ESHID-601608

Los Alamos
NATIONAL LABORATORY
EST. 1943

Associate Director for ESH
Environment, Safety, and Health
P.O. Box 1663, MS K491
Los Alamos, New Mexico 87545
505-667-4218/Fax 505-665-3811

Environmental Management
Los Alamos Field Office, MS A316
3747 West Jemez Road
Los Alamos, New Mexico 87544
(505) 665-5658/FAX (505) 606-2132

Date: JUL 0 6 2016
Refer To: ADESH-16-089
LAUR: 16-24186
Locates Action No.: n/a

John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of Three Additional Work Plans for the Plugging and Abandonment of Wells and Boreholes for Fiscal Year 2016

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of Three Additional Work Plans for the Plugging and Abandonment of Wells and Boreholes for Fiscal Year 2016. These work plans summarize the methods Los Alamos National Laboratory (the Laboratory) proposes to use in plugging and abandoning 11 wells and boreholes in accordance with Section X.D (Well Abandonment) of the Compliance Order on Consent. This work continues the effort by the Laboratory to plug and abandon unused penetrations on Laboratory property.

Field work will be completed during fiscal year 2016 and a summary report submitted by March 30, 2017.

If you have any questions, please contact Ted Ball at (505) 665-3996 (tedball@lanl.gov) or Peter Maggiore at (505) 665-5025 (peter.maggiore@nnsa.doe.gov).

Sincerely,

Bruce Robinson, Program Director
Environmental Remediation Program
Los Alamos National Laboratory

Sincerely,

Peter Maggiore, Acting Chief of Staff
Office of the Manager
Los Alamos Field Office

BR/PM/TB:sm

Enclosures: Two hard copies with electronic files – Three Additional Work Plans for the Plugging and Abandonment of Wells and Boreholes for Fiscal Year 2016 (EP2016-0087)

Cy: (w/enc.)
Ted Ball, ADEM ER Program

Cy: (w/electronic enc.)
Laurie King, EPA Region 6, Dallas, TX
Raymond Martinez, San Ildefonso Pueblo
Dino Chavarria, Santa Clara Pueblo
Steve Yanicak, NMED-DOE-OB, MS M894
emla.docs@em.doe.gov
Public Reading Room (EPRR)
ADESH Records
PRS Database

Cy: (w/o enc./date-stamped letter emailed)
lasomailbox@nnsa.doe.gov
Peter Maggiore, DOE-NA-LA
Kimberly Davis Lebak, DOE-NA-LA
David Rhodes, DOE-EM-LA
Bruce Robinson, ADEM ER Program
Randy Erickson, ADEM
Jocelyn Buckley, ADESH-EPC-CP
Mike Saladen, ADESH-EPC-CP
John McCann, ADESH-EPC-DO
Michael Brandt, ADESH
William Mairson, PADOPS
Craig Leasure, PADOPS

LA-UR-16-24186
June 2016
EP2016-0087

Three Additional Work Plans for the Plugging and Abandonment of Wells and Boreholes for Fiscal Year 2016

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Associate Directorate for Environmental Management

EP2016-0087

Three Additional Work Plans for the Plugging and Abandonment of Wells and Boreholes for Fiscal Year 2016

June 2016

Responsible project manager:

Printed Name	Signature	Title	Organization	Date
Ted Ball	Ted Ball	Project Manager	Environmental Remediation Program	6/22/16

Responsible LANS representative:

Printed Name	Signature	Title	Organization	Date
for Randall Erickson		Associate Director	Associate Directorate for Environmental Management	6/28/16

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
Peter Maggiore	Peter Maggiore	Acting Chief of Staff	DOE-NA-LA	7/5/16

CONTENTS

Figures

Tables

1.0 INTRODUCTION

Because funds and time are still available for additional plugging and abandonment work in fiscal year 2016, these work plans propose plugging and abandoning three additional groups of wells and boreholes at Los Alamos National Laboratory (LANL or the Laboratory). This document contains information on the plugging and abandonment of 11 boreholes and alluvial wells at the Laboratory and is part of the Laboratory's ongoing efforts to plug and abandon legacy wells and boreholes on and adjacent to Laboratory property.

The work plans describe plugging and abandonment procedures that comply with Section X.D (Well Abandonment) of the Compliance Order on Consent (the Consent Order) as well as the New Mexico Office of the State Engineer (NMOSE) well or borehole abandonment regulations. Additionally, the plugging and abandonment procedures used comply with 19.27.4 New Mexico Administrative Code Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Well. The work plans will be submitted to NMOSE before abandonment.

