FINAL
MONITORING WELL NETWORK OPTIMIZATION DATA SUMMARY REPORT
Phase II

OPERABLE UNIT No. 2 (GROUNDWATER)

Former Nebraska Ordnance Plant
Mead, Nebraska

Prepared for

United States Army Corps of Engineers
Kansas City District

April 2013

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April 2013

I hereby certify that the enclosed *Monitoring Well Network Optimization Data Summary Report*, shown and marked in this submittal, is in compliance with the contract specifications and is submitted for government approval for the former Nebraska Ordnance Plant near Mead, Nebraska.

Approved by:

Project Manager **Date** 4/18/13

Accepted by:

USACE Contracting Officer **Date**

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Attachment 1 Quality Control Summary Report Monitoring Well Network Optimization

LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BMcD	Burns & McDonnell
LL	Load Line
MW	monitoring well
NOP	Nebraska Ordnance Plant
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
TCE	trichloroethene

1.0 INTRODUCTION

This report summarizes the background, sampling activities, and results of the Monitoring Well Network Optimization, Phase II, performed at the former Nebraska Ordnance Plant (NOP), Mead, Nebraska. The optimization field activities consisted of direct-push groundwater profiling, aquifer testing (slug tests), monitoring well installation, monitoring well abandonment, bedrock coring, and baseline sampling of newly-installed monitoring wells. The field work was performed in accordance with the *Monitoring Well Network Optimization Analysis and Work Plan Phase II, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2012a). Field activities are summarized below:

- Fifty-one direct-push groundwater samples were collected at seven direct-push profile locations (two locations were sampled for trichloroethene [TCE] and five locations were sampled for hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX]);
- Thirty-six new monitoring wells were installed and baseline sampling was conducted;
- Forty-seven monitoring wells were abandoned;
- Fourteen wells were slug tested; and
- Bedrock coring was conducted at five locations.

Data from the Monitoring Well Network Optimization sampling events was validated in accordance with project required criteria and appropriate qualifiers were assigned to the data. Data validation for the former NOP was performed in accordance with the *Mead Validation Guidelines* (ECC, 2007), which include an evaluation of holding times, a comparison of both field and laboratory duplicate results, a review of trip blank results, and an evaluation of other quality-control measurements reported by the laboratory.

The *Quality Control Summary Report Monitoring Well Network Optimization, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* is included as Attachment 1. The Quality Control Summary Report presents the following information: locations sampled, planned and actual sample collection and analyses, detailed results of the data validation for all sampling events, data qualifiers, sample collection summaries, data summary tables, and completeness calculations. Appendices to the Quality Control Summary Report contain the sample Chain-of-Custody records, field sampling documents, daily field logbook pages, data validation qualifiers reference sheet; and the complete analytical laboratory report for the associated sampling events.

Field completeness for sample collection is assessed by comparing the number of samples collected to the number of samples planned for collection. For the Monitoring Well Network Optimization sampling event, a goal for total number of samples was not established because sample quantity requirements were refined as the plume was defined. The field completeness was therefore considered to be 100%.

1.1 Site History

The former NOP (Site) occupies approximately 17,250 acres and is located south and east of Mead Nebraska, about 30 miles west of Omaha, in Saunders County (Figure 1-1). During World War II and the Korean War, bombs, shells, and rockets were assembled at the site. The Site included four bomb load lines, a Bomb Booster Assembly plant, an ammonium nitrate plant, two explosive burning areas, a proving range, a landfill, a wastewater treatment plant, analytical laboratories, and storage and administration facilities. Most of the raw materials used to manufacture the weapons were produced at other locations and shipped to the Site facilities for assembly. Routine plant operations included washout of explosive materials prior to bomb loading and assembly, and bomb washing following assembly. Wash water was discharged to sumps and open ditches.

During the 1950s and early 1960s, the United States Air Force operated Nike and Atlas Missile assembly and launch facilities at the Site. Construction and maintenance activities at the Site resulted in the release of TCE, an industrial solvent, into the groundwater near Load Line (LL) 4 and the Atlas Missile Area. TCE has also been detected in the groundwater at LL1 and LL2.

