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Date: JAN 22 2016
Refer To: ADESH-16-005
LAUR: 16-20224
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 the Work Plans for the Plugging and Abandonment of Wells for Fiscal Year 2016

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the Work Plans for the Plugging and Abandonment of Wells for Fiscal Year 2016. The work plans summarize the methods Los Alamos National Laboratory (the Laboratory) proposes to use in plugging and abandoning these wells. 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 – Work Plans for the Plugging and Abandonment of Wells for Fiscal Year 2016 (EP2015-0212)

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Ted Ball, ADEP ER Program, MS M992

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LA-UR-16-20224
January 2016
EP2015-0212

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

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Programs Directorate

EP2015-0212

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

January 2016

Responsible project manager:

Printed Name	Signature	Title	Organization	Date
Ted Ball	Ted Ball	Project Manager	Environmental Remediation Program	1/21/16

Responsible LANS representative:

	Printed Name	Signature	Title	Organization	Date
for	Randall Erickson		Associate Director	Environmental Programs	1/21/16

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
Peter Maggiore	Pete Magg	Acting Chief of Staff	DOE-NA-LA	1/22/16

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1.0 INTRODUCTION

This document contains information for the plugging and abandonment of 25 alluvial wells in Mortandad Canyon at Los Alamos National Laboratory (LANL or 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 two 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

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 adhere to allocated 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), and other issues that may hamper the abandonment activities proposed in the work plans.

The locations of wells and boreholes to be abandoned are shown in Figure 2.0-1. Table 2.0-1 lists the wells for plugging and abandonment. The rationale for plugging and abandoning each group of penetrations is provided below.

2.1 Water Balance Wells in Mortandad Canyon

In 1994 a series of shallow alluvial wells was drilled on the floor of Mortandad Canyon as part of a study of the canyon's water balance (McLin et al. 1997, 085422). These wells vary from 15 to 80 ft in depth and all terminate at the top of the bedrock. All these wells have a 10-ft screen with 0.02-in. slots and surrounding silica sand filter pack. Above the filter pack is a layer of bentonite. The remainder of the borehole is filled with drill cuttings. The wells are constructed of 3-in.–inside diameter (I.D.) schedule 40 polyvinyl chloride (PVC) and have a concrete apron with a steel casing and locking security cap. An assessment conducted by the Laboratory proposed the wells for plugging and abandonment because several of the filter packs are up to 20 ft long and may cross perching horizons in the alluvium and the backfill material is native drill cuttings rather than bentonite.

2.2 Mortandad Canyon Test Wells

Four test borings were drilled in Mortandad Canyon in 1988. They were completed as 2-in.-diameter wells constructed of plastic pipe with 10 to 20 ft screened intervals with gravel packs. The wells are 69 to 74 ft deep. An assessment conducted by the Laboratory proposed the wells for plugging and abandonment because several of the screens are up to 20 ft long and may cross perching horizons, and the backfill material is cuttings rather than bentonite.

3.0 WORK PLANS FOR PLUGGING AND ABANDONMENT

3.1 Work Plan to Plug and Abandon Water Balance Wells in Mortandad Canyon

Primary Purpose	The purpose for plugging and abandoning the water balance wells in Mortandad Canyon is to prevent the migration of surface water and contaminants in the wells to depth. This work plan summarizes the plugging and abandonment methods the Laboratory proposes for the wells in Mortandad Canyon. Abandonment will be consistent with Section X.D (Well Abandonment) of the Consent Order and NMOSE regulations. A plugging plan of operations will be submitted to NMOSE before abandonment.
Construction	Twenty-four wells were installed in the alluvium of Mortandad Canyon in 1994 as part of a water and mass balance study for the shallow perched aquifer there (McLin et al. 1997, 085422). Three of these wells have already been plugged and abandoned. The remaining 21 wells vary from 15 ft deep at the west end of the study area to 80 ft deep on the east end. All wells terminate at the top of the alluvium/bedrock contact. The wells are constructed of 3-in.-I.D., schedule 40 PVC pipe with a 10-ft slotted screen length. All wells have a 10–20 mesh silica sand filter pack that typically extends 5 ft above and below the screened interval. The remainder of the annular space above the filter pack is filled with drill cuttings above the bentonite seal.
Abandonment Methods	Because of the small diameter, the casing cannot be perforated. The PVC pipe in each well will be pressure grouted from total depth to 20 ft below ground surface (bgs). The wells will then be overdrilled to a depth of 20 ft and the drilled out volume filled with cement grout to ground surface. A schematic diagram of the well 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 well 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 Disposal	A waste characterization strategy form (WCSF) will be prepared to guide disposal of any wastes generated during abandonment.
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 Mortandad Canyon Test Wells

