



National Nuclear Security Administration

Sandia Site Office

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ENTERED



CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. James Bearzi,
Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road, Bldg. E
Santa Fe, NM 87505

JUN 06 2008



Dear Mr. Bearzi:

On behalf of Sandia Corporation and the Department of Energy (DOE), DOE is submitting a Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan. These plans are prepared as identified requirements under Section VIII.A and C of the Compliance Order on Consent (COoC). The wells to be plugged and abandoned are groundwater surveillance wells PL-1 and PL-3. These wells are part of the groundwater surveillance network for the SNL/NM Groundwater Protection Program as established pursuant to DOE Order 450 "Environmental Protection Program." The wells are not associated with compliance activities associated with any SWMU, or AOC, at SNL/NM. Water levels in PL-3 have dropped to the bottom of the well screen and representative sample collection is no longer possible. Well PL-1 is a 2-inch well that is not suitable for sampling and should be plugged as a groundwater protection measure.

The plugging, abandonment, and replacement work is scheduled for 2008 as funds become available.

If you have any questions regarding this submittal, please contact me at (505) 845-6036, or Dan Pellegrino of my staff at (505) 845-5398.

Sincerely,

Patty Wagner
Manager

Enclosure:

cc w/enclosure:

W. Moats, NMED (Via Certified Mail)
L. King, EPA, Region 6 (Via Certified Mail)
T. Skibitski, NMED-OB
B. Birch, NMED-OB



James Bearzi

(2)

JUN 06 2008

cc w/o enclosure:

A. Blumberg, SNL/NM, Org. 11100, MS 0141

T. Cooper, SNL/NM, Org. 4133, MS 1042

P. Freshour, SNL/NM, Org. 6765, MS 1089

F. Lauffer, SNL/NM, Org. 1042, MS 1042

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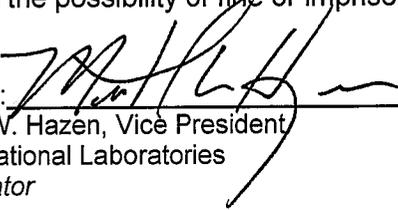
CERTIFICATION STATEMENT

Document title:

1. "Monitoring Well Plug and Abandonment Plan: Decommissioning of Groundwater Well PL-1," Groundwater Protection Program, Sandia National Laboratories, New Mexico – Stacy Griffith, 6765
2. "Monitoring Well Plug and Well Construction Plan: Decommissioning of Groundwater Monitoring Well PL-3, Installation of Replacement Groundwater Monitoring Well PL-4," Groundwater Protection Program, Sandia National Laboratories, New Mexico Stacy Griffith, 6765

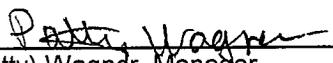
Document author: Stacy Griffith, 6765

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

Signature: 
Michael W. Hazen, Vice President
Sandia National Laboratories
Co-Operator

5 May 2008
Date

and

Signature: 
Ms. Patrice (Patty) Wagner, Manager
Sandia Site Office
U.S. Department of Energy
National Nuclear Security Administration
Owner and Co-Operator

6-6-08
Date

Monitoring Well Plug and Abandonment Plan

**Decommissioning of
Groundwater Monitoring Well PL-1**

**Groundwater Protection Program
Sandia National Laboratories, New Mexico**

Sandia is a multiprogram laboratory operated by Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin Corporation, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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1.0 PROJECT AND SITE INFORMATION

Task Description: Sandia National Laboratories/New Mexico (SNL/NM) decommissioning with plug and abandonment of one groundwater monitoring well.

Project Leader/Department No.: Franz Lauffer/4133

Scheduled Start Date: August 2007

Estimated Completion Date: August 2007

Operations/Technical Area: Northwest of Technical Area III

2.0 REGULATORY CRITERIA

This Plug and Abandonment (P&A) Plan outlines the activities and procedures to decommission existing groundwater monitoring well PL-1.

Requirements for well P&A can be found in New Mexico Office of the State Engineer (OSE) "Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells" under section 19.27.4.30 "Well Drilling – Non-Artesian Well Requirements (NM OSE August 2005):

To meet these regulatory requirements, the following tasks will be completed at SNL/NM subject to regulatory approval:

- Decommission well PL-1 as it was installed as a pilot well for PL-2 and PL-3; it is no longer needed for the intended purpose (identify water-producing zone and monitoring of groundwater levels).
- Submit this P&A Plan to the OSE for review and approval.
- Use a licensed well driller and approved materials to seal the wells so that they cannot act as a conduit for the migration of potential contaminants from the ground surface to the saturated zone.
- Upon completion of the P&A activities, submit a plugging record to the OSE.

3.0 EXISTING WELL INFORMATION

Groundwater level monitoring well PL-1 is proposed for decommissioning in this P&A Plan. PL-1 was installed in late 1994 and is located approximately 4000 feet (ft) northwest of Technical Area III (Figure 1). The monitoring well completion diagram is presented in Attachment 1 and the pertinent well completion information is summarized in Table 1.

Table 1 PL-1 Completion Information

	Groundwater Level Monitoring Well PL-1
Total Depth	480 ft bgs
Screened Interval	440-470 ft bgs
Nominal Well Diameter	2 inches
Current Water Level	Assumed to be approximately 464 bgs, based on water level in adjacent PL-3. (April 4, 2007)
Construction Materials	Polyvinyl chloride (PVC) riser pipe and screen, carbon steel protective surface casing and guard posts, and a concrete well pad.
Water-bearing Strata	Groundwater occurs in unconsolidated well-graded sands and gravelly sands of the upper Santa Fe Group that have relatively high hydraulic conductivities.
Reason for Decommissioning	<ul style="list-style-type: none"> • No longer used for intended purpose • To prevent migration of contaminants • The annular seal appears to be intact.

Bgs = Below ground surface.

Ft = Feet.

