LA-UR-09-6791
October 2009
EP2009-0552

Plugging and Abandonment Summary Report for Wells 03-B-09 and 03-B-10

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Programs Directorate

LA-UR-09-6791
EP2009-0552

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October 2009

Responsible project leader:

Printed Name	Signature	Title	Organization	Date
Ardyth M. Simmons		Program Manager	Environmental Programs	10.28.09

Responsible LANS representative:

Printed Name	Signature	Title	Organization	Date
Michael J. Graham		Associate Director	Environmental Programs	10-28-09

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
David R. Gregory		Project Director	DOE-LASO	10/29/09

EXECUTIVE SUMMARY

This report describes the methods Los Alamos National Laboratory (the Laboratory) used to plug and abandon groundwater monitoring wells 03-B-09 and 03-B-10 (the B-wells) located at Technical Area 03, Los Alamos, New Mexico.

Per the request of the New Mexico Environment Department's approval with modifications letter dated August 10, 2009, wells 03-B-09 and 03-B-10 were plugged and abandoned because they had been subject to damage by snow plows and had been compromised to the point of being potential conduits for contamination into the subsurface.

Plugging and abandonment activities at wells 03-B-09 and 03-B-10 occurred on September 25, 2009. The wells were physically measured with a tag line to ensure that no obstructions were present that could interfere with abandonment. Final water-level measurements were collected before abandonment.

Each well was abandoned by grouting in place with a mixture of Portland Type I/II/V cement and Baroid IDP-381. Grout was emplaced from the bottom to the top of each well by pumping under pressure with a tremie pipe. Approximately 11 gal. of cement grout was used to abandon well 03-B-09, and approximately 9 gal. of cement grout was used to abandon well 03-B-10.

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1.0 INTRODUCTION

This report summarizes the methods Los Alamos National Laboratory (the Laboratory) used to plug and abandon groundwater monitoring wells 03-B-09 and 03-B-10 (the B-wells). Well abandonment was consistent with the requirements and guidelines specified in EP-ERSS-SOP-5034, Monitoring Well and Borehole Abandonment, and Sections IV.B.1.b.v and X.D (Well Abandonment) of the Compliance Order on Consent (the Consent Order).

2.0 BACKGROUND

The B-wells are located at Technical Area 03 (TA-03), Los Alamos, New Mexico (Figure 2.0-1). The B-wells were installed in June 2005 using a hollow-stem auger (HSA) drill rig. Postplugging and abandonment diagrams for the B-wells are presented in Figures 2.0-2 and 2.0-3.

Construction is as follows:

03-B-09:

- 0–21.3 ft: 2-in.-inside diameter (I.D.) flush-threaded schedule 40 polyvinyl chloride (PVC) casing
- 21.3–31.3 ft: 2-in. I.D. schedule 40 PVC 0.010-in. slotted, pre-pack well screen
- 31.3–31.8 ft: 2-in. I.D. PVC end cap

03-B-10:

- 0–20.6 ft: 2-in. I.D. flush-threaded schedule 40 PVC casing
- 20.6–30.6: 2-in. I.D. schedule 40 PVC 0.010-in. slotted, pre-pack well screen
- 30.6–31.1 ft: 2-in. I.D. PVC end cap

2.1 Well History

The B-wells were drilled and installed in June 2005 to monitor the impacts to groundwater from Solid Waste Management Unit 03-010(a) and Area of Concern 03-001(e). Drilling was performed using HSA methods and supporting equipment. The tools used for the installation were 4.25-in.-I.D. HSAs. These augers produced an 8.25-in.-outside diameter (O.D.) borehole. Drilling fluids were not used during the installation.

Both B-wells were single-screen completions with 10-ft screen intervals. The wells were installed with pre-pack well screens, and a conventional sand pack was installed around the pre-pack screens. Well 03-B-09 had a 3.1-ft bentonite chip seal located from 13.9–17.0 ft below ground surface (bgs) and a 13.9-ft cement surface seal located from ground surface to 13.9 ft bgs. Well 03-B-10 had a 3.0-ft bentonite chip seal located from 13.0–16.0 ft bgs and a 13.0-ft cement surface seal located from ground surface to 13.0 ft bgs. Both wells were flush-mount completions and included short steel protective sleeves and cast-iron manhole covers.

2.2 Rationale for Plugging and Abandonment

Wells 03-B-09 and 03-B-10 were plugged and abandoned at the request of the New Mexico Environment Department (NMED) because these wells had been subject to damage by snow plows and had been compromised to the point of being potential conduits for contamination into the subsurface. Well 03-B-13, located east of wells 03-B-09 and 03-B-10, penetrates the same perched zone as the other two wells and provides representative hydrologic and geochemical data.