Primary Purpose	The purpose for plugging and abandoning the test wells drilled in Mortandad Canyon is to prevent the migration of surface water and contaminants in the wells to depth. This work plan summarizes the plugging and abandonment methods the Laboratory proposes for the wells in Mortandad Canyon. Abandonment will be consistent with Section X.D (Well Abandonment) of the Consent Order and NMOSE regulations. A plugging plan of operations will be submitted to NMOSE before abandonment.
Construction	Four test wells were installed in Mortandad Canyon in 1988 as part of a Laboratory-wide test well installation program (Purtymun 1995, 045344). The wells vary from 69 to 74 ft deep. All wells terminate at the top of the alluvium/bedrock contact. The wells are constructed of 2-in.-I.D. plastic pipe with a 10-ft (MT-2 and MT-4) or a 20-ft (MT-1 and MT-3) screen length. Screen slot size is 0.01 in for all wells. All wells have a silica sand filter pack. The remainder of the annular space above the filter pack appears to have been filled with drill cuttings.
Abandonment Methods	Because of the small diameter, the casing cannot be perforated. The plastic pipe in each well will be pressure grouted from total depth to 20 ft bgs. The wells will then be overdrilled to a depth of 20 ft and the drilled out volume filled with cement grout to ground surface. A schematic diagram of the well 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 Disposal	A WCSF will be prepared to guide disposal of any wastes generated during abandonment.
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.

McLin, S.G., W.D. Purtymun, S. Swanton, and R.J. Koch, August 1997. "Logs and Completion Data for Water Balance Wells in Mortandad and Ten Site Canyons," Los Alamos National Laboratory report LA-13297-MS, Los Alamos, New Mexico. (McLin et al. 1997, 085422)

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)

