Miller Geotechnical Consultants, Inc.

3801 Automation Way, Suite 100
Fort Collins, Colorado 80525
(970) 412-1256

June 16, 2009

Richard Chang, Project Manager
Special Projects Branch
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: Request for Additional Information – Amendments to License Condition 74, Materials License SUA-56, Western Nuclear, Inc., Split Rock Site, Jeffrey City, Wyoming (TAC J00577)

Dear Mr. Chang:

The following letter was prepared in response to your letter dated April 1, 2009 and a subsequent phone conversation in which you requested additional information to support the proposed license condition amendments for the Western Nuclear, Split Rock Uranium Mill Tailings Facility. Each of the requests for additional information is presented followed by the response.

1. Provide additional information justifying that the value requested (0.05 milligrams per liter (mg/L)) for selenium is as low as is reasonably achievable (ALARA).

Response to Comment No. 1
The alternatives that were evaluated in the original submittal (WNI 1999) and documented in the NRC EA (NRC 2006) are the same alternatives that could be used to reduce selenium values in groundwater. Evaluation of these alternatives was used to show that the chosen alternative was protective and gave constituent concentrations that were as low as reasonably achievable (ALARA). The ALARA evaluation included a comparison of the benefits associated with reducing the concentrations to the costs necessary to achieve the lower concentrations. The costs included both economic as well as environmental impacts and are documented in the NRC EA (NRC 2006). The economic costs associated with reducing the concentrations ranged in excess of $100 million. The environmental impacts associated with these alternatives and include the following:

- Environmental impacts associated with constructing groundwater injection and extraction systems
- Impacts associated with construction of evaporation ponds
- Loss of water due to evaporation
- Removal of land from the historic livestock and wildlife land use
- Loss of billions of gallons of water due to contact with contaminated waters

The evaluation included in the original submittal from Western Nuclear (WNI, 1999a) confirmed that the chosen alternative, institutional controls with ACLs, would achieve concentration that are as low as

NMSS01

reasonably achievable (ALARA). The NRC EA (NRC 2006) concluded that the other alternatives "would not provide a remedial benefit commensurate with the associated costs."

While this conclusion was made for the constituents for which ACLs were granted, the conclusion is equally or more relevant for the proposed ACL for selenium. The constituents that the EA addresses and for which ACLs have been granted are at concentrations above protective values at the POC but are at levels that are protective at the POE. Selenium concentrations are below protective values at the POC wells and all other locations.

Any active remediation that might be employed to reduce selenium concentrations to values less than the proposed standard of 0.05 mg/l would involve massive programs to extract and treat water or to inject and dilute concentrations. These alternatives were developed in Section 3 and Appendix H of the original groundwater plan (WNI 1999). Those active alternatives had costs in excess of $100 million and had massive non-economic impacts associated with the consumption of water (up to 1875 gallons/minute) and the removal of land (up to 1000 acres) from traditional grazing uses that would be required for treatment and evaporation systems. Therefore, it can be concluded that the cost, both economic and non-economic, associated with reducing selenium levels would be excessive.

The benefit associated with reducing selenium concentrations to levels less than the protective level of 0.05 mg/l would be negligible. The concentrations at the POC wells and within the restricted area are all less than the value at which the EPA has determined is protective. In addition, access to water within the restricted area will be controlled by the long-term custodian in perpetuity because of the concentration of other constituents and thus there is no possible pathway for access to the water. Since the selenium concentrations in the groundwater are protective and the use of the water is restricted because of other constituents for which ACLs have already been granted it is obvious that there would be no tangible benefit associated with reducing selenium concentrations.

In summary, the proposed ACL for selenium is 0.05 mg/l which is the protective level set by the EPA. In addition, access to groundwater is restricted as a result of ACLs granted for other constituents. Therefore, the proposed standard is protective. Further, any action to reduce the selenium concentrations would involve millions of dollars and would have significant environmental impacts. That coupled with the fact that reducing the levels would provide no incremental benefit clearly demonstrates that the proposed standard is as low as reasonably achievable (ALARA).

2. Provide updated information identifying the recent surface water and groundwater users within 5 miles of the site.

Response to Comment No. 2
There are no new or different surface water or groundwater users within 5 miles of the site. The information presented in the original submittal (WNI 1999) remains valid.

3. Confirm that selenium is not expected to travel outside of the impoundment above the requested value (0.05 mg/L) given that values at well WN-42A have, in the recent past, approached this value.

Response to Comment No. 3
Selenium concentrations in groundwater have been measured for many years. The data indicate a slow decline in concentrations in the wells within and close to the reclaimed tailings and mill area. Specifically, wells 1 and 4R which are up-gradient of the point of compliance wells have values since 1996 which remain less than the proposed standard of 0.05 mg/l. The POC wells, 5 and 21, indicate that the selenium values

have remained less than the proposed standard for approximately 30 years. Well 21 has always had selenium values that are very low and for the most part less than the detection limit. The selenium values for well 5 have been as high as approximately 0.03 mg/l in the past with the recent values decreasing to approximately 0.02 mg/l. All the selenium values for the POC wells, going back 30 years, are less than the proposed standard for selenium.

The other monitoring wells, with the exception of well 42A have selenium values that are constant and general at or less than 0.01 mg/l. The selenium values in well 42A have been as high as 0.042 mg/l in 2007 with the 2008 data averaging approximately 0.03 mg/l. The selenium concentrations for all the wells are shown on Figures 1-3 and the location of the wells is shown on Figure 4.

The data clearly show that the POC wells, and the wells that are up-gradient of the POC wells have selenium concentrations that are less than the proposed standards and are either constant or have decreasing concentrations. The wells downgradient from the POC wells all have much lower selenium concentrations than the POC wells with the exception of well 42 A. This well has concentrations that are less than the standard and appear to be stable or declining. The higher selenium concentrations in well 42 A are likely the result of a pulse of water with slightly elevated selenium values that continues to move from the tailings area and the constituents continue to disperse, attenuate and be diluted. Since the concentrations at the source (i.e. wells 4R and 5) and the POC wells are less than the standard, the selenium concentrations in well 42A will slowly reduce as concentrations continue to decline and attenuation and dilution continue to reduce the concentrations as groundwater flows away from the tailings impoundment.

4. Is the fact that wells SWAB-1 and SWAB-12 contain insufficient water to provide a valid sample, as stated in your February 26, 2009, Surface Water and Groundwater Monitoring Report, change WNI's conclusions on aquifer flow and transport?

Response to Comment No. 4

SWAB-1 and SWAB-12 were replaced by drilling deeper wells adjacent to the existing wells. These wells are viewed as replacement wells by the Wyoming State Engineer's office and have the same identification number as the previous wells. The completion details for the replacement wells are shown in the attached memorandum.

Water level in the replacement wells (SWAB -1 R and SWAB-12R) were measured and water quality samples were taken from the wells during the May 2009 sampling episode. Water levels in wells SAB-1 and SWAB-12 have declined approximately 3 feet since the wells were installed in 1996. Similarly, water levels in the other wells to the south of the site have also declined. Figure 5 shows the approximate water levels in the wells to the south of the site in 1996 and 2008. As can be seen, while the water levels have declined, the general groundwater flow directions have remained the same.

In summary, the replacement wells completed to a deeper depth will provide a sampling point for groundwater in the future and the water levels in the replacement wells and the surrounding wells indicate that the conclusions regarding aquifer flow direction and contaminant transport remain valid.

5. Clarification is requested on your March 9, 2009 letter that requested to keep the standard for beryllium at the point of compliance wells at 0.05 mg/L.