3.0 SCOPE OF ACTIVITIES

The scope of activities is presented below. A pumping test was conducted before plugging and abandonment. The pumping test was outside the scope of plugging and abandonment activities and is being reported separately.

3.1 Plugging and Abandonment Design and Approach

Before plugging and abandonment, wells 03-B-09 and 03-B-10 were physically measured with a tag line to ensure no obstructions were present that could interfere with abandonment, and final water-level measurements were collected.

After measuring well depths and water levels, grout was emplaced from the bottom to the top of each well by pumping under pressure with a tremie pipe. Hydrostatic pressure achieved the necessary pressure to force the grout out of the screen intervals and into the wells' filter sand.

3.2 Borehole Logging

No video or geophysical logging was conducted at wells 03-B-09 and 03-B-10.

3.3 Plugging and Abandonment

Plugging and abandonment activities included mobilization, pressure-grouting, and demobilization. There were no pumps, transducers, or data loggers present at either well. All activities were performed following standard operating procedures and Laboratory-approved health and safety documents. Wells 03-B-09 and 03-B-10 were plugged and abandoned in accordance with the NMED-approved work plan (LANL 2009, 106599).

3.3.1 Field Activities

Plugging and abandonment activities at wells 03-B-09 and 03-B-10 occurred on September 25, 2009. Equipment mobilized included an air compressor, dual-diaphragm pump, various hoses, drums, potable water, and grouting materials.

A groundwater-level measurement of 19.5 ft bgs was recorded from well 03-B-09; the bottom of the well was measured at 31.75 ft bgs. A groundwater-level measurement of 20.0 ft bgs was recorded from well 03-B-10; the bottom of the well was measured at 31.90 ft bgs.

After groundwater-level measurements and well depths were recorded, well 03-B-09 was abandoned with a mixture of Portland Type I/II/V cement, Baroid IDP-381 cement additive, and municipal water. The well was pressure-grouted with a 1-in. I.D. PVC tremie pipe, using approximately 11 gal. of cement slurry. The volume and type of abandonment materials used are presented in Table 3.3-1.

After well 03-B-09 was abandoned, well 03-B-10 was abandoned with the same mixture of Portland Type I/II/V cement, Baroid IDP-381 cement additive, and municipal water. The well was pressure-grouted with the same 1-in. I.D. PVC tremie pipe that was used in well 03-B-09. Approximately 9 gal. of cement slurry was used. After the 30-ft, 1-in. I.D. PVC tremie pipe was removed from the grouting hoses, the PVC string was pushed into the cement slurry, where it was grouted in place in well 03-B-10 to minimize generation of mixed low-level waste (MLLW).

Pressure was achieved in two forms: via a pneumatic pump during emplacement and via hydrostatic head for forcing the grout into the formation. A pneumatic-diaphragm pump was used to deliver the grout from a 55-gal. drum located at ground surface to the bottom of the wells in a 1-in. tremie pipe. Pumping

the grout in one continuous lift built a column of grout inside the well casing that ensured the screen interval was under continuous head pressure.

The addition of Baroid IDP-381 helped ensure a thorough plugging operation. IDP-381 is a cement-curing retardant that enhances the cement's flow properties and improves bonding characteristics.

3.3.2 Completion

Both well casings were grouted to ground surface. The steel sleeves that formerly held the bolts securing the manhole covers were left in place because removing them would have required heavy equipment and repaving. The space within the steel sleeves was filled with concrete to ground surface. The wells were originally surveyed during well completion in accordance with Section IX.B.2.f of the Consent Order. The surveyed location is recorded in the diagram in the investigation report for SM-30 (DOE 2005, 092301). No additional surveys of the abandoned wells are planned.

4.0 POSTABANDONMENT ACTIVITIES

Postabandonment activities are described below.

4.1 Well Site Restoration

Plugging and abandonment activities were not obtrusive to site conditions, and no restoration efforts were required.

4.2 Waste Management

Contact waste and purge water were generated during the plugging and abandonment of wells 03-B-09 and 03-B-10. Contact waste included gloves and paper towels that were used to decontaminate the water-level meter and tag line, and the 1-in. PVC tremie pipe that was used for grouting. The gloves and paper towels will be disposed of in accordance with the waste characterization strategy form that applies to this activity. The 30-ft string of 1-in. PVC tremie pipe was grouted in place in well 03-B-10 to minimize generation of MLLW.