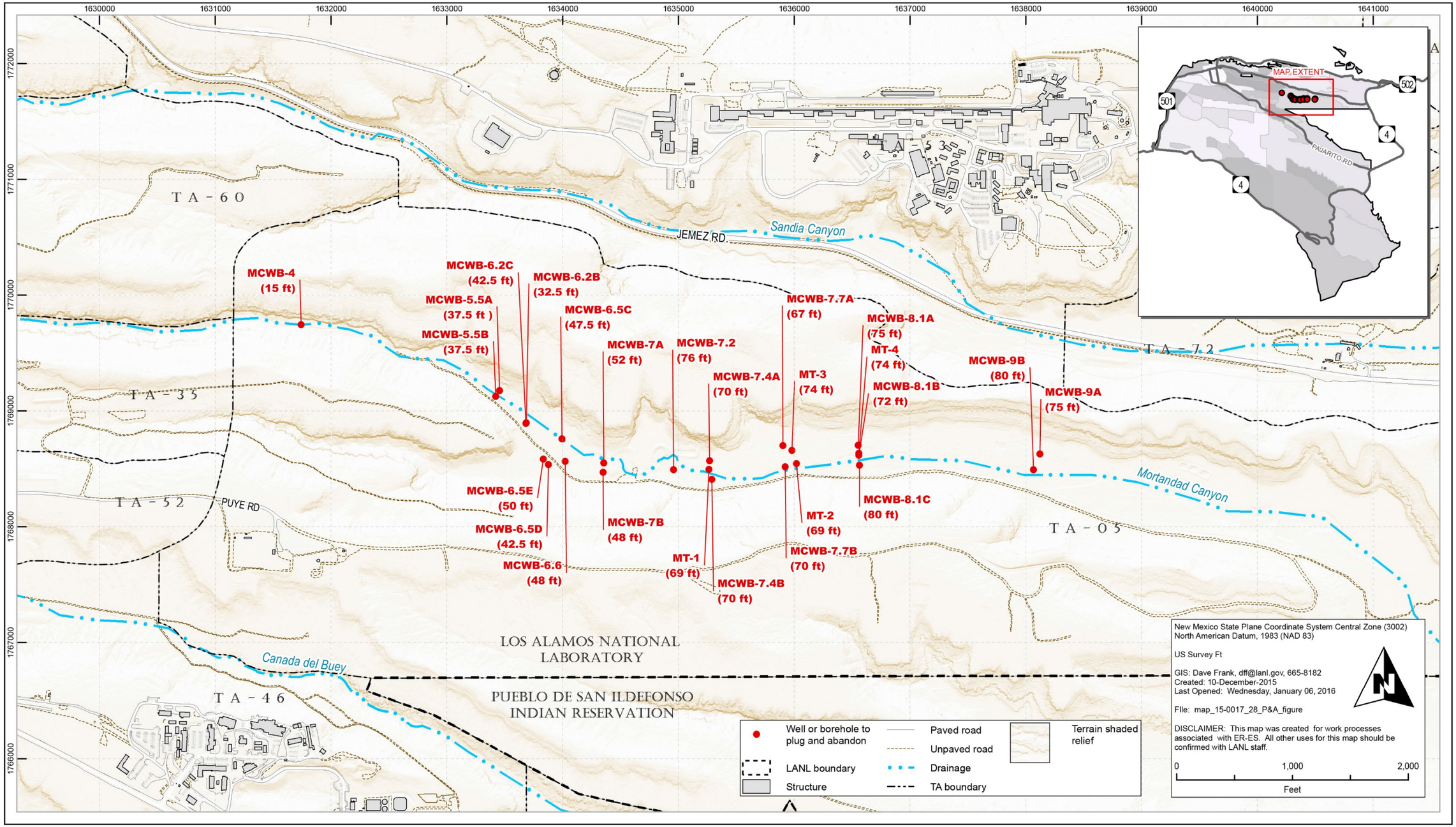

Figure 2.0-1 Locations of wells and boreholes to be abandoned

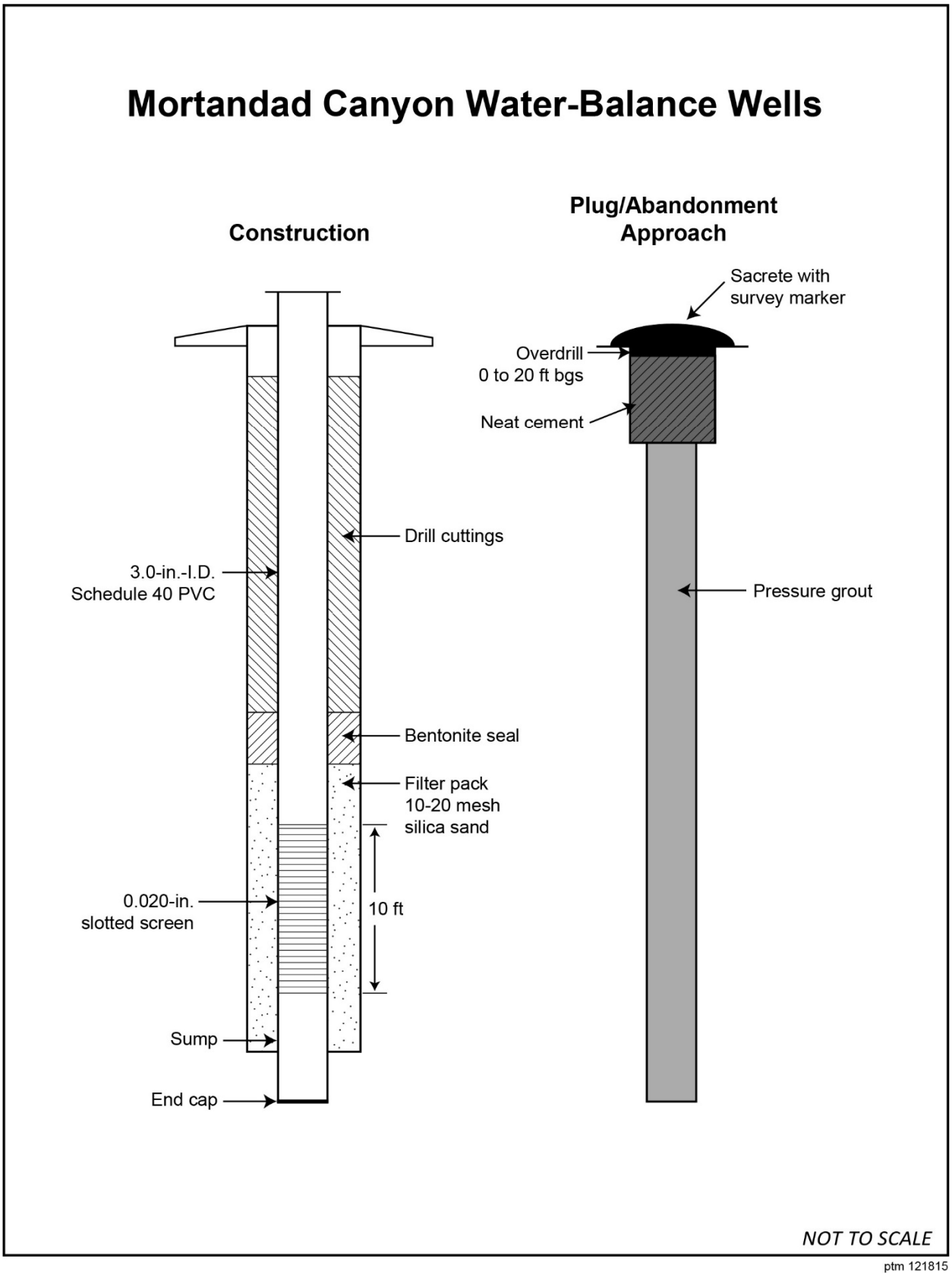

Figure 3.1-1 Mortandad Canyon water balance wells abandonment schematic

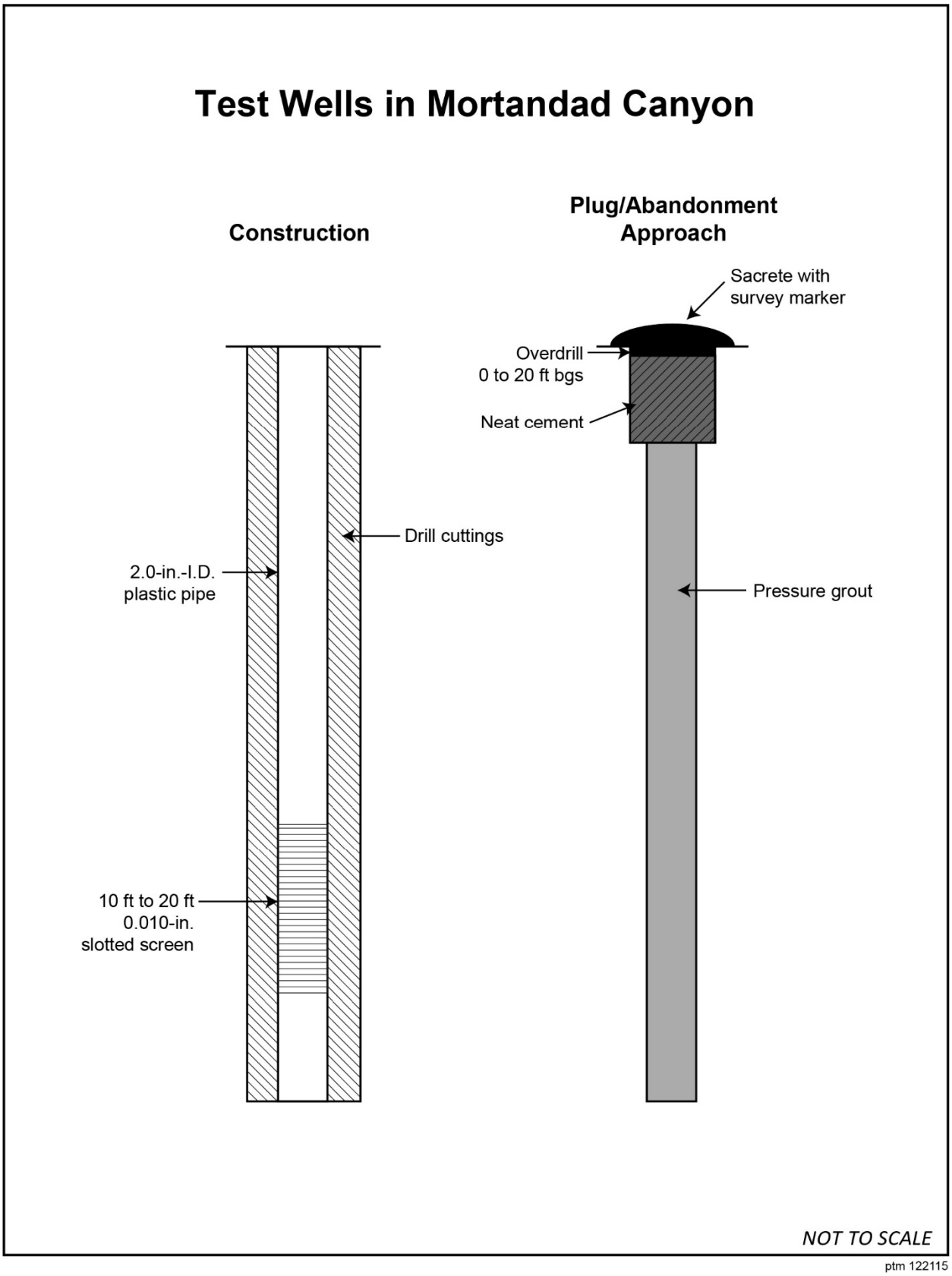

Figure 3.2-1 Test wells in Mortandad Canyon abandonment schematic

Table 2.0-1
Wells for Plugging and Abandonment

Well Name	Depth (ft)	Diameter (in.)	Number of Screens	Screen Length* (ft)	Construction Material	Easting	Northing	Elevation
MT-1	69	2	1	20	Plastic	1635262.86	1768493.96	6811.63
MT-2	69	2	1	10	Plastic	1636019.79	1768544.59	6796.2
MT-3	74	2	1	20	Plastic	1635980.95	1768657.83	6796.65