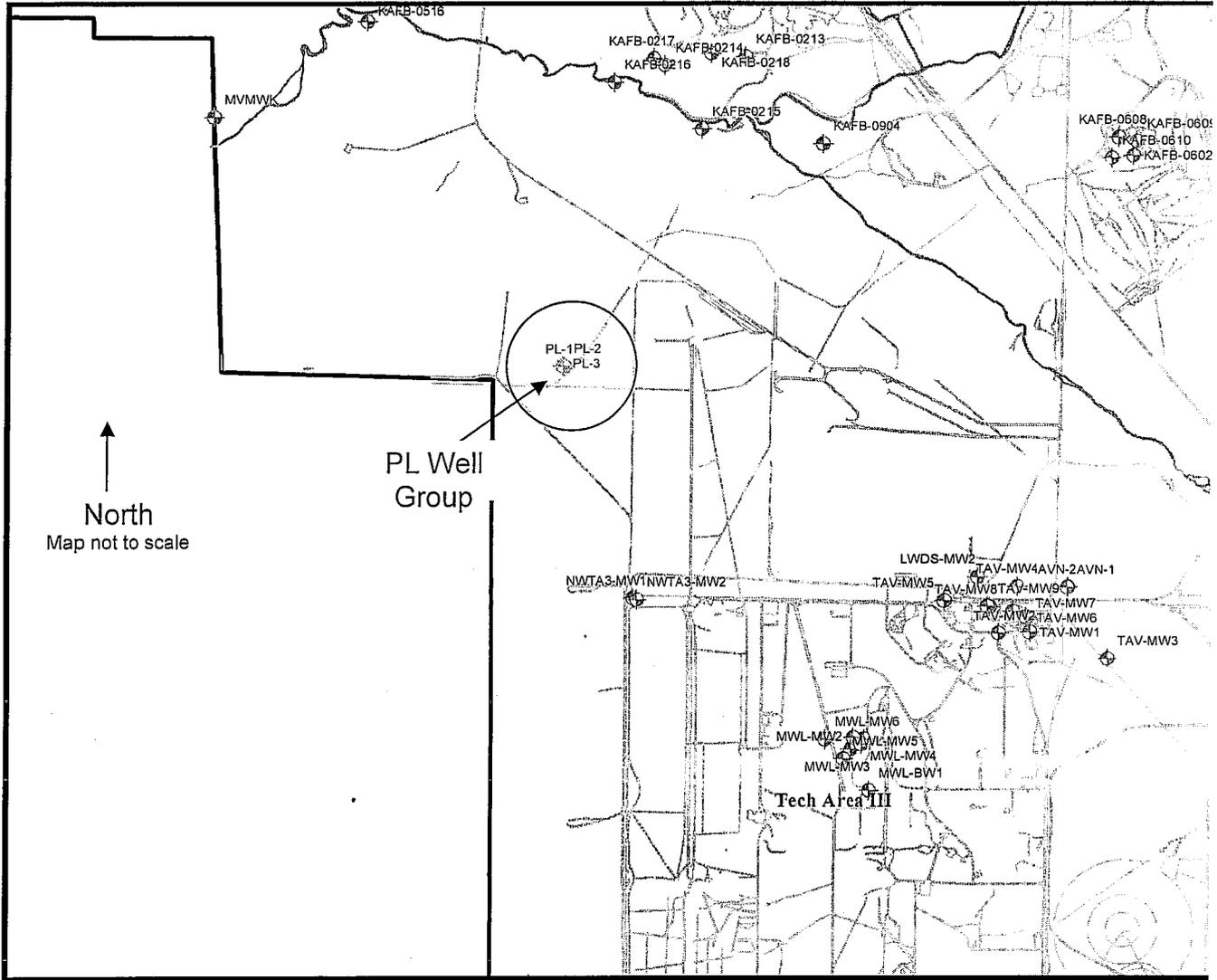


Figure 1 General Location Map for Groundwater Level Monitoring Well PL-1.

4.0 PLUGGING AND ABANDONMENT

Based on the requirements established by the OSE, the groundwater monitoring well PL-1 will be decommissioned. Applicable Field Operating Procedures (FOPs) and Administrative Operating Procedures (AOPs) are listed in Table 2; however, this site-specific P&A Plan should be used as the primary guidance in the field.

Table 2 Applicable Operating Procedures

Number of Procedure	Title of Procedure
FOP 94-01	Safety Meetings, Inspections, and Pre-Entry Briefings Rev. 1, 12/16/96
FOP 94-25	Documentation of Field Activities, Rev. 0, 11/4/94
FOP 94-26	General Equipment Decontamination, Rev. 1, 2/20/97
FOP 94-38	Drilling Methods and Drill Site Management, Rev. 0, 4/14/94
FOP 94-42	Integration of the design, Installation, Rehabilitation, and Decommissioning of Environmental Restoration Wells, Rev. 1, 5/31/94
FOP 94-43	Decommissioning Of Wells, Rev 0, 5/31/94
FOP 94-57	Decontaminating Drilling and Other Field Equipment, Rev. 0, 5/31/94
FOP 94-68	Field Change Control, Rev. 2 (in revision)
FOP 94-69	Personnel Decontamination (Level D, C, and B Protection), Rev. 1, 1/23/98
AOP 94-24	System and Performance Audits, Rev. 0, 1/12/95
AOP 94-25	Deficiency Reporting, Rev. 0, 1/12/95
AOP 95-16	Administrative Operating Procedure for Sample Management and Custody, Rev. 1, 4/18/96

4.1 GOAL

The goal for decommissioning the monitoring well is to eliminate the potential of this well to act as conduit for the migration of potential contamination to groundwater. The well is constructed with an annular bentonite seal from the screen to the surface casing. The well materials and annular seals are not believed to pose a threat to groundwater, and therefore the casing will be backfilled in place with proper sealing materials.

4.2 OBJECTIVE

The objective is to seal this monitoring well in such a manner that there is reasonable certainty that the abandonment has adequately eliminated the potential for cross-communication between the land surface and the aquifer, and the potential for downward migration of potential contaminants through the borehole annulus to the aquifer. All grouting techniques and grout mixtures used during decommissioning will minimize grout intrusion into the native formation.

4.3 IMPLEMENTATION

General activities for the implementation of the P&A include:

- Remove all monitoring well surface completion features
- Backfill the casing with well-plugging materials
- Construct a new surface pad and monument at each well

SNL/NM personnel and the selected drilling contractor will remove all surface completion features, such as guard posts, concrete well pads, and surface protective casing. Care will be taken to prevent materials from falling down the well casing and possibly causing a downhole obstruction. The well will be abandoned with casing left in place, and the well casing will be cut off at approximately 5 ft bgs.

The well screen and blank well casing will be sealed by lowering a tremie pipe to the base of the well casing (below the base of the screen) and injecting the plug material (bentonite grout) using a diaphragm or equivalent pump system. The plug material will be filled to within 5 ft of the ground surface and allowed to set overnight. If the level of the plug material in the well casing drops overnight, additional bentonite grout will be added to again reach within 5 ft of ground level.

Once the well has been properly plugged, the decommissioning process will be completed by placing concrete in the upper 5 ft of the well/borehole and installing a concrete slab on the surface. The concrete pad will be approximately 4 inches thick with a 2 ft by 2 ft area, constructed so that the surface of the finished concrete slab will be 1 to 2 inches above the natural ground surface. A brass marker containing the well name and date of decommissioning will be set in the concrete pad at each site.

5.0 EQUIPMENT DECONTAMINATION

The drilling rig and related equipment will be decontaminated at the decontamination pad in Technical Area III prior to the beginning of drilling operations. Decontamination of equipment will also be required after completing the well. Decontamination waste will be kept to a minimum and containerized in drums placed on spill control pallets at the decontamination pad.

6.0 HEALTH AND SAFETY

Level D personal protective equipment is required for all drilling operations. Health and Safety records associated with drilling and development personnel will be maintained on site and will be available for the duration of drilling activities. All field personnel will operate under an SNL/NM Health and Safety Plan (HASP) and will have SNL/NM-required training including 40-Hr OSHA HAZWOPER and subsequent yearly refresher courses. An SNL/NM Subject Matter Expert will perform a safety inspection of the drill rig before drilling commences.

7.0 PRE-FIELD ACTIVITIES

Pre-field activities that must be completed prior to work may include:

- Preparation of the Statement of Work
- SNL/NM dig permit request and approval
- HASP preparation, review, and signatures
- National Environmental Policy Act (NEPA) review and signatures
- Waste Management Plan preparation
- Field checklist completion, review, and approval
- Readiness review meeting

8.0 MOBILIZATION AND SITE SETUP

SNL/NM personnel will ensure that access to the site has been established. Coordination with Kirtland Air Force Base Security for base access.

9.0 REPORTING

Based on the requirements established by the OSE and SNL/NM FOPs, the field activities associated with decommissioning the monitoring well will be documented and compiled into a final P&A Report.

10.0 DECOMMISSIONING RECORDS

All decommissioning field activities will be documented in a field log book per guidance in FOP 94-25. Upon completion of decommissioning of a well, the P&A Report will document all site activities and provide the final Groundwater Well Abandonment Diagram (Attachment 2) and the Well Plugging and Abandonment form (Attachment 3). These will be used to assure that all records are completed, approved, and submitted for proper records management. The following list of documents and records that are generated as part of the decommissioning process will be provided to the SNL/NM Well File Coordinator who, in turn, will submit them to the SNL/NM Customer-Funded Records Center:

- Monitoring Well Plugging and Abandonment Request
- Well Plugging and Abandonment Form
- Site-Specific Well Plugging and Abandonment Work Plan
- Site-Specific Well Plugging and Abandonment Report

- Plugging and Abandonment Documentation and Approval Checklist
- Waste Management Plan
- Field Log Book
- Detailed as-built diagram

All decommissioning activities performed at SNL/NM will be accurately and concisely documented in a final P&A Report to be submitted to the OSE. The P&A Report will contain a brief narrative describing actual work performed at the site and any variances to the site-specific P&A Plan. Information to be contained in the P&A Report include: daily field activity notes, all materials used, a final well abandonment diagram, and documentation of notification of SNL/NM GIS group and the appropriate regulatory agencies.

