay system. The Weatherford specialist will mobilize to LANL with specialized tooling and equipment in order to pull the Westbay system from the inside of the lowermost aluminum-based packer body. If this should be the case, the Westbay system will be largely destroyed upon removal.

After removing the Westbay system, the well will be perforated and pressure grouted in stages/lifts from the bottom upward. The prescribed perforation intervals listed in the table below will be made in stages, as opposed to completing all the perforations in one step. Only two screen intervals will be grouted per lift of cement. The strategy employed will be to maintain at least one more screen interval perforated (in the upward direction) than the intended subsequent grouting interval. That is, three intervals will be perforated for every two intervals of grouting. This will prevent the unintentional grouting of any imperforated zone above if the grout level should come upward in the well higher than anticipated. This strategy will also allow for frequent inspections of the pneumatic casing perforator's cutting wheel. The anticipated frequency of perforations will be three (3) rows of perforations spaced at approximately 120-degrees. The perforated intervals may be video logged by the drilling subcontractor to ensure adequate penetration of the stainless steel casing.

Following each perforating step, no more than two well screen intervals will be pressure grouted with neat cement grout. The grout will be emplaced via a tremie pipe. Each lift of grout will be calculated to extend (upward) to within 5 ft of the next perforated interval above. This will provide some volume of grout in excess of 100% of the theoretical volume of the interval being grouted and will provide some hydrostatic pressure to force the cement out of the screens and perforated intervals. Individual lifts of cement will be allowed to cure for approximately 24 hours before installing the next lift. The actual depth of the cured cement will be physically measured and recorded before emplacing the next lift. It is impossible to predict cement losses to the formation through screen and perforated intervals. For this reason, it is impossible to predict precisely how many lifts of cement will be required to abandon all nine screen intervals. After establishing the cement grout above the uppermost screen, the well will be pressure grouted to 2 ft bgs in one continuous lift.

**Prescribed casing perforation intervals at R-25**

<b>Well Screen Interval</b>	<b>Upper Perforations (ft bgs)</b>	<b>Lower Perforations (ft bgs)</b>	<b>Total</b>
1. 737.6 – 758.4	721 – 736	760 – 767	22
2. 882.6 – 893.4	860 – 880	895 – 910	35
3. 1054.6 – 1064.6	1035 – 1050	1067 – 1075	23
4. 1184.6 – 1194.6	1176 – 1182	1196 – 1207	17
5. 1294.7 – 1304.7	1279 – 1292	1307 – 1313	19
6. 1404.7 – 1414.7	1389 – 1402	1417 – 1429	25
7. 1604.7 – 1614.7	1590 – 1602	1617 – 1630	25
8. 1794.7 – 1804.7	1776 - 1792	1807 - 1818	27
9. 1894.7 – 1904.7	None	None	0

Well construction details for R-25 are shown on Figure 3.3.2.

Following abandonment, the 5-in. surface casing will be cut off level or slightly below the existing concrete surface pad. The upper 2 ft of the borehole will be filled with concrete and will be mounded slightly above grade to promote storm water runoff. A survey pin will be embedded in the concrete and the location will be surveyed.

### **3.4 Surface Completions**

The wells/boreholes will be grouted with neat cement to within 2.0 ft of ground surface. A simple concrete plug will be installed at ground surface with a brass or aluminum survey marker and will be surveyed in accordance with the Section IX.B.2.f of the Consent Order, which states that pertinent structures may be horizontally located with a global-positioning system to within 0.5 ft. Surveys will be performed by a licensed New Mexico surveyor.

The LAWS locations and R-25, which have existing concrete pad surface completions, will be cement-grouted to within 2.0 ft of ground surface. Concrete will be placed in the top 2 ft of the casing with a brass survey pin placed in the cement over the center of the casing. The existing concrete surface pads at these locations are not scheduled for removal.

DT-5A will be completed with a simple concrete plug. The top 2 ft of the borehole will be filled with concrete that is mounded slightly above grade and slightly larger than the borehole diameter. A survey pin will be placed in the center of the concrete plug. The small existing concrete surface pad will be demolished and removed.

The survey pins will be stamped with the elevation and well or borehole number.

