0096

Canyon Fuel Company, LLC.
Sufco Mine
A Subsidiary of Arch Western Bituminous Group, LLC.

Ken May, General Manager
397 South 800 West
Salina, UT 84654
(435) 286-4400 - Office
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Refer to Expandable 10 30 2006 file in C0410002, 2006, Incoming for additional information

Incoming of C/041/0002

October 30, 2006

D. Wayne Hedberg
Permit Supervisor
Utah Coal Regulatory Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P. O. Box 145801
Salt Lake City, Utah 84114-5801

RECEIVED
OCT 30 2006
DIV. OF OIL, GAS & MINING

Re: Results of Drilling and Piezometer/Well Installation in the area of Pines 105, 310, 311 Springs and Joes Mill Pond Spring Area, Canyon Fuel Company, LLC, SUFCO Mine C/041/002

Dear Wayne:

Please find enclosed with this letter three copies of the Results of Drilling and Piezometer/Well Installation in the area of Pines 105, 310, 311 Springs and Joes Mill Pond Spring Area. This submittal is being made in part to satisfy the requirements of the Sufco M&RP that committed the mine to submitting to the Division results of the North Water Spring August – September 2006 drilling and piezometer/well installation project. This information is due to the Division on or before the last day of October 2006.

Copies of the geologic description of the cores or cuttings for most of the drill holes in which piezometers/wells were installed are presented in this document. A few of the drill holes were not logged since they were drilled next to or very close by another logged drill hole. In the interest of time and getting the project completed before subsidence began again in the area, we elected to forgo logging a few of the drill holes. However, we believe the sediments in the investigation area can be adequately characterized by the drill hole descriptions obtained and presented herein.

Also included in the enclosed information is a map identifying the location of each of the piezometers/wells and the location of springs Pines 105, 310, 311, and Joes Mill Pond. Tables with piezometer/well completion data and water level measurements obtained in the piezometers/wells current as of October 24, 2006 are also included. The elevation of the measuring point and ground elevation adjacent to the surface for most of the piezometers/wells is also included in the data. These elevations were obtained prior to the occurrence of subsidence related to the mining of panel 6 Left Pines East. A few of the sites could not be

surveyed before subsidence with the survey-grade GPS equipment due to the thick vegetative overstory. However, these missed sites and the remainder of all of the piezometers/wells will be surveyed in the next few weeks for elevations and locations with the GPS equipment and appropriate traditional survey equipment. This second survey is being completed to determine what post-mining changes, if any, have occurred to the ground and piezometers/well elevations.

Sufco will continue to obtain data from the piezometers/wells on a bi-weekly basis for as long as conditions permit access. Sufco will also use the material contained in this submittal along with any additional data collected through the remainder of this year to prepare and submit a more detailed report of the drilling activities, changes in water levels in the piezometers/wells, changes in spring flows, and potential future investigative activities and mitigation proposals. This report will be submitted to the Division, as stipulated in Sufco's M&RP, in January 2007.

If you have any questions or need additional information, please contact Chris Hansen at (435) 448-2669 or Mike Davis at (435) 286-4421.

Sincerely,
CANYON FUEL COMPANY, LLC
SUFCO Mine

Kenneth E. May
Mine Manager

Encl.

KEM/MLD:kb

cc: DOGM Correspondence File

sufpub\govtplan.org\dogmmrp\06northwaterplan\resultssubmittal10-30-06

FILE IN Expandable 10 30 2006
Refer to Record No. 0096
in C0410002, 2006, INCOMING
for additional information

Results of Drilling and Piezometer/ Well Installation in the area of Pines 105, 310, 311 Springs and Joes Mill Pond Spring Area, Canyon Fuel Company, LLC, SUFCO Mine C/041/002

29 October 2006

Canyon Fuel Company, LLC
Sufco Mine
Salina, Utah

PETERSEN HYDROLOGIC, LLC
CONSULTANTS IN HYDROGEOLOGY

Results of Drilling and Piezometer/ Well Installation in the area of Pines 105, 310, 311 Springs and Joes Mill Pond Spring Area, Canyon Fuel Company, LLC, SUFCO Mine C/041/002

29 October 2006

Canyon Fuel Company, LLC
SUFCO Mine
Salina, Utah

Prepared by:

Erik C. Petersen, P.G.
Senior Hydrogeologist
Utah P.G. No. 5373615-2250

PETERSEN HYDROLOGIC, LLC
CONSULTANTS IN HYDROGEOLOGY

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PETERSEN HYDROLOGIC, LLC

29 October 2006

Mr. Mike Davis
Canyon Fuel Company, LLC
Sufco Mine
397 South 800 West
Salina, Utah 84526

Mike,

During August 2006 we installed 32 piezometers and four production wells in the North Water and Joes Mill areas at the Sufco Mine. This data summary report details the results of the drilling and piezometer/well installation and completion. Water level data collected from the piezometers and wells through 24 October 2006 are also presented herein.

Piezometer and well drilling and installation
The drilling of the piezometers and wells in the North Water and Joes Mill areas was performed by Clement Drilling and Geophysical, Inc. of Cedar Hills, Utah. The locations of the wells and piezometers in the North Water and Joes Mill areas are shown on Figures 1 and 2, respectively. Well completion information is presented in Table 1.

Thirty 1-inch piezometers and three 4-inch wells were installed in the North Water area. Two 1-inch piezometers and one 4-inch well were installed in the Joes Mill area. Most of the 1-inch piezometers were drilled using direct-push techniques incorporating continuous core recovery and extraction. The remaining piezometers, which were installed in locations where the subsurface stratigraphy was adequately characterized, were installed using direct-push methods that did not produce sediment cores. The 4-inch wells were drilled using an 8-inch hollow-stem auger.

Both the 1-inch piezometers and the 4-inch wells were completed using 0.010 PVC well screen and solid PVC riser pipe. Typically, a sand filter-pack was emplaced in the well annulus opposite and to about 0.5 feet above the top of the well screen. The sand filter-pack consisted of either 10-20 Colorado silica sand and/or native flowing fine-grained sand that was present in the borehole and naturally rose in the borehole upon insertion of the well screen. The annular space above the sand filter pack in the 1-inch piezometers was filled with anhydrous bentonite chips to the ground surface. The annular space above the sand filter-pack in the 4-inch wells was filled to within 0.5 feet of the land

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surface with anhydrous bentonite chips, and a 0.5-foot thick concrete surface seal was emplaced to the land surface. A locking steel protective enclosure was embedded in the concrete surface seal to protect the wells. The 1-inch piezometers were protected at the surface by a driven 4-inch PVC casing and cap.