Response to Comment No. 5
The March 9, 2009 request included a proposed standard for beryllium of 0.05 as this is the existing license standard and it was believed that minimizing changes to the license was desirable. The comment that the 1999 groundwater report suggested a standard of 0.01 mg/l based on background is correct. Based on the comment, it is proposed that the standard for beryllium be set at 0.01 mg/l

6. In addition to the written comments that were documented in the April 1, 2009 request, a verbal request was made to further the discussion of uranium background relative to the request to set the uranium trigger level in license condition 74 D to a background value of 0.13 mg/l.

Response to Comment No. 6

It was proposed that the trigger level for uranium in the wells down-gradient of the POC wells be changed from the MCL value of 0.03mg/l to a background derived level of 0.13 mg/l. It was discussed in the previous submittal that using a background value which is higher than the MCL as a trigger level was the appropriate value to determine if concentrations in a down-gradient well would be indicative of contamination from the tailings impoundment.

Background concentrations for the complete list of constituents of concern were developed as part of the original groundwater submittal (WNI, 1999). In that submittal, background concentrations for uranium were calculated using concentrations from un-impacted wells around the site. The site wide background concentration for uranium was determined to be 0.13 mg/l.

Questions were raised by NRC about the use of various wells in determining background concentrations. In response to those questions, a response was made (SMI, 2001) in which background concentrations of uranium, and other constituent, were reevaluated. This evaluation concluded that the background concentrations for uranium would be 0.087 mg/l instead of 0.13 mg/l if certain wells were excluded from the background determination.

The attached memorandum discusses the details of the determination of background. For the initial background determination, which was based on all the data, it was determined that the data were neither normal nor log-normally distributed. According to the standard procedures the upper prediction limit for a data set that is not normally or log-normally distributed is determined to be the maximum value in the data set. The initial background value for uranium was therefore set at the maximum value in the data set which was 0.13 mg/l. The data set which excluded some of the values was determined to be log-normally distributed and therefore the upper prediction level was calculated using the equation presented in the attached memorandum. The 95% upper prediction level for the smaller data set was calculated to be 0.087 mg/l.

While it was argued that there was no technical basis to eliminate some of the data from the background analysis, it was concluded that changing the proposed background from 0.13 mg/l to 0.087 mg/l would not impact the overall closure strategy. It was therefore proposed that background concentrations for uranium be set at 0.087 mg/l. In light of that determination, it is proposed that the trigger level for uranium listed in license condition 74 D be set at 0.087 mg/l.

I trust this information addresses your concerns. Should you have any further questions, please feel free to contact me.

Sincerely,

Miller Geotechnical Consultants, Inc.

Louis Miller
Project Manager

Attachment

cc. Larry Corte, WNI
Harley Shaver, Esq.
Scott Surovchek, DOE
Anne Thomas, WNI

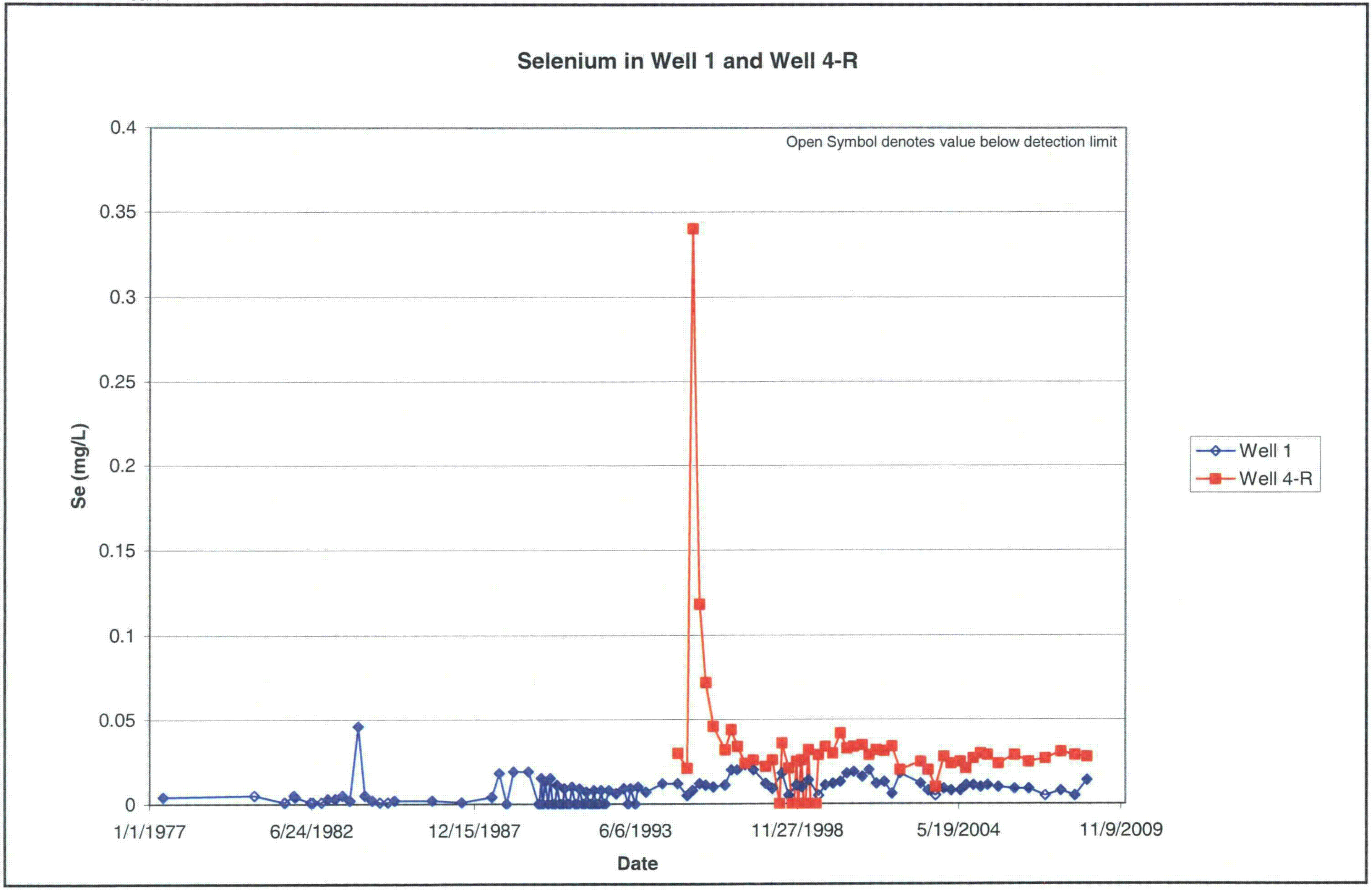
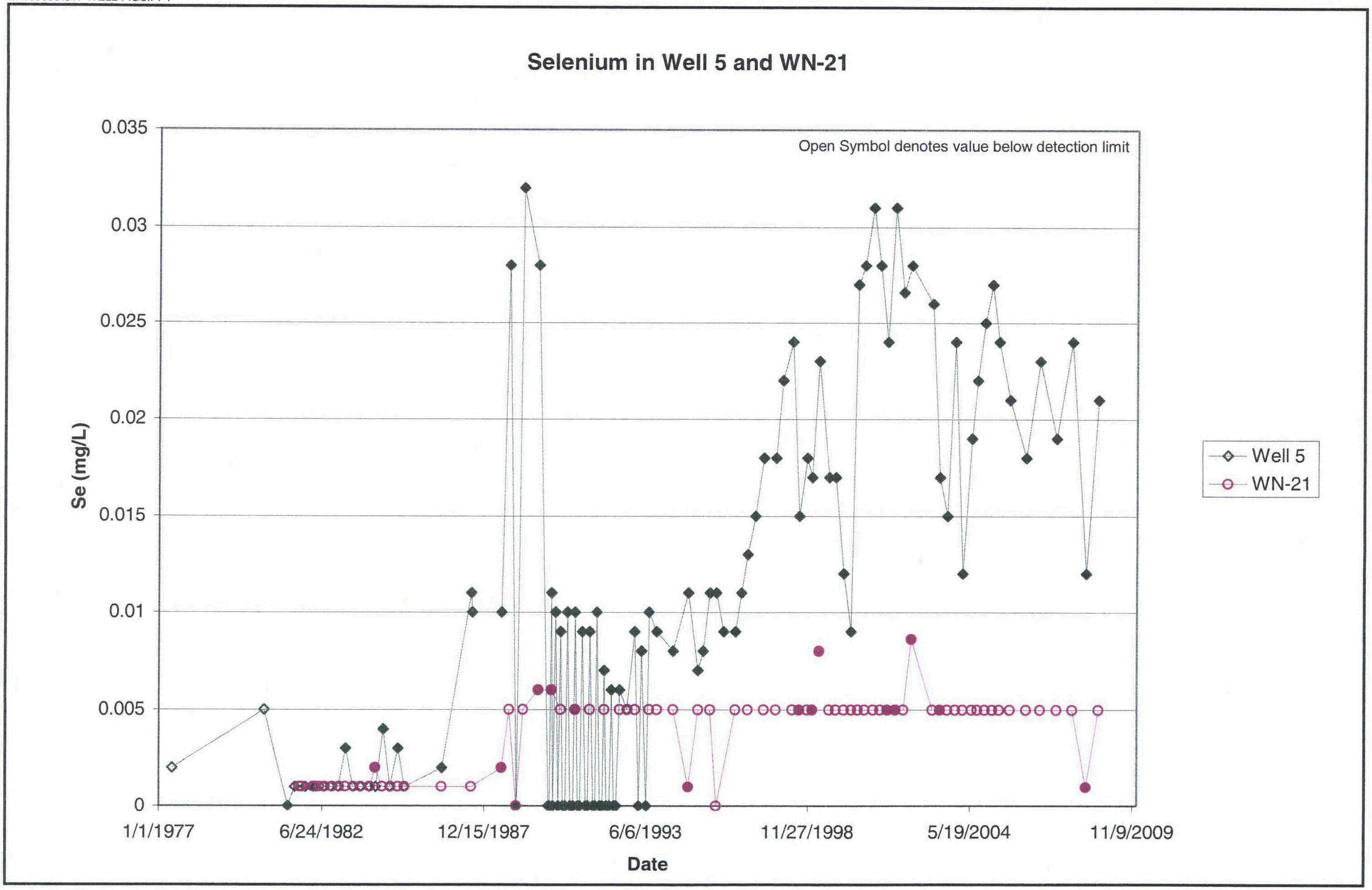


