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Created By:	Janelle V. Vigil
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Version:	2.0
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Title:	ERID-095030 1) EMAIL-RESPONSE TO COMMENTS REVISION THREE WELL REHAB REPORT 2) FINAL REVISION 1, REHABILITATION REPORT FOR REGIONAL WELLS R-20 AND R-16, LANL PROJECT NO. 68402
ERID Number.StartPage:	ERID-095030
Office of Record:	ENV-ERSS
Date Received:	03/12/2007
Official Use Only:	N
Page Count:	6
Record Type:	E-Mail
Document Date:	02/28/2007
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From:(Senders - Organization) *(separate multiple values with semicolons)*	BARBARA EVERETT
Other Document Number(s): *(separate multiple values with semicolons)*	N/A
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To: "'Ardyth Simmons'" <asimmons@lanl.gov>,
"'Jean M. Dewart'" <dewart@lanl.gov>, <mjohansen@doeal.gov>
Cc: <riggs@lanl.gov>
Subject: FW: Response to Comments Revision III Well Rehab Report
Date: Wed, 28 Feb 2007 12:05:31 -0700
X-Mailer: Microsoft Office Outlook 11
Thread-Index: AcdbZ6KJLPP9uK1VRPi2s/cuU1ok7AAAvcFg
X-PMX-Version: 4.7.1.128075

Ardyth, I think we can agree to disagree and make the appropriate statements in our report.

From: Barbara Everett [mailto:BEverett@kleinfelder.com]
Sent: Wednesday, February 28, 2007 11:38 AM
To: Mat Johansen; Steve Pearson; <Ardyth Simmons
Cc: Hyland B SPK Morrow
Subject: Response to Comments Revision III Well Rehab Report

Steve,

Please find attached Kleinfelder's proposed revisions. Let me know if these are acceptable.

Barbara Everett, R.G., P.G.
Program Manager
Kleinfelder, Inc.

beverett@kleinfelder.com
(505) 344-7373, ext 209 office
(505) 344-1711 fax

8300 Jefferson NE, Suite B
Albuquerque, NM 87113

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Response to Comments dated 02/27/07 from Steve Pearson, LANL re: R-16/R-20 Well Rehabilitation Report.

Pearson comment

Section 1.0, para. 4, 4th bullet *:*

Kleinfelder Revision III:

The screened intervals were swabbed, bailed, and pumped. Additionally, at R-20, the Hydropuls® tool was operated in all three screens. The Hydropuls is a tool that uses compressed nitrogen emitted in short bursts to dislodge fine-grained material from the well's filter pack.

Discussion for Rev III:
In keeping with the context of this bullet, reference to the jetting has been deleted. It is addressed in 3.2.

Section 3.2 First Phase of Rehabilitation Activities Revision:
The first phase of rehabilitation activities consisted of video logging the well interior and conducting initial specific capacity trial tests on the three screens. Next each screen was swabbed, bailed, and pumped. Jetting of the upper screen was attempted, but was unsuccessful; therefore, not attempted on the middle and lower screens. Next the Hydropuls® tool was operated at each screen, and then swabbed and bailed again. Follow-up specific capacity tests were then conducted.

Kleinfeld proposes to rewrite the first 3 paragraphs
Kleinfelder Revision III (3.2.3 Paragraphs 1-3):

Initial redevelopment of the three screens was conducted between July 9 and July 11, 2006. The three screens were swabbed and bailed. Jetting of the upper screen was attempted, but was unsuccessful due to clogging of the jetting ports. The jetting tool was serviced, but excessive vibration of the pipe string continued with its use. Due to concerns for safety and equipment failure, attempts to jet the screens were discontinued. The three screens were then swabbed and bailed again.

On July 12, a Hydropuls® tool was used in the well to support redevelopment of the screens. The Hydropuls® is a tool that uses compressed nitrogen emitted in short bursts to dislodge fine-grained material from the well's filter pack. The original set up configuration suspended the Hydropuls® below the submersible pump via ½-in pressure-rated nitrogen supply hose. This configuration would allow the well to be pumped immediately after Hydropuls® operation. On July 12, the Hydropuls® tool was operated in the lower and middle screens with this setup. Each screen was hydropulsed for 13 minutes (min), then pumped for approximately 35 min, then hydropulsed for 8 to 9 min, and finally pumped again. The hydropulsing was deemed to be operative because

turbidity levels decreased from >1,000 to 13.6 NTUs for the lower screen and from a high of 455 to 55.1 NTUs for the middle screen.

On July 13, the Hydropuls® tool was operated in the upper screen for approximately 12 min, in the same configuration as was used on July 12; turbidity levels decreased from 485 to 23.5 NTUs during the 16 min of follow-up pumping. Excessive nitrogen was observed in the discharge, so the equipment was retrieved from the hole. It was discovered that the Hydropuls® had separated from the nitrogen supply hose and had been left in the well. The tool and centralizer were fished from the well on July 14, 2006.

On July 15, 2006 equipment setup was reconfigured due to the problems encountered. The Hydropuls® tool was suspended on a sand line without a submersible pump. The Hydropuls® tool was operated in the upper and middle screens at R-20. As the crew was lowering the tool into the lower screen, the tool and cable became stuck in the well casing. The Hydropuls® was not operated in the lower screen on July 15. The tool and cable was retrieved on July 16 without incidence. At that point Kleinfelder was directed to discontinue using the Hydropuls® and to resume using conventional redevelopment techniques to complete the rehabilitation activities.

3.3.1 Logging

Kleinfelder Revision III:

On July 23, 2006 LANL personnel ran a second video log in the well to inspect the well screens. The video run was terminated after reaching the middle screen due to very poor visibility. Approximately 500 gallons of clear potable water was introduced into the well in an attempt to improve visibility for another logging attempt the following day. On July 24, 2006 a video run was made to a depth of 1348'; all screens were visible except the bottom portion of the lower screen. All screens were observed to be intact and no obvious intrusion of bentonite was noted at the screen surfaces. The July 24 video is included as a DVD in Appendix A. On July 25, 2006 LANL personnel ran a gamma ray log to supplement the video data recorded the day before.

Discussion to Rev III:
Minor changes made to keep formatting consistency within Kleinfelder's report.

X-Sieve: CMU Sieve 2.2
From: "Steve Pearson" <spearson@lanl.gov>
To: "'Ardyth Simmons'" <asimmons@lanl.gov>,
"'Jean M. Dewart'" <dewart@lanl.gov>, <mjohansen@doeal.gov>
Subject: FW: Revised comments III Well Rehabilitation Report
Date: Wed, 28 Feb 2007 10:28:30 -0700
X-Mailer: Microsoft Office Outlook 11
Thread-Index: AcdbUs7mnYJfDTe1TZyjWbWtm1kLCwACsPOQ
X-PMX-Version: 4.7.1.128075

Kleinfelder is still resisting/avoiding the problem that we identified by our comments. From Barbara's e-mail they are still not addressing our concerns.

From: Barbara Everett [mailto:BEverett@kleinfelder.com]
Sent: Wednesday, February 28, 2007 9:09 AM
To: Steve Pearson
Cc: Mat Johansen
Subject: Revised comments III Well Rehabilitation Report

Steve:

Matt Johansen and I spoke this morning about the revisions to the report. I indicated that I have some concerns about your revisions II. It is unclear to me what is the goal of these revisions. Kleinfelder feels that it is important to include the turbidity data that shows the affect the Hydropuls tool had on a screen. To eliminate or discount the data in favor of reporting Klan's unsubstantiated opinion of the operation of the tool is inappropriate. Per my discussion with Matt, I will modify the text of the report to describe the configuration of the setup of the tool and pump and expand on the problems encountered, thus the conclusion that it was not necessarily the right tool for these wells. I will forward to you the rev III shortly.

Barbara Everett, R.G., P.G.
Program Manager
Kleinfelder, Inc.

beverett@kleinfelder.com
(505) 344-7373, ext 209 office
(505) 344-1711 fax

8300 Jefferson NE, Suite B
Albuquerque, NM 87113

FINAL REV. 1
REHABILITATION REPORT FOR REGIONAL WELLS R-20 AND R-16 LOS ALAMOS NATIONAL LABORATORY LOS ALAMOS, NEW MEXICO PROJECT NO. 68402

Prepared for:

The US Department of Energy and the
National Nuclear Security Administration through the
US Army Corps of Engineers
Sacramento District

Prepared by:

KLEINFELDER

8300 Jefferson NE, Suite B
Albuquerque, New Mexico 87113

March 2007

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LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BMPs	Best Management Practices
°C	degrees Celsius
DOE	US Department of Energy
DVD	digital video disc
ft	foot/feet
ft^3	cubic feet
gal.	gallon/gallons
gpm	gallons per minute
hour/hours	hr/hrs
hp	horsepower
ID	inside diameter
in.	inch/inches
Kleinfelder	Kleinfelder, Inc.
LANL	Los Alamos National Laboratory
min	minute/minutes
NMED	New Mexico Environment Department
NTUs	nephelometric turbidity units
OD	outside diameter
SOPs	Standard Operating Procedures
SSHASP	Site-Specific Health and Safety Plan
TD	total depth
µS/cm	microSiemens per centimeter
WDC	WDC Exploration & Wells

1.0 INTRODUCTION

This report presents the activities associated with the rehabilitation of regional wells R-20 and R-16 at Los Alamos National Laboratory (LANL). The wells were installed in 2002 for the United States Department of Energy (DOE) as part of the LANL "Hydrogeologic Work Plan" (LANL 1998). The United States Army Corps of Engineers contracted Kleinfelder, Inc. (Kleinfelder) to perform this work at the direction of DOE and LANL personnel. The activities summarized herein were conducted in accordance with the "Work Plan for Rehabilitation of Regional Wells R-16 and R-20, Final," (Kleinfelder 2006a).