Further P&A reporting elements are required by the OSE (OSE August 2005). SNL/NM personnel and the licensed well driller (contractor) will submit a plugging record with the state engineer no later than twenty (20) days after completion of the plugging. The record will include the following elements:

- Name and address of the well owner
- Well driller's name and license number
- Name of each drill rig supervisor that supervised the well plugging
- State engineer file number for the well (if available)
- Location of the well (reported in New Mexico state plane coordinates to ± 0.01 ft)
- Dates when plugging began/concluded
- Plugging material(s) used
- Depth of the well
- Size and type of casing
- Location of perforations
- Location of the sanitary seal
- Completed well log with depth and thickness of all strata plugged, including whether each stratum was water bearing

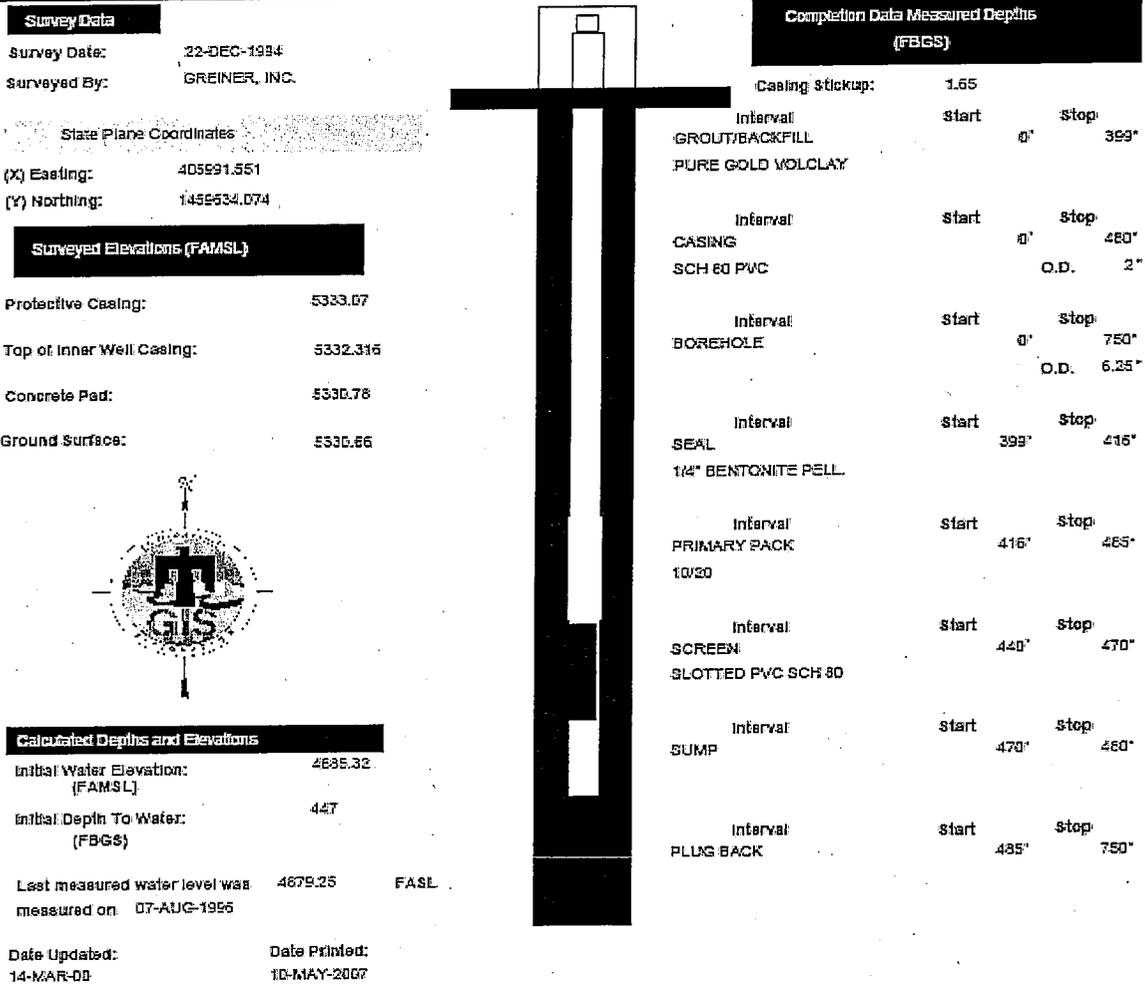
11.0 REFERENCES

OSE August 2005, "Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells" New Mexico Office of the State Engineer, August 2005.

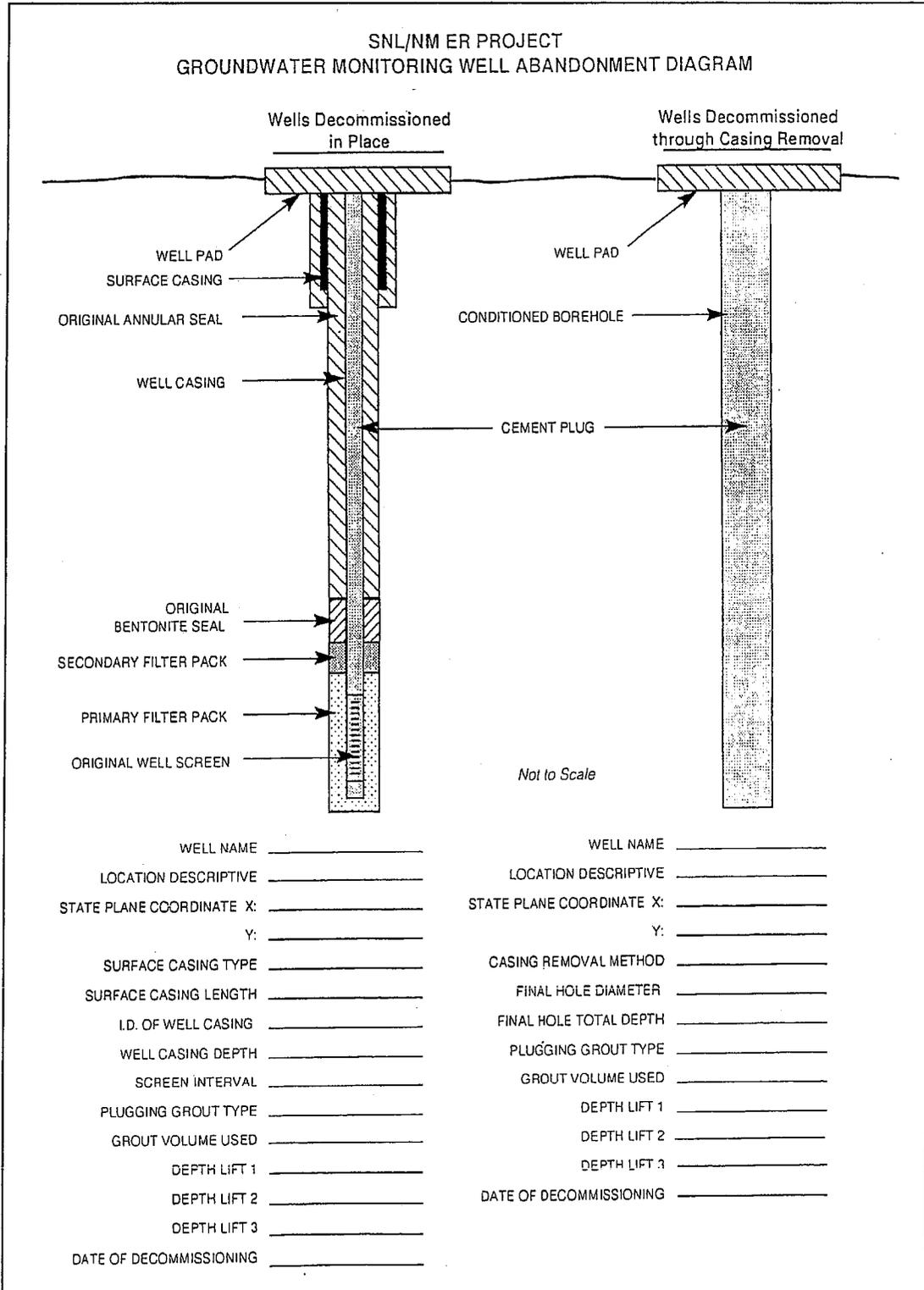
Attachment 1 Monitoring Well Completion Diagram for PL-1