Purge water was produced from grouting. Approximately 4 gal. of purge water from the wells was placed into a 55-gal. waste drum. Purge water from the wells must be managed as MLLW because of the presence of solvents and tritium in the perched zone that was monitored.

Excess cement grout was generated during the plugging and abandonment of the B-wells and was containerized in 55-gal. waste drums. The excess cement did not come in contact with site contamination and will be recycled.

5.0 DEVIATIONS FROM PLANNED ACTIVITIES

There were no deviations from the NMED-approved work plan (LANL 2009, 106599).

6.0 SUMMARY

Wells 03-B-09 and 03-B-10 were plugged and abandoned from bottom to top via tremie pipe, with a mixture of Portland Type I/II/V cement, Baroid IDP-381 cement additive, and municipal water. The manhole covers were removed from the ground above the wells, and concrete was poured over the well casings, flush with the ground surface.

7.0 REFERENCES

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

DOE (U.S. Department of Energy), August 2005. "Investigation Report for Solid Waste Management Units 03-010(a) and 03-001(e) at Technical Area 3," DOE Los Alamos Area Office document, Los Alamos, New Mexico. (DOE 2005, 092301)

LANL (Los Alamos National Laboratory), July 2009. "Work Plan to Plug and Abandon Wells 03-B-09 and 03-B-10," Los Alamos National Laboratory document LA-UR-09-3324, Los Alamos, New Mexico. (LANL 2009, 106599)

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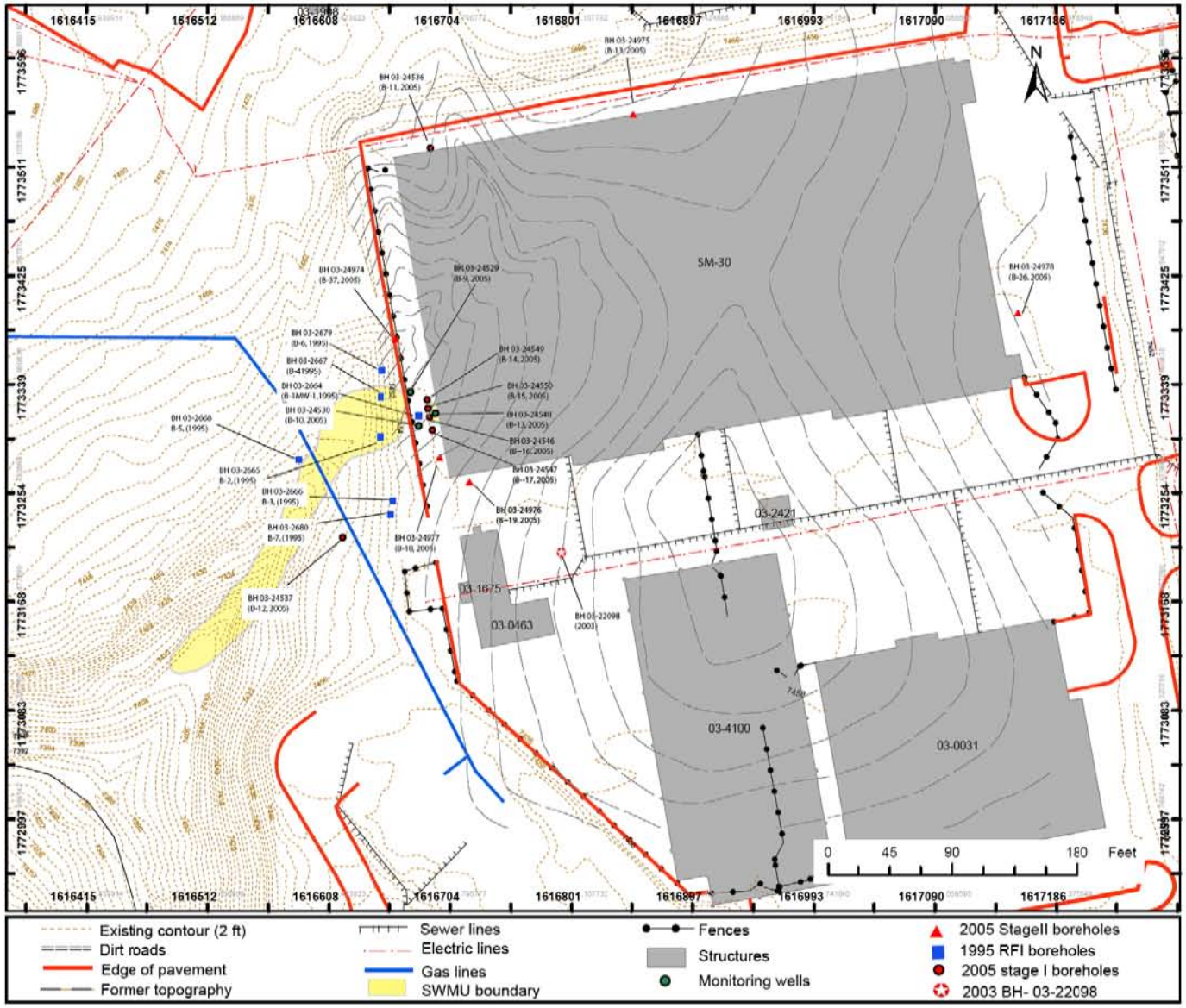