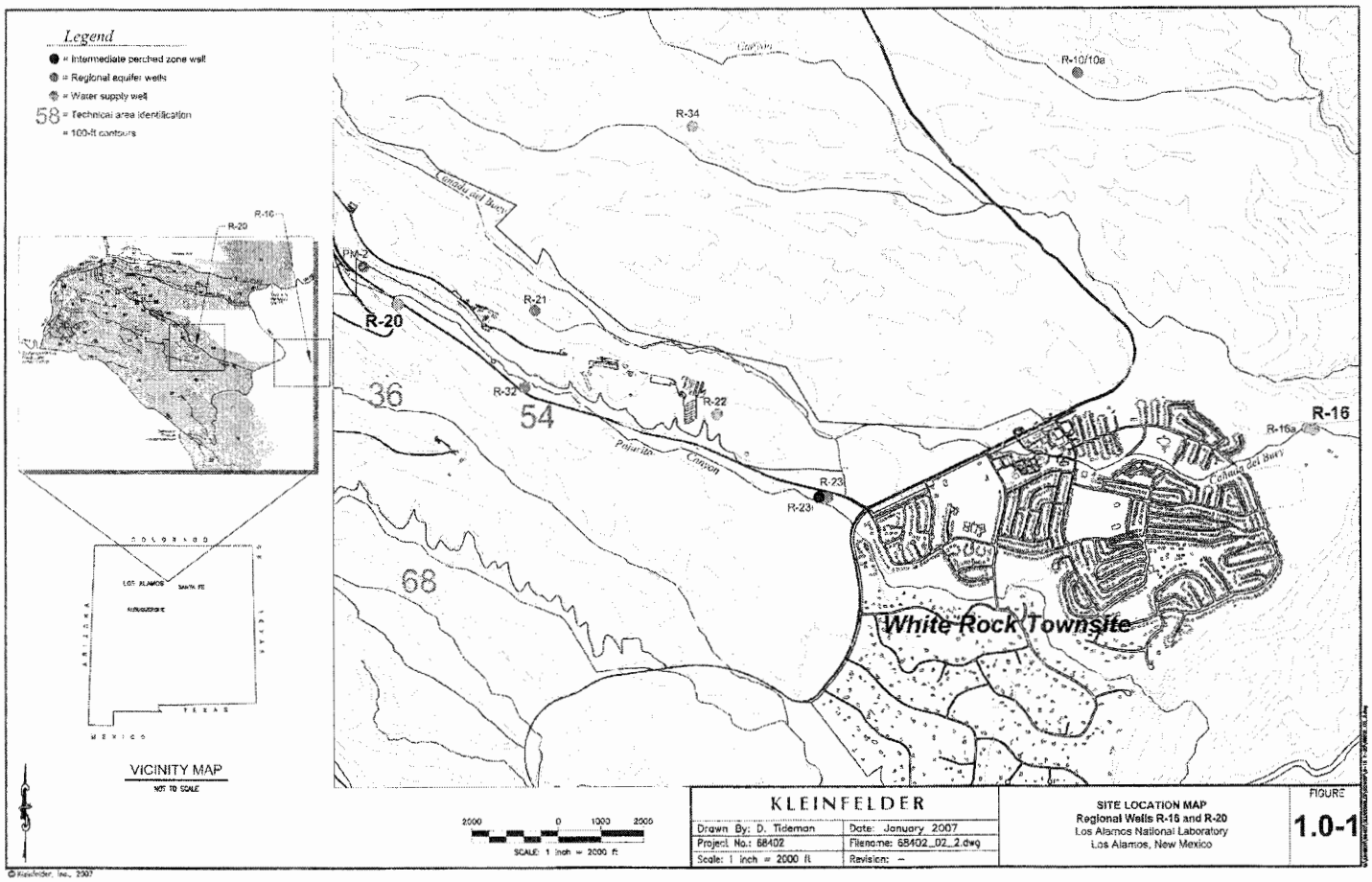
R-20 is located in Pajarito Canyon east of Technical Area 18 (Figure 1.0-1). It was drilled to 1,365 feet below ground surface (ft bgs) with fluid-assisted air rotary and mud rotary techniques, and was completed with three screened intervals in the regional aquifer. The upper, middle and lower screened intervals are 904.6 – 912.2 ft bgs, 1147.1 – 1154.7 ft bgs, and 1328.8 – 1336.5 ft bgs, respectively. R-16 was drilled in Cañada del Buey (Figure 1.0-1), to 1,287 ft bgs with the same drilling techniques, and was completed with four screened intervals in the regional aquifer. However, the upper screened interval is blocked by drill casing that could not be retracted following well installation, so R-16 has three functioning screened intervals. The three R-16 screens are referred to as upper, middle and lower and are 863.4 – 870.9 ft bgs, 1014.8 – 1022.4 ft bgs, and 1237.0 – 1244.6 ft bgs, respectively.

The purpose of the rehabilitation activities described herein was to remove potential residual mud-rotary drilling fluids from the filter pack at the screened intervals of the wells. Per the scope of work, the goal was to redevelop each zone until groundwater chemistry was representative of pre-drilling conditions, based on measured concentrations of major ion and trace element chemistry, total organic carbon, isopropyl alcohol and acetone. However, the analytical data were not available for this report so this evaluation could not be made. The data will be included in a forthcoming LANL report evaluating the hydrochemistry at R-16 and R-20.

The following rehabilitation activities were performed at each well:

- The Westbay multi-port sampling systems were removed
- Video logs were run of the well interiors
- Initial specific capacity tests were conducted on each screened interval
- The screened intervals were swabbed, bailed, and pumped. Additionally, at R-20, the Hydropuls® tool was operated in all three screens. The Hydropuls is a tool that uses compressed nitrogen emitted in short bursts to dislodge fine-grained material from the well's filter pack.
- Followup specific capacity tests were conducted on the lower screened interval and the combined upper and middle zones in R-20. Followup specific capacity tests were not conducted at R-16
- The Westbay sampling system was reinstalled in R-16; two packers were installed in R-20 to isolate the screened intervals.

R-20 well rehabilitation activities are presented in Section 3; R-16 well rehabilitation activities are summarized separately in Section 4.



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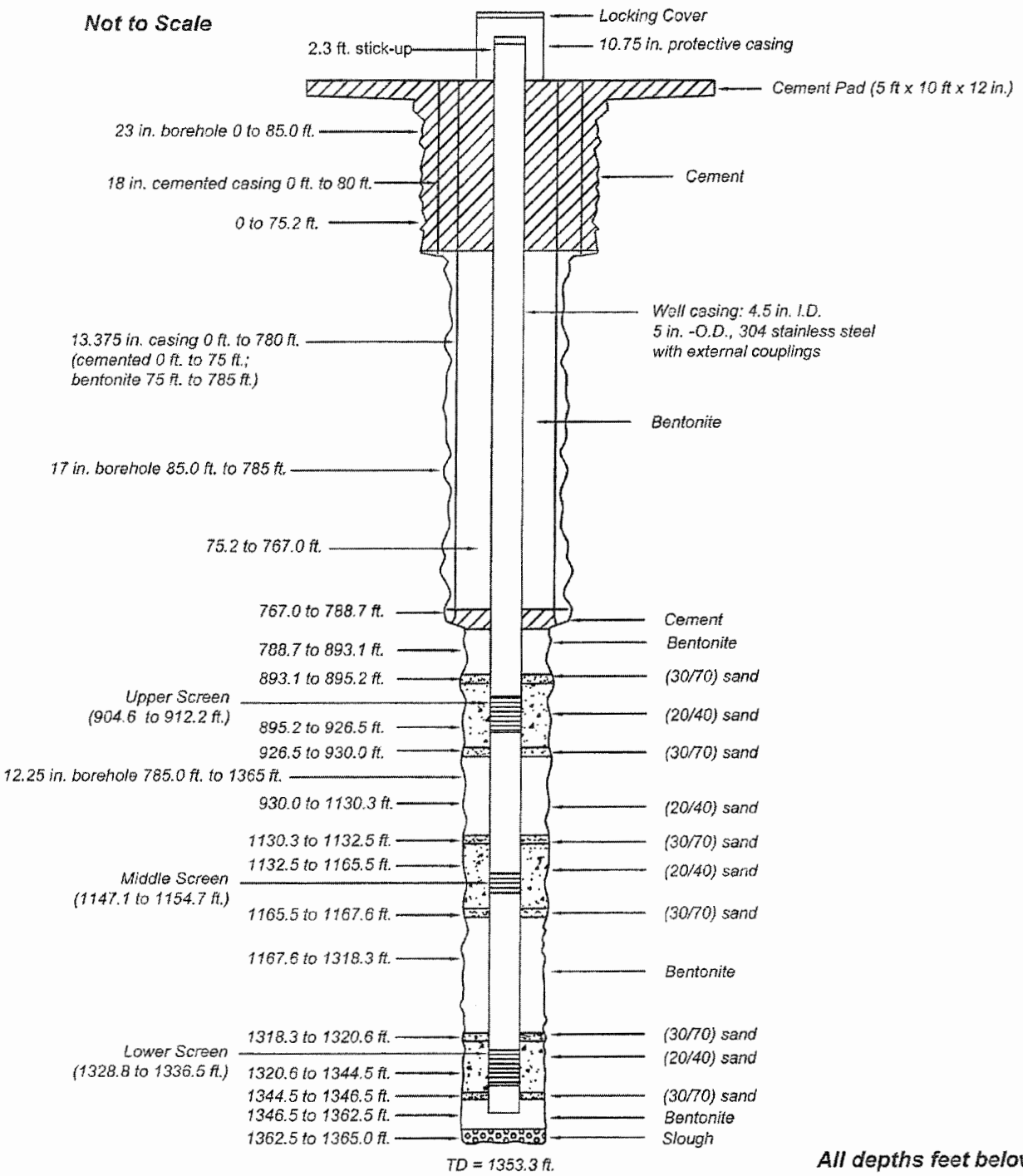