WELL DATABASE SUMMARY SHEET

Project Name:	SWHC	Geo Location:	KAFB WEST BOUNDARY
ER ADS #:	1330	Well Completion Date:	28-OCT-1994
Well Name:	PL-1	Completion Zone:	SANDY GRAVEL
Owner Name:	SNL/NM	Formation of Completion:	SANTA FE GROUP
Date Drilling Started:	15-OCT-1994	Well Comment:	PIEZOMETER
Drilling Contractor:	USGS		
Drilling Method:	MUD ROTARY		
Borehole Depth:	750		
Casing Depth:	480		



Attachment 2 Groundwater Well Abandonment Diagram



Attachment 3 Well Plug and Abandonment Form

SNL/NM ER PROJECT
WELL PLUGGING AND ABANDONMENT FORM

Page 1 of 1

1. Preabandonment Well Specifics:
- a. Well Identification _____
 - b. Location (geographic description and state plane coordinates) _____
 - c. Reported Well Depth (feet) _____
 - d. Field Well Depth (feet) _____
 - e. Screened Intervals(s) (feet) _____
 - f. Screen Diameter(s) (inches) _____
 - g. Screen Type(s) (SS or PVC, etc.) _____
 - h. Casing Diameter(s) (inches) _____
 - i. Casing Type (PVC, steel, etc.) _____
 - j. Artesian or Nonartesian Aquifer _____

2. Reason for Abandonment: _____

3. Abandonment Specifics:
- a. Date Abandonment Started _____
 - b. Date Abandonment Completed _____
 - c. ID Number of Field Log Book Used _____
 - d. Site Personnel _____
 - e. Drilling Method Used _____
 - f. Grout Used _____
 - g. Casing Removed (Y or N) _____
 - h. Concrete Pad Inscription _____

- j. Briefly Describe Abandonment Method: _____

- k. Disposition of Materials Removed From Well: _____

4. Comments or Problems Encountered: _____

Completed by: _____
Printed Name Signature Date

Subcontractor: _____

Drilling Contractor: _____ License No.: _____

**Monitoring Well Plug and Well Construction Plan:
Decommissioning of Groundwater Monitoring Well PL-3
Installation of Replacement Groundwater Monitoring Well
PL-4**

**Groundwater Protection Program
Sandia National Laboratories, New Mexico**

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1.0 PROJECT AND SITE INFORMATION

Task Description: Sandia National Laboratories/New Mexico (SNL/NM) decommissioning with plug and abandonment of one groundwater monitoring well, and installation of one replacement groundwater monitoring well.

Project Leader/Department No.: Franz Lauffer/4133
Scheduled Start Date: August 2007
Estimated Completion Date: August 2007
Operations/Technical Area: Northwest of Technical Area III

2.0 REGULATORY CRITERIA

This Plug and Abandonment (P&A) Plan outlines the activities and procedures to decommission existing groundwater monitoring well PL-3 and install replacement groundwater monitoring well PL-4.

Requirements for well P&A can be found in New Mexico Office of the State Engineer (OSE) "Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells" under section 19.27.4.30 "Well Drilling – Non-Artesian Well Requirements (NM OSE August 2005):

To meet these regulatory requirements, the following tasks will be completed at SNL/NM subject to regulatory approval:

- Decommission well PL-3 as it no longer provides representative groundwater samples due to falling water levels and insufficient productivity.
- Submit this P&A Plan to the OSE for review and approval.
- Use a licensed well driller and approved materials to seal the wells so that they cannot act as a conduit for the migration of potential contaminants from the ground surface to the saturated zone.
- Upon completion of the P&A activities, submit a plugging record to the OSE

3.0 EXISTING WELL INFORMATION

Groundwater monitoring well PL-3 is proposed for decommissioning in this P&A Plan. PL-3 was installed in late 1994 and is located approximately 4000 feet (ft) northwest of Technical Area III (Figure 1). The monitoring well completion diagram is presented in Attachment 1 and the pertinent well completion information is summarized in Table 1.

Table 1 PL-3 Completion Information

	Groundwater Monitoring Well PL-3
Total Depth	475 ft bgs (4865 ft amsl)
Screened Interval	445-465 ft bgs
Nominal Well Diameter	4 inches
Current Water Level	464 ft bgs (April 4, 2007)
Construction Materials	Polyvinyl chloride (PVC) riser pipe and screen, carbon steel protective surface casing and guard posts, and a concrete well pad.
Water-bearing Strata	Groundwater occurs in unconsolidated well-graded sands and gravelly sands of the upper Santa Fe Group that have relatively high hydraulic conductivities.
Reason for Decommissioning	<ul style="list-style-type: none"> • The regional water table has dropped to within a foot of the bottom of the screened interval. • There is no evidence that suggests the annular seal is compromised.

amsl = Above mean sea level.

bgs = Below ground surface.

ft = Feet.

