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Los Alamos
NATIONAL LABORATORY
EST. 1943

Environmental Programs
P.O. Box 1663, MS M991
Los Alamos, New Mexico 87545
(505) 606-2337/FAX (505) 665-1812

National Nuclear Security Administration
Los Alamos Site Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
(505) 667-4255/FAX (505) 606-2132

Date: NOV 06 2009
Refer To: EP2009-0578

James Bearzi, 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 Plugging and Abandoning Wells TW-2, TW-2a, and TW-2b

Reference: Letter, Messrs. Gregory and McInroy to Bearzi, dated 10/29/09

Dear Mr. Bearzi:

Enclosed please find two hard copies with electronic files of three separate work plans for plugging and abandoning wells TW-2, TW-2a, and TW-2b. These work plans summarize the methods Los Alamos National Laboratory proposes to use in plugging and abandoning these groundwater monitoring wells. Well abandonment will be consistent with the requirements and guidelines of the "New Mexico Environment Department Monitoring Construction and Abandonment Guidelines" and guidelines in Sections IV.B.1.b.v and X.D (Well Abandonment) of the Compliance Order on Consent. The schedule for completion of field work and reporting was provided in the above-referenced letter.

If you have any questions, please contact Ardyth Simmons at (505) 665-3935 (asimmons@lanl.gov) or Everett Trollinger at (505) 667-0281 (etrollinger@doeal.gov).

Sincerely,

for

Bruce Schappell, Executive Director
Environmental Programs – Recovery Act Projects
Los Alamos National Laboratory

Sincerely,

for

Everett Trollinger, Federal Project Director
Environmental Projects
Los Alamos Site Office

MG/DG/PH/AS:sm

Enclosures: Two hard copies with electronic files –
(1) Work Plan to Plug and Abandon Well TW-2 (LA-UR-09-7267)
(2) Work Plan to Plug and Abandon Well TW-2a (LA-UR-09-7315)
(3) Work Plan to Plug and Abandon Well TW-2b (LA-UR-09-7314)

Cy: (w/enc.)
Neil Weber, San Ildefonso Pueblo
Everett Trollinger, DOE-LASO, MS A316
Hai Shen, DOE-LASO, MS A316
Ted Ball, PMF-SEC, MS M992
Mark Everett, EP-LWSP, MS M992
Ardyth Simmons, EP-LWSP, MS M993
RPF, MS M707 (with two CDs)
Public Reading Room, MS M992

Cy: (Letter and CD only)
Laurie King, EPA Region 6, Dallas, TX
Steve Yanicak, NMED-DOE-OB, MS M894
Kristine Smeltz, EP-WES, MS M992

Cy: (w/o enc.)
Tom Skibitski, NMED-OB, Santa Fe, NM
Annette Russell, DOE-LASO (date-stamped letter emailed)
Michael J. Graham, ADEP, MS M991
Paul Huber, EP-LWSP, MS M992
IRM-RMMSO, MS A150 (date-stamped letter emailed)