More detailed information on the physical setting at the Site is available in the *Remedial Investigation Report Operable Unit 2 (Groundwater) for Former Nebraska Ordnance Plant, Mead, Nebraska* (Woodward-Clyde, 1993); the *2010 Groundwater Model Update Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC and Burns & McDonnell [BMcD], 2011); and the *2011 Annual Summary Report Operable Unit No. 2 (Groundwater) former Nebraska Ordnance Plant, Mead, Nebraska* (ECC 2012b).

1.2 Purpose and Scope

This monitoring well network optimization consisted of the following specific objectives:

- Install additional monitoring wells at locations that improved the spatial delineation of RDX and TCE concentrations within the groundwater plumes and to support future groundwater and contaminant transport modeling efforts;
- Abandon monitoring wells which do not significantly contribute to delineating the spatial distribution of RDX and TCE concentrations within the groundwater plumes;
- Obtain bedrock cores to assess bedrock competency and variability with depth and correlate site geophysical data; and
- Conduct slug tests in existing and new wells to determine aquifer characteristics.

1.3 Report Organization

This Monitoring Well Network Optimization Report summarizes field activities conducted and presents the results. The scope of this report includes a summary and brief interpretation of the data and consists of the following:

- ***Section 1.0 Introduction***
  Provides an introduction, purpose, and background.

- ***Section 2.0 Field Activities***
  Presents the field activities conducted during the Monitoring Well Network Optimization and discusses deviations from the *Monitoring Well Network Optimization Analysis and Work Plan* (ECC, 2012a).
- ***Section 3.0 Summary of Bedrock Results***
  Discusses of the bedrock coring data and slug tests.
- ***Section 4.0 References***
  Provides the references cited in this report.
- ***Tables, Figures, Appendices, and Attachments***
  Tables, figures, and appendices containing information that supports the text of this report are included as part of this document. The following is a list of the appendices included with this report:
  - Appendix A – Daily Quality Control Reports
  - Appendix B - Boring Logs
  - Appendix C - Monitoring Well Construction Diagrams
  - Appendix D - Slug Test Summary Pages
  - Attachment 1 – Quality Control Summary Report

2.0 FIELD ACTIVITIES

Field activities began the first week of October 2012 and continued through mid-December 2012. Activities were conducted in accordance with the *Monitoring Well Network Optimization Analysis and Work Plan* (ECC, 2012a) and applicable sections of the *Site-Wide Work Plan* (ECC, 2009a). Daily Quality Control Reports are included in Appendix A.

2.1 Direct-Push Groundwater Profiling

Seven locations were identified for direct push groundwater profiling prior to monitoring well installation. These were locations that did not have a recent (less than two years) groundwater contaminant profile that could be used to locate the monitoring well screens. These locations were profiled with direct-push groundwater sampling methods to determine the highest contaminant concentration intervals. Direct-push groundwater profiling was conducted in accordance with the technical approach and procedures presented in the *Monitoring Well Network Optimization Analysis and Work Plan* (ECC, 2012b) and Section 2.10 of Attachment 1 to the *Site-Wide Work Plan* (ECC, 2009a). Direct-push tooling was advanced using GeoProbe®-type equipment. The groundwater profiling locations are presented on Figure 2-1.

During the direct-push investigation, groundwater samples were collected every 10 feet from the top of bedrock (direct-push refusal) to just below the water table and the samples were analyzed for TCE at two locations and RDX at five locations. The analytical results of the direct-push samples are presented in Table 2-1.

2.2 Monitoring Well Installation

A total of 36 monitoring wells were installed during the monitoring well network optimization field activities. All monitoring wells were installed using either sonic drilling methods or hollow-stem auger methods following the procedures and using materials described in Appendix E of Attachment 1 to the *Site-Wide Work Plan* (ECC, 2009a). The locations of the new monitoring wells are presented on Figure 2-2. Screen lengths and placement depths not identified in the *Monitoring Well Network Optimization Work Plan* (ECC, 2012a) were selected to screen the highest concentrations identified in the direct-push groundwater data. Monitoring well construction details are shown on Table 2-2. Boring logs for monitoring well installed with sonic drilling methods are provided in Appendix B. Wells installed with hollow-stem auger were not logged either because a sonic or direct-push soil boring was conducted at or near that location or previously existing geologic information was available. Monitoring well construction diagrams are provided in Appendix C. Wells were developed and surface completions installed using the methods and materials described in the *Site-Wide Work Plan* (ECC, 2009a). Well registration forms for all new monitoring wells were submitted to the Nebraska Department of Natural Resources.