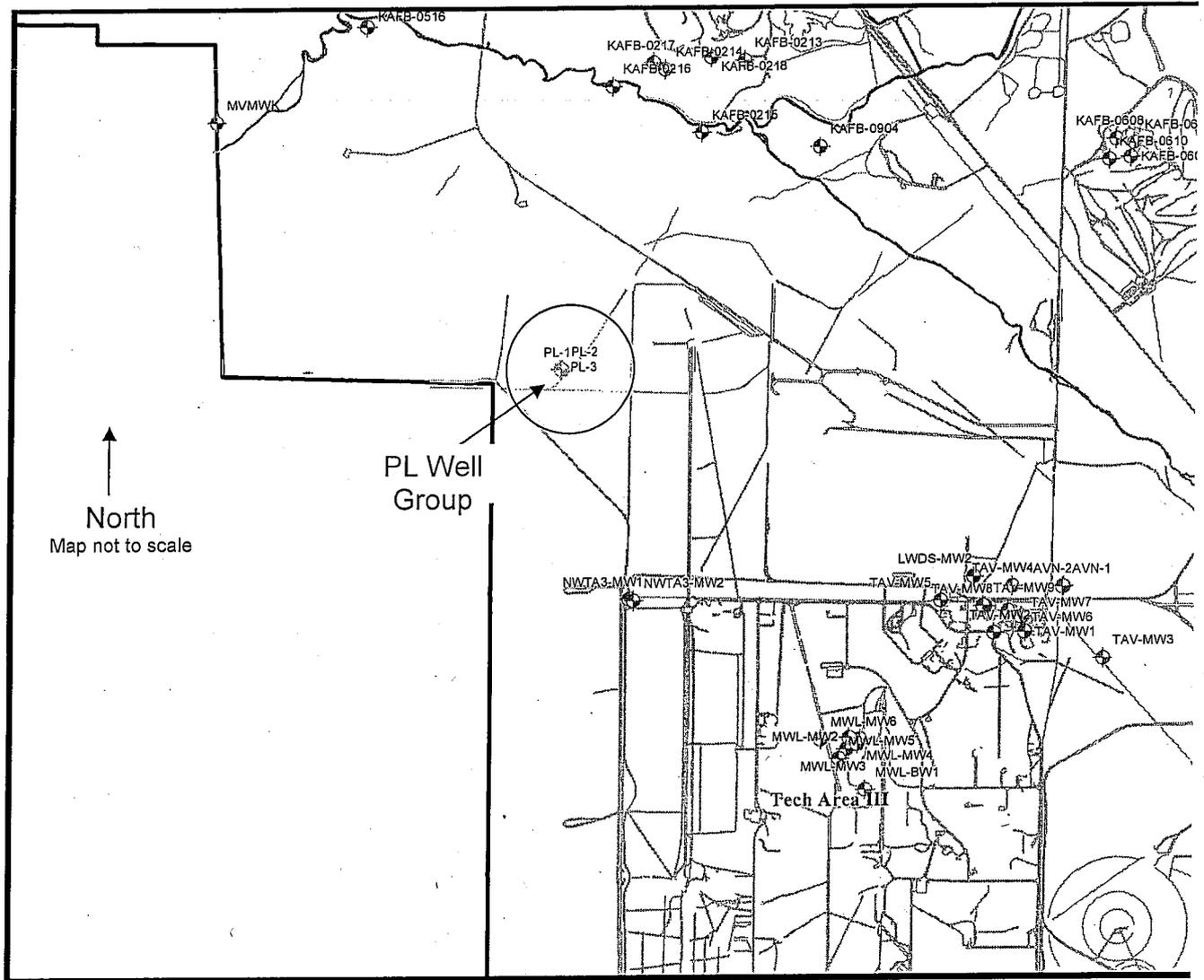


Figure 1 General Location Map for Groundwater Monitoring Well PL-3.

4.0 PLUGGING AND ABANDONMENT

Based on the requirements established by the OSE, the groundwater monitoring well PL-3 will be decommissioned. Applicable Field Operating Procedures (FOPs) and Administrative Operating Procedures (AOPs) are listed in Table 2; however, this site-specific P&A Plan should be used as the primary guidance in the field.

Table 2 Applicable Operating Procedures

Number of Procedure	Title of Procedure
FOP 94-01	Safety Meetings, Inspections, and Pre-Entry Briefings Rev. 1, 12/16/96
FOP 94-05	Borehole Lithologic Logging, Rev. 0, 2/10/94
FOP 94-25	Documentation of Field Activities, Rev. 0, 11/4/94
FOP 94-26	General Equipment Decontamination, Rev. 1, 2/20/97
FOP 94-28	Health and Safety Monitoring of Organic Vapors (FID and PID), Rev. 2, 4/27/97
FOP 94-38	Drilling Methods and Drill Site Management, Rev. 0, 4/14/94
FOP 94-41	Well Development, Rev. 0, 11/21/94
FOP 94-42	Integration of the design, Installation, Rehabilitation, and Decommissioning of Environmental Restoration Wells, Rev. 1, 5/31/94
FOP 94-43	Decommissioning Of Wells, Rev 0, 5/31/94
FOP 94-45	Designing and Installing Groundwater Monitoring Wells, Rev. 0, 5/31/94
FOP 94-57	Decontaminating Drilling and Other Field Equipment, Rev. 0, 5/31/94
FOP 94-68	Field Change Control, Rev. 2 (in revision)
FOP 94-69	Personnel Decontamination (Level D, C, and B Protection), Rev. 1, 1/23/98
AOP 94-24	System and Performance Audits, Rev. 0, 1/12/95
AOP 94-25	Deficiency Reporting, Rev. 0, 1/12/95
AOP 95-16	Administrative Operating Procedure for Sample Management and Custody, Rev. 1, 4/18/96

4.1 GOAL

The goal for decommissioning the monitoring well is to eliminate the potential of this well to act as conduit for the migration of potential contamination to groundwater. The well materials and annular seals are not believed to pose a threat to groundwater, and therefore will be backfilled in place with proper sealing materials.

4.2 OBJECTIVE

The objective is to seal this monitoring well in such a manner that there is reasonable certainty that the abandonment has adequately eliminated the potential for cross-communication between the land surface and the aquifer, and the potential for downward migration of potential contaminants through the borehole annulus to the aquifer. All grouting techniques and grout mixtures used during decommissioning will minimize grout intrusion into the native formation.

4.3 IMPLEMENTATION

General activities for the implementation of the P&A include:

- Remove all monitoring well surface completion features
- Backfill the casing with well-plugging materials
- Construct a new surface pad and monument at each well

SNL/NM personnel and the selected drilling contractor will remove all surface completion features, such as guard posts, concrete well pads, and surface protective casing. Care will be taken to prevent materials from falling down the well casing and possibly causing a downhole obstruction. The well will be abandoned with casing left in place, and the well casing will be cut off at approximately 5 ft bgs.

The well screen and blank well casing will be sealed by lowering a tremie pipe to the base of the well casing (below the base of the screen) and injecting the plug material (bentonite grout) using a diaphragm or equivalent pump system. The plug material will be filled to within 5 ft of the ground surface and allowed to set overnight. If the level of the plug material in the well casing drops overnight, additional bentonite grout will be added to again reach within 5 ft of ground level.

Once the well has been properly plugged, the decommissioning process will be completed by placing concrete in the upper 5 ft of the well/borehole and installing a concrete slab on the surface. The concrete pad will be approximately 4 inches thick with a 2 ft by 2 ft area, constructed in the ground so that the surface of the finished concrete slab will be 1 to 2 inches above the natural ground surface. A brass marker containing the well name and date of decommissioning will be set in the concrete pad at each site.

5.0 MONITORING WELL INSTALLATION

A replacement monitoring well (PL-4) will be installed after PL-3 has been decommissioned.

5.1 OBJECTIVE

Install a 5-inch nominal diameter PVC casing replacement monitoring well to provide representative groundwater samples. The replacement monitoring well borehole will be drilled using Air-Rotary Casing-Hammer (ARCH) drilling methods at a location a minimum of 25 ft away from existing PL-3 well location.

5.2 IMPLEMENTATION

Applicable FOPs and AOPs are listed in Table 1; however, this site-specific plan should be used as the primary guidance in the field.

5.2.1 BOREHOLE DRILLING

The ARCH drilling method will use environmentally-friendly lubricants and will be able to penetrate highly variable lithologies such as cobbles, boulders, gravel, sand, clay, and caliche while maintaining an open, competent borehole. The geology of the borehole will be logged during drilling. The total depth of the borehole will be determined by the SNL/NM field geologist, but the depths are anticipated to be 30 to 35 ft deeper than the original well. The depth of the first encounter with regional groundwater will be documented during drilling. The borehole diameter will be at a minimum 4 inches greater than the well casing.

Minimal water (but no other foams/liquids) in the form of "mist" may be introduced into the borehole to aid in the removal of cuttings. Waste generation will be kept to a minimum. Borehole cuttings will be contained within an area adjacent to the well. Water produced from the well during drilling or development will be contained in 55-gallon drums and placed on spill control pallets.