Figure 1
Selenium Concentrations
Wells Up-Gradient of POC Wells

E:\180888\GW-WELL-FIGS.PPT

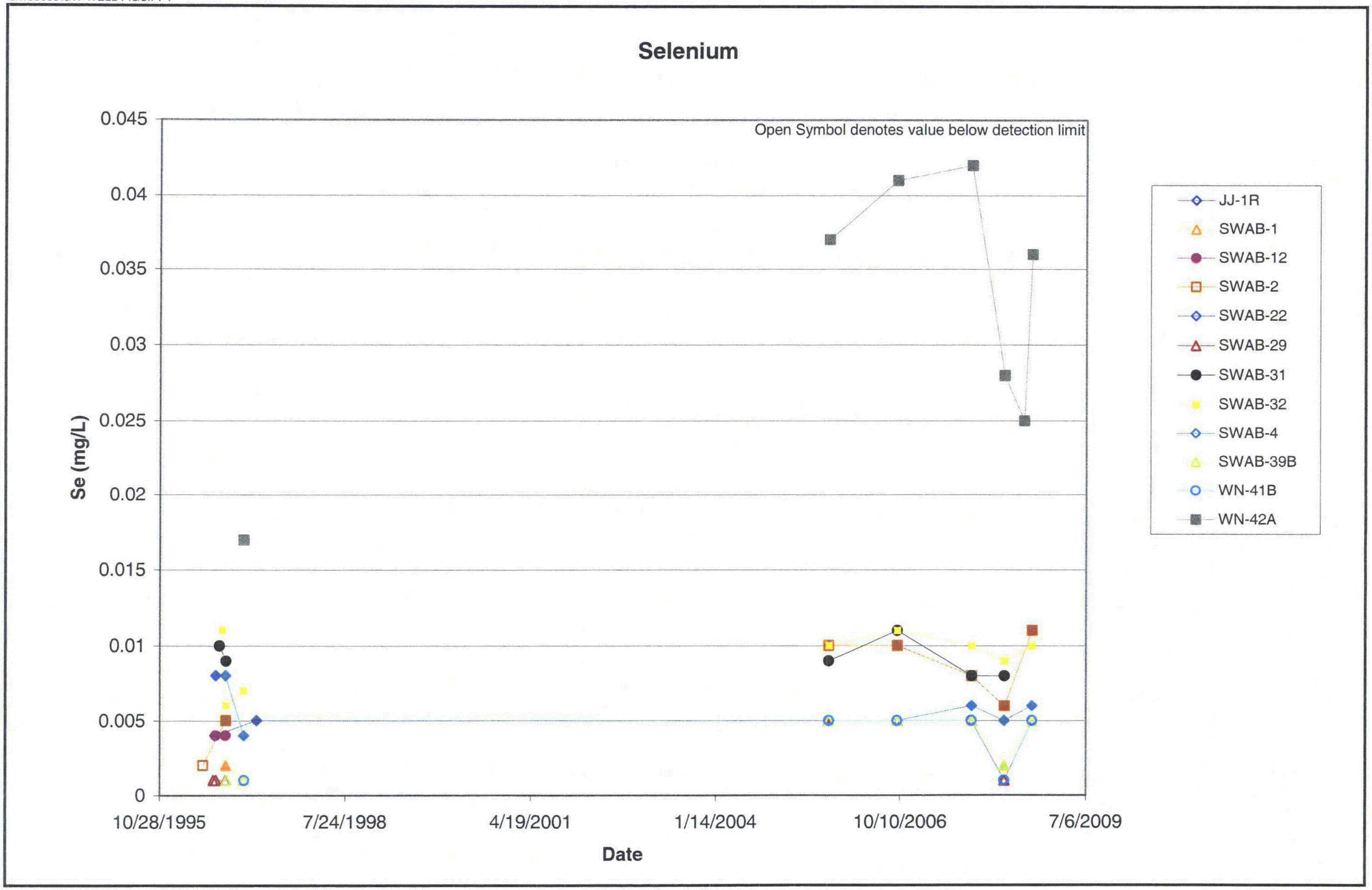


Project No: 180888

June 2009

Figure 2
Selenium Concentrations
POC Wells