MT-4	74	2	1	10	Plastic	1636558.75	1768634.37	6783.59
MCWB-4	15	3	1	A	PVC	1631740.56	1769745.66	6893.42
MCWB-5.5A	37.5	3	1	B	PVC	1633455.53	1769176.95	6858.36
MCWB-5.5B	37.5	3	1	B	PVC	1633420.54	1769125.78	6856.89
MCWB-6.2B	32.5	3	1	B	PVC	1633685.09	1768897.84	6848.01
MCWB-6.2C	42.5	3	1	A	PVC	1633682.27	1768893.49	6847.98
MCWB-6.5C	42.5	3	1	B	PVC	1633993.33	1768759.41	6841.02
MCWB-6.5D	42.5	3	1	A	PVC	1633878.05	1768536.19	6843.2
MCWB-6.5E	50	3	1	B	PVC	1633833.36	1768583.81	6843.8
MCWB-6.6	48	3	1	B	PVC	1634020.98	1768565.73	6839.35
MCWB-7A	52	3	1	B	PVC	1634356.62	1768551.02	6831.17
MCWB-7B	48	3	1	B	PVC	1634350.16	1768469.73	6832.45
MCWB-7.2	76	3	1	C	PVC	1634956.96	1768491.86	6818.86
MCWB-7.4A	70	3	1	C	PVC	1635270.33	1768569.46	6812.4
MCWB-7.4B	70	3	1	C	PVC	1635287.73	1768407.84	6813.07
MCWB-7.7A	67	3	1	B	PVC	1635902.25	1768700.71	6798.31
MCWB-7.7B	70	3	1	B	PVC	1635921.84	1768517.26	6798.97
MCWB-8.1A	75	3	1	C	PVC	1636552.36	1768704.12	6785.95
MCWB-8.1B	72	3	1	C	PVC	1636559.97	1768618.31	6783.8
MCWB-8.1C	80	3	1	C	PVC	1636565.71	1768531.74	6785.63
MCWB-9A	75	3	1	C	PVC	1638123.04	1768627.67	6752.11
MCWB-9B	80	3	1	C	PVC	1638069	1768490.99	6753.6

* A = 5-ft screen above end cap; B = 5-ft blank casing above end cap, then 10 ft screen; C = 5-ft blank casing above end cap, then 20-ft screen.