Water level data

Depth-to-water measurements relative to a marked reference point on the top of the inner PVC casing were performed using an electronic well sounder and the data were recorded in a field notebook. Elevations and ground coordinates of most piezometers and wells were surveyed by Sufco Mine personnel using survey-grade GPS instruments prior to the undermining of the region. In some locations visual obstructions precluded the GPS survey of some wells. These wells will subsequently be surveyed using conventional survey techniques. Water elevations presented herein were calculated using measured depth-to-water data and surveyed well elevations. Depth-to-water data and water elevation data for piezometers and wells in the North Water and Joes Mill areas are presented in Table 2.

Additionally, automated pressure transducer/data logger units (In-Situ Level Troll 500 model) were installed in 10 selected piezometers in the North Water area. These units are currently configured to automatically measure and record water-level information in the selected wells several times per day. This information is periodically downloaded to a field computer and will be used together with the hand water-level measurements to analyze water level trends in the North Water area.

Geologic logging and sampling of boreholes

Sediment core samples from piezometers in the North Water and Joes Mill areas were geologically logged. For each stratigraphic interval, an internally-generated hydrogeologic code was also assigned. The purpose of the hydrogeologic code is to facilitate general comparisons between adjacent wells and to simplify the characterization of hydrogeologic properties. Geologic logs for each logged piezometer are presented in the Appendix. Grab samples from the sediment cores for each described interval for all logged wells were collected in plastic sample bags and placed into storage for potential future analysis.

Please feel free to contact me should you have any questions in this regard.

Sincerely,

Erik C. Petersen, P.G.
Principal Hydrogeologist
Utah PG #5373615-2250

Table 1 Completion details for piezometers and production wells in the North Water Canyon and Joes Mill Pond areas, Sufco Mine.

PETERSEN HYDROLOGIC, LLC Well completion info.xls

Notes: All measurements are in feet below the ground surface
Sand pack used in all wells is 10-20 Colorado Silica Sand; Well screen is 0.010 slot size
Well screen and riser pipe used is flush-threaded PVC
Piezometers enclosed in 4-inch PVC surface protectors; Production wells enclosed in locking steel surface protectors.