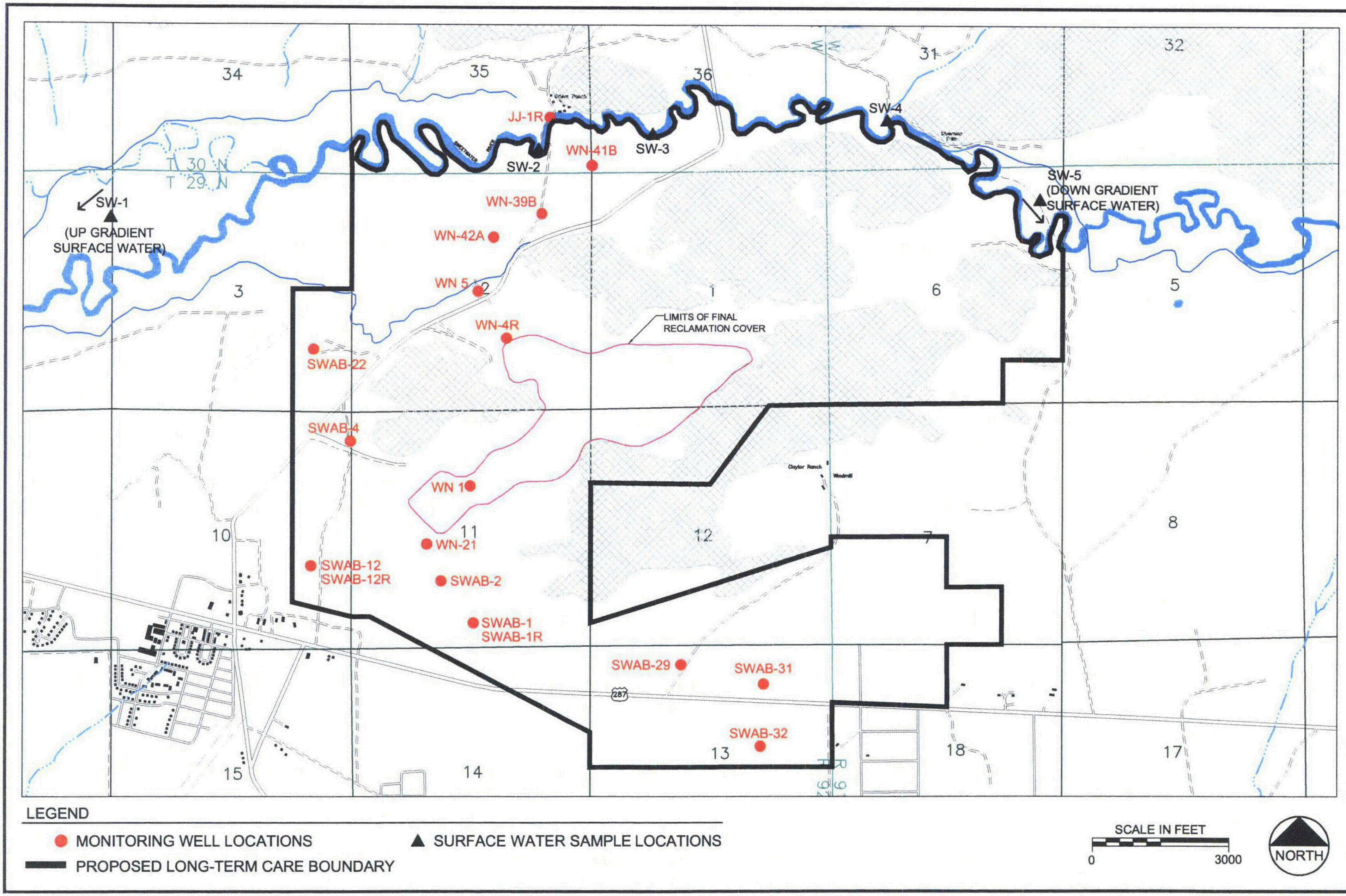
E:\180888\GW-WELL-FIGS.PPT



Project No: 180888

June 2009

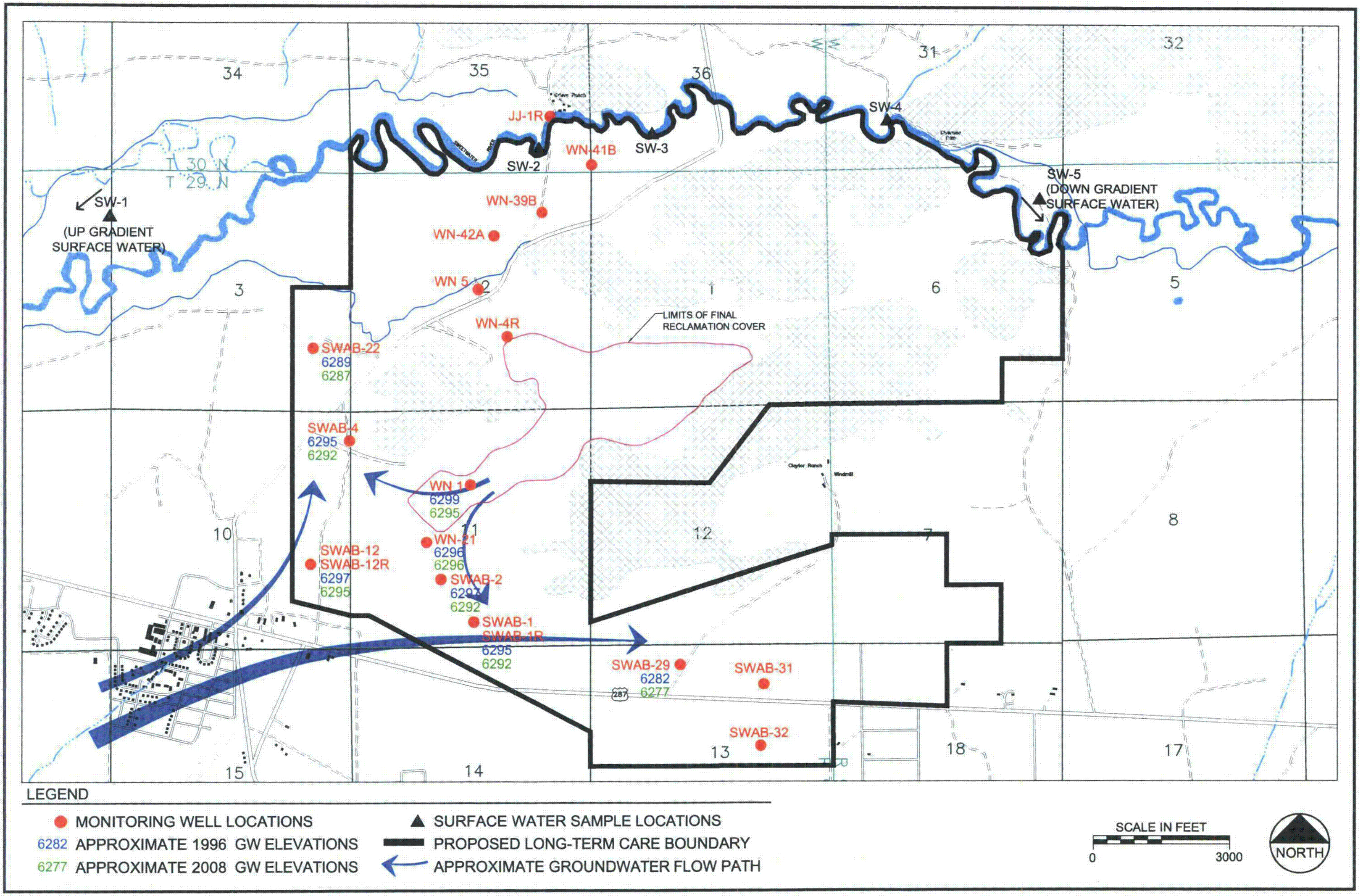
Figure 3
Selenium Concentrations
Wells Down-Gradient of POC Wells