Upon completion, new monitoring wells were transitioned into the Site groundwater monitoring program for the subsequent Fourth Quarter sampling event and subsequent events based on annual reviews and recommendations conducted each fall. Baseline sample results for the new monitoring wells are provided on Table 2-3.

Deviations from the *Monitoring Well Network Optimization Analysis and Work Plan* (ECC, 2012a) related to monitoring well installation, included the following:

- The shallow monitoring well proposed for location monitoring well (MW)-163 was changed to an intermediate well due to the direct-push analytical results (Table 2-1). MW-163A was screened between 98 feet below ground surface (bgs) and 108 feet bgs to monitor higher RDX concentrations detected at 109 feet bgs.
- MW-177 was not installed at the proposed work plan location due to property access issues. This well number replaced MW180 in the work plan to avoid a number gap and was installed within the LL1 plume.
- The RDX analytical results from LL3 direct-push sample GP-MW-174 (Table 2-1) were below the Final Groundwater Target Cleanup Goal of 2 micrograms per liter; therefore, a monitoring well was not installed at that location. This well number replaced MW-181 in the work plan to avoid a number gap and was installed within the LL2 plume.

2.3 Well Abandonment

During the field work, 47 monitoring wells were abandoned. The monitoring wells abandoned are listed in Table 2-4 and the locations of the abandoned wells are shown on Figure 2-3. These monitoring wells were abandoned in accordance with Nebraska state regulations and the procedures presented in Appendix E of Attachment 1 to the *Site-Wide Work Plan* (ECC, 2009a). Well abandonment forms have been submitted to the Nebraska Department of Natural Resources for processing.

2.4 Slug Testing

Slug testing and analysis were conducted at selected monitoring well clusters following the procedures outlined in the handbook *The Design, Performance, and Analysis of Slug Tests* (Butler, 1998) and in the *Focused Extraction Well 14 and Extraction Well 16 Construction Complete Report Operable Unit No. 2 (Groundwater) Former Nebraska Ordnance Plant Mead, Nebraska – Appendix A.2 - Mead NOP Hydraulic Testing Near EW-14/16* (ECC, 2009b). Slug tests were conducted at fourteen locations shown on Figure 2-4. Slug test data were analyzed using the software program AQTSOLV version 4.5. The new slug test results were compared with previous slug test data in Table 2-5. AQTSOLV summary sheets are presented in Appendix D. Slug tests at monitoring wells MW-104A (compromised seal on equipment) and MW-135D (data logger malfunction) did not provide useable data.

2.5 Analytical and Geotechnical Samples

Matrix samples from monitoring well installations and bedrock core samples from select locations and depths were archived for future geotechnical and grain-size analysis testing. During the installation of interior plume monitoring well clusters, aquifer matrix samples were collected from the finest grained material for Total Organic Carbon analysis and the results are listed in Table 2-6. All of the Total Organic Carbon results were below the analytical detection limit.

2.6 Bedrock Coring

Five borings (TH-BR-01 through TH-BR-05), shown on Figure 2-4, were advanced through the bedrock that consists of the Omadi Formation (sandstone and shale) and the underlying Pennsylvanian System (Kansas City, Lansing, Douglas, and Shawnee Groups) (limestone and shale). The general intent was to provide data to support assessments of bedrock competency and variability with depth and provide data to support correlation with geophysical data from the Site. Boring logs are provided in Appendix B and a summary is provided in Table 2-7. Bedrock borings were advanced in accordance with procedures presented in Appendix C of the *Monitoring Well Network Optimization Analysis and Work Plan Phase II* (ECC, 2012a). Bedrock drilling methods were modified in the field as necessary based on conditions encountered. At locations TH-BR-01 and TH-BR-02 (the first two borings drilled) bedrock core recovery using coring techniques was limited due to the poorly cemented of the sandstone intervals (see Appendix B). Coring methods using drilling mud were used at TH-BR-01 in an attempt to improve core recovery, however core recovery remained limited. Following completion of TH-BR-01 and TH-BR-02, bedrock drilling methods were re-evaluated to address the limited core recovery. Following discussions with team members, TH-BR-03, TH-BR-04, and TH-BR-05 were advanced using sonic drilling methods. The use of sonic drilling methods was successful in increasing bedrock core recovery; sonic drilling does not provide undisturbed core samples. Bedrock core and representatives cuttings were retained in accordance with the procedures presented in Appendix C of the *Monitoring Well Network Optimization Analysis and Work Plan Phase II* (ECC, 2012a).