This document includes three stand-alone work plans and associated figures, as shown in Table 1.0-1. References for the work plans are provided at the end of this document.

Table 1.0-1
Organization of Work Plans

Work Plan	Page Number
Work plan to plug and abandon well 16-P-1 Figure 3.1-1, plugging and abandonment schematic	9
Work plan to plug and abandon 8 alluvial wells in Cañada del Buey Figure 3.2-1, plugging and abandonment schematic	10
Work plan to plug and abandon 2 moisture monitoring boreholes in Cañada del Buey Figure 3.3-1, plugging and abandonment schematic	11

Table 1.0-2 summarizes pertinent information on the 11 wells and boreholes proposed for plugging and abandonment.

2.0 BACKGROUND INFORMATION AND RATIONALE

Prioritization of wells and boreholes to be abandoned is based on criteria that determine their potential for providing a pathway for contaminants to migrate to depth. These criteria include the depth of the well, the location of the penetration (canyon bottom versus mesa top), its condition (the hole is wet or dry), its proximity to known sources of contamination, its age, its construction, and its accessibility to the public. In addition, recent experience from work performed from 2010 to 2015 has added some practical criteria to maximize cost savings and stay within allotted budgets. These criteria include grouping wells and boreholes within a given location to minimize mobilization costs and required permitting and combining difficult and thus expensive wells with less difficult ones. The information available about legacy boreholes can be inaccurate, and unexpected conditions may be encountered. Field reconnaissance will be conducted at the wells and boreholes to verify construction details of each well. These include possible obstructions, ease of site access, condition of surface well pad, surface casing and well head

security, verification of total well depth, depth of groundwater (if present) location of any potential obstructions, and other issues that may hamper abandonment.

The locations of wells and boreholes to be abandoned are shown in Figures 2.0-1 and 2.0-2. The rationale for plugging and abandoning each group of penetrations is provided below.

2.1 Well 16-P-1

Well 16-P-1 was drilled as part of a moisture content study of the Bandelier Tuff in the area of Material Disposal Area (MDA) P in 1987 (Brown et al. 1988, 006871). Well 16-P-1 is 35 ft deep and is dry. It is constructed of 2-in. polyvinyl chloride (PVC) and its top appears to have melted, possibly during the Cerro Grande fire of 2000. Figure 2.0-1 provides a regional map showing the location of well 16-P-1. Figure 2.0-2 shows a more detailed map of the location of this well. Because it is dry and damaged, it should be plugged and abandoned to eliminate a pathway to the deeper groundwater.

2.2 Alluvial Wells in Cañada del Buey

Four alluvial ground water monitoring wells (CDB0-1 through CDB0-4) were installed in Cañada del Buey in 1985 (International Technology Corporation 1987, 008998). These wells have consistently been dry since they were installed.

Construction of the Laboratory's new Sanitary Wastewater Systems Consolidation (SWSC) project was completed in late 1992. Because treated effluent from the SWSC may at some time be discharged into the Cañada del Buey drainage system, a network of five alluvial groundwater monitoring wells (CDB0-5 through CDB0-9) was installed. Wells CDB0-5, CDB0-8, and CDB0-9 have been dry since installation. These wells are constructed of 2-in. PVC with 4- to 10-ft screened intervals. They range in depth from 15 ft to 34 ft. Alluvial groundwater monitoring well CDB0-7 is 44 ft deep, of the same construction, and has less than 2 ft of standing water in the sump—too little to sample. Because these wells are dry or are not recharging, they should be plugged and abandoned to eliminate a pathway to the deeper groundwater.

2.3 Moisture-Monitoring Boreholes in Cañada del Buey

Two moisture-level boreholes (CDBM-1 and CDBM-2) were installed during the early summer of 1992 within the upper and middle reaches of the drainage. These boreholes have a metal casing at the surface. It is unclear from historical records if the boreholes are cased to total depth. These boreholes are 190 ft and 99 ft deep, respectively, are dry, and should be plugged and abandoned to eliminate a pathway to the deeper groundwater.