TETRA TECH

FIGURE 4
WESTERN NUCLEAR - SPLIT ROCK SITE
MONITOR WELLS

Date:	JUNE 2009
Project:	180888
File:	GW-WELLS-09-1



TETRA TECH

FIGURE 5
WESTERN NUCLEAR - SPLIT ROCK SITE
GROUNDWATER ELEVATIONS

Date:	JUNE 2009
Project:	180888
File:	GW-WELLS-09-2

TETRA TECH

3801 Automation Way Suite 100
Fort Collins CO 80525
Tel 970.223.9600 Fax 970.223.7171
www.tetratech.com

Technical Memorandum

To:	Lou Miller	**From:**	Joe Reed
Company:	Miller Geotechnical Consultants	**Date:**	5/8/09
Re:	Western Nuclear Split Rock Well Installation Report	**Project #:**	180888.2009
CC:			

This report covers the installation and development of two monitoring wells at the Western Nuclear Inc. Split Rock Mill Site located near Jeffrey City, Wyoming. The water level in two existing monitoring wells, SWAB-1 (Permit Number U.W.P102522W) and SWAB-12 (Permit Number U.W. P102626W) has decreased and the wells could no longer be sampled. SWAB-12 also has two feet of sediment in the bottom of the well. The two new replacement wells (SWAB-1R and SWAB-12R) were located twelve feet from the existing wells and drilled approximately fifteen feet deeper. The replacement wells were drilled using hollow stem auger drilling and were completed in the same shallow water bearing formations as the original wells. Table 1 presents the monitor well completion data and the GPS survey data. The monitor well installation started April 29, 2009 and was completed May 1, 2009.

Monitor Well Installation

Boreholes were drilled by Drilling Engineers Inc., of Fort Collins, Colorado. A CME 75 drill rig utilizing hollow stem augers was used to drill the boreholes. SWAB-1R and SWAB-12R were drilled with 10.25-inch outside diameter (OD) X 6.25-inch inside diameter (ID) hollow stem augers (HSA). The boreholes were logged during drilling by observation of auger flight drill cuttings. Borehole logs are presented in Attachment A. A composite auger flight sample of the bottom 10 feet of each borehole was collected and a mechanical grain size analysis was preformed. The Grain Size Distribution Data are presented in Attachment B.

Table 1 presents well completion summary data and Figures 1 and 2 are monitor well completion diagrams. The 4-inch diameter monitoring wells were constructed from Boart Longyear Schedule 40 PVC. Slotted well screen (0.010-inch) and cap was installed at the depths specified in Table 1. Carmeuse Industrial Sand's (Colorado Silica Sand) 10-20 filter pack was installed to above the screen (Table 1). Chip bentonite was installed above filter pack to 1 foot below ground surface. The 4-inch PVC was capped with a 4-inch slip cap. The surface completions consisted of a five foot long lockable protective steel casing with a three foot square cement pad.

All downhole drilling equipment was decontaminated by washing with potable water before the first borehole and between boreholes.

An "Application To Relocate &/Or Deepen An Existing Domestic &/Or Stock Well" has been submitted to the Wyoming State Engineer's Office for both wells.

TETRA TECH

Monitor Well Development

Wells were developed by first surging and bailing throughout the screened interval. The wells were then further developed by pumping. Table 2 presents development data including gallons purged, field parameter data, and pumping rates. Well SWAB-12R was pumped continuously at the rates specified in Table 2 and cleaned up quickly. Well SWAB-1R could not be pumped continuously at the rates specified in Table 2 and was allowed to recover between pumping cycles.

Development water and drill cuttings were spread on the ground at the well site.

Table 1. Well Completion Summary

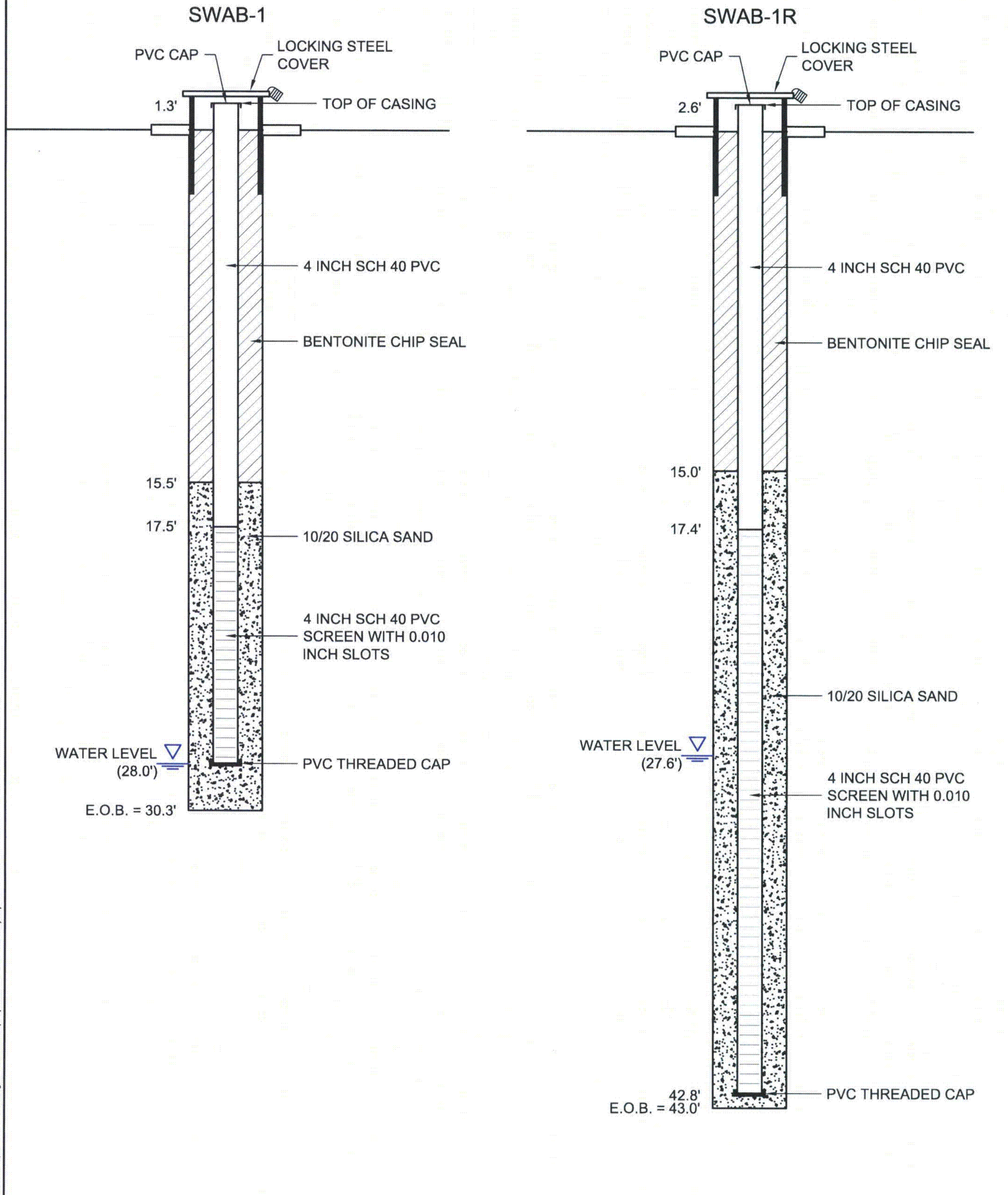
Well	Borehole Depth	Well Depth	Top of Screen	Top of Sand	Stick Up	Depth to Water[1]	GPS North	GPS West
SWAB-1	30.3	28.0	17.5	15.5	1.3	28.00	42° 29.670'	107° 48.360'
SWAB-1R	43.0	42.8	17.4	15.0	2.6	27.60	42° 29.670'	107° 48.359'
SWAB-12	20.5	19.4	9.0	6.5	1.9	14.64	42° 29.877'	107° 49.150'
SWAB-12R	34.1	34.1	8.7	5.5	2.5	15.35	42° 29.870'	107° 49.156'