3.0 SUMMARY OF BEDROCK RESULTS

Bedrock coring and slug testing was conducted to assess bedrock competency and variability with depth and will be used in the future to correlate site geophysical data. The following sections summarize the results of bedrock coring and slug testing.

3.1 Bedrock Coring Results

A total of five borings (TH-BR-01 through TH-BR-05) were drilled through the Omadi Formation (sandstone and shale) into the underlying Pennsylvanian Formation (shale and limestone). Figure 2-4 shows these locations and Table 2-7 provides depths and descriptions of materials encountered. The Omadi Formation was encountered between 39 bgs (TH-BR-05) and 157 feet bgs (TH-BR-02). At TH-BR-03, the Omadi Formation was encountered approximately 20 feet shallower than the anticipated depth. At the remaining four locations, the Omadi was encountered within two feet or less of the anticipated depth based on existing data. Sandstone was the predominant facies observed in the Omadi Formation, interbedded with shale layers typically less than three feet thick (shale was not observed at TH-BR-02). Greater thicknesses of shale were observed at: TH-BR-01 (41 feet) and TH-BR-04 (18 feet). Bands (up to 0.4 feet thick) and fragments of ironstone/limonite concretions in the Omadi were observed in several of the borings.

The sandstone varied in color including orange, yellow, white, gray, and brown and was generally very fine to medium grained and poorly cemented. The degree of cementation was observed to increase slightly in intervals with higher iron content. The shale was generally light to dark gray with some orange to yellow and green to blue intervals, soft to hard (hardness increasing with depth), and slightly to moderately fissle. The Pennsylvanian limestone was encountered between 132 feet bgs (TH-BR-05) and 226 feet bgs (TH-BR-01). The limestone was white to very light gray and was described as hard, slightly weathered, microcrystalline, and fossiliferous at TH-BR-02 (the remaining four borings were drilled with sonic methods which returned disturbed samples preventing a complete description). Between 3-15 feet of shale was observed immediately above the Pennsylvanian limestone in each of the five borings. This shale was interpreted to be part of the Pennsylvanian System.

The five borings advanced during the investigation provided data from areas adjacent to the contaminant plumes at LL1 (TH-BR-01 and TH-BR-02), LL3 (TH-BR-04), and LL4 / Atlas Missile Area / Landfill (TH-BR-03 and TH-BR-05). Based on these five borings, sandstones in the Omadi were generally poorly cemented. The occurrence and thickness of shale in the Omadi was variable and did not indicate the presence of a consistent unit to act as a potential aquitard on a site-wide level.

3.2 Slug Test Comparison

Slug tests were conducted and analyzed at select monitoring well clusters to provide hydraulic conductivity estimates in the lower portion of the Todd Valley aquifer and in the upper weathered portion of the Omadi Formation. Hydraulic conductivity values derived from the slug test data for "A" designated monitoring wells (screened in lower portion of the Todd Valley aquifer) and "D" designated monitoring wells (screened in the upper portion of the Omadi) are compared in Table 2-5.