## **4.0 WASTE MANAGEMENT**

All waste generated during implementation of this field implementation plan will be managed in accordance with applicable Environmental Programs—Waste and Environmental Services (EP-WES) and Environmental Protection Water Quality and Resource Conservation Recovery Group (ENV-RCRA) SOPs. These SOPs incorporate the requirements of all applicable U.S. Environmental Protection Agency (EPA) and NMED regulations, DOE orders, and Laboratory requirements. Documents applicable to the characterization and management of investigation derived waste (IDW) are the following:

- EP-DIR-SOP-10021, “Characterization and Management of Environmental Programs Waste” ([http://int.lanl.gov/environment/all/docs/qa/ep\\_qa/EP-DIR-SOP-10021.pdf](http://int.lanl.gov/environment/all/docs/qa/ep_qa/EP-DIR-SOP-10021.pdf));

A Waste Characterization Strategy Form (WCSF) will be prepared by LANL in accordance with EP-DIR-SOP-10021, R0 and will provide more detailed information on waste descriptions, quantities, handling, and disposition. All wastes generated during this plug and abandonment project will be managed according to the approved WCSF.

## **5.0 REPORTING**

A plugging and abandonment report will be prepared detailing the methods used, presenting the quantities of backfill materials used, and providing the final abandonment details. Figures depicting the location of the abandoned well and backfill completion will also be included in the report.

## 6.0 REFERENCES

Purtymun, W.D., January 1995. "Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells, Supply Wells, Springs, and Surface Water Stations in the Los Alamos Area," Los Alamos National Laboratory report LA-12883-MS, Los Alamos, New Mexico. (Purtymun 1995, 045344)

Purtymun, W.D., and A.S. Swanton, February 5, 1998. "Engineering, Geology, and Construction Data of Twenty-Five Test Holes and Test Wells on and Adjacent to the Pajarito Plateau," draft, Los Alamos National Laboratory, Los Alamos, New Mexico. (Purtymun and Swanton 1998, 099096)