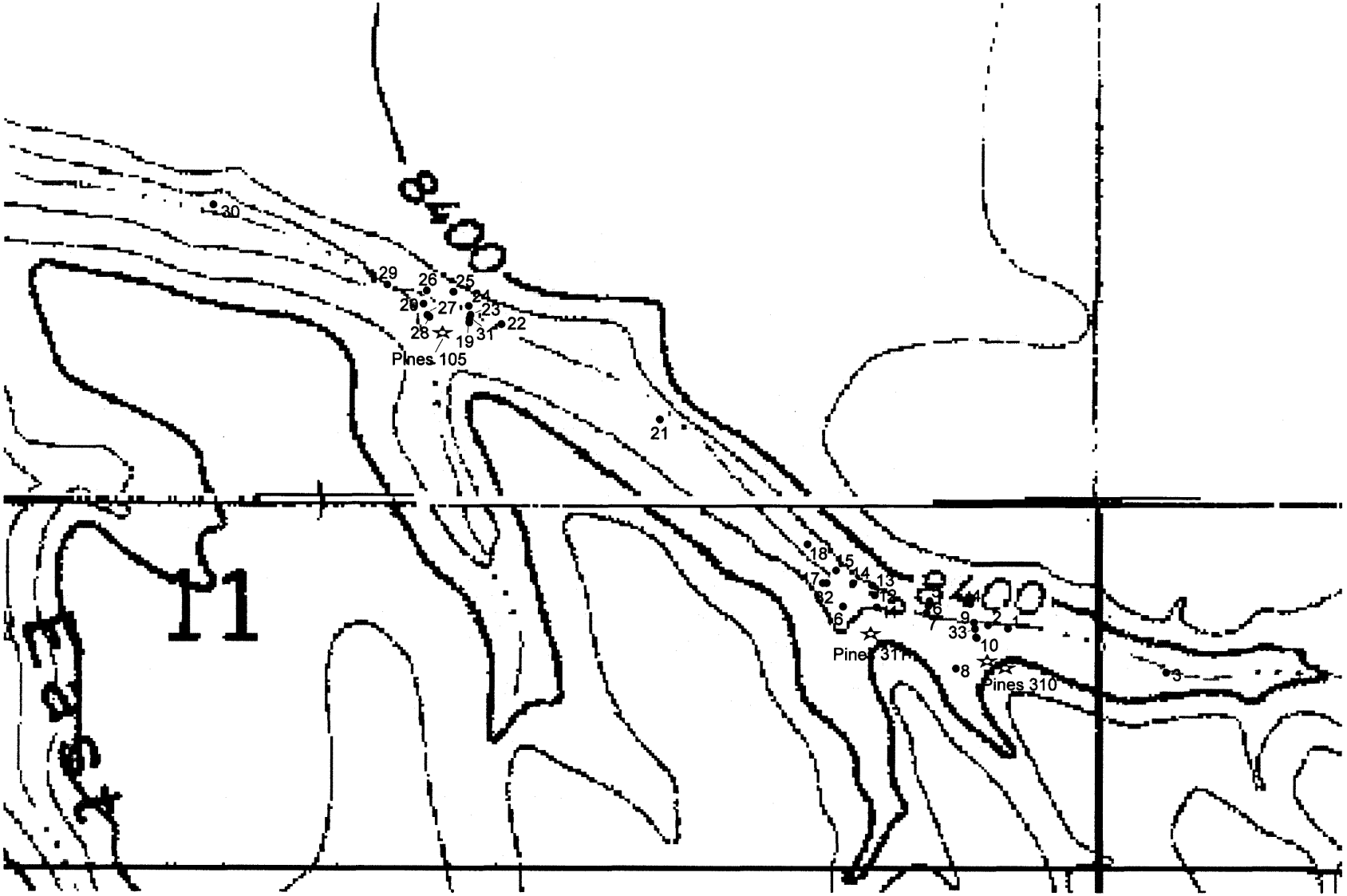
				Depth to	Screen interval			Sand pack		Bentonite seal		Flowing sand	Sampled interval		Direct push interval		8-inch augered interval		Concrete surface seal	
	Area	Type	Date completed	bedrock/refusal	From	To	Screen length	From	To	From	To	infil to	From	To	From	To	From	To	From	To
NWP-1	Pines 310	1-inch Piezometer	1-Aug-2006	28	8	28	20	5	12	0	5	12	0	28	---	---	---	---	---	---
NWP-2	Pines 310	1-inch Piezometer	1-Aug-2006	23	3	23	20	8	9	0	8	9	0	23	---	---	---	---	---	---
NWP-3	Upgradient alluvium	1-inch Piezometer	2-Aug-2006	16	6	16	10	5	13.5	0	5	13.5	0	16	---	---	---	---	---	---
NWP-4	Pines 310	1-inch Piezometer	2-Aug-2006	38	9.7	29.7	20	9	13	0	9	13	0	30	30	38	---	---	---	---
NWP-5	Pines 310	1-inch Piezometer	2-Aug-2006	29.7	8	28	20	7	10	0	7	10	0	29.7	---	---	---	---	---	---
NWP-6	Pines 310	1-inch Piezometer	2-Aug-2006	35	4	24	20	3	8	0	3	8	0	26	26	35	---	---	---	---
NWP-7	Pines 310	1-inch Piezometer	2-Aug-2006	36	8	28	20	7.5	8	0	7.5	8	0	26	26	36	---	---	---	---
NWP-8	Pines 310	1-inch Piezometer	3-Aug-2006	41	4	19	15	7	13	0	7	13	0	24	24	41	---	---	---	---
NWP-9	Pines 310	1-inch Piezometer	3-Aug-2006	Not encountered	8	28	20	---	---	0	6.8	6.8	---	---	0	28	---	---	---	---
NWP-10 shallow	Pines 310	1-inch Piezometer	3-Aug-2006	Not encountered	5	10	5	4	10	0	4	10	---	---	0	10	---	---	---	---
NWP-10 deep	Pines 310	1-inch Piezometer	3-Aug-2006	41	23	28	5	---	---	0	12	12	0	24	24	41	---	---	---	---
NWP-11	Pines 311	1-inch Piezometer	3-Aug-2006	28	8	28	20	7	8	0	7	7	0	28	---	---	---	---	---	---
NWP-12	Pines 311	1-inch Piezometer	4-Aug-2006	40	8	28	20	7	7.5	0	7	7.5	---	---	0	40	---	---	---	---
NWP-13	Pines 311	1-inch Piezometer	4-Aug-2006	35	8	28	20	7	8	0	7	7	---	---	0	35	---	---	---	---
NWP-14	Pines 311	1-inch Piezometer	4-Aug-2006	35	8	28	20	7	8	0	7	8	0	28	28	35	---	---	---	---
NWP-15	Pines 311	1-inch Piezometer	4-Aug-2006	33	8	28	20	7	8	0	7	8	0	28	28	33	---	---	---	---
NWP-16	Pines 311	1-inch Piezometer	4-Aug-2006	9	4	9	5	2	7	0	2	7	0	9	---	---	---	---	---	---
NWP-17	Pines 311	1-inch Piezometer	4-Aug-2006	22	9	24	15	5	9	0	5	9	0	24	---	---	---	---	---	---
NWP-18	Pines 311	1-inch Piezometer	5-Aug-2006	29	9	29	20	7	8	0	7	8	0	29	---	---	---	---	---	---
NWP-19	Pines 105	1-inch Piezometer	5-Aug-2006	21	6	21	15	5	8	0	5	8	0	21	---	---	---	---	---	---
NWP-20	Pines 105	1-inch Piezometer	5-Aug-2006	25	5	25	20	3	18	0	3	18	0	25	---	---	---	---	---	---
NWP-21	Between Pines 105 and 311	1-inch Piezometer	15-Aug-2006	25.5	5.5	25.5	20	4	12	0	4	12	0	25.5	---	---	---	---	---	---
NWP-22	Pines 105	1-inch Piezometer	15-Aug-2006	22.5	7.5	22.5	15	3.5	10.8	0	3.5	10.8	0	22.5	---	---	---	---	---	---
NWP-23	Pines 105	1-inch Piezometer	15-Aug-2006	25	10	25	15	7	9	0	7	9	---	---	0	25	---	---	---	---
NWP-24	Pines 105	1-inch Piezometer	15-Aug-2005	28.5	8.5	28.5	20	7	22.4	0	7	22.4	0	28.5	---	---	---	---	---	---
NWP-25	Pines 105	1-inch Piezometer	15-Aug-2005	20.5	10.5	20.5	10	10	15.6	0	10	15.6	0	20.5	---	---	---	---	---	---
NWP-26	Pines 105	1-inch Piezometer	15-Aug-2006	26.5	11.5	26.5	15	---	---	0	6.5	6.5	0	26.5	---	---	---	---	---	---
NWP-27	Pines 105	1-inch Piezometer	16-Aug-2006	25	10	25	15	9	10	0	9	10	0	25	---	---	---	---	---	---
NWP-28 shallow	Pines 105	1-inch Piezometer	16-Aug-2006	Not encountered	9	12	3	---	---	0	7.3	7.3	---	---	0	12	---	---	---	---
NWP-28 deep	Pines 105	1-inch Piezometer	16-Aug-2006	22.5	19.5	22.5	3	---	---	0	10	10	---	---	0	22.5	---	---	---	---
NWP-29	Pines 105	1-inch Piezometer	16-Aug-2006	22	7	22	15	5	12.9	0	5	12.9	0	22	---	---	---	---	---	---
NWP-30	Lower Canyon	1-inch Piezometer	16-Aug-2006	22	7	22	15	6	13.3	0	6	13.3	0	22	---	---	---	---	---	---
NWP-31 (4")	Pines 105	4-inch Production	16-Aug-2006	23	0	18	18	3	15	0.5	3	15	---	---	---	---	0	23	0	0.5
NWP-32 (4")	Pines 311	4-inch Production	16-Aug-2006	Not encountered	0	14	14	3	8.5	0.5	3	8.5	---	---	---	---	0	24	0	0.5
NWP-33 (4")	Pines 310	4-inch Production	17-Aug-2006	Not encountered	0	19	19	2.5	7	0.5	2.5	7	---	---	---	---	0	19	0	0.5
NWP-34 (4")	Joes Mill Pond	4-inch Production	17-Aug-2006	11.5	1	11	10	3	4	0.5	3	4	---	---	---	---	0	14.5	0	0.5
NWP-35	Joes Mill Pond	1-inch Piezometer	17-Aug-2006	18	8	18	10	7	14.5	0	7	14.5	0	18	---	---	---	---	---	---
NWP-36	Joes Mill Pond	1-inch Piezometer	17-Aug-2006	15	5	15	10	---	---	0	4	4	0	14	---	---	---	---	---	---

Table 2 Sufco North Water area piezometers, water level data

PETERSEN HYDROLOGIC, LLC, North Water Piezometers water levels.xls

Measurements reported as depth to water in feet relative to top of PVC casing and water elevation in feet above mean sea level