Four monitoring well clusters (MW-21A/D, MW-90A/D, MW-124A/D, and MW-125A/D) evaluated throughout the LL1 contaminant plume indicated that hydraulic conductivity of the "D" monitoring wells was one to two orders of magnitude lower than the "A" wells. At the two monitoring well clusters associated with the LL3 contaminant plume, the hydraulic conductivity of the "D" monitoring well was one order of magnitude lower than the "A" well at the MW-99 cluster and the hydraulic conductivity of the "D" monitoring well was the same order of magnitude as the "A" well at the MW-86 cluster. Three monitoring well clusters were evaluated in the LL4 / Atlas Missile Area contaminant plume (MW-09, within the northern portion of the plume; MW-42, within the central portion of the plume, and MW-44, within the downgradient portion of the plume). The hydraulic conductivity of the "D" monitoring well was one order of magnitude lower than the "A" monitoring well in the central (MW-42) and downgradient (MW-44) portion of the contaminant plume. At MW-09, the hydraulic conductivities of the "A" and "D" wells were of the same order of magnitude. Upon review of the boring log, MW-09A is screened partially in the alluvial aquifer and partially in the bedrock therefore the "A" zone results are not exclusively representative of the alluvial aquifer.

Comparison of hydraulic conductivity values at "A" and "D" wells indicated hydraulic conductivities at least one order of magnitude lower in the "D" monitoring well than the "A" monitoring well at seven of the nine locations evaluated. At the remaining two locations, hydraulic conductivity of the "A" monitoring well and "D" monitoring well (screened in the upper weathered portion of the Omadi) were of the same order of magnitude.

Based on the results of the slug tests performed during this investigation, it is likely that the alluvial aquifer and the weathered Omadi Sandstone are hydraulically connected where the weather sandstone Omadi formation is contiguous to the alluvium. The degree of hydraulic connectivity is typically a function of the vertical gradient between the geologic units that drives vertical flow and hydraulic conductivity of the adjacent units. Vertical gradients between the alluvium and sandstone facies of the Omadi are typically low (less than 0.02 ft/ft on average) (ECC 2012a). Based on the results of these slug tests, the hydraulic conductivity of the weathered sandstone of the Omadi Formation in most cases was observed to be at least one order of magnitude lower than the alluvium which may limit the degree of hydraulic interconnection.

4.0 REFERENCES

Butler, J. 1998. *The Design, Performance, and Analysis of Slug Tests*, CRC Press, 262 p.

ECC, 2007. *Mead Validation Guidelines* (approved by USACE 2007).

ECC, 2009a. *Site-Wide Work Plan, Support Services, Former Nebraska Ordnance Plant, Mead, Nebraska*. October.

ECC, 2009b. *Focused Extraction Well 14 and Extraction Well 16 Construction Complete Report Operable Unit No. 2 (Groundwater) Former Nebraska Ordnance Plant Mead, Nebraska, - Appendix A.2 - Mead NOP Hydraulic Testing Near EW-14/16*. August.

ECC and BMcD, 2011. *2010 Groundwater Model Update, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. May.

ECC, 2012a. *Monitoring Well Network Optimization Analysis and Work Plan Phase II, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska.* September.

ECC, 2012b. *2011 Annual Summary Report, Operable Unit No. 2 (Groundwater) former Nebraska Ordnance Plant, Mead, Nebraska.* July.

Hanson, P.R., Korus, J.T. and Divine, D.P., 2012. *Three-dimensional hydrostratigraphy of the Platte River Valley near Ashland, Nebraska: Results from Helicopter Electromagnetic (HEM) mapping in the Eastern Nebraska Water Resources Assessment (ENWRA)*. Conservation and Survey Division, School of Natural Resources, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln. Conservation Bulletin 2 (New Series), 51 p.

Piskin, R., 1971. *Hydrogeology of the University of Nebraska Field Laboratory at Mead, Nebraska*. Ph.D. Dissertation. University of Nebraska. Lincoln.

Woodward-Clyde, 1993. *Remedial Investigation Report Operational Unit 2 (Groundwater) for Former Nebraska Ordnance Plant, Mead, Nebraska.*