NOTES: 1) This Figure is from "Characterization Well R-20 Completion Report", June 2003, LA-UR-03-1839.
2) Depths for screens are for actual screen intervals, not joints.

KLEINFELDER		R-20 Well Construction Diagram Pajarito Canyon Los Alamos, New Mexico	FIGURE **3.0-1**
Drawn By: D. Tideman	Date: January 2007		
Project No.: 68402	Filename: 68402_10_1.dwg		

G:\ENVIRON\68402\DELIVERABLES\SSHASP\R15-20\68402_10_1.dwg

3.1 Removal of the Westbay Sampling System

WDC and Westbay personnel removed the R-20 Westbay sampling system between June 28 and July 2, 2006. They initially removed the transducers and solar panel. Next, they deflated and removed the six Westbay packers, and lastly they removed the piping and sampling ports from the well. After removal, the Westbay system components were steam-cleaned and rinsed with deionized water, dried, and placed in plastic bags. The system was placed into storage at the former Field Support Facility.

3.2 First Phase of Rehabilitation Activities

The first phase of rehabilitation activities consisted of video logging the well interior and conducting initial specific capacity trial tests on the three screens. Next each screen was swabbed, bailed, and pumped. Jetting of the upper screen was attempted, but was unsuccessful; therefore, not attempted on the middle and lower screens. Next the Hydropuls® tool was operated at each screen, and then swabbed and bailed again. Follow-up specific capacity tests were then conducted.

3.2.1 Video Logging

LANL personnel ran a downhole video log at R-20 on July 3, 2006. A copy of the video log is included on a DVD in Appendix A.

3.2.2 Initial Specific Capacity Tests

Brief initial specific capacity tests were performed on the three screened intervals at R-20 from July 6 through 8, 2006. A 6-hr test was run on the upper screen, and 3-hr tests were performed on the middle and lower screens. The specific capacities from these brief tests were 0.01, 0.01 and 0.09 gallons per minute per foot (gpm/ft) for the upper, middle and lower screens, respectively.

Data from the specific capacity tests are summarized in Table 3.5-1, following the descriptions of all rehabilitation activities. Figures showing the water quality parameters measured during the tests are grouped by screen and presented in Figures 3.5-1 through 3.5-8.

3.2.3 Rehabilitation Activities

Initial redevelopment of the three screens was conducted between July 9 and July 11, 2006. The three screens were swabbed and bailed. Jetting of the upper screen was attempted, but was unsuccessful due to clogging of the jetting ports. The jetting tool was serviced, but excessive vibration of the pipe string continued with its use. Due to concerns for safety and equipment failure, attempts to jet the screens were discontinued. The three screens were then swabbed and bailed again.

On July 12, a Hydropuls® tool was used in the well to support redevelopment of the screens. The Hydropuls® is a tool that uses compressed nitrogen emitted in short bursts to dislodge fine-grained material from the well's filter pack. The original set up configuration suspended the Hydropuls® below the submersible pump via ½-in pressure-rated nitrogen supply hose. This configuration would allow the well to be pumped immediately after Hydropuls® operation. On July 12, the Hydropuls® tool was operated in the lower and middle screens with this setup. Each screen was hydropulsed for 13 minutes (min), then pumped for approximately 35 min, then

hydropulsed for 8 to 9 min, and finally pumped again. The hydropulsing was deemed to be operative because turbidity levels decreased from >1,000 to 13.6 NTUs for the lower screen and from a high of 455 to 55.1 NTUs for the middle screen.

On July 13, the Hydropuls® tool was operated in the upper screen for approximately 12 min, in the same configuration as was used on July 12; turbidity levels decreased from 485 to 23.5 NTUs during the 16 min of follow-up pumping. Excessive nitrogen was observed in the discharge, so the equipment was retrieved from the hole. It was discovered that the Hydropuls® had separated from the nitrogen supply hose and had been left in the well. The tool and centralizer were fished from the well on July 14, 2006.

On July 15, 2006 equipment setup was reconfigured due to the problems encountered. The Hydropuls® tool was suspended on a sand line without a submersible pump. The Hydropuls® tool was operated in the upper and middle screens at R-20. As the crew was lowering the tool into the lower screen, the tool and cable became stuck in the well casing. The Hydropuls® was not operated in the lower screen on July 15. The tool and cable was retrieved on July 16 without incidence. At that point Kleinfelder was directed to discontinue using the Hydropuls® and to resume using conventional redevelopment techniques to complete the rehabilitation activities.

On July 17 and 18, 2006, each screen was swabbed for 15 min, then bailed, then swabbed again for 15 min, followed by a final round of bailing.

3.2.4 Followup Specific Capacity Tests

After the first phase of rehabilitation activities was completed, a 10.5-hr specific capacity test was conducted on the lower screened interval on July 21, 2006. The measured specific capacity for the lower screened interval was 0.02 gpm/ft.

Specific capacity tests were attempted on the upper and middle screens, but could not be completed because the zones could not sustain the pumping required for the tests. Data from the lower screen specific capacity test are summarized in Table 3.5-1. Figures showing the water quality parameters measured during pumping are grouped by screen and presented in Section 3.5.

3.3 Second Phase of Rehabilitation Activities

Because pumping could not be sustained from the upper and middle screens when the followup specific capacity tests were attempted, video and gamma logging and additional well rehabilitation activities were undertaken on these zones. Specific capacity tests were then run on each screened interval.

3.3.1 Logging

On July 23, 2006 LANL personnel ran a second video log in the well to inspect the well screens. The video run was terminated after reaching the middle screen due to very poor visibility. Approximately 500 gallons of clear potable water was introduced into the well in an attempt to improve visibility for another logging attempt the following day. On July 24, 2006 a video run was made to a depth of 1348 ft; all screens were visible except the bottom portion of the lower screen. All screens were observed to be intact and no obvious intrusion of bentonite was noted at

the screen surfaces. The July 24 video is included as a DVD in Appendix A. On July 25, 2006 LANL personnel ran a gamma ray log to supplement the video data recorded the day before.

3.3.2 Rehabilitation Activities – Upper and Middle Screens

DOE and LANL project personnel decided to conduct additional rehabilitation activities on the combined upper and middle screens at R-20 in an attempt to increase water production. The field crew alternately injected water into the well casing and then bailed water to below the starting static water level, creating a gentle surging effect on the filter packs in the upper and middle screens.

A bridge plug was installed below the middle screened interval on August 7, 2006. On August 8 through 11 and on the 17th, water was alternately injected into the well and then bailed out. This approach was repeated for eighteen cycles over the 5-day period.

On August 21, 2006 it was discovered that the bridge plug had slipped downward inside the well casing. Attempts to reseat it were unsuccessful and a pump and packer assembly was then installed above the lower screen. On August 25, the crew alternately injected water into and pumped water from the well to create a surging effect across the upper and middle screens.

3.3.3 Specific Capacity Tests

On August 26 and 27, 2006, two approximately 11-hr specific capacity tests were performed on the combined upper and middle screened intervals at R-20. The specific capacity measured on August 27 for the combined screened intervals was 0.02 gpm/ft.

On August 28, 2006, after the packer had been raised to isolate the upper screen, it was alternately pumped and allowed to recover for three rounds. It was pumped for 1.8 hours (hrs), allowed to recover for 0.75 hr, pumped again for 1.3 hrs, allowed to recover for 1 hr and finally pumped again for 1.3 hrs, at which point the packer was deflated. The specific capacity for the upper zone measured from these brief tests was 0.02 gpm/ft.

On August 30 and 31, 2006, 12-hr and an 8-hr specific capacity tests were conducted on the lower screened interval. The resultant specific capacities were 0.07 and 0.06 gpm/ft, respectively. Data from all specific capacity tests are summarized in Table 3.5-1. Figures showing the water quality parameters measured during pumping are grouped by screen and presented in Section 3.5.