All Depths Below Ground Surface
[1] SWAB-1R and SWAB-12R Before Development 5/7-8/09

TETRA TECH

Table 2 Well Development Data

					Final Field Parameters			
Well	Pre-Development Water Level (Below Ground Surface)	Gallons Bailed	Gallons Pumped	Pumping Rate (GPM)	pH	Conductivity (µS/cm)	Temperature (C°)	Comments
SWAB-1R	27.6	15	160	2.8	7.41	3240	11.7	Pumped dry 3 times, recovers >40 gal in 10 min.
SWAB-12R	15.35	20	110	5	7.65	540	9.9	Continuous pumping, cleans up fast

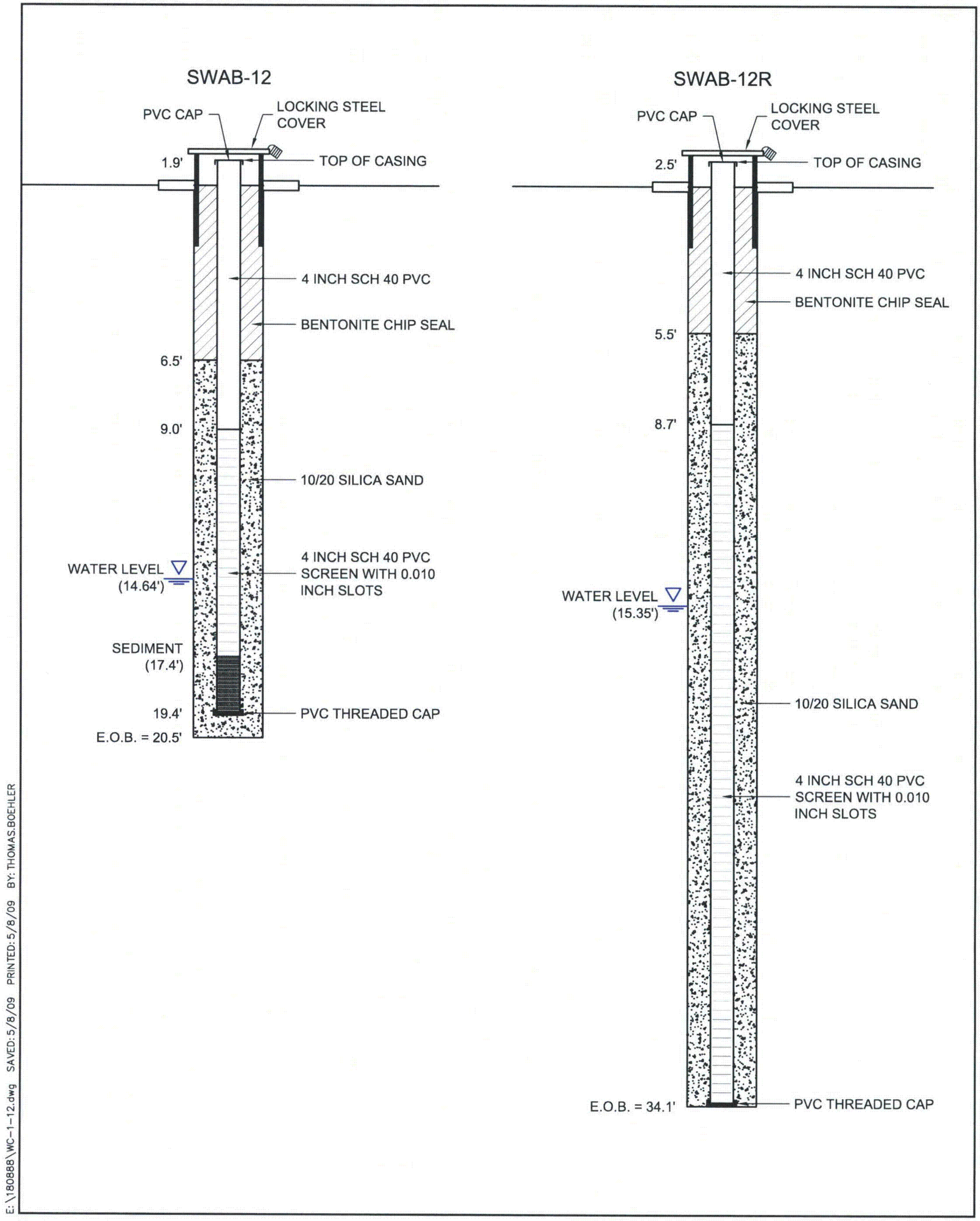


E:\180888\WC-1-12.dwg SAVED: 5/8/09 PRINTED: 5/8/09 BY: THOMAS.BOEHLER

Project No. 180888

May 2009

Figure 1
SWAB-1 and SWAB-1R Well Completion Diagram



Project No. 180888

May 2009

Figure 2
SWAB-12 and SWAB-12R Well Completion Diagram

TETRA TECH

ATTACHMENT A

BOREHOLE LOG

PROJECT: *WNI SPLIT ROCK MILL SITE* PAGE: *1 OF 1*

PROJECT NO.: *180888* DATE: *04/29/09*

BOREHOLE NO.: **SWAB-1R**

DEPTH (FT)	LITHOLOGY GRAPHIC	SOIL DESCRIPTION
0–4		**SAND (0 TO 4')** DARK YELLOW BROWN (10YR 4/6), MOIST, LOOSE, MOSTLY FINE SAND, SOME MEDIUM SAND, TRACE OF COARSE SAND.
4–15		**SAND (4' TO 15')** PALE YELLOW (2.5Y 8/3), SLIGHTLY MOIST, LOOSE, FINE AND MEDIUM SAND, TRACE OF COARSE SAND.
15–20		**SAND (15' TO 20')** PALE YELLOW (2.5Y 8/3), SLIGHTLY MOIST, LOOSE, 50% COARSE SAND, 35% MEDIUM SAND, 15% FINE SAND.
20–30		**SAND (20' TO 30')** VERY PALE BROWN (10YR 7/4), MOIST, LOOSE, 505 MEDIUM SAND, 25% COARSE SAND, 25% FINE SAND, TRACE FINE GRAVEL INCREASING WITH DEPTH TO 15% AT 30 FEET.
30–38		**SAND (30' TO 38')** PALE YELLOW BROWN (10YR 6/3), MOIST TO WET AT 31 FEET, LOOSE, FINE SAND, TRACE OF MEDIUM AND COARSE SAND, TRACE OF FINE GRAVEL.
38–40		**SAND/CLAYEY SAND (38' TO 43')** PALE YELLOW BROWN (10YR 6/3), WET, COHESIVE, FINE SAND, TRACE OF MEDIUM AND COARSE SAND, TRACE OF FINE GRAVEL, CLAY,

BOREHOLE LOG

PROJECT: *WNI SPLIT ROCK MILL SITE* PAGE: *1 OF 1*

PROJECT NO.: *180888* DATE: *04/30/09*

BOREHOLE NO.: **SWAB-12R**

DEPTH (FT)	LITHOLOGY GRAPHIC	SOIL DESCRIPTION
0–4		**SANDY CLAY (0 TO 4')** VERY PALE BROWN (10YR 7/3), DRY TO SLIGHTLY MOIST, SOFT TO MEDIUM STIFF, VERY FINE SAND AND FINE SAND, SOME SILT.
4–10		**CLAYEY SAND (4' TO 10')** VERY PALE BROWN (10YR 7/3), DRY, LOOSE, 50% FINE SAND, 30% MEDIUM SAND, 20% COARSE SAND.
10–14		**GRAVELLY SAND (10' TO 14')** LIGHT YELLOW BROWN (10YR 6/4), SLIGHTLY MOIST, LOOSE, FINE TO COARSE SAND, FINE TO MEDIUM GRAVEL.
14–34		**SAND (14' TO 34')** BROWN (10YR 5/3), WET, LOOSE TO SLIGHTLY COHESIVE, FINE SAND, SOME MEDIUM SAND, TRACE OF COARSE SAND, TRACE FINE GRAVEL, TRACE OF CLAY.
34		**EO.B. AT 34'**