	Casing Elevation	3-Aug-06		4-Aug-06		11-Aug-06		15-Aug-06		16-Aug-06		17-Aug-06		24-Aug-06		1-Sep-06		14-Sep-06		29-Sep-06		12-Oct-06		23-Oct-06	
NWP-1	8369.511	4.91	8364.60	4.06	8365.45	4.27	8365.24	4.41	8365.10	4.40	8365.11			4.61	8364.90	4.81	8364.70	4.75	8364.76	5.08	8364.43	4.76	8364.75	4.87	8364.64
NWP-2	8367.362	2.70	8364.66	2.72	8364.64	2.92	8364.44	3.02	8364.34	3.01	8364.35			3.15	8364.21	3.39	8363.97	3.63	8363.73	3.91	8363.45	3.65	8363.71	3.75	8363.61
NWP-3	---	11.01		11.01		11.13		11.21		11.23				11.36		11.41		11.42		11.44		11.34		11.32	
NWP-4	8366.460	3.08	8363.38	3.10	8363.36	3.35	8363.11	3.47	8362.99	3.41	8363.05			3.55	8362.91	3.71	8362.75	4.34	8362.12	4.67	8361.79	4.40	8362.06	4.46	8362.00
NWP-5	8362.524	2.70	8359.82	2.68	8359.84	2.86	8359.66	3.02	8359.50	2.95	8359.57			2.93	8359.59	3.06	8359.46	5.45	8357.07	6.15	8356.37	6.02	8356.50	6.15	8356.37
NWP-6	8362.634	2.80	8359.83	2.75	8359.88	3.07	8359.56	3.16	8359.47	3.08	8359.55	3.05	8359.58	3.08	8359.55	3.24	8359.39	5.51	8357.12	6.06	8356.57	5.85	8356.78	5.73	8356.90
NWP-7	8362.784	3.19	8359.59	3.15	8359.63	3.34	8359.44	3.46	8359.32	3.41	8359.37			3.41	8359.37	3.54	8359.24	6.40	8356.38	7.26	8355.52	7.21	8355.57	7.44	8355.34
NWP-8	---	8.66		8.49		8.59		8.65		8.65				8.77		8.78		9.50		9.82		9.88		9.49	
NWP-9	8366.405			2.43	8363.98	2.60	8363.81	3.05	8363.36	2.70	8363.71			2.79	8363.62	2.98	8363.43	3.53	8362.88	3.84	8362.57	3.59	8362.82	3.69	8362.72
NWP-10 shallow	8367.955			2.94	8365.02	3.17	8364.79	3.29	8364.67	3.23	8364.73			3.39	8364.57	3.60	8364.36	3.71	8364.25	3.91	8364.05	3.64	8364.32	3.79	8364.17
NWP-10 deep	8367.385			1.84	8365.55	1.92	8365.47	2.20	8365.19	2.18	8365.21			2.06	8365.33	2.26	8365.13	3.43	8363.96	3.86	8363.53	4.29	8363.10	4.61	8362.78
NWP-11	8357.739			2.27	8355.47	2.76	8354.98	2.86	8354.88	2.80	8354.94			2.58	8355.16	3.14	8354.60	19.68	8338.06	19.59	8338.15	20.20	8337.54	20.08	8337.66
NWP-12	8357.833			4.29	8353.54	4.42	8353.41	4.67	8353.16	4.51	8353.32	4.48	8353.35	4.14	8353.69	4.94	8352.89	22.52	8335.31	16.29	8341.54	17.36	8340.47	17.42	8340.41
NWP-13	8357.542			4.18	8353.36	4.37	8353.17	4.58	8352.96	4.48	8353.06			3.88	8353.66	5.44	8352.10	12.38	8345.16	13.87	8343.67	14.37	8343.17	15.08	8342.46
NWP-14	8356.219			3.66	8352.56	3.87	8352.35	4.09	8352.13	4.04	8352.18			3.34	8352.88	5.43	8350.79	9.59	8346.63	12.04	8344.18	12.02	8344.20	12.04	8344.18
NWP-15	8354.396			3.46	8350.94	3.71	8350.69	3.88	8350.52	3.90	8350.50	3.73	8350.67	2.87	8351.53	5.42	8348.98	7.76	8346.64	9.91	8344.49	9.97	8344.43	9.84	8344.56
NWP-16	8357.145			3.64	8353.51	3.23	8353.92	3.52	8353.63	3.39	8353.76	3.35	8353.80	3.30	8353.85	4.43	8352.72	Dry		Dry		Dry		Dry	
NWP-17	8354.293			4.86	8349.43	3.98	8350.31	4.21	8350.08	4.65	8349.64	4.17	8350.12	3.56	8350.73	9.03	8345.26	7.98	8346.31	9.93	8344.36	9.88	8344.41	9.83	8344.46
NWP-18	8351.101					5.35	8345.75	5.48	8345.62	5.39	8345.71	5.31	8345.79	4.19	8346.91	4.19	8346.91	9.25	8341.85	10.75	8340.35	10.47	8340.63	10.60	8340.50
NWP-19	8330.022					7.79	8322.23	7.65	8322.37	7.69	8322.33			8.46	8321.56	8.52	8321.50	9.04	8320.98	9.81	8320.21	10.52	8319.50	10.77	8319.25
NWP-20	8326.041					17.21	8308.83	17.44	8308.60	17.36	8308.68			17.35	8308.69	17.60	8308.44	17.58	8308.46	19.14	8306.90	18.08	8307.96	18.16	8307.88
NWP-21	8336.979							3.90	8333.08	3.82	8333.16	3.85	8333.13	2.70	8334.28	5.63	8331.35	submerged		3.68	8333.30	submerged		submerged	
NWP-22	8330.924							7.08	8323.84	7.03	8323.89	7.11	8323.81	7.24	8323.68	7.68	8323.24	8.22	8322.70	9.70	8321.22	8.97	8321.95	8.97	8321.95
NWP-23	8329.751									8.13	8321.62			8.74	8321.01	9.08	8320.67	9.54	8320.21	9.96	8319.79	10.22	8319.53	10.29	8319.46
NWP-24	8333.117									16.91	8316.21			17.21	8315.91	17.48	8315.64	17.72	8315.40	18.05	8315.07	18.09	8315.03	18.14	8314.98
NWP-25	---									15.40				15.56		15.73		15.98		16.22		16.52		16.71	
NWP-26	8327.935									17.69	8310.25			18.79	8309.15	18.96	8308.98	19.27	8308.67	19.78	8308.16	20.06	8307.88	20.08	8307.86
NWP-27	8326.853									8.25	8318.60			8.36	8318.49	8.63	8318.22	9.18	8317.67	9.74	8317.11	10.13	8316.72	10.12	8316.73
NWP-28 shallow	8327.061									6.92	8320.14			7.18	8319.88	7.39	8319.67	7.83	8319.23	8.31	8318.75	8.50	8318.56	8.55	8318.51
NWP-28 deep	8327.028									8.67	8318.36			8.56	8318.47	8.79	8318.24	9.32	8317.71	9.97	8317.06	10.46	8316.57	10.57	8316.46
NWP-29	8323.009									9.65	8313.36	8.96	8314.05	9.90	8313.11	9.74	8313.27	9.84	8313.17	10.33	8312.68	10.68	8312.33	9.95	8313.06
NWP-30	8312.035									12.30	8299.74	12.42	8299.62	12.95	8299.09	13.30	8298.74	13.84	8298.20	14.75	8297.29	15.42	8296.62	15.86	8296.18
NWP-31 (4")	8330.233													9.00	8321.23	9.30	8320.93	9.74	8320.49	10.13	8320.10	10.48	8319.75	10.55	8319.68
NWP-32 (4")	8355.332											3.90	8351.43	3.60	8351.73	6.19	8349.14	6.27	8349.06	9.60	8345.73	9.74	8345.59	9.65	8345.68
NWP-33 (4")	8368.272											3.90	8364.37	4.03	8364.24	4.36	8363.91	4.46	8363.81	4.48	8363.79	4.17	8364.10	4.20	8364.07
NWP-34 (4")	---															6.73		7.03		7.37		7.68		7.80	
NWP-35	---															14.69		14.97		15.19		15.52		15.67	
NWP-36	---															10.16		10.27		10.34		10.50		10.54	



☆ Spring location

• Piezometer/well location

Figure 1 Piezometer/well locations in the Pines 105 and Pines 310/311 areas.