Based on the current conditions in PL-3 and the most recent groundwater level measurements (April 2007), monitoring well PL-4 is anticipated to be drilled to approximately 494 ft bgs. The well screen for PL-4 will be set with approximately 5 ft of screen situated above the static water level. The anticipated depth to water at this location is approximately 464 ft bgs; therefore, the screen completion interval is expected to be approximately 459 to 489 ft bgs with a 5-ft sump placed below the screen.

5.2.2 WELL CONSTRUCTION

The monitoring well will be completed as specified in this plan. The water-table monitoring well will be installed through the temporary steel drive casing (nominal 10-inch diameter), and completed using 5-inch inner diameter, flush threaded, PVC Schedule-80 water well casing. No solvents, cleaners, or lubricants will be used for construction of the monitoring well. The casing will be delivered pre-cleaned and

bagged, or steam-cleaned on site prior to installation. To preserve the integrity of the well materials, the well screen and riser pipe will be suspended in the borehole until the primary filter pack, bentonite pellet seal and annular seal are installed.

The regional aquifer in the study area is being over-pumped and the water table at PL-3 is rapidly declining with a decline rate of approximately 1 foot/year over the last several years (Figure 2). To accommodate the rapidly declining water table, a 30-ft length of PVC screen with a 0.010-inch or a 0.020-inch slot size will be used for the replacement well. A 5-ft sump will be placed at the base of the screen and sealed with a PVC threaded end cap. PVC centralizers will be placed at the base and top of the well screen and then at intervals not to exceed 100 ft up to the ground surface.

A sounding tube to be used for water level measurements will be installed external of the well casing. The tube will be flush-threaded Schedule 40 PVC, 1-inch diameter. An end cap, 5 foot sump, and a 20 foot slotted section, will be used. The tube will be strapped to the outside of the well using stainless steel straps above the water table and nylon cable ties below the water table.

The appropriate screen slot size and gradation of the filter pack material will be based on the gradation of the sediments in the screen interval as determined in the field by the geologist logging the borehole. If the predominant water-bearing interval consists mostly of clay and silt then a 0.010-inch screen slot and a primary filter pack of clean 20-40 silica sand will be placed in the annulus. However, if the predominant water-bearing interval consists mostly of silt and sand then a 0.020-inch screen slot and a primary filter pack of clean 10-20 silica will be placed in the annulus. The primary filter pack will extend from the bottom of the sump to at least 5 ft above the top of the screen. A 5-ft thick layer of clean 40-60 sand will be placed above the primary filter pack. Both sand packs will be tagged using a tag line pipe to verify their depth. Preliminary well development using a surge block will be performed at this time to help settle the filter pack.

A 10-foot thick layer of ¼-inch bentonite pellets or 3/8-inch bentonite chips will be placed above the filter pack prior to emplacement of the bentonite-grout annular seal. Each 5 ft thickness of bentonite pellets/chips added will be hydrated before adding the next 5-ft thickness of bentonite pellets/chips. The final lift of bentonite pellets/chips will be allowed to set for a time adequate for hydration (at least 1 hour). The remaining annular space to within 20 ft of the ground surface will then be filled with bentonite grout. To prevent overloading, the bentonite grout will be installed in approximately 100 ft lifts, with a minimum of 24 hours of setting time between the first two lifts. The bentonite grout will be topped off to within 6-inches to 1-ft bgs.

The well casing will extend approximately 30 inches above ground surface with a water-tight cap. The monitoring well will be completed with protective steel casing with a hinged locking cap. The protective casing will be primed and painted yellow. A 3-ft by 3-ft, sloped concrete pad will be constructed around the casing. The pad will contain a 3-in brass cap stamped with the well identification. Three, 4-inch diameter

concrete-filled, steel guard posts (also primed and painted yellow) will be placed around the pad, equidistant from the well.

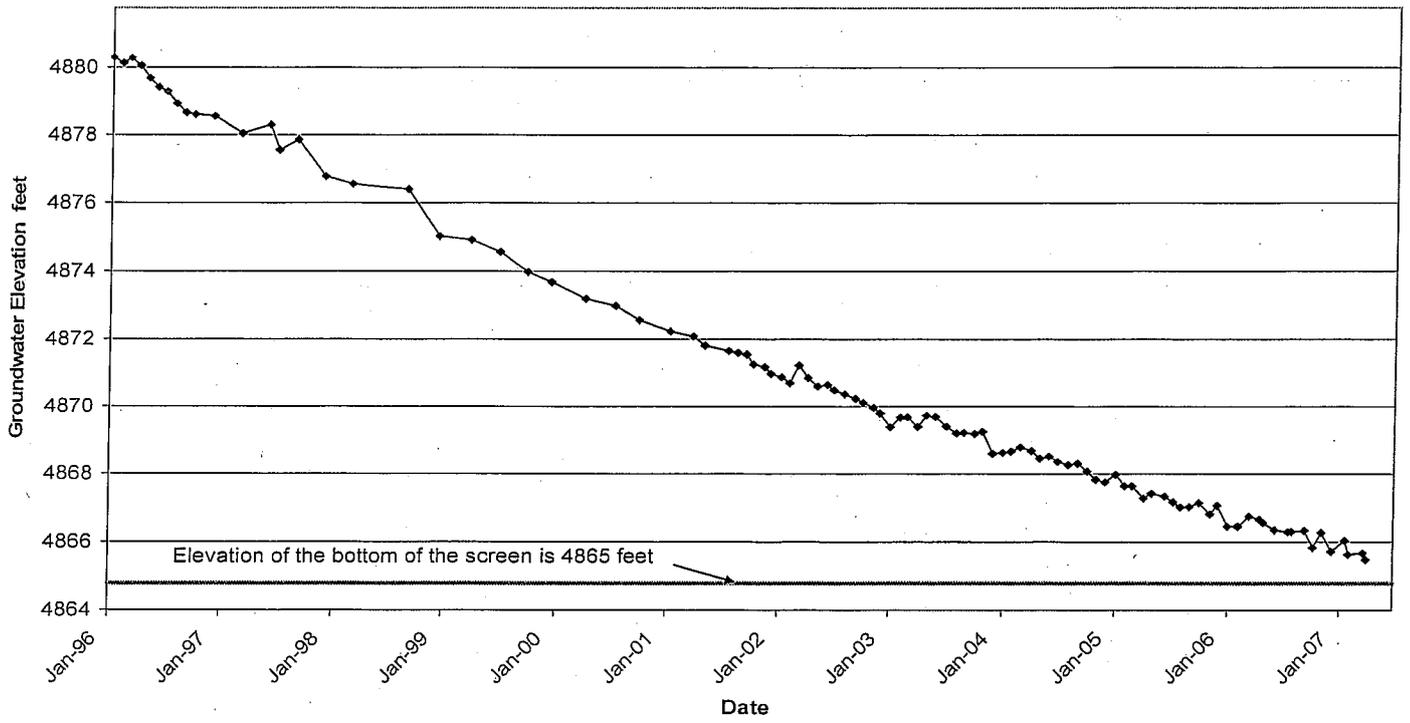


Figure 2 Groundwater Elevations in PL-3 versus Time

5.2.3 WELL DEVELOPMENT

Well development will be completed at least 48 hours after grouting. The well will be developed for approximately 10 hours, and will consist of pumping, surge-block, swabbing, and/or bailing techniques. The sounding tube shall be cleared of any obstruction that would prevent the equilibration of water levels in the tube. During development, the groundwater field parameters (pH, specific conductivity, temperature, and turbidity) will be continuously monitored, and development will continue until parameters have stabilized. All development water will be contained in drums and will not be allowed to discharge to the ground surface. The method of development, the volume of water added or removed, the parameters measured, the results of the measurements, and the time these activities take place will be documented in writing during well development. If required, only potable water shall be added to the well during development.