Figure 2.0-1 Location of B-wells at SM-30, Los Alamos National Laboratory

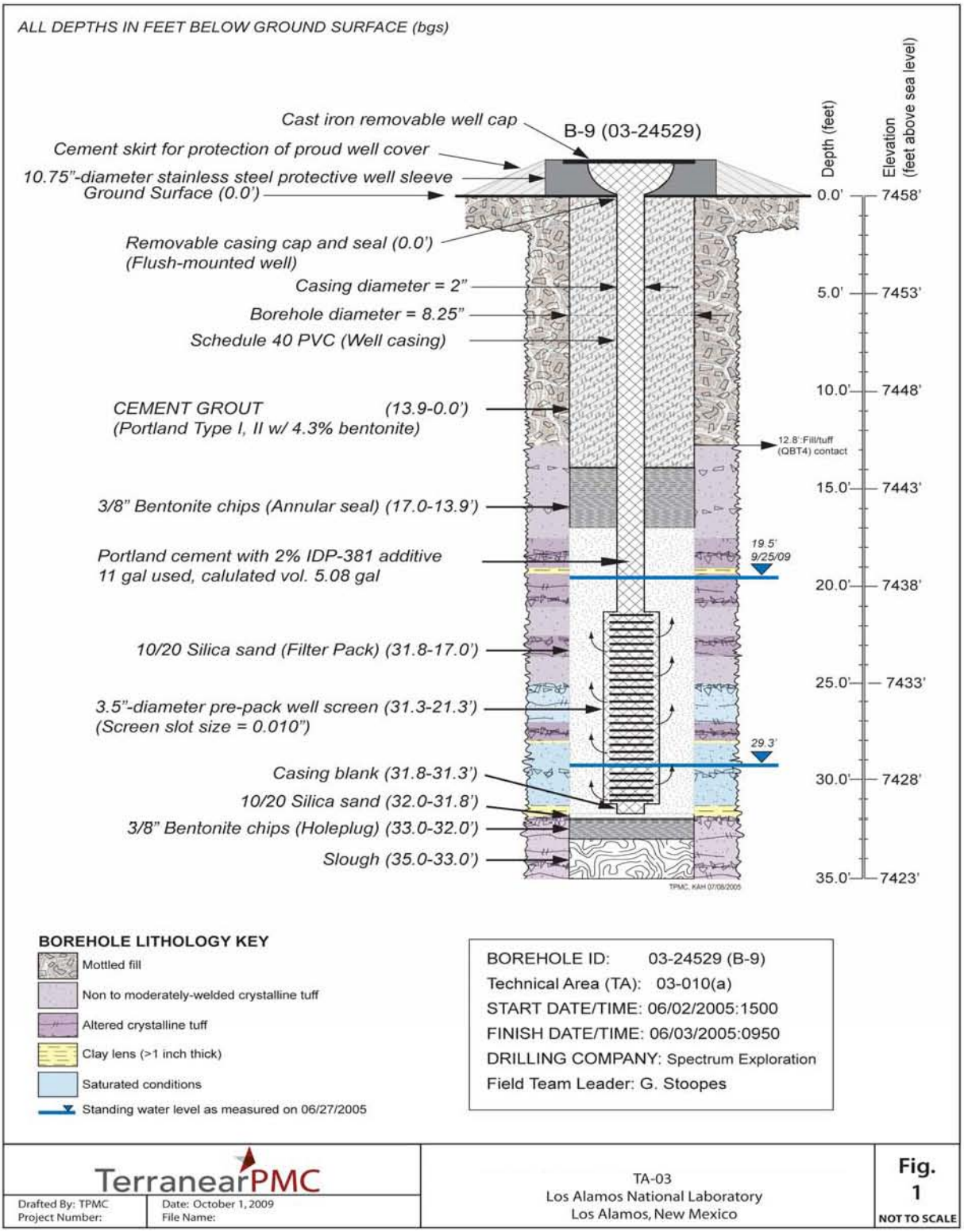

Figure 2.0-2 Monitoring well 03-B-09 postplugging and abandonment diagram

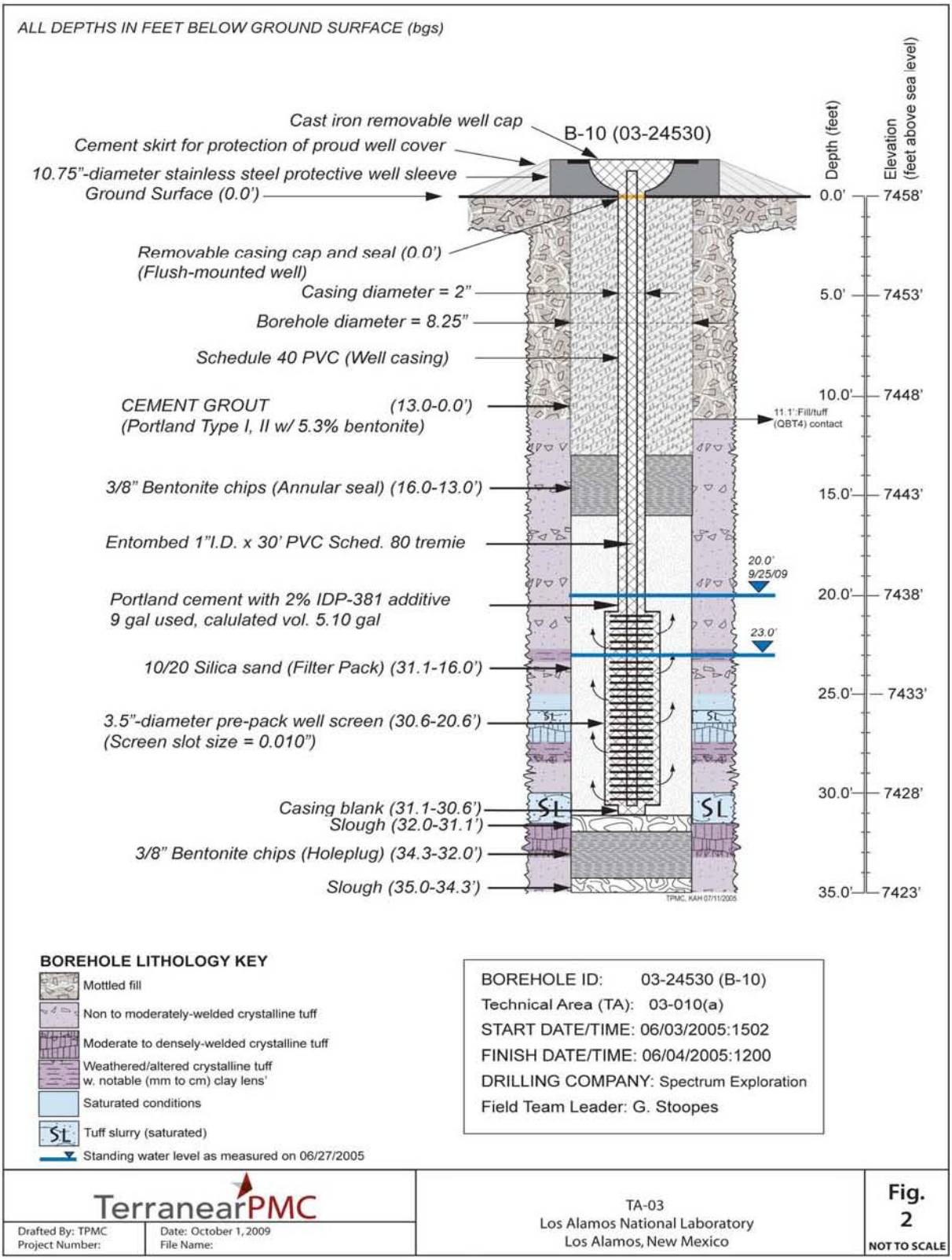

Figure 2.0-3 Monitoring well 03-B-10 postplugging and abandonment diagram

Table 3.3-1
Quantity and Materials Used to Plug and Abandon B-Wells

Date	Depth Interval (ft bgs bottom to top)	Quantity Portland Type I/II/V (lb)	Quantity Municipal Water (gal.)	Quantity Baroid IDP-381 (lb)	Calculated Volume (gal.)	Actual Volume (gal.)
Well 03-B-09						
09/25/2009	31.75–surface	129.7	8.3	2.8	5.08	11
Well 03-B-10						
09/25/2009	31.90–surface	105.3	6.7	2.2	5.10	9