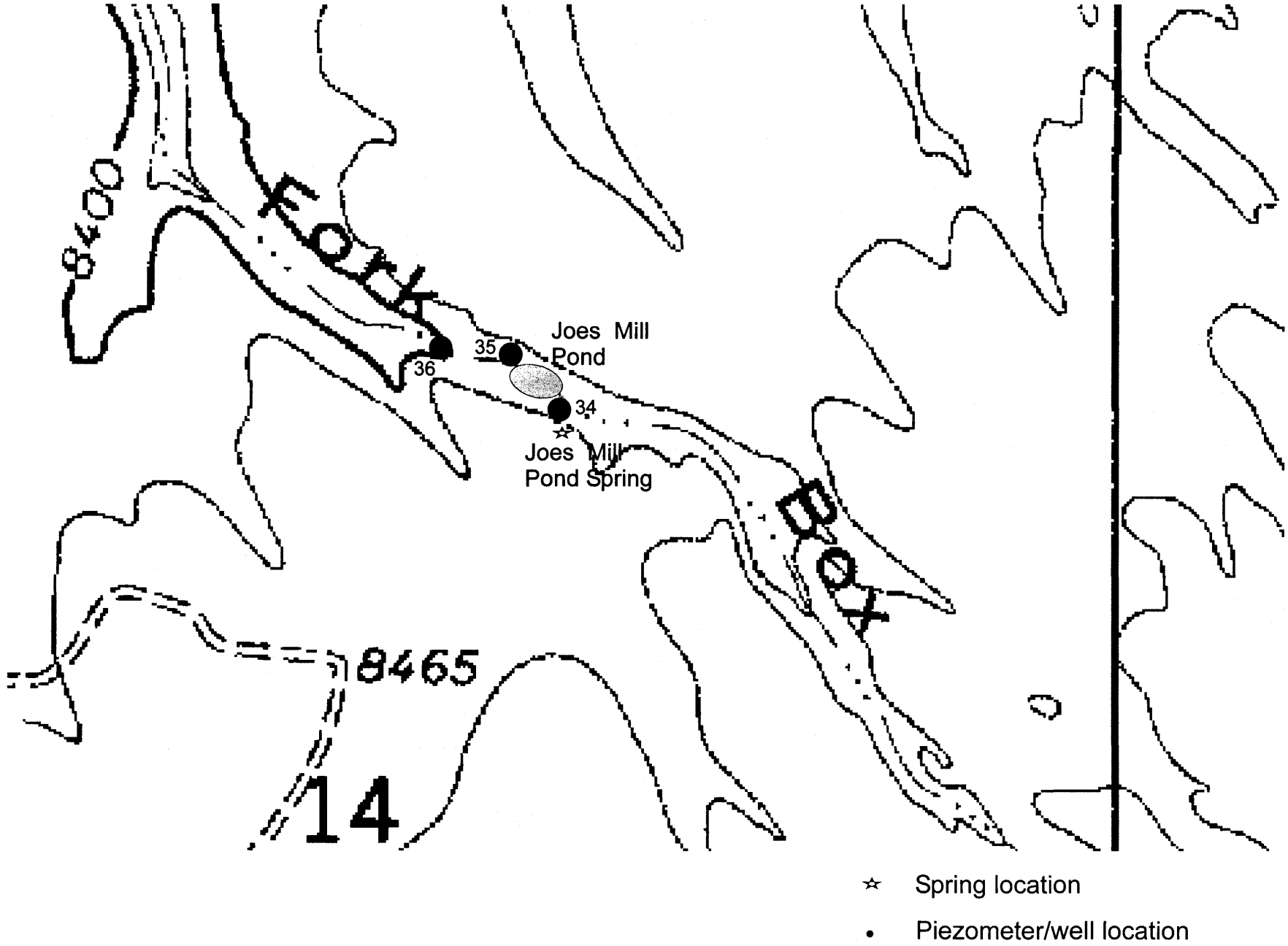


Figure 2 Piezometer/well locations in the Joes Mill Pond area.

Appendix

Geologic Logs

Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-1**
Date drilled: 1-Aug-06

Interval (feet)	Code	Description
0-3.8	FGS	Fine-grained sand, gray to brown, moist, some mottling, fe-staining from 2.5 to 3.5 feet
3.8-11.8	OSLT	Organic silt, dark gray to black, wood from 4.8-5.0, fine-grained sand layer from 5.0 to 5.3 feet, wood/organic silt from 10.8-11.5
11.8-13.5	FGS	Gray fine-grained sand
13.5-14.5	INTBD	Organic sand/silt, banded with about 20% wood chunks
14.5-15	FGS	Fine-grained sand, gray
15-15.8	OSLT	Dark brownish gray organic silt, plastic consistency
15.8-19	FGS	Gray fine-grained sand, dark gray organic silt layer from 18.0-18.4.
19-20	OSLT	Dark gray organic silt with woody debris
20-22.5	FGS	Gray fine-grained sand
22.5-23	OSLT	Dark gray-brown organic silt with woody debris
23-26.3	FGS	Gray fine-grained sand
26.3-28	BDRK	Weathered castlegate sandstone, light gray, highly weathered

Key:	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-2**
Date drilled: 1-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Wet, gray-brown fine grained sand with some roots and Fe staining along rootways, poor recovery (50%)
4-8	OSLT	Dark gray to black organic silt, plastic, 4-inch fine-grained sand layer at bottom, poor recovery (40%)
8-11	OSLT	Organic silt, wood chunks, some thin sand layers
11-15	FGS	Gray fine-grained sand, wet, fine laminations from 14-15 feet
15-15.4	WOOD	Log
15.4-16	INTBD	Laminated, thin beds
16-20	FGS	Gray to brownish gray fine-grained sand, wet, minor interbedded/laminated organic silt and sand interval from 19.2-20 feet
20-21.5	FGS	Gray fine-grained sand with some organics
21.5-23	OSLT	Dark gray to black organic silt with big chunks of wood

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-3**
Date drilled: 2-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Fine-grained sand, medium brown
4-10	FGS	Fine-grained sand, dark brown
10-10.5	FGS	Orange weathered fine-grained sand, soft, likely boulder
10.5-15	FGS	Fine-grained sand, dark brown, wet
15-16	BDRK	Weathered Castlegate Sandstone, yellowish gray, wet