3.4 Third Phase of Rehabilitation Activities

In October 2006, the lower screen was briefly jetted again and the sump was bailed prior to a final 8-hr specific capacity test. Additionally, the upper screen was isolated, briefly pumped and groundwater samples were collected.

3.4.1 Lower Screen – Additional Jetting plus 8-hr Specific Capacity Test

On October 11, 2006, the lower screen was jetted intermittently for a total of approximately 3 hrs; the sump was bailed in between jetting. Approximately 20 gallons (gal.) of water were removed by bailing. On October 13, 2006, an 8-hr pump test resulted in a measured specific

capacity of 0.06 gpm/ft for the lower screened interval. Groundwater samples were collected at the end of sampling.

3.4.2 Upper Screen – Short Pumping plus Sampling

On October 15, 2006 the upper screen was isolated and pumped for 30 min. LANL and New Mexico Environment Department (NMED) personnel collected samples during pumping. The specific capacity measured during this event was 0.009 gpm/ft for the upper zone.

3.5 Specific Capacity Test Data

Table 3.5-1 presents a summary of the specific capacity test data from the three screened zones at R-20. The water quality parameters pH, temperature, specific conductance and turbidity were measured periodically during pumping and are shown in Figures 3.5-1 through 3.5-8 and tabulated in Appendix B.

Table 3.5-1 R-20 Specific Capacity Test Data

SCREEN	DATE	DURA-TION (hrs)	TOTAL VOLUME WITH-DRAWN (gal.)	PUMP-ING RATE (gpm)	DRAW DOWN (ft)	SPECIFIC CAPACITY (gpm/ft)	PHASE	COMMENTS
Upper	7/6/06	6	296.5	0.8	76	0.01	1	Initial test
Upper	8/28/06	4.4	264.2	0.7	35	0.02	2	Three short tests (1.3 to 1.8 hrs) after second rehab. phase
Upper	10/15/06	0.5	19.2	0.6	66	0.009	3	Prior to collecting water samples
Middle	7/8/08	3	557.2	3.0	248	0.01	1	Initial test
Upper + Middle	8/27/06	11	1,071.4	1.7	73.2	0.02	2	Following second rehab. phase
Lower	7/7/06	3	2,716.8	16.1	170	0.09	1	Initial test
Lower	7/21/06	10.5	6,383.3	9.5	474	0.02	1	Following first rehab. phase
Lower	8/30/06	12	1,734.6	2.4	35.7	0.07	2	Following second rehab. phase
Lower	8/31/06	8	1,164.5	2.4	37.2	0.06	2	Following second rehab. phase
Lower	10/13/06	8	3,836.0	7.9	131	0.06	3	Following third rehab.

Water Quality Parameters for Upper Screen Tests

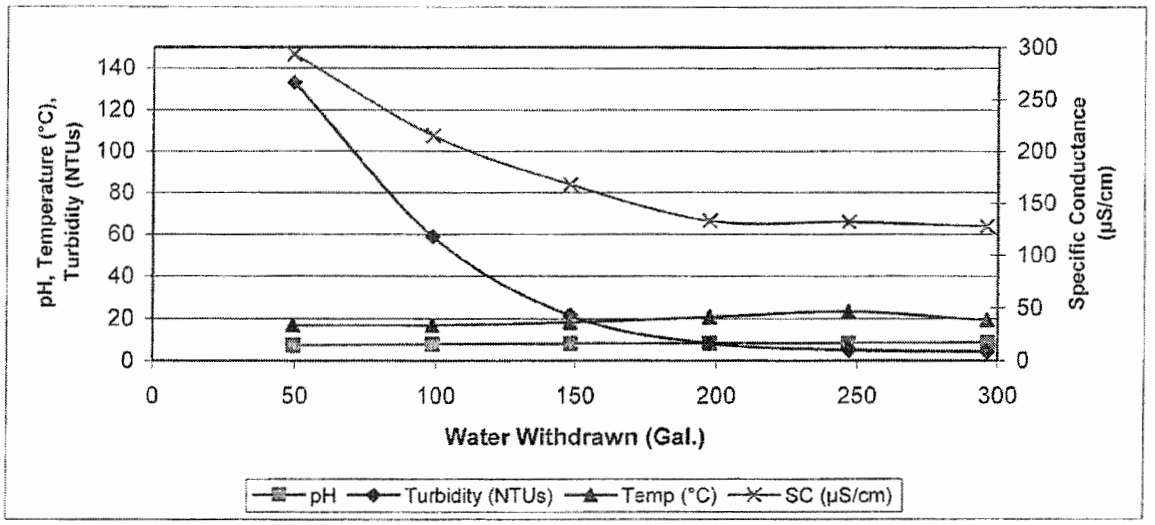


Figure 3.5-1 Water Quality Parameters – R-20 Initial Upper Screen Test, July 6, 2006 (Note: Parameters were recorded after the calculated drop pipe water volume was discharged.)

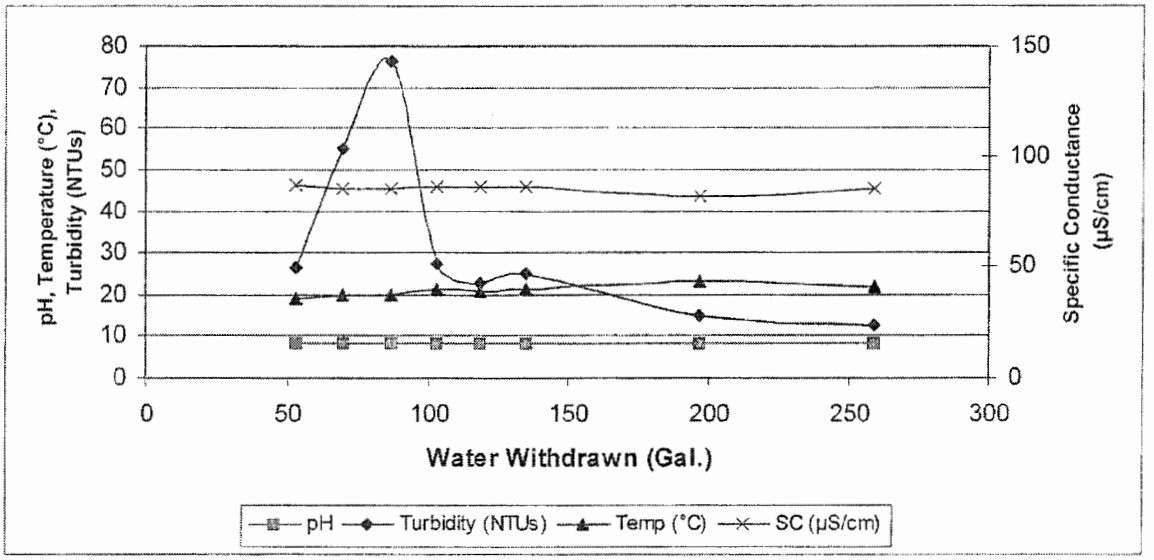


Figure 3.5-2 Water Quality Parameters – R-20 Final Upper Screen Test, August 28, 2006 (Note: Parameters from three short-duration pumping tests were combined in this graph.)

Water Quality Parameters for the Middle Screen Test

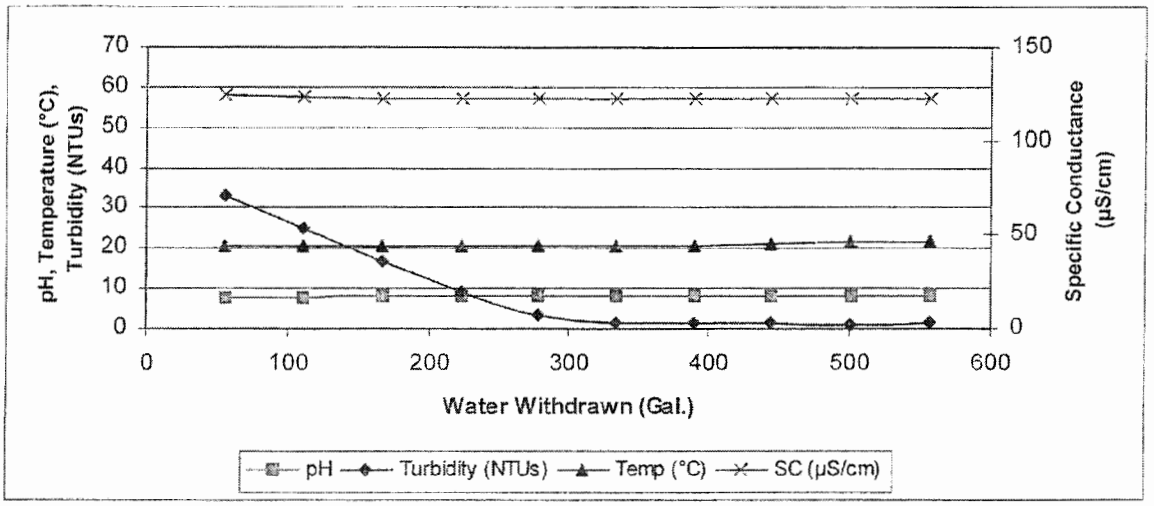


Figure 3.5-3 Water Quality Parameters – R-20 Initial Middle Screen Test, July 8, 2006