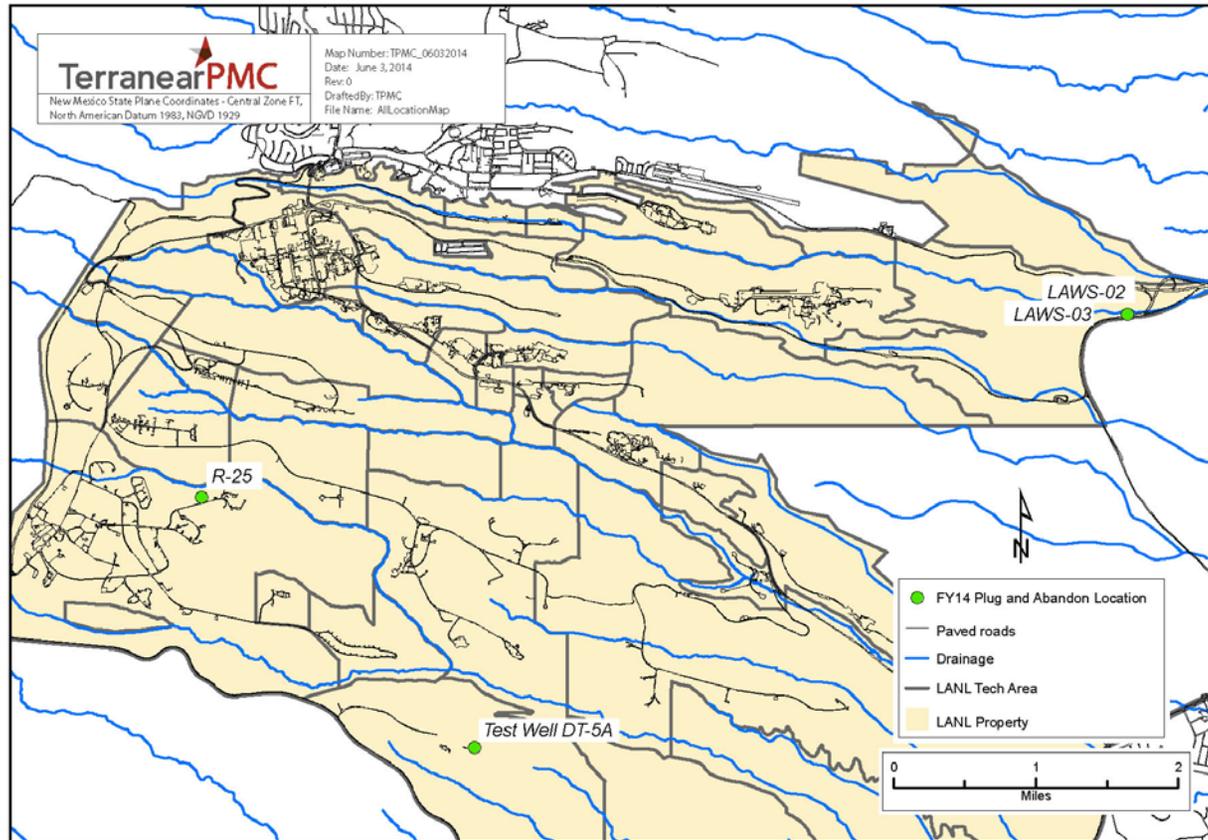


Figure 1.0-1 General location of FY 14 P & A wells

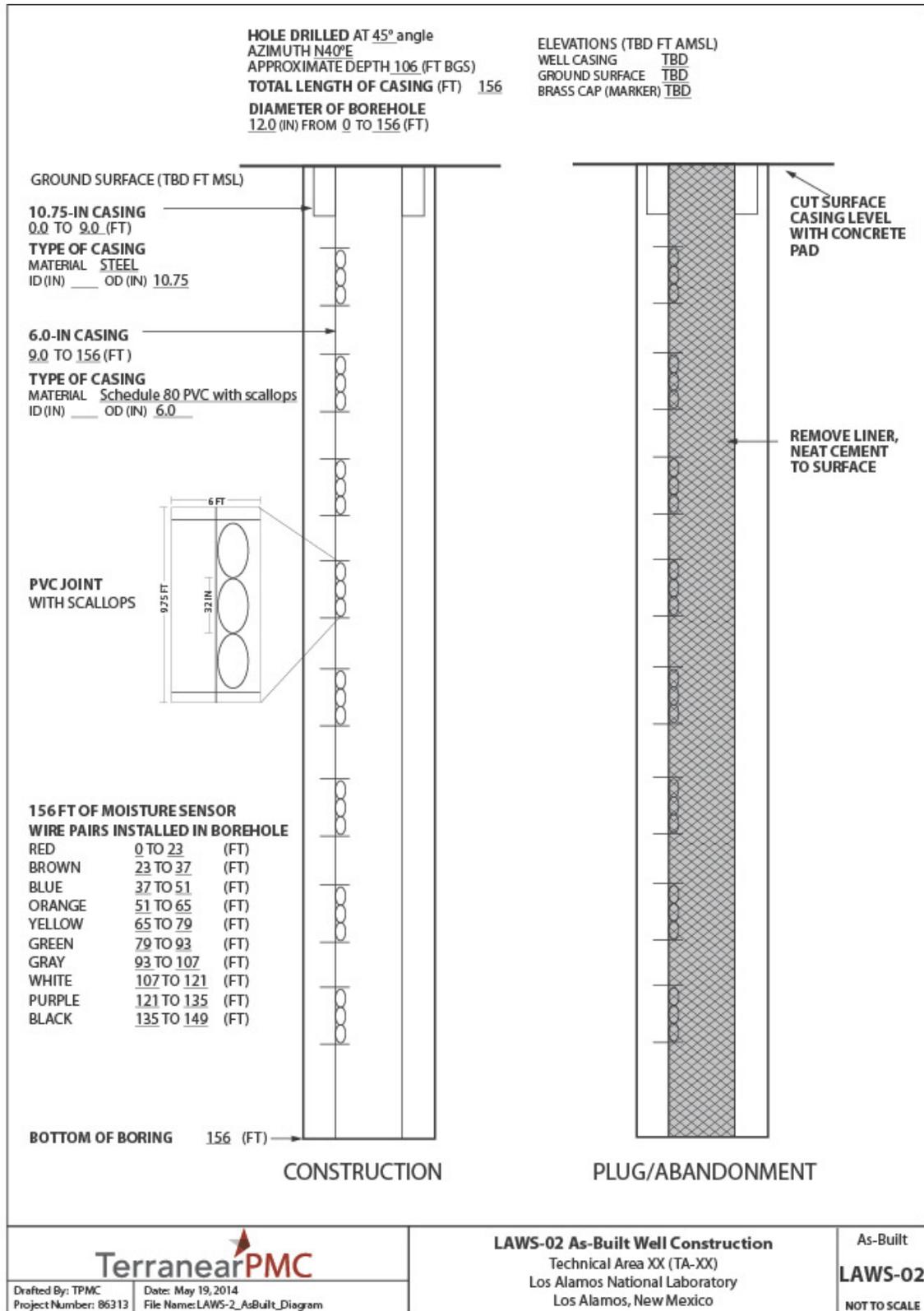