During well development a minimum of 5 well bore volumes will be removed. After the minimum volume has been removed, development will continue until representative water is obtained. Representative water is assumed to be obtained when pH, temperature, turbidity, and specific conductivity readings stabilize (less than 10% variability over 3 consecutive well bore volumes) and the water is visually clear of suspended solids with a target turbidity of less than 5 Nephelometric Turbidity Units (NTUs).

6.0 EQUIPMENT DECONTAMINATION

The drilling rig and related equipment will be decontaminated at the decontamination pad in Technical Area III prior to the beginning of drilling operations. Decontamination of equipment will also be required after completing the well. Decontamination waste will be kept to a minimum and containerized in drums placed on spill control pallets at the decontamination pad.

7.0 HEALTH AND SAFETY

Level D personal protective equipment is required for all drilling operations. Health and Safety records associated with drilling and development personnel will be maintained on site and will be available at the commencement of drilling activities. All field personnel will operate under an SNL/NM Health and Safety Plan (HASP) and will have SNL/NM-required training including 40-Hr OSHA HAZWOPER and subsequent yearly refresher courses. An SNL/NM Subject Matter Expert will perform a safety inspection of the drill rig before drilling commences.

8.0 PRE-FIELD ACTIVITIES

Pre-field activities that must be completed prior to drilling include:

- Preparation of the Statement of Work for drilling and monitoring well installation
- SNL/NM dig permit request and approval

- HASP preparation, review, and signatures
- National Environmental Policy Act (NEPA) review and signatures
- Sample bottle order for waste samples through Sample Management Office
- Waste Management Plan preparation
- Field checklist completion, review, and approval
- Readiness review meeting

9.0 MOBILIZATION AND SITE SETUP

SNL/NM personnel will ensure that containers for cuttings have been obtained and are ready for drilling operations. Roll-off bins supplied by SNL/NM will be used to collect drill cuttings for waste management purposes. Coordination with Kirtland Air Force Base Security for base access.

10.0 REPORTING

Based on the requirements established by the OSE, and SNL/NM FOPs, the field activities associated with decommissioning and installation of the monitoring wells will be documented and compiled into a final P&A Report and a final Installation Report.

10.1 DECOMMISSIONING RECORDS

All decommissioning field activities will be documented in a field log book per guidance in FOP 94-25. Upon completion of decommissioning of a well, the P&A Report will document all site activities and provide the final Groundwater Well Abandonment Diagram (Attachment 2) and the Well Plugging and Abandonment form (Attachment 3). These will be used to assure that all records are completed, approved, and submitted for proper records management. The following list of documents and records that are generated as part of the decommissioning process will be provided to the SNL/NM Well File Coordinator who, in turn, will submit them to the SNL/NM Customer-Funded Records Center:

- Monitoring Well Plugging and Abandonment Request
- Well Plugging and Abandonment Form
- Site-Specific Well Plugging and Abandonment Work Plan
- Site-Specific Well Plugging and Abandonment Report
- Plugging and Abandonment Documentation and Approval Checklist
- Waste Management Plan
- Field Log Book
- Detailed as-built diagram

All decommissioning activities performed at SNL/NM will be accurately and concisely documented in a final Well Installation and P&A Report to be submitted to the OSE. The P&A Report will contain a brief narrative describing actual work performed at the site and any variances to the site-specific P&A Plan. Information to be contained in the P&A Report include: daily field activity notes, all materials used, a final well abandonment diagram, and documentation of notification of the Well Registry group

maintained by the SNL/NM Groundwater Protection Program and the appropriate regulatory agencies.

Further P&A reporting elements are required by the OSE (OSE August 2005). SNL/NM personnel and the licensed well driller (contractor) will submit a plugging record with the state engineer no later than twenty (20) days after completion of the plugging. The record will include the following elements:

- Name and address of the well owner
- Well driller's name and license number
- Name of each drill rig supervisor that supervised the well plugging
- State engineer file number for the well (if available)
- Location of the well (reported in New Mexico state plane coordinates to ± 0.01 ft)
- Dates when plugging began/concluded
- Plugging material(s) used
- Depth of the well
- Size and type of casing
- Location of perforations
- Location of the sanitary seal
- Completed well log with depth and thickness of all strata plugged, including whether each stratum was water bearing

10.2 WELL INSTALLATION RECORDS

All well installation field activities will be documented in a field log book per guidance in FOP 94-45. Upon completion of the well installation, the Installation Report will document all site activities and provide final Groundwater Monitoring Well Datasheet (completion diagram) (Attachment 4). The report will contain a brief narrative describing actual work performed at the site and any variances to the site-specific Well Installation Plan. Information to be contained in the report include: daily field activity notes, all materials used, a final well completion diagram, and documentation of notification of the Well Registry group maintained by the SNL/NM Groundwater Protection Program and the appropriate regulatory agencies. The following list of documents and records that are generated as part of the well installation process will be provided to the SNL/NM Well File Coordinator who, in turn, will submit them to the SNL/NM Customer-Funded Records Center:

- Well permit agreement
- Well file contents checklist
- Well data summary sheet
- Statement of work for drilling the well
- Drilling permit
- Lithologic (boring) log
- Well construction diagram and completion parameters
- Well development data and groundwater parameters
- Copies of field logbook (geologist, driller)

- Surveyed elevations and location in state plane coordinates (with a degree of accuracy of ± 0.01 feet)
- Location map
- Water level measurements
- Aquifer test data
- Analytical data
- Waste management documentation
- Photographs

11.0 REFERENCES

OSE August 2005, "Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells" New Mexico Office of the State Engineer, August 2005.

Attachment 1 Monitoring Well Completion Diagram for PL-3

WELL DATABASE SUMMARY SHEET

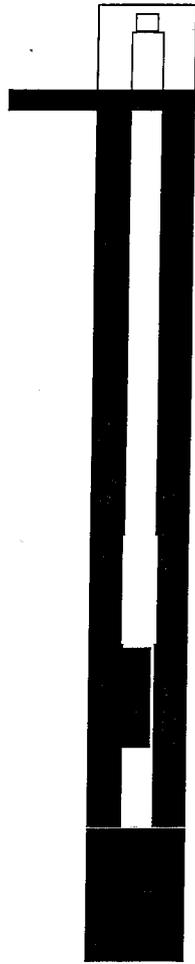
Project Name: SWHC	Geo Location: KAFB WEST POWERLINE
ER ADS #: 1330	Well Completion Date: 04-DEC-1994
Well Name: PL-3	Completion Zone: COARSE SAND
Owner Name: SNL/NM	Formation of Completion: SANTA FE GROUP
Date Drilling Started: 29-NOV-1994	Well Comment: 4" WATER TABLE PUMPING WELL
Drilling Contractor: USGS	
Drilling Method: MUD ROTARY	
Borehole Depth: 480	
Casing Depth: 475	

Survey Data	
Survey Date:	22-DEC-1994
Surveyed By:	GREINER, INC.
State Plane Coordinates	
(X) Easting:	405951.733
(Y) Northing:	1455644.606

Surveyed Elevations (FAMSL)	
Protective Casing:	5332.64
Top of Inner Well Casing:	5331.972
Concrete Pad:	5330.19
Ground Surface:	5330.11