Water Quality Parameters for the Combined Upper and Middle Screen Tests

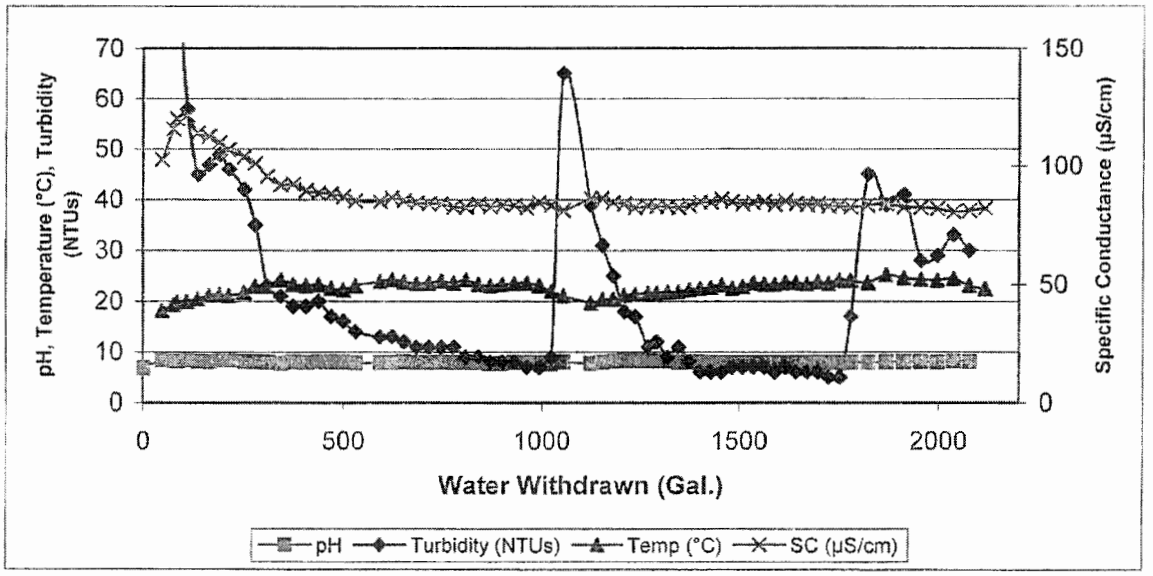


Figure 3.5-4 Water Quality Parameters – R-20 Combined Upper and Middle Screen Tests, August 26 and 27, 2006

(Note: Two long-duration tests are plotted together. The turbidity peak in the middle of the chart represents the start of the second test. The turbidity peaks at approximately 1,800 gal. occurred after the valve was opened to increase the flow rate; field notes indicate the turbidity increased before the calculated arrival time of water from the middle screen and was due to rust in the pump drop pipe.)

Water Quality Parameters for the Lower Screen Tests

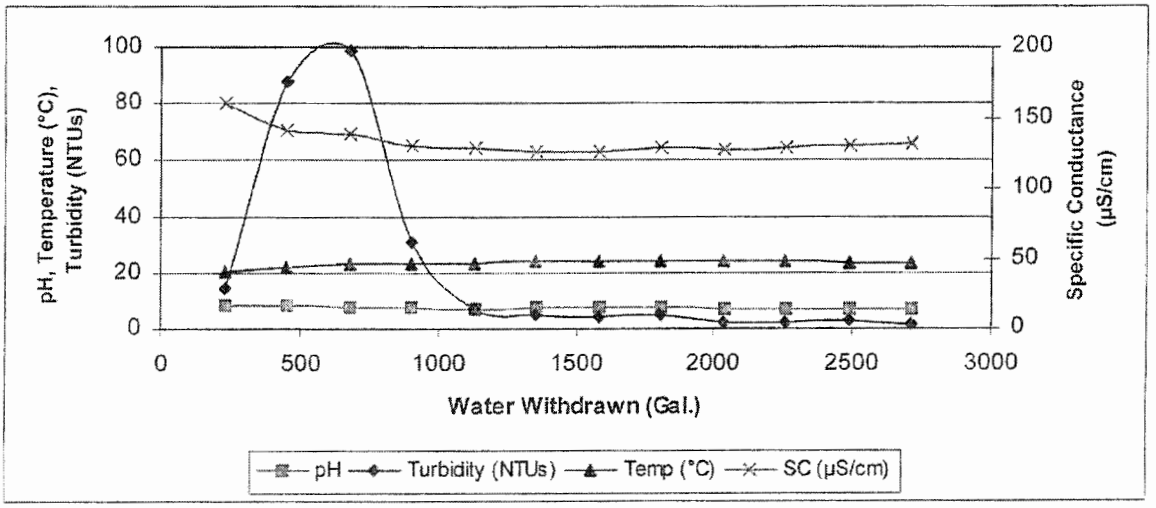


Figure 3.5-5 Water Quality Parameters – R-20 Initial Lower Screen Test, July 7, 2006

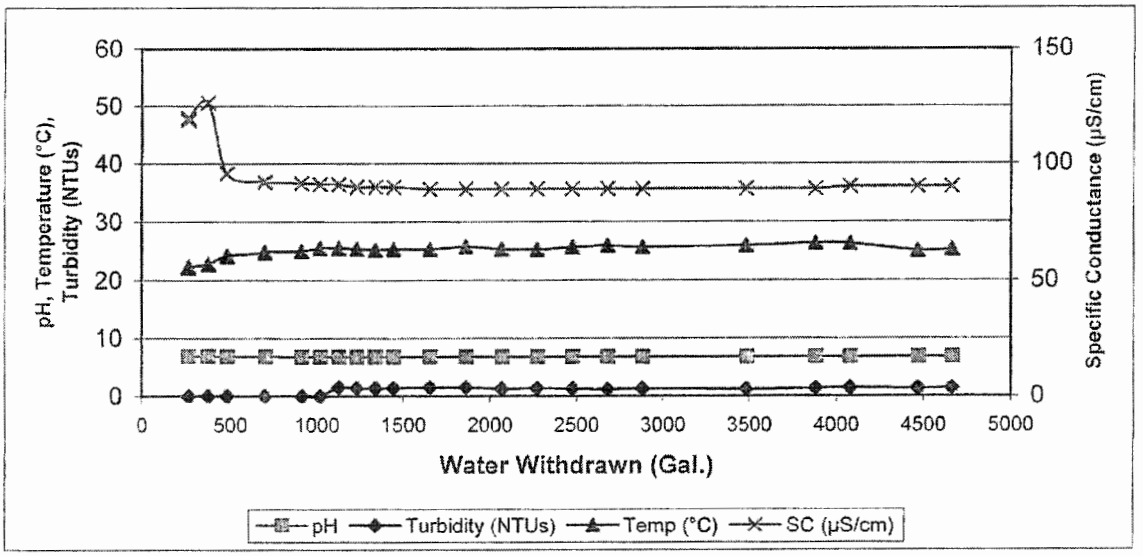


Figure 3.5-6 Water Quality Parameters – R-20 Initial Lower Screen Test, July 21, 2006

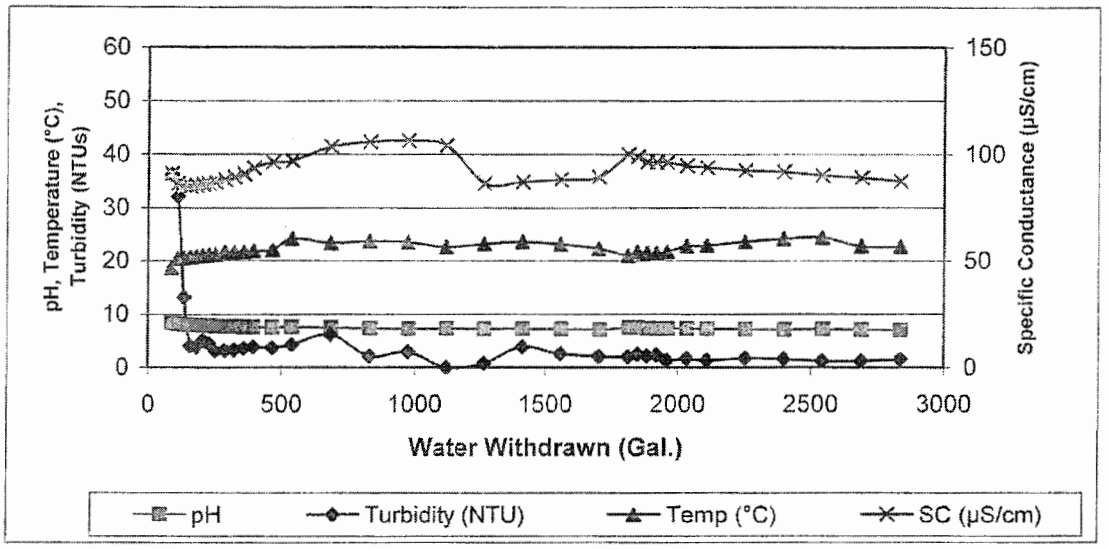


Figure 3.5-7 Water Quality Parameters – R-20 Lower Screen Tests, August 30 and 31, 2006 (Note: Two long-duration tests are plotted together.)

3.6 Groundwater Sample Collection

LANL and NMED field personnel collected groundwater samples for laboratory analysis during the pumping activities. The analytical results will be presented in a separate LANL report.