Depth scale (FT): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

TETRA TECH

ATTACHMENT B

Mechanical Grain Size Analysis

Tetra Tech, Inc. 970.223.9600

Sample Identification	SWAB-1R 33'-43'

Project Information

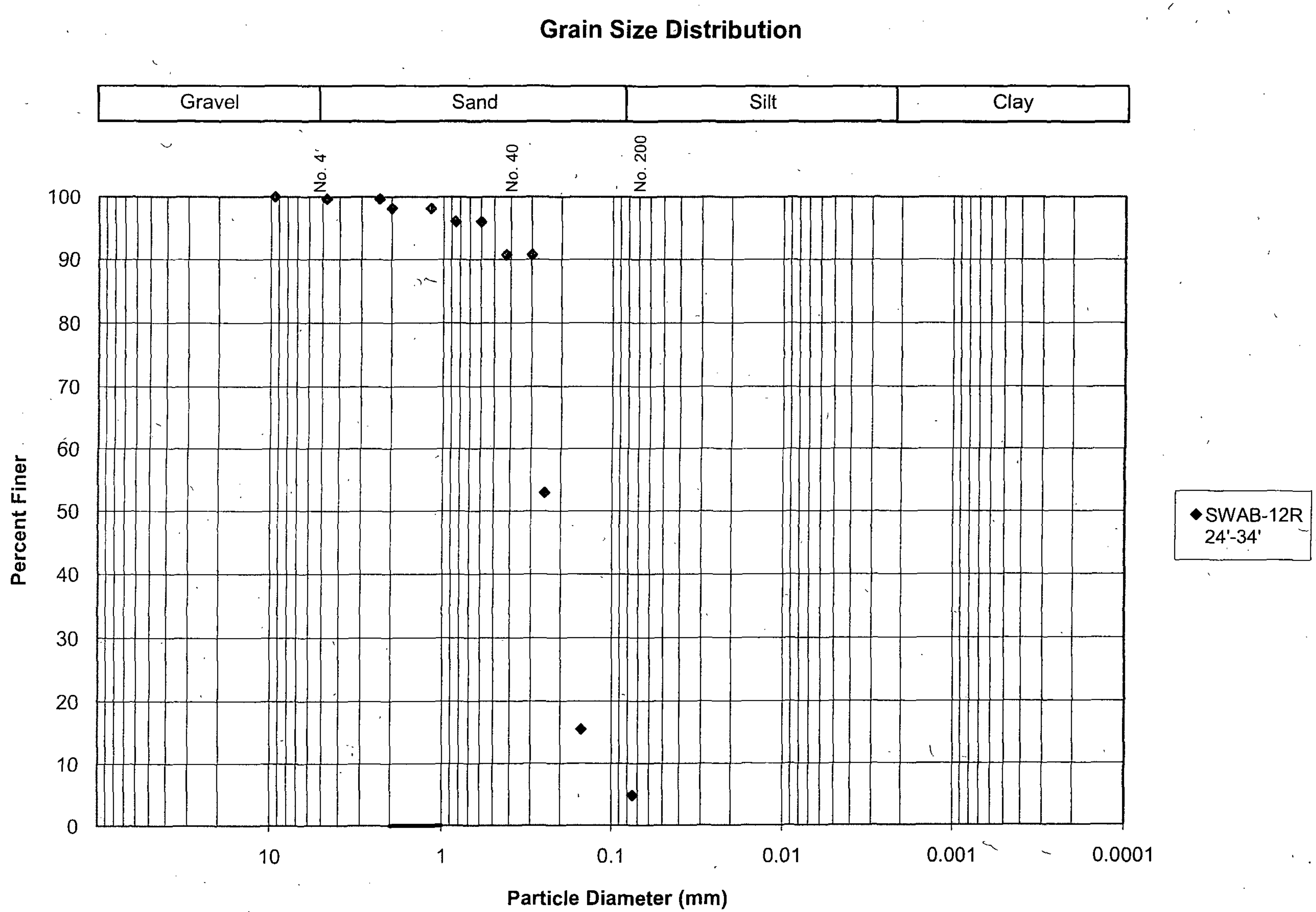
Project Name	Jeffrey City/ Split Rock
Project Number	180888
Date	May 6, 2009
Sample Type	Bulk
Soil Description	
Remarks	
Tested By	CK

Drying Pan ID	N
Mass Drying Pan (g.)	236.89
Mass Pan + Dry Sample Before Wash (g.)	835.17
Mass of Dry Sample Before Wash (g.)	598.28

Sieve Size (mm)	Sieve #	Individual Mass Retained (g.)	Individual % Retained	Cumulative % Passing
9.5	3/8"	0.0	0.0	100
4.75	#4	3.9	0.6	99
2.00	#10	18.6	3.1	96
0.850	#20	59.7	10.0	86
0.425	#40	151.6	25.3	61
0.250	#60	131.2	21.9	39
0.150	#100	78.6	13.1	26
0.075	#200	64.1	10.7	15
0.00	Pan	9.32		
TOTAL				

For Use When Washing Wet Sample

Moisture Content (%)		***Wet Soil***	
Tare ID		Tare ID	
Tare Mass (g)		Tare Mass (g)	
Wet Soil + Tare (g)		Wet Soil + Tare (g)	
Dry Soil + Tare		Wet Soil (g)	
Moisture Content (%)	#DIV/0!	Dry Soil (g)	#DIV/0!
		Dry Soil + Tare (g)	#DIV/0!


Grain Size Distribution
Gravel
Sand
Silt
Clay
No. 4
No. 40
No. 200
Percent Finer
100
90
80
70
60
50
40
30
20
10
0
10
1
0.1
0.01
0.001
0.0001
Particle Diameter (mm)
SWAB-12R 24'-34'

Mechanical Grain Size Analysis

Tetra Tech, Inc. 970.223.9600

Sample Identification	SWAB-12R 24'-34'