3.0 WORK PLANS FOR PLUGGING AND ABANDONMENT

3.1 Work Plan to Plug and Abandon 16-P-1

Primary Purpose	The purpose for plugging and abandoning well 16-P-1, located on the east side of the Burning Grounds at Technical Area 16, is to prevent the migration of water and contaminants. This work plan summarizes the plugging and abandonment methods the Laboratory proposes for 16-P-1. Abandonment will be consistent with Section X.D (Well Abandonment) of the Consent Order and NMOSE regulations. A plugging plan will be submitted to NMOSE before abandonment.
Construction	This well was installed as part of a moisture content study of the Bandelier Tuff in the area of MDA P in 1987 (Brown et al. 1988, 006871). Well 16-P-1 is 35 ft deep. The well is constructed of 2-in. PVC and is dry.
Abandonment Methods	Because the well is in a remote location without road access, the well will be plugged and abandoned by hand. The well will be grouted from total depth to ground surface by pouring cement grout into the well from the surface. A schematic diagram of the borehole abandonment is shown in Figure 3.1-1.
Surface Completion	A neat-cement mound with a brass or aluminum marker will be installed over the borehole at ground surface. The marker will be surveyed in accordance with Section IX.B.2.f of the Consent Order, which states pertinent structures may be horizontally located with a global positioning system with an accuracy of ±0.5 ft.
Waste Management	A waste characterization strategy form (WCSF) will be prepared to guide in the management and disposition of any waste generated during abandonment in accordance with applicable policies, procedures, and regulations.
Summary Report	A report will be prepared detailing the abandonment methods and the quantities of backfill materials used. A location map and abandonment schematic will also be included in the report.

3.2 Work Plan to Plug and Abandon Alluvial Wells in Cañada del Buey

Primary Purpose	The purpose for plugging and abandoning the alluvial wells located in Cañada del Buey is to prevent the migration of water and contaminants. This work plan summarizes the plugging and abandonment methods the Laboratory proposes for CDBO-1 through CDBO-9, except CDBO-6, which is wet. Abandonment will be consistent with Section X.D (Well Abandonment) of the Consent Order and NMOSE regulations. A plugging plan will be submitted to NMOSE before abandonment.
Construction	These wells are constructed of 2-in. and 4-in. PVC with 4-ft to 12-ft screened intervals. They range in depth from 13 ft to 44 ft deep.
Abandonment Methods	Any surface appurtenances, if present, will be removed from the boreholes before abandonment. The boreholes will be pressure-grouted from total depth to 20 ft below ground surface (bgs). All holes will then be overdrilled to 20 ft bgs and the overdrilled volume filled with neat-cement grout. Wells less than 20 ft deep will be overdrilled and removed before filling with cement grout. A schematic diagram of the borehole abandonment is shown in Figure 3.2-1.
Surface Completion	A neat-cement mound with a brass or aluminum marker will be installed over the borehole at ground surface. The marker will be surveyed in accordance with Section IX.B.2.f of the Consent Order, which states pertinent structures may be horizontally located with a global positioning system with an accuracy of ±0.5 ft.
Waste Management	A WCSF will be prepared to guide in the management and disposition of any waste generated during abandonment in accordance with applicable policies, procedures, and regulations.
Summary Report	A report will be prepared detailing the abandonment methods and the quantities of backfill materials used. A location map and abandonment schematic will also be included in the report.

3.3 Work Plan to Plug and Abandon Moisture-Monitoring Boreholes in Cañada del Buey

Primary Purpose	The purpose for plugging and abandoning two moisture-monitoring boreholes located in Cañada del Buey is to prevent the migration of water and contaminants. This work plan summarizes the plugging and abandonment methods the Laboratory proposes for CDBM-1 and CDBM-2. Abandonment will be consistent with Section X.D (Well Abandonment) of the Consent Order and NMOSE regulations. A plugging plan will be submitted to NMOSE before abandonment.
Construction	These boreholes have a 2-in.-diameter metal casing at the surface. It is unclear from historical records if the boreholes are cased to total depth. These boreholes are 190 ft and 99 ft deep, respectively
Abandonment Methods	Any surface appurtenances, if present, will be removed from the boreholes before abandonment. The boreholes will be pressure-grouted from total depth to 20 ft bgs. All holes will then be overdrilled to 20 ft bgs and the overdrilled volume filled with neat-cement grout.
Surface Completion	A neat-cement mound with a brass or aluminum marker will be installed over the borehole at ground surface. The marker will be surveyed in accordance with Section IX.B.2.f of the Consent Order, which states pertinent structures may be horizontally located with a global positioning system with an accuracy of ±0.5 ft.
Waste Management	A WCSF will be prepared to guide in the management and disposition of any waste generated during abandonment in accordance with applicable policies, procedures, and regulations.
Summary Report	A report will be prepared detailing the abandonment methods and the quantities of backfill materials used. A location map and abandonment schematic will also be included in the report.