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TABLES

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Table 2-1

Direct Push Groundwater Samples

Groundwater Monitoring Program Optimization, Operable Unit No.2

Former Nebraska Ordnance Plant, Mead, Nebraska

Explosives				
Location	**Field Sample ID**	**Sample Depth**	**Sample Date**	**RDX (UG/L)**
GP-MW-163B	GP-MW0163B-49	49	10/16/2012	0.44 U
	GP-MW0163B-59	59	10/16/2012	0.40 U
	GP-MW0163B-69	69	10/16/2012	**1.3**
	GP-MW0163B-79	79	10/16/2012	**0.10 J**
	GP-MW0163B-89	89	10/16/2012	**0.18 J**
	GP-MW0163B-99	99	10/16/2012	**0.17 J**
	GP-MW0163B-109	109	10/16/2012	**11.0**
GP-MW-163B (FD)	GP-MW2163B-69	69	10/16/2012	**1.1**
GP-MW-171A	GP-MW0171A-47	47	10/16/2012	**0.48**
	GP-MW0171A-57	57	10/16/2012	**20.0**
	GP-MW0171A-67	67	10/16/2012	**8.6**
	GP-MW0171A-77	77	10/16/2012	**0.27 J**
	GP-MW0171A-87	87	10/16/2012	**3.3**
	GP-MW0171A-97	97	10/16/2012	**40.0**
GP-MW-171A (FD)	GP-MW2171A-67	67	10/16/2012	**31.0**
GP-MW-174B	GP-MW0174B-62	62	10/17/2012	**0.38 J**
	GP-MW0174B-72	72	10/17/2012	**0.40**
	GP-MW0174B-85	85	10/17/2012	**0.18 J**
	GP-MW0174B-95	95	10/17/2012	**0.13 J**
	GP-MW0174B-105	105	10/17/2012	**1.2**
GP-MW-175	GP-MW0175-56	56	10/17/2012	**0.51**
	GP-MW0175-66	66	10/17/2012	**1.0**
	GP-MW0175-76	76	10/17/2012	**3.9**
	GP-MW0175-86	86	10/17/2012	**4.6**
	GP-MW0175-96	96	10/17/2012	0.40 U
	GP-MW0175-106	106	10/17/2012	**0.47**
GP-MW-175 (FD)	GP-MW2175-86	86	10/17/2012	**5.0**
GP-MW-181A (**MW-174**)	GP-MW0181A-55	55	10/17/2012	**0.071 J**
	GP-MW0181A-65	65	10/17/2012	**0.18 J**
	GP-MW0181A-75	75	10/17/2012	**0.14 J**
	GP-MW0181A-85	85	10/17/2012	**0.98**
	GP-MW0181A-95	95	10/17/2012	**0.13 J**
GP-MW-181A (FD)	GP-MW2181A-65	65	10/17/2012	**0.35 J**

Table 2-1

Direct Push Groundwater Samples

Groundwater Monitoring Program Optimization, Operable Unit No.2

Former Nebraska Ordnance Plant, Mead, Nebraska

Volatile Organic Compounds				
Location	**Field Sample ID**	**Sample Depth**	**Sample Date**	**TCE (UG/L)**
GP-MW-160	GP-MW0160-53	53	10/15/2012	**29.0**
	GP-MW0160-63	63	10/15/2012	**120**
	GP-MW0160-73	73	10/15/2012	**260**
	GP-MW0160-83	83	10/15/2012	**460**
	GP-MW0160-93	93	10/15/2012	**710**
	GP-MW0160-103	103	10/15/2012	**1100**
	GP-MW0160-113	113	10/15/2012	**1900**
	GP-MW0160-123	123	10/15/2012	**1800**
	GP-MW0160-133	133	10/15/2012	**1100**
GP-MW-179A	GP-MW0179A-15	15	10/15/2012	1.0 U
	GP-MW0179A-25	25	10/15/2012	1.0 U
	GP-MW0179A-35	35	10/15/2012	1.0 U
	GP-MW0179A-45	45	10/15/2012	1.0 U
	GP-MW0179A-55	55	10/15/2012	1.0 U
	GP-MW0179A-65	65	10/15/2012	1.5 UJ
	GP-MW0179A-75	75	10/15/2012	1.0 U
	GP-MW0179A-85	85	10/15/2012	1.0 U
GP-MW-179A (FD)	GP-MW2179A-35	35	10/15/2012	1.0 U
	GP-MW2179A-55	55	10/15/2012	1.0 U

Notes:

J = estimated
FD = field duplicate
MW = monitoring well
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
TCE = trichloroethene
U = not detected at laboratory limit of quantitation
Unless designated otherwise, all samples are water samples.
Detections are displayed in bold font
Results for water are reported in micrograms/liter (µg/L)

Table 2-2
New Monitoring Well Construction Details Table
Former Nebraska Ordnance Plant, Mead, Nebraska