Work Plan to Plug and Abandon Well TW-2

Primary Purpose	This work plan summarizes the methods Los Alamos National Laboratory (the Laboratory) proposes to use to plug and abandon groundwater monitoring test well 2 (TW-2), located in Pueblo Canyon, Los Alamos, New Mexico. Well abandonment of TW-2 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). The construction of TW-2 and the methods used to abandon the well are detailed below.
Conceptual Model of TW-2	TW-2 was installed in 1949 to monitor the water in the regional aquifer in Pueblo Canyon downgradient of the waste treatment plant at Technical Area 45. TW-2 was completed to 789 ft, with a slotted screen section from 779 to 789 ft. In 1990, 15 ft of the 6-in. casing and screen was removed, and a 6-in.-inside diameter (I.D.) casing was hung in the well from 0 to 834 ft, with the lower section slotted from 774 to 824 ft. Construction details are as follows: • 0–57 ft: 16-in.-I.D. steel casing • 0–197 ft: 12-in.-I.D. steel casing • 0–519 ft: 10-in.-I.D. steel casing • 0–779 ft: 8-in.-I.D. steel casing • 0–834 ft: 6-in.-I.D. steel casing, with slotted screen section from 774 to 824 ft
Abandonment Methods	All aboveground and belowground appurtenances will be removed, including pumps, transducers, data loggers, control panels, concrete pad, etc. The well will be inspected with a downhole video camera, and a natural gamma log will be collected to document the existing conditions. Based on the available well-completion notes (Purtymun and Swanton 1998, 099096), TW-2 does not have an annular seal or a filter pack around the screen. Completion notes disagree on the exact screen interval; one source places the top of the screen at 774 ft below ground surface (bgs). Completion notes are also unclear about the status of annular seals between strings of casing. Most likely, given TW-2 was installed with a cable-tool rig, there are no seals (e.g., cement) between casing strings. The actual conditions at the well will be determined by the video camera survey and other methods at the start of field activities. Plugging and abandonment at TW-2 will generally take the approach of removing as many of the internal casing strings as possible in order to gain access to outer casing strings for the purpose of perforating and sealing via grouting. Work will take place within the well from inside to outside, working on the smallest diameter casing first. Grouting will take place in stages to mitigate very high hydrostatic pressures that will be present in this telescopic hole, which will be capable of “blowing out” formations. Grouting in stages will also allow time for the grout to set while other work with larger casing strings is performed simultaneously. Casing cutters and perforators will be pneumatic tools run in the hole on drill rods. This approach will require the use of a rotary drilling rig.

Abandonment Methods (continued)	To plug and abandon TW-2, an effort will be made to remove the entire section of 6-in. casing and screen. Because the 6-in. casing was fished out of the hole in 1990 to deepen the hole (and very likely the hole was deepened with 8-in. tooling), it is probable that the entire section of 6-in. casing can be pulled out. If the 6-in. casing string cannot be removed, the screen section will be evaluated via video logging to determine the need for perforating. After screen evaluations are made, the 6-in. casing will be cut off at the bottom of the 8-in. casing at 780 ft bgs and removed from the hole. After the 6-in. casing has been removed, the 8-in. casing will be perforated from 725 to 775 ft bgs. The first grouting sequence will be initiated at this point. The 8-in. casing will be pressure-grouted with a mixture of Portland Type I/II cement and Baroid IDP-381 additive from the bottom to approximately 540 ft bgs using a tremie pipe. This 294-ft interval of grout will have substantial enough hydrostatic pressure to achieve the sealing objective without having too much pressure to potentially blow out the loose Totavi Lentil formation logged at the bottom of the hole. The 8-in. casing will then be cut off at 520 ft bgs and removed from the hole. The 10-in. casing will be perforated from 380 to 420 ft bgs before being cut off at 200 ft bgs and then removed from the hole. The second grouting sequence will be initiated at this point. The previously installed grout will be physically measured with a tag line, and the second lift of grout will be installed from the top of the first lift to approximately 100 ft bgs. No interval of perforation is planned for the 12-in. casing because no lithologic targets in the section are interpreted to pose potential leaking contributions. The 12-in. casing will be cut off at 60 ft bgs and removed from the hole. The 16-in. casing will be perforated from 10 to 30 ft bgs and left in place. The third grouting sequence will be initiated at this point. The previously installed grout will be physically measured with a tag line, and the third lift of grout will be installed from the top of the second lift to approximately 2 ft bgs. Perforating the 16-in. casing will ensure that any alluvial water will be sealed off from the well casing.
Surface Completion	The hole will be cement-grouted to within 2.0 ft of ground surface. A 2-ft × 2-ft concrete surface pad will be installed at ground surface with a brass 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 within 0.5 ft.
Waste Disposal	No sampling will take place during plugging and abandonment of this well. The intent is to reuse and recycle all materials. If some materials cannot be recycled, they will be sampled, characterized, and disposed of in accordance with the waste characterization strategy form that applies to this activity.
Summary Report	A brief report will be prepared detailing the methods used, presenting borehole logs (video and natural gamma), describing the quantities of 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.
Schedule	**Activity** — **Completion Date** Plug and abandon TW-2 — No later than January 31, 2010 Submit report to the New Mexico Environment Department — No later than March 15, 2010

REFERENCE

The following list includes all documents cited in this plan. 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.