Figure 3.1.2a LAWS-02 Well Construction and Proposed Abandonment

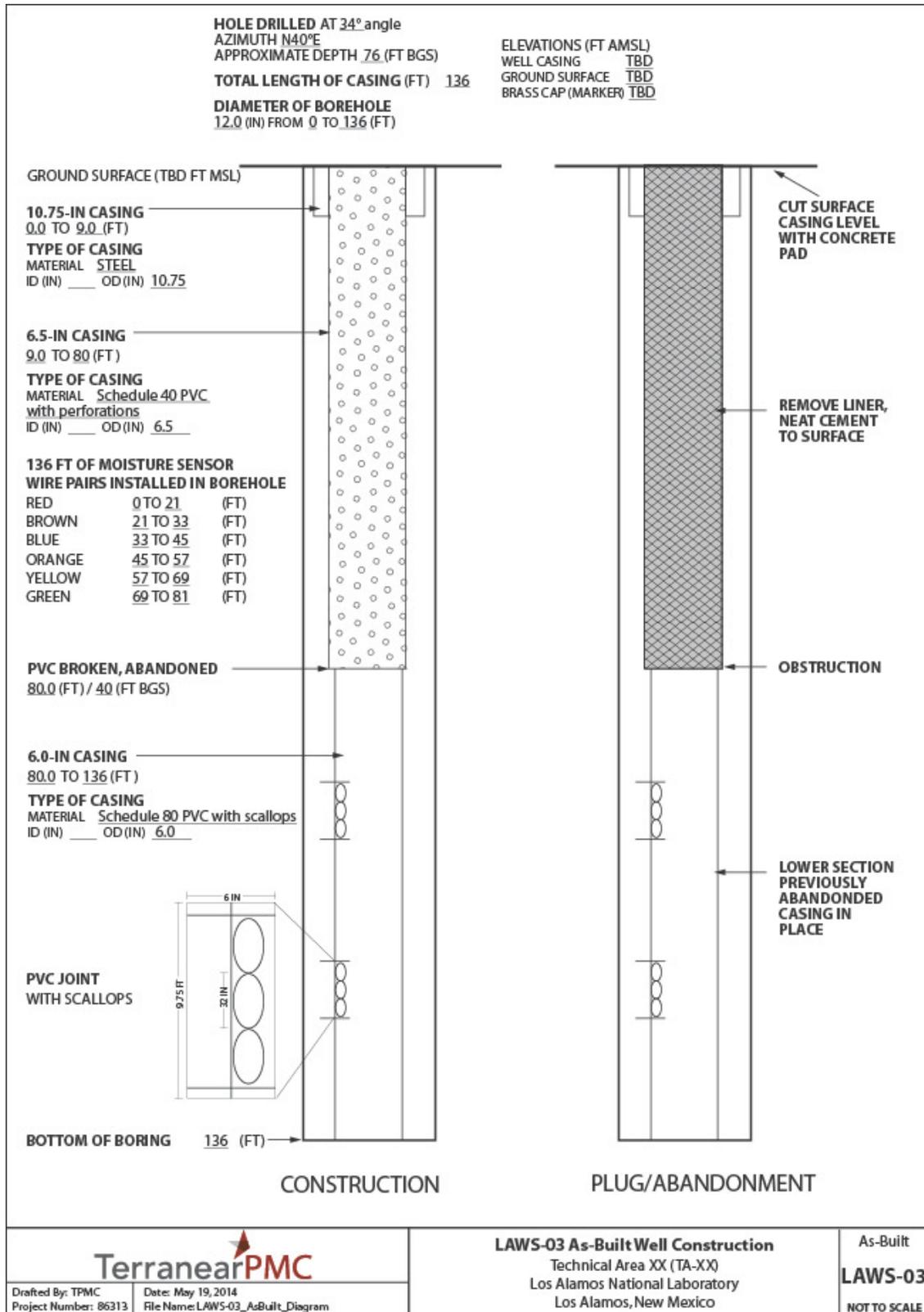


Figure F3.1.2b LAWS-03 Well