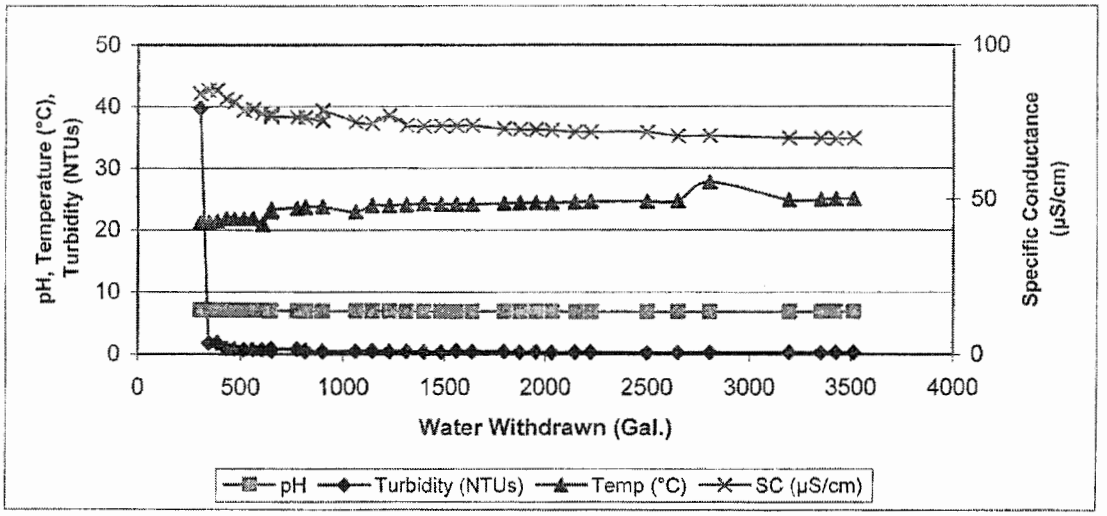


Figure 3.5-8 Water Quality Parameters – R-20 Final Lower Screen Test, October 13, 2006

3.7 R-20 Well Status

Following the well rehabilitation tasks, Kleinfelder installed packers above and below the middle screened interval to isolate the three water-bearing zones as shown in Figure 3.7-1. LANL is currently monitoring the packer inflation pressure and evaluating chemical data. They will prepare a comprehensive rehabilitation report with recommendations for R-20.

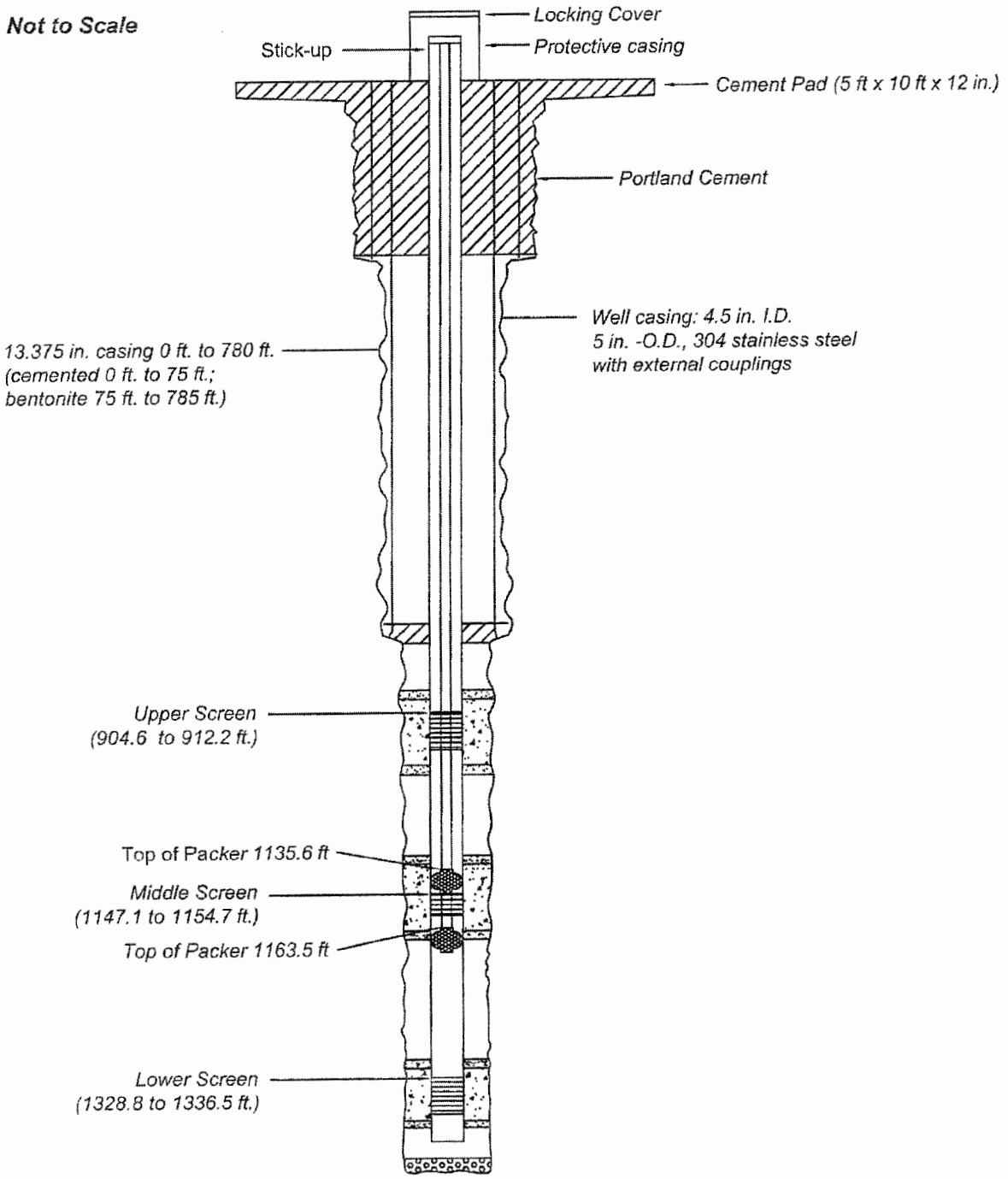
4.0 R-16 REHABILITATION ACTIVITIES

Figure 4.0-1 shows the well construction details for regional well R-16. Rehabilitation activities at R-16 consisted of removing the Westbay sampling system, video logging the well interior (conducted by LANL), conducting initial specific capacity tests on the three screened intervals, monitoring water quality parameters during the tests, and collecting groundwater samples for geochemical analyses (performed by LANL).

The Kleinfelder Work Plan also specified that the screens would be redeveloped by swabbing/bailing, jetting and/or pumping after the specific capacity tests were conducted. However, at the direction of DOE this phase of work was not performed because the water quality parameters measured during the specific capacity tests had stabilized and the turbidity levels were less than 1 nephelometric turbidity unit.

4.1 Removal of the Westbay Sampling System

WDC and Westbay personnel removed the R-16 Westbay sampling system between July 31 and August 6, 2006. They initially removed the three transducers and solar panel. Next, they deflated and removed the ten Westbay packers, and lastly they removed the piping and sampling ports from the well. After removal, the Westbay system components were steam-cleaned, rinsed with deionized water, dried, and placed in plastic bags. The system was then placed into storage at the former Field Support Facility.



All depths feet below ground surface

NOTE: This Figure is modified from "Characterization Well R-20 Completion Report", June 2003, LA-UR-03-1839.

KLEINFELDER		R-20 Well Schematic - November 2006 Pajarito Canyon Los Alamos, New Mexico	FIGURE **3.7-1**
Drawn By: D. Tideman	Date: January 2007		
Project No.: 68402	Filename: 68402_10_1.dwg		