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)

Work Plan to Plug and Abandon Well TW-2A

Primary Purpose	This work plan summarizes the methods Los Alamos National Laboratory (the Laboratory) proposes to use to plug and abandon groundwater monitoring test well 2A (TW-2A), located in Pueblo Canyon, Los Alamos, New Mexico. Well abandonment of TW-2A 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). The construction of TW-2A and the methods used to abandon the well are detailed below.
Conceptual Model of TW-2A	Groundwater monitoring well TW-2A was installed in 1949 to monitor intermediate perched groundwater in Pueblo Canyon downgradient of the waste treatment plant at Technical Area 45. Construction details are as follows: • 0–12 ft: 12-in.-inside diameter (I.D.) steel casing • 0–118 ft: 8-in.-I.D. steel casing • 0–128 ft: 6-in.-I.D. steel casing • 128–133 ft: 6-in. diameter screen
Abandonment Methods	All aboveground and belowground appurtenances will be removed, including pumps, transducers, data loggers, control panels, concrete pad, etc. The well will be inspected with a downhole video camera, and a natural gamma log will be collected to document the existing conditions. Based on the available well-completion notes (Purtymun and Swanton 1998, 099096), TW-2A does not have an annular seal or a filter pack around the screen. The actual conditions at the well will be determined by the video camera survey and other methods at the start of field activities. Plugging and abandonment at TW-2A will generally take the approach of removing as many of the internal casing strings as possible in order to gain access to outer casing strings for the purpose of perforating and sealing via grouting. Work will take place within the well from inside to outside, working on the smallest diameter casing first. Grouting will take place in one stage at TW-2A since it is not a particularly deep well, and the hydrostatic pressure associated with a single lift of grout will not be substantial enough to "blow out" the formations within the perforated intervals. Casing cutters and perforators will be pneumatic tools run in the hole on drill rods. This approach will require the use of a rotary drilling rig. To plug and abandon TW-2A, the screened interval will be evaluated to determine the need for either ripping or perforating. An attempt will be made to remove the entire 20-ft section of 6-in. casing and screen at the bottom of the well. Based on the age of the well, it is difficult to predict the outcome of this approach. If the 20-ft section of 6-in. casing and screen breaks or cannot be removed, the entire 20-ft section will be perforated. The 8-in. casing will be perforated in two intervals: 10 to 30 ft below ground surface (bgs) and 95 to 115 ft bgs. An attempt will be made to remove the 12-ft piece of 12-in. casing at the surface. This activity may require minor excavation. Removal of the 12-in. surface casing is desirable in order to eliminate any potential conduit for alluvial water (alluvium logged to 11 ft bgs). The top of the 8-in. casing will be cut off approximately 2 ft bgs. The entire well will be pressure-grouted in one continuous lift with a mixture of Portland Type I/II cement and Baroid IDP-381 from the bottom to approximately 2 ft bgs using a tremie pipe to force cement through the well screen and perforated intervals and into the formation.