Construction and Proposed Abandonment

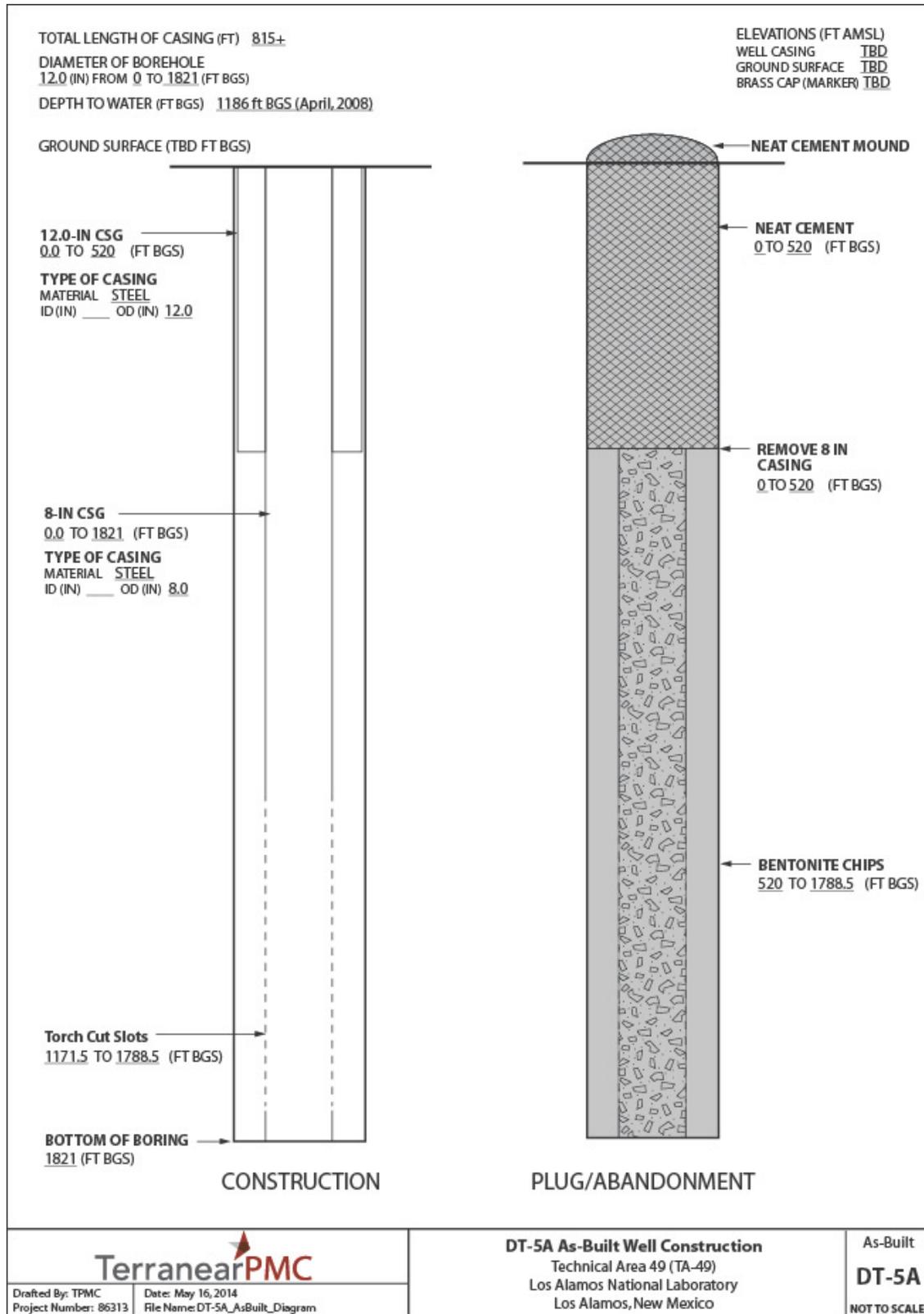


Figure 3.2.2 DT-5A Well Construction and Proposed Abandonment