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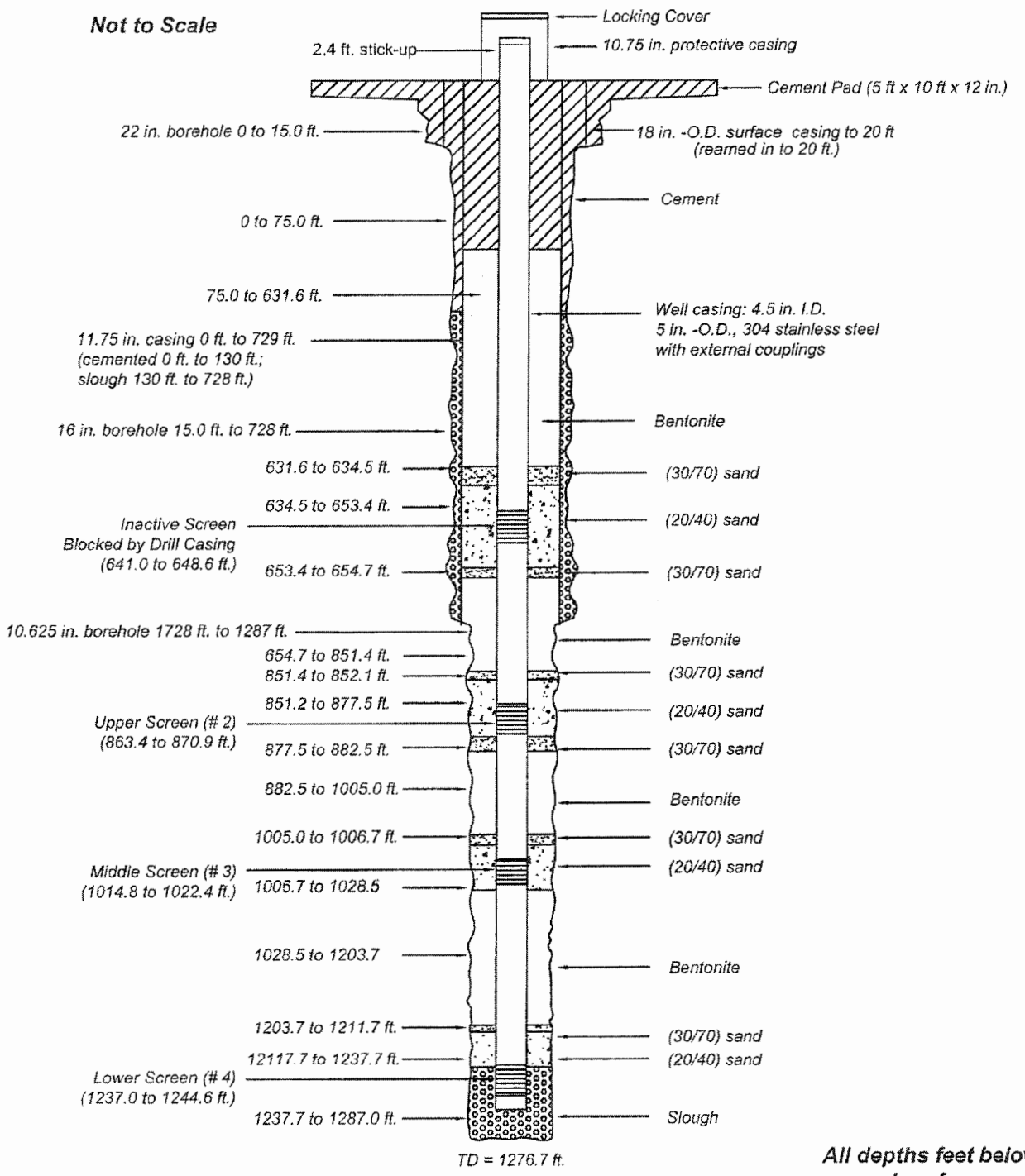

NOTES: 1) This Figure is from "Characterization Well R-16 Completion Report", June 2003, LA-UR-03-1841.
2) Depths for screens are for actual screen intervals, not joints.

KLEINFELDER		R-16 Well Construction Diagram Cañada del Buey Los Alamos, New Mexico	FIGURE **4.0-1**
Drawn By: D. Tideman	Date: January 2007		
Project No.: 68402	Filename: 68402_09_1.dwg		

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4.2 Video Logging

LANL personnel ran downhole video and gamma logs on August 6, 2006. The video log is included on a DVD in Appendix A.

4.3 Specific Capacity Tests

Three 12-hr constant rate specific capacity tests were conducted on the three R-16 screened intervals. The top screened interval (screen 1) is blocked by drill casing. The functioning screened intervals are called Upper - Screen 2, Middle - Screen 3 and Lower - Screen 4. A 10 horsepower Grundfos pump was used for each of the specific capacity tests.

4.3.1 Upper - Screen #2

On August 11, 2006, a packer was installed to isolate the upper screened interval and a 12-hr constant rate test was conducted. The data for this specific capacity test, along with the other constant rate tests conducted at R-16, are presented in Table 4.3-1.

The water quality parameters were measured periodically during the pump test and are shown in Figure 4.3-1 and tabulated in Appendix B. The parameters stabilized rapidly during the specific capacity testing indicating that redevelopment goals were met by pumping.

Table 4.3-1 R-16 Specific Capacity Test Data

DATE	SCREEN	WATER REMOVED (gal.)	PUMPING RATE (gpm)	DRAWDOWN (ft)	SPECIFIC CAPACITY (gpm/ft)
8/11/06	Upper - #2	12,926.4	18.0	212	0.08
8/10/06	Middle - #3	9,785.5	13.6	271	0.05
8/9/06	Lower - #4	4,368.3	6.0	278	0.02

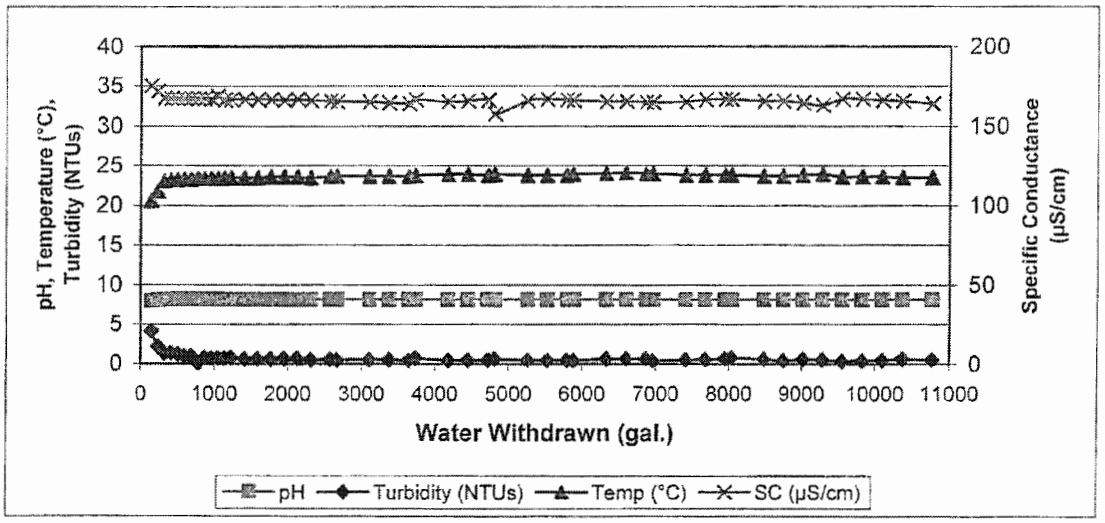


Figure 4.3-1 Water Quality Parameters – R-16 Upper Screen Test, August 11, 2006

4.3.2 Middle - Screen #3

On August 10, 2006, packers were installed to isolate the middle screened interval and a 12-hr constant rate test was conducted. The test data are summarized in Table 4.3-1. The water quality parameters pH, temperature, specific conductance and turbidity were measured periodically during the pump test and are shown in Figure 4.3-2, and tabulated in Appendix B. Water quality parameters rapidly stabilized during specific capacity testing, indicating that well redevelopment goals were met by pumping during the specific capacity test.