Key:	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-4**
Date drilled: 2-Aug-06

Interval (feet)	Code	Description
0-6.5	FGS	Medium gray fine-grained sand with some Fe staining and roots
6.5-9	OSLT	Organic silt with some minor sand and woody zones
9-9.3	WOOD	Decayed wood
9.3-10	OSLT	Organic silt with woody zones
10-11.5	FGS	Gray fine-grained sand with thin interbeds of organic silt
11.5-12	WOOD	Decayed wood with organic silt
12-13.5	FGS	Gray fine-grained sand
13.5-16	FGS	Gray fine-grained sand with thin interbeds of organic silt
16-30	FGS	Medium gray fine-grained sand with little or no organic content

Key:	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-5**
Date drilled: 2-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Brown to black silty/sandy organic soil/fine-grained sand
4-10.5	FGS	Medium to dark gray fine-grained sand with some minor organic-rich zones
10.5-11	OSLT	Organic silt, dark gray to black with some gray fine-grained sand
11-13	FGS	Gray fine-grained sand with some laminated organic silt interbedded with woody material
13-14.8	OSLT	Organic silt/decayed wood, some interbedded laminae of gray fine-grained sand
14.8-15.2	FGS	Gray fine-grained sand
15.2-15.6	OSLT	Dark gray to black organic silt with woody material
15.6-16.5	FGS	Gray fine-grained sand
16.5-18.5	OSLT	Dark gray to black organic silt with wood chunks, some interbedded gray fine-grained sand
18.5-23.8	FGS	Gray fine-grained sand with some thin dark gray organic zones
23.8-24	WOOD	Wood
24-28	FGS	Medium gray fine-grained sand with higher organic content, some organic silt
28-29	OSLT	Sandy organic silt with some wood and woody material
29-30	BDRK	Weathered Castlegate Sandstone

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-6**
Date drilled: 2-Aug-06

Interval (feet)	Code	Description
0-3.5	FGS	Brown to dark gray fine-grained sand with increasing organic content lower, poor recovery
3.5-8	FGS	Dark gray to dark brown fine-grained sand, wet, some interbedded darker organic-rich fine-grained sand
8-12	FGS	Gray fine-grained sand, wet, with 2-inch organic silt/woody layers at 8-8.2 and 11.8-12 feet.
12-16.5	FGS	Gray fine-grained sand, wet, with organic silt/woody zone from 14.4-14.6. Also some thin bands of organic-rich sand.
16.5-19	OSLT	Organic silt with some interbedded gray fine-grained sand; big wood piece from 17.3 to 17.6 feet
19-19.5	FGS	Gray fine-grained sand
19.5-20	OSLT	Dark browinsh gray organic silt/wood
20-23	OSLT	Organic silt/wood with thin stringers of fine-grained sand
23-25	FGS	Gray fine-grained sand
25-26	OSLT	Dark gray to black organic silt and wood

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-7**
Date drilled: 2-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Brown grading to dark gray/black organic rich sand, poor recovery (25%)
4-7	FGS	Dark gray organic-rich fine-grained sand, wet, silty in portions
7-12.6	FGS	Gray fine-grained sand with 1- to 2-inch silty organic layers about every 0.75 feet
12.6-13.3	OSLT	Silty organic-rich layer, dark gray-brown with fine-grained sand
13.3-21	FGS	Gray fine-grained sand with minor interbedded organic silt/woody zones every 0.5 feet; wood at 14.0, 17,0 and 19.0 feet
21-21.5	OSLT	Organic silt/wood zone
21.5-22.8	FGS	Gray fine-grained sand
22.8-23.2	OSLT	Organic silt/wood zone
22.2-28	FGS	Gray fine-grained sand with minor interbedded organic silt/wood zones; wood at 22.5, 26.0 and 26.4 feet

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-8**
Date drilled: 3-Aug-06

Interval (feet)	Code	Description
0-4	FGS	6 inches of organic soil at surface, 0.5-4 feet is tan fine-grained sand like that at the land surface, dry
4-8	FGS	Tan fine-grained sand, becommine slightly organic and damp in lower part
8-12	FGS	Tan to grayish tan fine-grained sand, little organic content, wet and soft
14.5-15.5	OSND	Dark gray organic sand with some organic silt
15.5-17.5	FGS	Dark gray fine-grained sand with some organic content
17.5-18.5	OSND	Dark gray organic silty sand, more plastic than above
18.5-20	FGS	Light gray fine-grained sand with three 1-inch intervals of organic sand with some silty/more plastic zones
20-24	FGS	Medium gray fine-grained sand, no silt layers, homogeneous, minor increase in organic content from 23.5 to 24 feet

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-10**
Date drilled: 3-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Approximately 1 foot layer of organic-rich sandy soil, 1-4 feet is gray fine-grained sand with some wood/roots
4-7	FGS	Gray to dark gray banded fine-grained sand, some interbedded silt layers
7-8	WOOD	Decomposed wood/organic silt
8-14	FGS	Gray to dark gray fine-grained sand with darker, more organic-rich zone in upper part, clean sand below
14-16	INTBD	Interbedded thin layers of organic silt and gray fine-grained sand (about 50% sand) layers about 1/8 to 3 inches thick
16-18	FGS	Gray fine-grained sand
18-20	FGS/BDRK	Light gray to creamy tan fine-grained sand, more consolidated than above, likely weathered Castlegate Sandstone
20-24	BDRK	Light gray to orange fine-grained sand/decemented Castlegate Sandstone bedrock

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-11**
Date drilled: 4-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Soil, sandy, organic, silt at bottom, poor recovery (30%)
4-5	OSLT	Plastic, low-permeability organic silt, dark gray-brown to black
5-7	OSND	Dark gray organic-rich fine-grained sand
7-10.5	FGS	Gray fine-grained sand
10.5-16	INTBD	Alternating layers (1 to 4 inches thick) of fine-grained gray sand and wood-rich organic silt (overall about 60% organic)
16-17	FGS	Gray fine-grained sand
17-20	FGS	Light to medium gray fine-grained sand, possibly decemented Castlegate Sandstone boulder
20-23	FGS	Gray fine-grained sand
23-24	FGS	Light to medium gray fine-grained sand, tight, semi-consolidated, possibly decemented Castlegate Sandstone boulder
24-26	FGS	Gray fine-grained sand
26-28	BDRK	Gray fine-grained sand/decemented Castlegate Sandstone, with small sandstone pebbles

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-14**
Date drilled: 4-Aug-06