Surface Completion	The hole will be cement-grouted to within 2.0 ft of ground surface. A 2-ft × 2-ft concrete surface pad will be installed at ground surface with a brass 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 within 0.5 ft.	
Waste Disposal	No sampling will take place during plugging and abandonment of this well. The intent is to reuse and recycle all materials. If some materials cannot be recycled, they will be sampled, characterized, and disposed of in accordance with the waste characterization strategy form that applies to this activity.	
Summary Report	A brief report will be prepared detailing the methods used, presenting borehole logs (video and natural gamma), quantities of 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. The proposed schedule for completion of well abandonment and reporting follows.	
Schedule	**Activity**	**Completion Date**
	Plug and abandon TW-2A	No later than January 31, 2010
	Submit report to the New Mexico Environment Department	No later than March 15, 2010

REFERENCE

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Work Plan to Plug and Abandon Well TW-2B

Primary Purpose	This work plan summarizes the methods Los Alamos National Laboratory (the Laboratory) proposes to use to plug and abandon groundwater monitoring test well 2B (TW-2B), located in Pueblo Canyon, Los Alamos, New Mexico. Well abandonment of TW-2B 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). The construction of TW-2B and the methods used to abandon the well are detailed below.
Conceptual Model of TW-2B	Groundwater monitoring well TW-2B was installed in 1949 in an attempt to isolate a zone of perched water above the regional aquifer identified during the drilling of Test Well 2 in Pueblo Canyon. When TW-2B was drilled, the perched aquifer was either not present or was of such limited extent that it could not be located. Construction details are as follows: • 0–112 ft: 12-in.-inside diameter (I.D.) steel casing • 0–130 ft: 6-in.-I.D. steel casing • 130–225 ft: (potential) open hole
Abandonment Methods	There are no reported aboveground or belowground appurtenances to be removed. The well will be inspected with a downhole video camera, and a natural gamma log will be collected to document the existing conditions. Based on the available well-completion notes (Purtymun and Swanton 1998, 099096), TW-2B does not have an annular seal or a screened interval. Completion notes are not in agreement on the location of the 6-in. casing at TW-2B. One source places the bottom of the 6-in. casing at 223 ft below ground surface (bgs) and another at 130 ft bgs, with the total depth of 225 ft bgs having been achieved in an open hole. Plugging and abandonment at TW-2B will generally take the approach of removing as many of the internal casing strings as possible in order to gain access to outer casing strings for the purpose of perforating and sealing via grouting. Work will take place within the well from inside to outside, working on the smallest diameter casing first. Grouting will take place in one stage at TW-2B because it is not a particularly deep well, and the hydrostatic pressure associated with a single lift of grout will not be substantial enough to "blow out" the formations within the perforated intervals. Casing cutters and perforators will be pneumatic tools run in the hole on drill rods. This approach will require the use of a rotary drilling rig. TW-2B will be abandoned by first determining the status of the 6-in. casing. An attempt will be made to remove the entire 130-ft string of 6-in. casing. If the 6-in. casing cannot be removed, it will be cut off at approximately 110 ft bgs near the bottom of the 12-in. casing string. After the 6-in. casing is removed, the 12-in. casing will be perforated in two intervals: 10 to 30 ft bgs and 80 to 100 ft bgs. The entire well will be pressure-grouted in one continuous lift with a mixture of Portland Type I/II cement and Baroid IDP-381 from the bottom to approximately 2 ft bgs using a tremie pipe to force cement through the perforated intervals and into the formation and to seal the open-hole portion.
Surface Completion	The hole will be cement-grouted to within 2.0 ft of ground surface. A 2-ft × 2-ft concrete surface pad will be installed at ground surface with a brass 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 within 0.5 ft.
Waste Disposal	No sampling will take place during plugging and abandonment of this well. The intent is to reuse and recycle all materials. If some materials cannot be recycled, they will be sampled, characterized, and disposed of in accordance with the waste characterization strategy form that applies to this activity.

Summary Report	A brief report will be prepared detailing the methods used, presenting borehole logs (video and natural gamma), quantities of 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.	
Schedule	**Activity**	**Completion Date**
	Plug and abandon TW-2B	No later than January 31, 2010
	Submit report to the New Mexico Environment Department	No later than March 15, 2010

REFERENCE

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