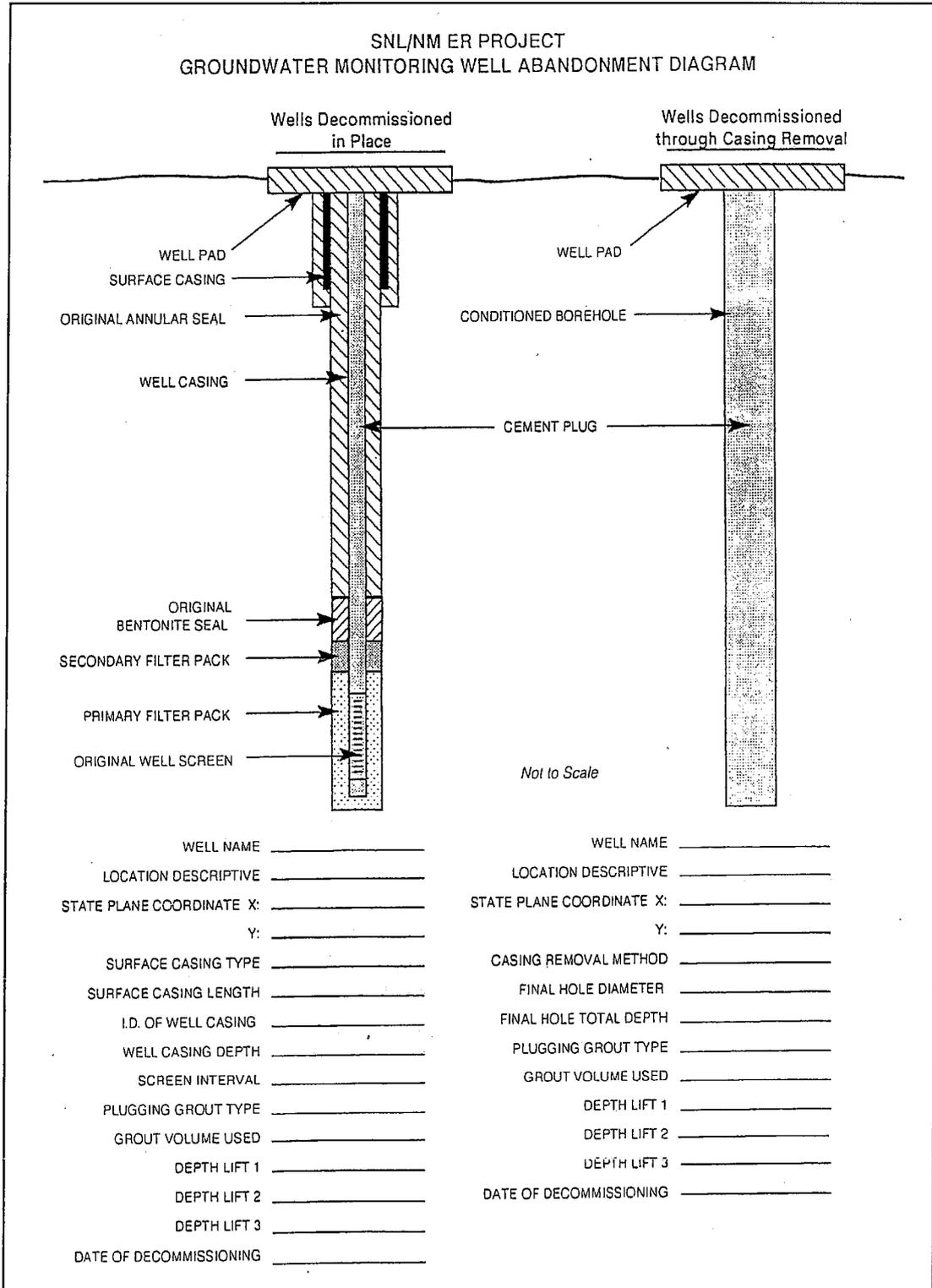


Calculated Depths and Elevations	
Initial Water Elevation (FAMSL)	4679.57
Initial Depth To Water (FBGS)	453.4
Last measured water level was measured on:	13-OCT-2005
Date Updated:	14-MAR-09
Date Printed:	10-MAY-2007



Completion Data Measured Depths (FBGS)			
Casing Stickup:	1.85		
Interval	Start	Stop	
GROUT/BACKFILL	0'	402'	
VOID CLAY 10/20 SAND			
Interval	Start	Stop	
CASING	0'	475'	
SCH 80 PVC	I.D. 3.5"	O.D. 4.5"	
Interval	Start	Stop	
BOREHOLE	0'	480'	
		O.D. 7.875"	
Interval	Start	Stop	
SEAL	402'	419'	
1/4" BENTONITE PELL.			
Interval	Start	Stop	
PRIMARY PACK	419'	480'	
10/20			
Interval	Start	Stop	
SCREEN	445'	465'	
SCH 80 PVC			
	Slot Size	.02"	
Interval	Start	Stop	
SUMP	455'	475'	
Interval	Start	Stop	
PLUG BACK	475'	480'	
10/20 SAND			

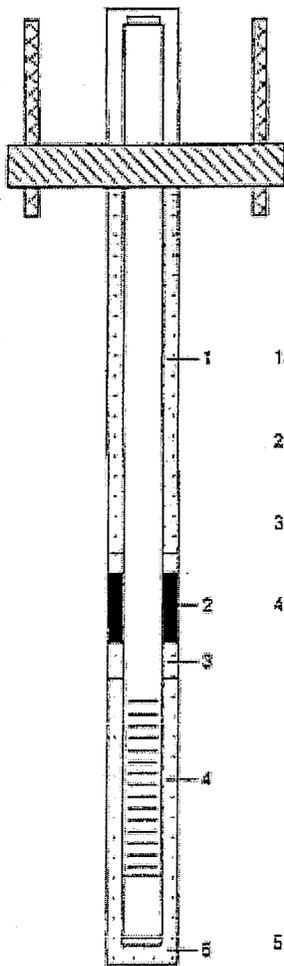
Attachment 2 Groundwater Well Abandonment Diagram



Attachment 4 Groundwater Monitoring Well Data Sheet

SNL/NM Groundwater Monitoring Well Data Sheet	
PROJECT NAME: _____	GEOGRAPHIC LOCATION: _____
ER ADS #: _____	WELL COMPLETION DATE: _____
WELL NAME: _____	COMPLETION ZONE: _____
OWNER: _____	FORMATION OF COMPLETION: _____
DATE DRILLING BEGAN: _____	REMARKS: _____
DRILLING CONTRACTOR: _____	_____
DRILLING METHOD: _____	_____
BOREHOLE DEPTH: _____	_____
BOREHOLE DIAMETERS: _____	_____



<p>Survey Data</p> <p>Survey Date: _____</p> <p>Surveyed by: _____</p> <p>State Plane Coordinates (X) Easting = _____</p> <p>(Y) Northing = _____</p> <p>Surveyed Elevations (feet above sea level)</p> <p>Protective Casing: _____ (Elev. D - FOP 94-71)</p> <p>Top of inner Well Casing: _____ (Elev. C - FOP 94-71)</p> <p>Concrete Pad: _____ (Elev. B - FOP 94-71)</p> <p>Ground Surface: _____ (Elev. A - FOP 94-71)</p> <p>Calculated Elevations (feet above sea level)</p> <p>Initial Water Level: _____</p> <p>Other: _____</p> <p>Comments: _____</p> <p>Form Completed by: _____</p> <p>Verified by: _____</p>	<p>Completion Data</p> <p>Measured Depths (feet below ground surface)</p> <p>Initial Water Level: _____</p> <p>Casing Stickup: _____ (above ground level)</p> <p>Casing OD (in.): _____</p> <p>Casing ID (in.): _____</p> <p>1. Grout/Backfill Interval: _____ Material: _____</p> <p>2. Seal Interval: _____ Material: _____</p> <p>3. Secondary Pack Interval: _____ Secondary Pack Size: _____</p> <p>4. Primary Pack Interval: _____ Primary Pack Size: _____</p> <p>Screen Interval: _____</p> <p>Slot Size: _____</p> <p>Material: _____</p> <p>Sump Length: _____</p> <p>Casing Depth: _____ Material: _____</p> <p>5. Plug Back Interval (if used): _____ (Casing TD-Hole TD) _____ Plug Material (if used): _____</p>	
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