ID	DNR registration No.	E-83 Easting (NAD83)	N-83 Northing (NAD 83)	TOC-88 TOC Elev (ft NAVD 88)	Ground Surface Elev (ft NAVD 88)	STICK UP	SLOT SIZE	Well Dia. (inches)	Boring Dia. (inches)	Bottom of Well Depth (ft bgs)	Bottom of Well Elevation (ft NAVD88)	Filter pack size	Depth to Top of Filter Pack (ft bgs)	Top of Screen Depth (ft bgs)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Depth (ft bgs)	Bottom of Screen Elevation (ft NAVD88)	Bottom of Boring Depth (ft bgs)	Bottom of Boring Elevation (ft NAVD88)	Top of Bedrock Depth (ft bgs)	Top of Bedrock Elevation (ft NAVD88)	Bedrock Type
MW-145B	Awaiting # from DNR	2617395.841	500656.14	1157.571825	1158.00182	-0.43	0.01	2.00	6.00	61.69	1096.31	20/40	49.69	51.69	1106.31	61.69	1096.31	63.00	1095.00	NP	NP	NP
MW-148A	Awaiting # from DNR	2620166.75	504433.591	1157.598739	1158.03874	-0.44	0.02	2.00	6.00	104.91	1053.13	12/20	92.91	94.91	1063.13	104.91	1053.13	104.91	1053.13	NP	NP	NP
MW-155B	Awaiting # from DNR	2629441.73	502456.405	1138.287218	1138.74722	-0.46	0.01	2.00	6.00	64.65	1074.10	20/40	52.65	54.65	1084.10	64.65	1074.10	65.00	1073.75	NP	NP	NP
MW-160A	Awaiting # from DNR	2609501.293	496947.488	1154.351451	1154.92145	-0.57	0.02	2.00	6.00	123.01	1031.91	12/20	111.01	113.01	1041.91	123.01	1031.91	133.00	1021.92	NP	NP	NP
MW-160B	Awaiting # from DNR	2609505.064	496954.303	1154.176041	1154.79604	-0.62	0.01	2.00	6.00	92.92	1061.88	20/40	80.92	82.92	1071.88	92.92	1061.88	124.01	1030.79	NP	NP	NP
MW-161A	Awaiting # from DNR	2608418.557	503133.216	1166.479491	1166.97949	-0.50	0.02	2.00	6.00	115.25	1051.73	12/20	103.25	105.25	1061.73	115.25	1051.73	135.00	1031.98	NP	NP	NP
MW-161B	Awaiting # from DNR	2608419.67	503123.84	1167.00088	1167.46088	-0.46	0.01	2.00	6.00	84.53	1082.93	20/40	72.53	74.53	1092.93	84.53	1082.93	116.25	1051.21	NP	NP	NP
MW-162A	Awaiting # from DNR	2618293.12	498773.02	1148.895604	1149.3356	-0.44	0.02	2.00	6.00	82.15	1067.19	12/20	70.15	72.15	1077.19	82.15	1067.19	105.00	1044.34	NP	NP	NP
MW-163A	Awaiting # from DNR	2618961.892	498952.862	1159.743613	1160.26361	-0.52	0.02	2.00	6.00	108.18	1052.08	12/20	96.18	98.18	1062.08	108.18	1052.08	109.18	1051.08	NP	NP	NP
MW-164A	Awaiting # from DNR	2617493.857	498294.974	1150.109067	1150.50907	-0.40	0.02	2.00	6.00	99.16	1051.35	12/20	87.16	89.16	1061.35	99.16	1051.35	103.00	1047.51	NP	NP	NP
MW-165B	Awaiting # from DNR	2617933.415	498609.918	1148.889982	1149.31998	-0.43	0.01	2.00	6.00	84.01	1065.31	20/40	72.01	74.01	1075.31	84.01	1065.31	85.01	1064.31	NP	NP	NP
MW-166A	Awaiting # from DNR	2618657.286	496609.561	1150.733553	1151.21355	-0.48	0.02	2.00	6.00	101.81	1049.40	12/20	89.81	91.81	1059.40	101.81	1049.40	104.00	1047.21	NP	NP	NP