4.0 REFERENCES

The following list includes all documents cited in this plan. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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.

Brown, F.H., W.D. Purtymun, A.K. Stoker, and A. Barr, February 1988. "Site Geology and Hydrology of Technical Area 16, Area P," Los Alamos National Laboratory report LA-11209-MS, Los Alamos, New Mexico. (Brown et al. 1988, 006871)

International Technology Corporation, March 1987. "Hydrogeologic Assessment of Technical Area 54, Areas G and L, Los Alamos National Laboratory," Los Alamos, New Mexico. (International Technology Corporation 1987, 008998)

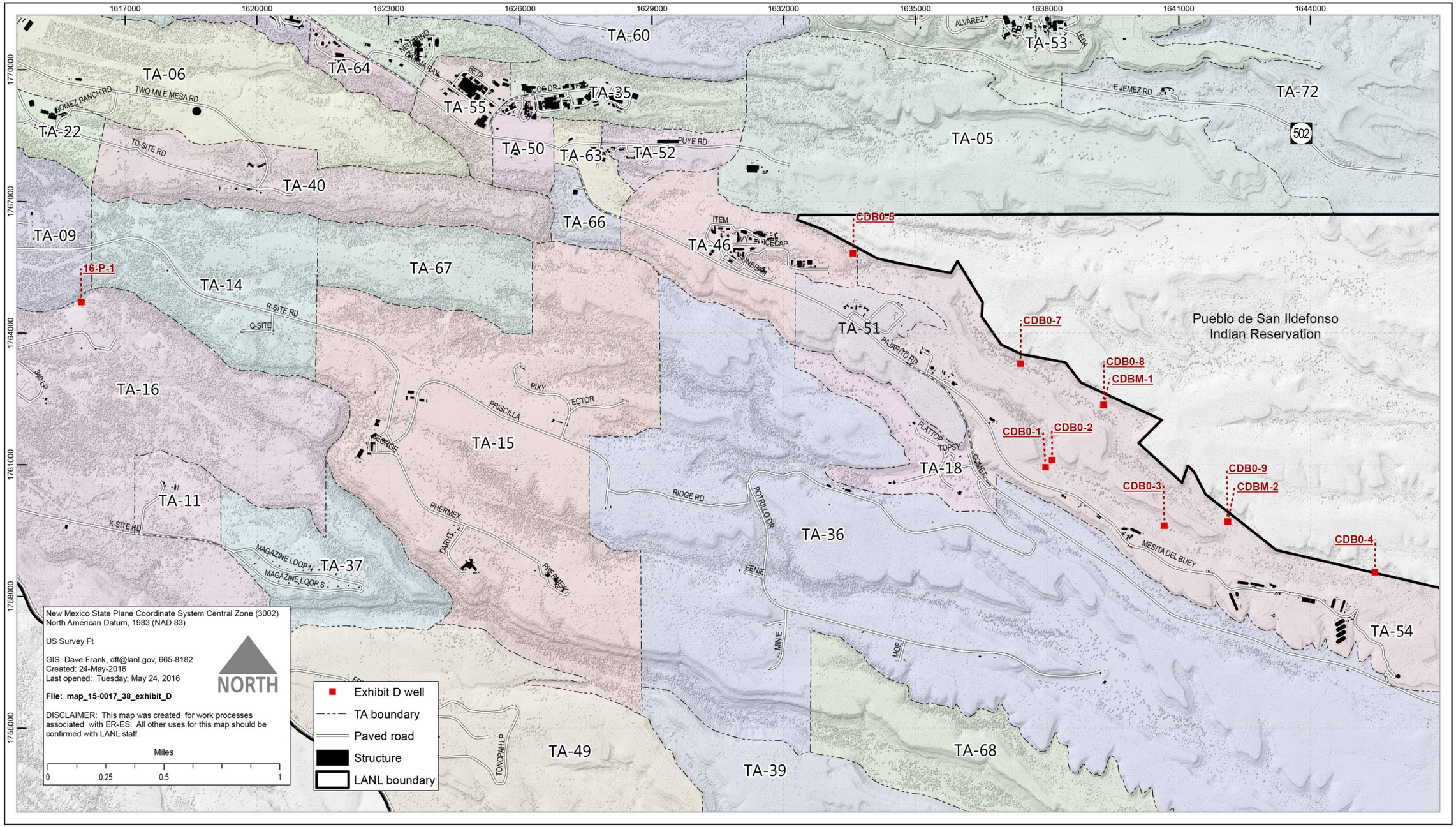

Figure 2.0-1 Locations of wells to be abandoned in Cañada del Buey

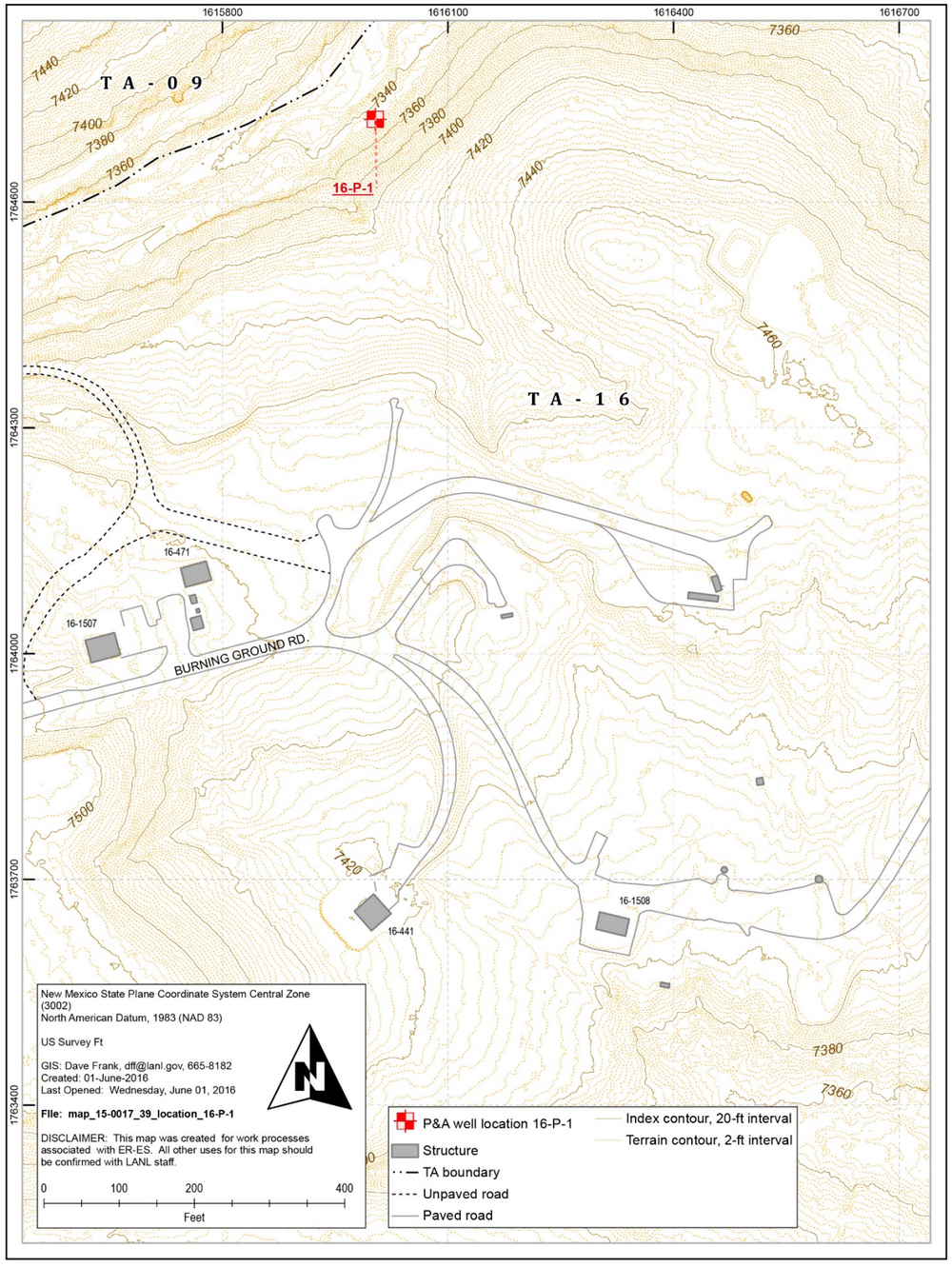