Interval (feet)	Code	Description
0-6	OSLT	Dark brown to black organic-rich soil/silt (poor recovery)
6-7.5	OSND	Silty organic-rich sand, more silty at base
7.5-10.5	FGS	Gray fine-grained sand
10.5-11.5	OSLT	Black, plastic organic silt
11.5-13	FGS	Gray fine-grained sand
13-15	OSLT	Dark brown to black organic silt/woody material, minor sand stringers
15-15-8	FGS	Gray fine-grained sand
15.8-16.3	OSLT	Dark brown to black organic silt with minor sand
16.3-17.8	FGS	Gray fine-grained sand
17.8-19.5	OSLT	Organic silt with occasional wood
19.5-27	INTBD	Interbedded gray fine-grained sandstone and decayed wood, overall about 20% decomposing wood/organic, 80% sand, wood is not completely decomposed
27-28	BDRK	Decemented Castlegate Sandstone/fine-grained sand

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-15**
Date drilled: 4-Aug-06

Interval (feet)	Code	Description
0-4	OSLT	Poor recovery (20%), recovered 1 foot of dark brown, organic/woody-rich soil
4-7.7	OSLT	Organic-rich silt, dark gray to black
7.7-10	OSND	Dark gray silty, organic-rich sand with some plastic organic silt interbeds
10-11	FGS	Gray fine-grained sand
11-12	OSND	Organic-rich sand and silt
12-15	INTBD	Interbedded gray fine-grained sand and black organic silt
15-16	FGS	Gray fine-grained sand
16-18		No recovery in this interval
18-19	WOOD	Wood and organic silt, dark gray
19-20	INTBD	Interbedded 1-inch layers of gray fine-grained sand and organic silt
20-23	FGS	Gray fine-grained sand
23-24	INTBD	Interbedded thin laminae of organic sand and fine-grained sand
24-25	FGS	Gray fine-grained sand
25-25.5	OSLT	Dark gray organic silt
25.5-27	FGS	Gray to dark gray fine-grained sand with some zones of increased organic content
27-28	BDRK	Medium gray decemented Castlegate Sandstone/fine-grained sand

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-16**
Date drilled: 4-Aug-06

Interval (feet)	Code	Description
0-3.8	OSLT	Poor recovery (30%), dark brown organic soil overlying dark gray to black organic silt
3.8-8	OSND	Dark gray organic-rich sand with some areas of increased silt content.
8-9	BDRK	Weathered, decemented Castlegate Sandstone, light gray

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-17**
Date drilled: 4-Aug-06

Interval (feet)	Code	Description
0-3.5	INTBD	Organic soil overlying tan, fine-grained sand and dark brown to black organic silt of plastic consistency
3.5-4.5	OSLT	Dark brown to black organic silt, plastic consistency
4.5-10	OSND	Organic-rich sand with minor organic silt
10-11	OSLT	Dark gray to black organic silt
11-12	OSND	Dark gray organic-rich sand
12-14	FGS	Gray to dark gray fine-grained sand
14-16.5	INTBD	Thin-bedded/banded gray fine-grained sand and black organic sand/silt
16.5-18	OSND	Dark gray to black organic-rich sand and some silt
18-22	FGS	Gray fine-grained sand, possibly decemented bedrock
22-24	BDRK	Medium gray decemented Castlegate Sandstone bedrock

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-18**
Date drilled: 15-Aug-06

Interval (feet)	Code	Description
0-4	OSND	Dark brown sandy organic soil; 4 inch layer of gray fine-grained sand near base; poor recovery
4-8	OSND	Dark grayish brown organic-rich silty sand with some thin zones of organic silt
8-10	FGS	Medium gray fine-grained sand
10-10.5	OSLT	Organic silt, brownish black
10.5-11.5	FGS	Gray fine-grained sand
11.5-12	OSND	Organic rich fine-grained sand
12-13	FGS	Gray fine-grained sand
13-13.5	OSLT	Organic silt
13.5-14.5	FGS	Gray fine-grained sand with some organic content
14.5-15.5	INTBD	Interbedded fine grained sand and organic-rich silty fine-grained sand
15.5-17.5	FGS	Gray fine-grained sand
17.5-20	OSND	Gray to dark gray organic-rich fine-grained sand
20-22	FGS	Gray fine-grained sand
22-23	OSLT	Organic silt, dark brown, with some interbedded sand; wood piece at 23 feet
23-24	INTBD	Interbedded thin laminae of gray fine-grained sand and organic silt
24-28	FGS	Gray fine-grained sand, wood at bottom

Key:	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-19**
Date drilled: 5-Aug-06

Interval (feet)	Code	Description
0-2	OSLT	Organic, silty soil
2-6	OSND	Gray organic-rich fine-grained sand
6-9.3	FGS	Gray to tan fine-grained sand, clean, uniform
9.3-14	FGS	Tan and orange fine-grained sand
14-15	CLAY	Medium brown clay
15-15.7	FGS	Grayish orange fine-grained sand
15.7-19.5	FGS	Fine-grained sand, rich orange color
19.5-21	BDRK	Clay/shale, gray, with orange iron-stained zones

Key:	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-20**
Date drilled: 5-Aug-06

Interval (feet)	Code	Description
0-4	OSLT	Soft, organic soil, black at surface, no recovery in tubes
4-8	OSLT	Very soft organic silt/soil and woody debris
8-15	OSLT	Black to dark brown organic silt, woody debris and wood pieces
15-16.8	OSND	Gray to dark gray organic-rich sand and wood piece
16.8-25	FGS	Fine-grained sand, medium to light gray, very minor organic-rich zones (<1 inch thick) in two locations, sand is more silty in lower 5 feet.

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-21**
Date drilled: 15-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Dark brown organic rich sandy soil
4-12	INTBD	Interbedded gray fine-grained sand and dark brown organic silt and woody matter; 4-8 feet is about 60% organic silt, 8-12 feet is about 75% organic silt and 25% grayish brown fine-grained sand
12-15	OSND	Medium grayish brown organic-rich fine-grained sand with some silty zones
15-15.5	OSLT	Organic silt, brown with woody debris
15.5-20	FGS	Gray fine-grained sand, wet, uniform
20-21.5	FGS	Brownish orange fine-grained sand with pebbley zones and some coarse sand
21.5-24	BDRK	Clay/shale bedrock, medium gray, tight, dense, not very wet
24-25.5	BDRK	Brownish gray decemented Castlegate Sandstone/fine-grained sand with pebbles ~1 inch diameter at base

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-22**
Date drilled: 15-Aug-06

Interval (feet)	Code	Description
0-3	FGS	Medium brown sandy soil
3-4	OSLT	Dark brown organic silt
4-10	OSND	Medium to dark gray organic-rich sand with zones of organic silt
10-11.5	FGS	Medium gray fine-grained sand with minor organic content
11.5-14	FGS	Light gray fine-grained sand, clean
14-16	FGS	Orange and gray fine-grained sand with some fine gravel and coarse-grained sand and some pebbles >1 inch diameter
16-18	FGS	Brownish orange fine-grained sand, wet, homogeneous
18-20	FGS	Interbedded fine-grained sand and 2-inch layers of clayey, silty sand
20-22.5	BDRK	Clay and silty clay bedrock, tight, dense, not very wet, medium gray color with orange and dark brown zones