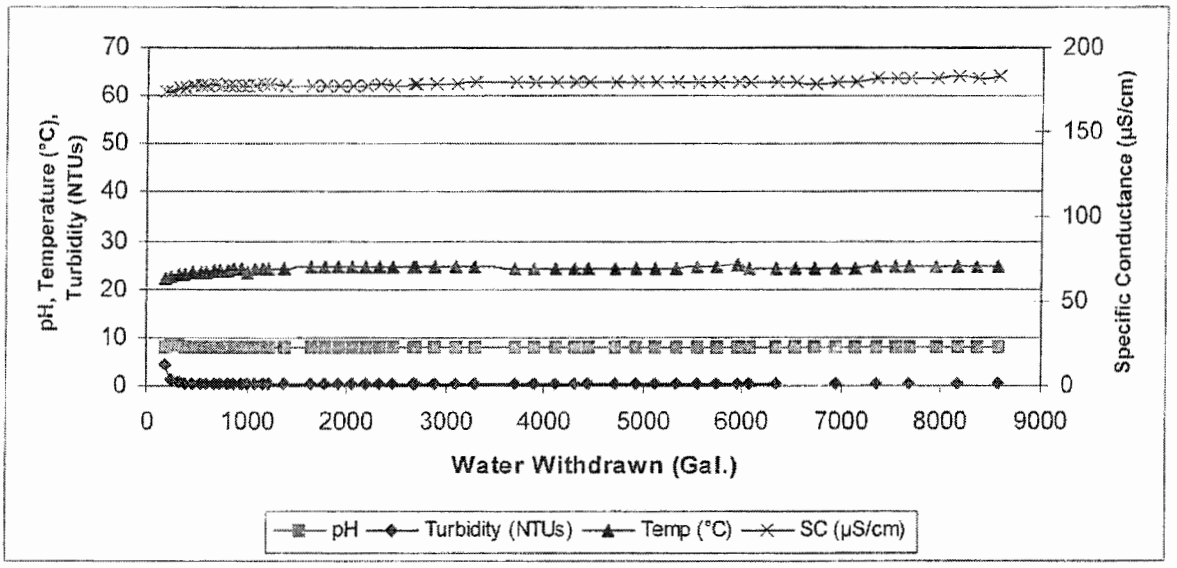


Figure 4.3-2 Water Quality Parameters – R-16 Middle Screen Test, August 10, 2006

4.3.3 Lower - Screen #4

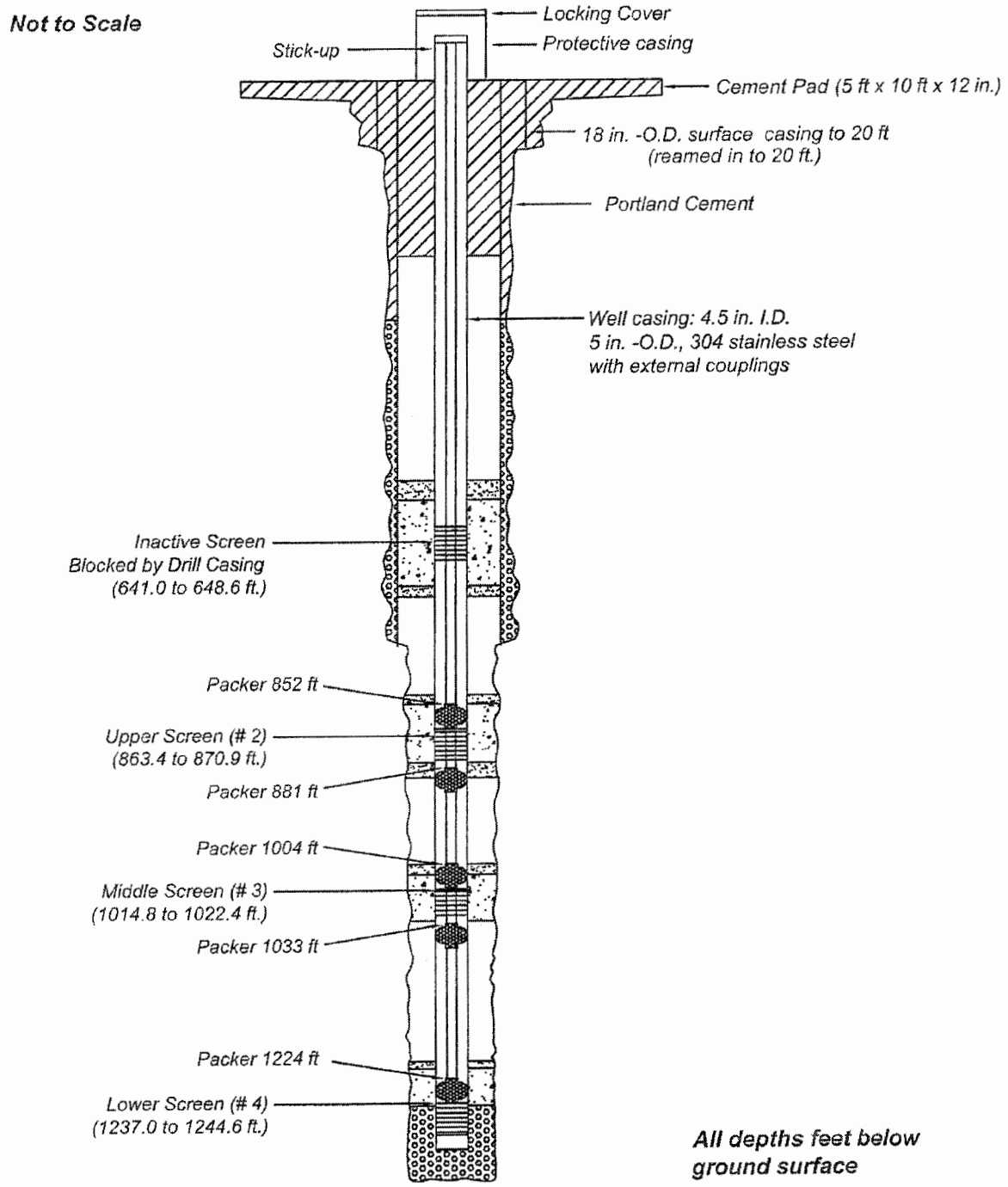
A 12-hr constant rate specific capacity test was conducted on the lower screened interval on August 9, 2006. The summary test data are presented in Table 4.3-1. The water quality parameters pH, temperature, specific conductance and turbidity were measured periodically during the lower screen pumping tests; data for the three consecutive pump tests are shown in Figure 4.3-3 and tabulated in Appendix B. Water quality parameters rapidly stabilized during specific capacity testing, indicating that redevelopment goals were met by pumping during the specific capacity tests.

4.4 Groundwater Sample Collection

LANL field personnel collected groundwater samples for laboratory analysis during the pumping activities. The data will be included in a separate LANL report.

4.5 R-16 Well Status

Following the well rehabilitation tasks, DOE directed WDC and Westbay personnel to reinstall the Westbay sampling system in R-16. A schematic of the sampling system installation is shown in Figure 4.5-1.



NOTE: This Figure is modified from "Characterization Well R-16 Completion Report", June 2003, LA-UR-03-1841.

NOTE: This schematic shows only the packers around the screened intervals. For the complete Westbay Reinstallation Log, see Appendix C.

KLEINFELDER		R-16 Well Schematic - November 2006 Cañada del Buey Los Alamos, New Mexico	FIGURE 4.5-1
Drawn By: D. Tideman	Date: January 2007		
Project No.: 68402	Filename: 68402_09_1.dwg		

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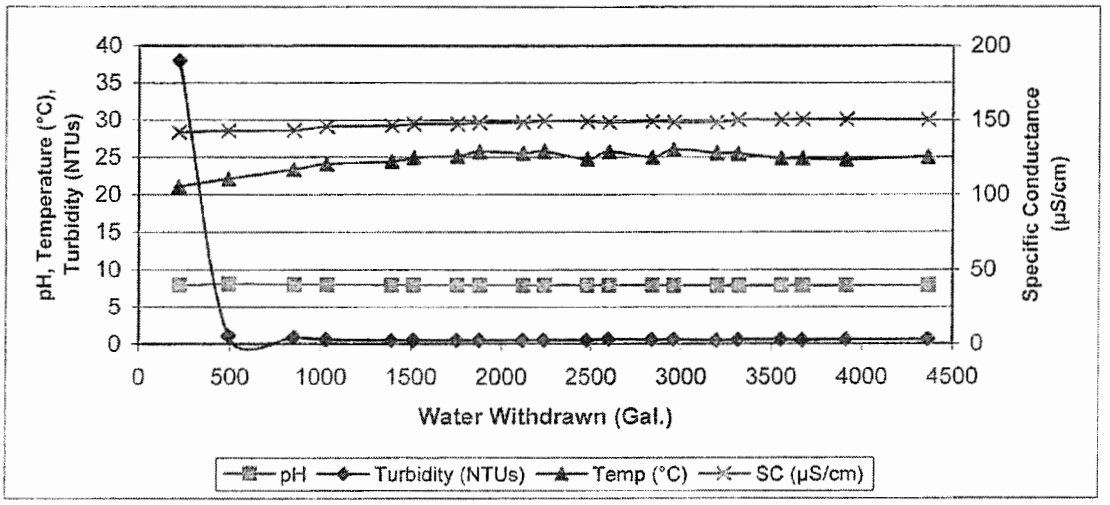

Figure 4.3-3 Water Quality Parameters – R-16 Lower Screen Test, August 9, 2006

5.0 INVESTIGATION-DERIVED WASTE

Water generated during R-20 and R-16 well rehabilitation efforts is stored at each site in frac tanks. Kleinfelder field personnel have collected samples to characterize the groundwater stored in the tanks. Following receipt of the analytical data and discharge approval from the NMED, R-16 and R-20 water will be applied to the land surface using sprinkler systems in accordance with the terms and conditions of the Notice of Intent dated August 2, 2001.

Other investigation-derived wastes generated during the project, such as contact wastes, were stored and handled in accordance with the Waste Characterization Strategy contained in Appendix A of the rehabilitation Work Plan (Kleinfelder 2006a).

6.0 SITE RESTORATION

After the R-16 and R-20 groundwater has been properly disposed, field equipment, as well as BMPs used during rehabilitation activities, will be removed from the site. Frac tanks will be drained and taken off site. Kleinfelder-owned locks will be removed from the wellhead and access road gate and replaced with LANL-owned locks.

7.0 SUMMARY

Per the scope of work, the goal of the rehabilitation activities was to redevelop each zone until groundwater chemistry was representative of pre-drilling conditions, based on measured concentrations of major ion and trace element chemistry, total organic carbon, isopropyl alcohol and acetone. However, the analytical data were not available for this report, and will be included in a forthcoming LANL report evaluating the hydrochemistry at R-16 and R-20.

The following well rehabilitation activities were conducted at R-20 and R-16:

- The Westbay multi-port sampling systems were removed
- Video logs were run of the well interiors
- Initial specific capacity tests were conducted on the screened intervals
- The screened intervals were swabbed, bailed, jetted, and pumped; additionally, at R-20, the screens were cleaned with a Hydropuls® tool that used compressed nitrogen emitted in short bursts
- Followup specific capacity tests were conducted on the lower screened interval and the combined upper and middle zones in R-20
- The Westbay sampling system was reinstalled in R-16. Two packers were installed in R-20 to isolate the three screened intervals.

DOE directed the following modifications during well rehabilitation activities:

- Followup specific capacity tests were not conducted at R-16 because the water quality parameters had stabilized and the turbidity measurements were low
- The Westbay sampling system was not re-installed at R-20 as planned; LANL is currently evaluating options which will be presented in a followup report.

8.0 REFERENCES

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