Figure 2.0-2 Location of well 16-P-1

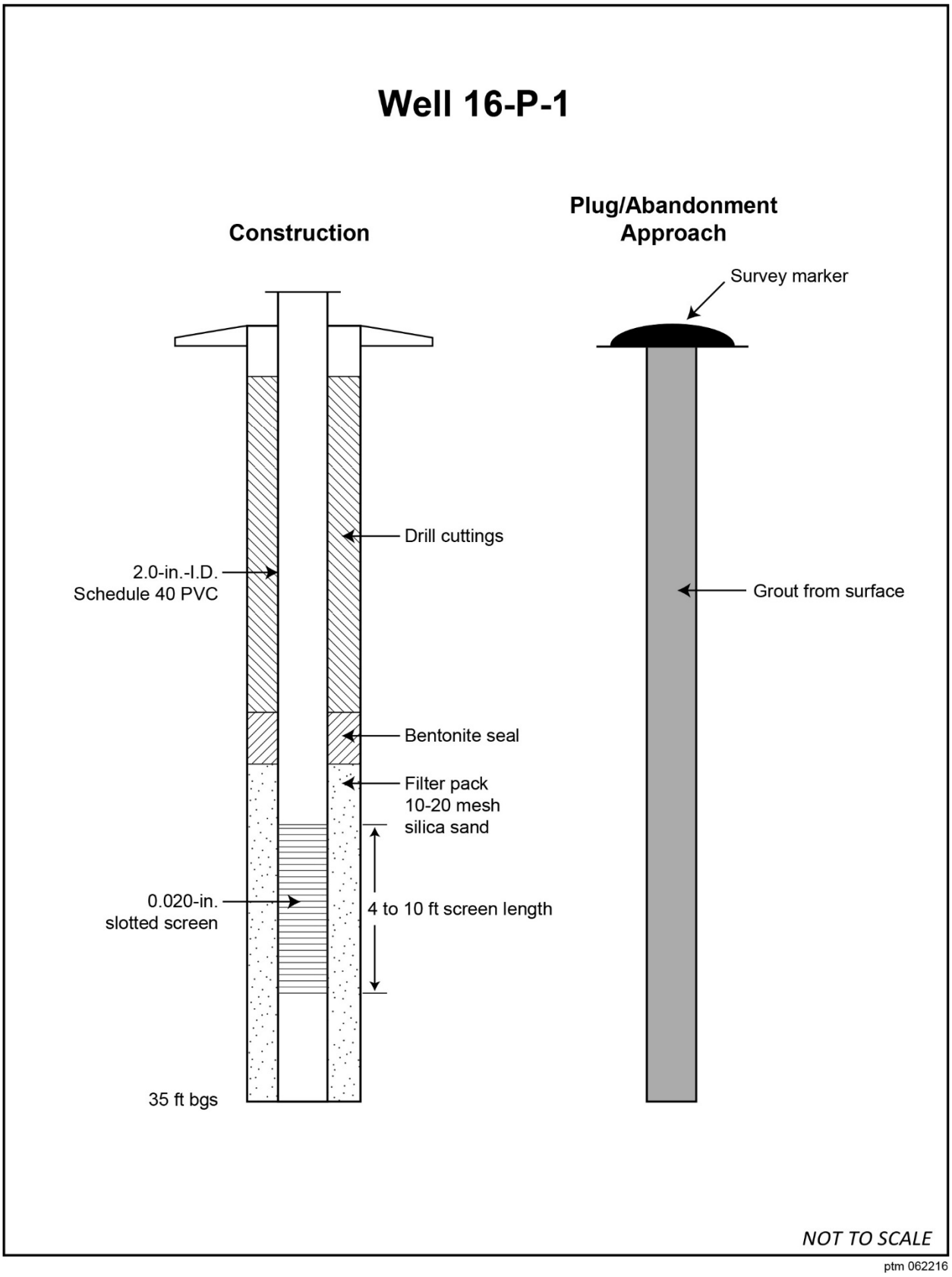

Figure 3.1-1 Plugging and abandonment schematic for well 16-P-1

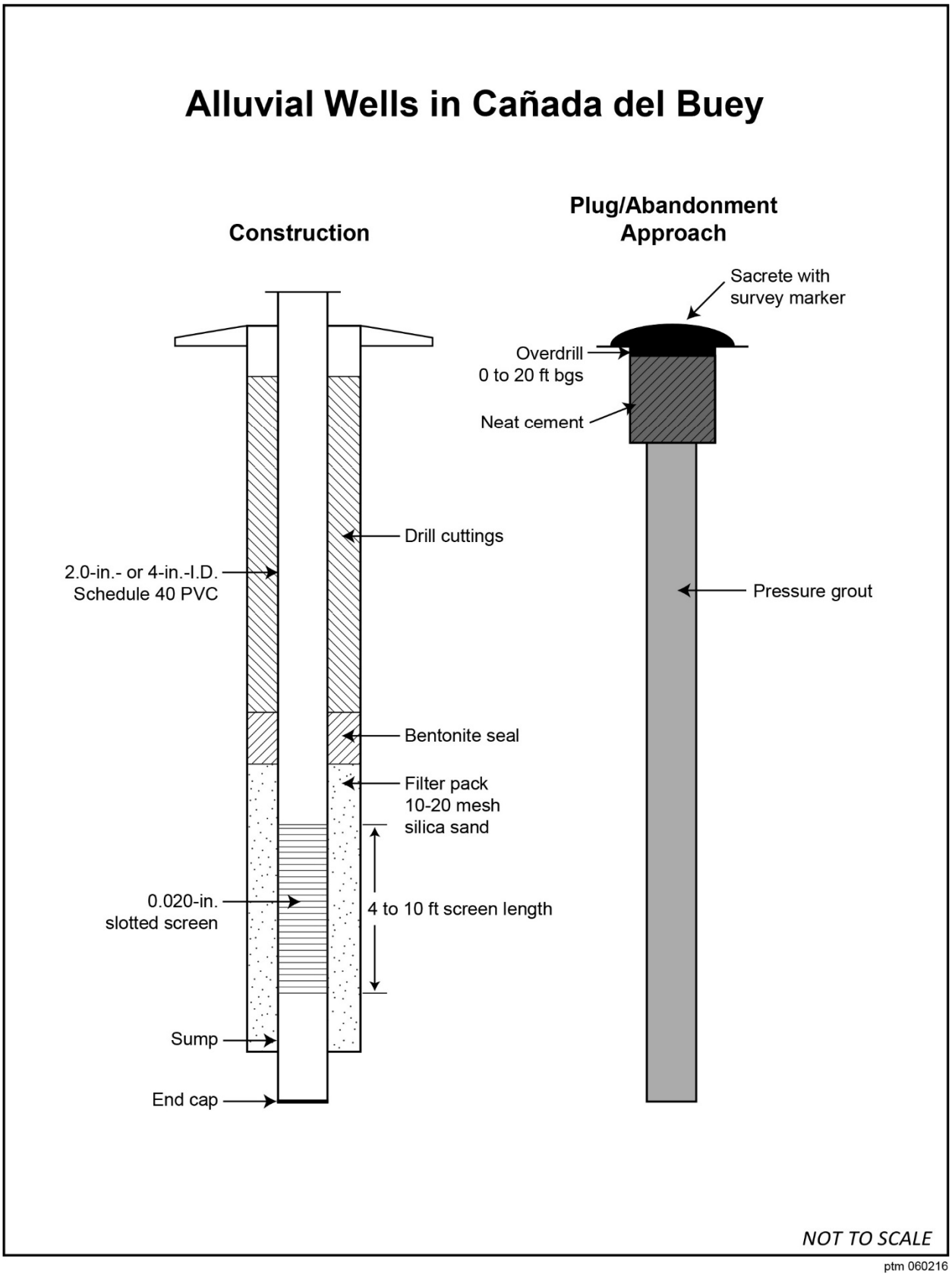

Figure 3.2-1 Plugging and abandonment schematic for alluvial wells in Cañada del Buey