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

PETERSEN HYDROLOGIC, LLC
CONSULTANTS IN HYDROGEOLOGY

Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-23**
Date drilled: 15-Aug-06

Interval (feet)	Code	Description
0-3	FGS	Medium brown fine-grained sandy soil, silty sand, some organic content
3-9	OSLT	Organic silt, brown to almost black, wet, some woody zones
9-10	OSND	Dark grayish brown organic sand and silty sand
10-18	FGS	Gray fine-grained sand, wet, some zones of fine gravel/pebbles
18-23.5	FGS	Orange-brown fine-grained sand with pebbles (~0.25 - 0.5 inch diameter), wet
23.5-25	FGS	Orange-brown fine-grained sand with pebbles, increased silt content

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-25**
Date drilled: 15-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Brownish gray fine-grained silty sand
4-15	FGS	Fine-grained sand, gray to brownish gray
15-18	FGS	Medium gray fine-grained sand, wet
18-18.2	OSND	Dark gray organic-rich sand
18.2-20.5	FGS	Fine-grained sand, gray, wet

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-26**
Date drilled: 15-Aug-06

Interval (feet)	Code	Description
0-3	FGS	Tanish brown fine-grained sand
3-4	FGS	Dark brown sand with wood pieces
4-6	OSLT	Dark brown organic silt
6-6.3	FGS	Gray fine-grained sand
6.6-6.6	WOOD	Wood piece
6.6-8.2	OSLT	Dark brown organic silt with minor sand lenses
8.2-11	INTBD	Interbedded thin layers of organic silt and gray fine-grained sand
11-24	FGS	Medium gray fine-grained sand, wet, homogeneous, some thin organic-rich zones
24-26.5	FGS	Dense, fine-grained sand with high silt content, tight, not very wet

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-27**
Date drilled: 16-Aug-06

Interval (feet)	Code	Description
0-12	OSLT	Dark brown, damp, organic-rich soil, abundant small wood and plant fragments, poor recovery (25%)
12-14	FGS	Medium to dark gray fine-grained sand
14-15	FGS	Light to medium-gray fine-grained sand
15-16	FGS	Light gray and orange fine-grained sand with pebbles of Castlegate Sandstone conglomerate (~0.5 inch diameter)
16-17	FGS	Gray fine-grained clayey sand
17-17.5	CLAY	Sandy clay, medium gray
17.5-18	FGS	Orange decemented Castlegate Sandstone boulder/fine-grained sand
18-18.3	CLAY	Gray sandy clay
18.3-20	FGS	Grayish orange decemented Castlegate Sandstone boulder/fine-grained sand
20-21	FGS	Grayish orange fine-grained sand with abundant pebbles (~0.5 inch diameter)
21-22	FGS	Grayish orange fine-grained sand, wet, flowing type
22-23	FGS	Grayish orange fine-grained sand with pebbles
23-24.5	CLAY	Brownish orange clay/silty clay, plastic, becoming sandy in bottom part
24.5-25	BDRK	Orange decemented Castlegate Sandstone/fine-grained sand

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-29**
Date drilled: 16-Aug-06

Interval (feet)	Code	Description
0-2	OSND	Organic-rich sandy soil
2-4	OSLT	Organic silt, black to dark brown
4-6.5	OSLT	Organic silt, dark brown with woody debris
6.5-7	FGS	Gray fine-grained sand
7-8	OSLT	Gray organic silt and organic-rich sand
8-10	OSLT	Organic silt and woody debris with pieces of wood/plants
10-10.5	OSND	Organic-rich fine-grained sand, gray to dark gray
10.5-15	FGS	Fine-grained sand, gray, wet
15-17	OSLT	Gray, wet, clayey silt
17-21	FGS	Gray to brownish gray fine-grained sand
21-22	CLAY	Olive drab mottled with gray hard, dense, silty clay; 2 inch soft clay layer at top

Key:	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-30**
Date drilled: 16-Aug-06

Interval (feet)	Code	Description
0-4	OSND	Sandy organic soil, dark brown, 4-inch fine-grained sand layer at 3 feet depth.
4-7	OSLT	Organic silt
7-8	OSND	Thin bedded laminae of organic sand with some organic silt
8-9	OSND	Dark brown organic-rich sand
9-10	OSLT	Dark brown organic silt, plastic consistency
10-13	OSND	Dark brown organic-rich sand
13-15	OSND	Medium brown organic-rich sand
15-16.5	FGS	Gray fine-grained sand, uniform, wet
16.5-17	FGS	Gravelly fine-grained sand, gray
17-19	FGS	Gray fine-grained sand with some pebbles and some silty zones
19-19.5	CLAY	Silty clay/shale bedrock, hard, tight, medium orangish brown
19.5-22	FGS	Gray fine-grained sand, wet, occasional pebbley zones, uniform, possibly decemented Castlegate Sandstone
22-24	BDRK	Gray decemented Castlegate Sandstone/fine-grained sand with some pebbles and coarse sand

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-34**
Date drilled: 17-Aug-06

Interval (feet)	Code	Description
0-4	FGS	Silty, sandy soil with some minor organic content, medium to dark gray
4-11.5	FGS	White to creamy tan fine-grained sand, very wet
11.5-14.5	CLAY	Hard clay/shale with minor silt, gray to orange; 3-inch fine-grained sand layer at 12 feet

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-35**
Date drilled: 17-Aug-06

Interval (feet)	Code	Description
0-3	FGS	Medium grayish brown silty fine-grained sand, hard
3-6	FGS	Fine-grained sand, light gray
6-11	FGS	Medium grayish brown silty fine-grained sand, hard; 1-inch black organic silt layer at 11 feet
11-15	FGS	Fine-grained sand, light tan to white
15-16	FGS	Fine-, Medium-, and coarse-grained sand with some pebbles, light gray
16-17	FGS	Fine-, medium-, and coarse-grained sand, tan to orange
17-18	CLAY	Clay/shale, hard, tan to orange

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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Sufco, North Water Piezometers
Geologic log
Geologist: Erik Petersen, PG

Piezometer: **NWP-36**
Date drilled: 17-Aug-06

Interval (feet)	Code	Description
0-3	FGS	Brown sandy soil
3-4	FGS	Hard, fine-grained sand, may be weathered Castlegate Sandstone boulder
4-8	FGS	Hard, compacted gray to white fine-grained sand
8-13	FGS	Fine-grained sand, orange and white, coarse sand horizon in lower part
13-14	FGS	Fine-grained and medium- to coarse-grained sand
14-15	CLAY	Hard, dense shale/clay

Key:		
	FGS	Fine-grained sand
	OSLT	Organic silt/muck
	OSND	Organic-rich sand
	INTBD	Interbedded fine-grained sand and organic silt/muck
	WOOD	Wood or woody material
	BDRK	Bedrock
	CLAY	Clay/shale

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