Project Information

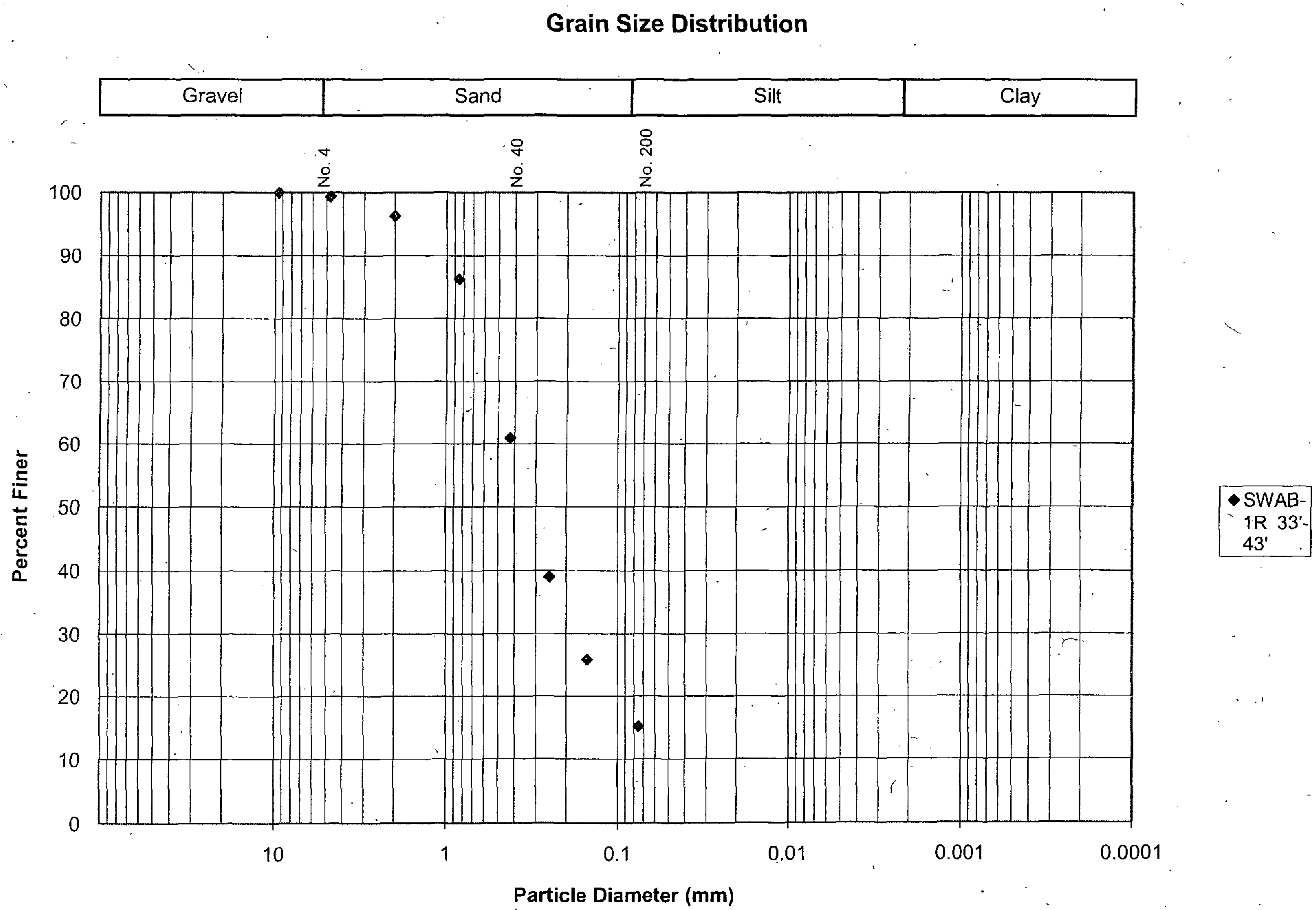
Project Name	Jeffrey City/ Split Rock
Project Number	180888
Date	May 6, 2009
Sample Type	Bulk
Soil Description	
Remarks	
Tested By	CK

Drying Pan ID	6
Mass Drying Pan (g.)	481.51
Mass Pan + Dry Sample Before Wash (g.)	1289.65
Mass of Dry Sample Before Wash (g.)	808.14

Sieve Size (mm)	Sieve #	Individual Mass Retained (g.)	Individual % Retained	Cumulative % Passing
9.5	3/8"	0.0	0.0	100
4.75	#4	2.9	0.4	99.6
2.00	#10	12.5	1.5	98
0.850	#20	17.0	2.1	96
0.425	#40	42.9	5.3	91
0.250	#60	305.1	37.7	53
0.150	#100	302.7	37.5	15
0.075	#200	86.6	10.7	5
0.00	Pan	2.55		
TOTAL				

For Use When Washing Wet Sample

Moisture Content (%)		***Wet Soil***	
Tare ID		Tare ID	
Tare Mass (g)		Tare Mass (g)	
Wet Soil + Tare (g)		Wet Soil + Tare (g)	
Dry Soil + Tare		Wet Soil (g)	
Moisture Content (%)	#DIV/0!	Dry Soil (g)	#DIV/0!
		Dry Soil + Tare (g)	#DIV/0!



Grain Size Distribution
Gravel
Sand
Silt
Clay
No. 4
No. 40
No. 200
Percent Finer
100
90
80
70
60
50
40
30
20
10
0
10
1
0.1
0.01
0.001
0.0001
Particle Diameter (mm)
SWAB-1R 33'-43'

TETRA TECH

3801 Automation Way Suite 100
Fort Collins CO 80525
Tel 970.223.9600 Fax 970.223.7171
www.tetratech.com

Technical Memorandum

To: Lou Miller

From: Jill Richards –Tetra Tech

Company: Miller Geotechnical Consulting

Date: June 12, 2009

Re: Split Rock Site: Groundwater Background Concentration Method for Uranium, Split Rock Formation

Project #: 180888

CC:

This summarizes the technical approach and methodology for which the groundwater background concentration was calculated for Uranium for the Split Rock Formation at the Split Rock, Wyoming Site (Site). The document reviewed was the Western Nuclear, Inc. Split Rock Site Ground Water Characterization and Evaluation Report (main document), and included related sections on groundwater background determination from Appendix F (Section F.5.4).

The general approach in determination of background concentrations for the Site were done according to EPA (1989, 1992) based on methods for background statistics from ASTM (1996) and Gibbons (1994). An inter-well approach was used in which water samples for background selected were limited to upgradient or distantly cross-gradient areas near the Site. The areas were assumed not to have been affected by site seepage or any site operations. The selected wells were located within a few miles of the site included site drinking water wells, Well #22, Well #27; four private wells that were PVC-screened; and installed wells WN-43A, WN-43B, SAB Wells and some SEB- and SWAB- series wells. The data collected were between November 1995 through December 1997, except wells #22 and #27 which were collected since 1981.

The data was first tested for outliers according to Rosner (1983), and any outliers were identified. No Uranium data were removed from the data set as a result of the outlier identification, as recommended from ASTM (1996). The distributions of the data sets were first determined in order to determine the statistical methodologies to be used for the descriptive statistics and upper prediction limits (UPLs). UPLs of 95% Upper Confidence Levels were then calculated from the background data. UPLs are used for future for comparisons with down-gradient compliance monitoring data. In the case of the Uranium background concentration UPLs, a nonparametric UPL was used because the data was neither normal nor log-normally distributed. This value was defined as the largest (or maximum) value of the Uranium background samples in accordance to ASTM (1996).

Distributions and UPLs were then calculated on a revised set of wells for the Split Rock Formation in SMI (2001). The Uranium data was log-normally distributed in this case, and the UPL was calculated according to the following equation from EPA (1989), pg 5-25, for a single future observation (k=1) for future downgradient comparisons against the background UPL.

$$\bar{X} + S\sqrt{1/m + 1/n}\quad t_{(n-1,\ K,\ 0.95)}$$

Where X and S are the mean and standard deviation for the background well data, m = number of observations taken and n = number of background observations.

References:

American Society for Testing and Materials (ASTM). 1996. *Provisional Standard Guide for Developing Appropriate Statistical Approaches for Ground Water Detection Monitoring Programs.* ASTM, PS64-96, 14p. Philadelphia, Pennsylvania.

Gibbons, R.D. 1994. *Statistical Methods for Ground Water Monitoring.* New York, New York: Wiley & Sons.

Rosner, B. 1983. "On the Detection of Many Outliers", *Technometrics*, vol. 17. pp. 221-227.

Shepherd Miller (SMI) 2001. *WNI Response to NRC Request of 9/6/01 for Additional Information on Site Closure Plan for the Split Rock, Wyoming Site.* November 2001.

U.S. Environmental Protection Agency (EPA). 1989. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities.* NTIS PB89-151047.

U.S. Environmental Protection Agency (EPA). 1992. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance, July 1992.*