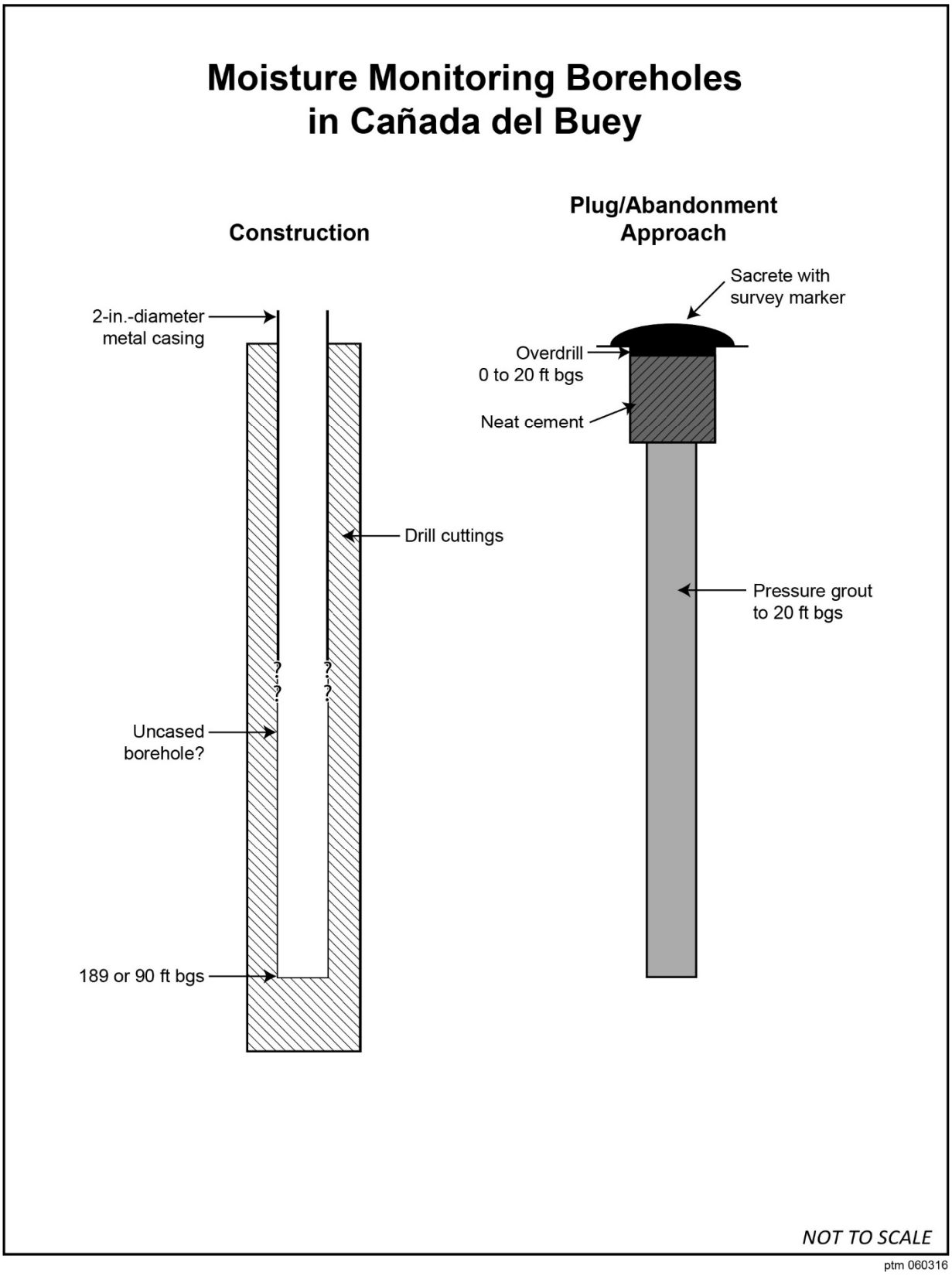

Figure 3.3-1 Plugging and abandonment schematic for moisture-monitoring boreholes in Cañada del Buey

Table 1.0-2
Summary of Information on Wells and Boreholes Proposed for Plugging and Abandonment

Well Name	Depth (ft) from Reports	Depth (ft) from Field Verification	Diameter (in.)	Number of Screens	Screened Interval (ft)	Screen Length	Construction Material	Depth to Water	Installation Date	Easting	Northing	Elevation
16-P-1	na[a]	34.89	2	n/a[b]	n/a	n/a	PVC	Dry	1985	1616000	1764707	7344.0
CDB0-1	15	14.42	4	1	5.1–13.1	8	PVC	Dry	1985	1637968.59	1760943.96	6757.6
CDB0-2	18	19.25	4	1	5.9–17.9	12	PVC	Dry	1985	1638119.02	1761103.11	6748.2
CDB0-3	12	13.55	4	1	4.4–12.4	8	PVC	Dry	1985	1640677.11	1759611.02	6670.2
CDB0-4	12	13.4	4	1	4.1–12.1	8	PVC	Dry	1985	1645474.9	1758546.9	6564.5
CDB0-5	17.5	20.81	2	1	7–17	10	PVC	Dry	1992	1633583.37	1765818.37	6879.0
CDB0-7	44	46.02	2	1	29–39	10	PVC	1–2 ft water	1992	1637400	1763301	6771.8
CDB0-8	23	25.66	2	1	13–23	10	PVC	Dry	1992	1639294	1762366	6722.5
CDB0-9	34	33.59	2	1	Unknown	Unknown	PVC	Dry	1992	1642119.12	1759702.87	6633.0
CDBM-1	189	190.11	2	n/a	n/a	n/a	Metal	Moisture Monitoring	1992	1639296	1762355	6721.6
CDBM-2	99	98.63	2	n/a	n/a	n/a	Metal	Moisture Monitoring	1992	1642126	1759697	6634.1

[a] na = Not available.

[b] n/a = Not applicable.