MW-166B	Awaiting # from DNR	2618661.424	496616.201	1150.812611	1151.35261	-0.54	0.01	2.00	6.00	61.01	1090.34	20/40	49.01	51.01	1100.34	61.01	1090.34	62.01	1089.34	NP	NP	NP
MW-167A	Awaiting # from DNR	2619420.511	497423.398	1147.655985	1148.15599	-0.50	0.02	2.00	6.00	97.33	1050.83	12/20	85.33	87.33	1060.83	97.33	1050.83	105.00	1043.16	NP	NP	NP
MW-167B	Awaiting # from DNR	2619428.964	497426.555	1147.615367	1147.94537	-0.33	0.01	2.00	6.00	69.78	1078.17	20/40	57.78	59.78	1088.17	69.78	1078.17	70.78	1077.17	NP	NP	NP
MW-168A	Awaiting # from DNR	2620186.362	498009.89	1152.751938	1153.06194	-0.31	0.02	2.00	6.00	101.25	1051.81	12/20	89.25	91.25	1061.81	101.25	1051.81	105.00	1048.06	NP	NP	NP
MW-168B	Awaiting # from DNR	2620178.267	498011.714	1152.169795	1152.6298	-0.46	0.01	2.00	6.00	81.60	1071.03	20/40	69.60	71.60	1081.03	81.60	1071.03	82.60	1070.03	NP	NP	NP
MW-169A	Awaiting # from DNR	2619932.754	495501.598	1145.608602	1146.0486	-0.44	0.02	2.00	6.00	99.27	1046.78	12/20	87.27	89.27	1056.78	99.27	1046.78	105.00	1041.05	NP	NP	NP
MW-169B	Awaiting # from DNR	2619942.569	495502.951	1145.516859	1146.06686	-0.55	0.01	2.00	6.00	75.07	1071.00	20/40	63.07	65.07	1081.00	75.07	1071.00	76.07	1070.00	NP	NP	NP
MW-170A	Awaiting # from DNR	2621225.191	496442.892	1145.457852	1146.01785	-0.56	0.02	2.00	6.00	90.32	1055.70	12/20	78.32	80.32	1065.70	90.32	1055.70	100.00	1046.02	NP	NP	NP
MW-171A	Awaiting # from DNR	2615668.935	501881.314	1160.216844	1160.54684	-0.33	0.02	2.00	6.00	97.25	1063.30	12/20	85.25	87.25	1073.30	97.25	1063.30	100.00	1060.55	NP	NP	NP
MW-171B	Awaiting # from DNR	2615662.16	501881.095	1159.790579	1160.24058	-0.45	0.01	2.00	6.00	66.87	1093.37	20/40	54.87	56.87	1103.37	66.87	1093.37	67.87	1092.37	NP	NP	NP
MW-172A	Awaiting # from DNR	2625763.501	497428.549	1146.965181	1144.32518	2.64	0.02	2.00	6.00	95.80	1048.53	12/20	83.80	85.80	1058.53	95.80	1048.53	99.00	1045.33	NP	NP	NP
MW-172B	Awaiting # from DNR	2625755.506	497431.526	1146.876486	1144.31649	2.56	0.01	2.00	6.00	76.00	1068.32	20/40	64.00	66.00	1078.32	76.00	1068.32	77.00	1067.32	NP	NP	NP
MW-173A	Awaiting # from DNR	2627008.041	497957.667	1148.574607	1146.59461	1.98	0.02	2.00	6.00	90.41	1056.18	12/20	78.41	80.41	1066.18	90.41	1056.18	105.00	1041.59	NP	NP	NP
MW-174A	Awaiting # from DNR	2622869.283	497380.635	1142.129583	1142.56958	-0.44	0.02	2.00	6.00	93.01	1049.56	12/20	81.01	83.01	1059.56	93.01	1049.56	105.00	1037.57	NP	NP	NP
MW-174B	Awaiting # from DNR	2622865.16	497375.022	1141.71815	1142.07815	-0.36	0.01	2.00	6.00	74.73	1067.35	20/40	62.73	64.73	1077.35	74.73	1067.35	75.73	1066.35	NP	NP	NP
MW-175A	Awaiting # from DNR	2622690.122	501101.536	1151.786244	1152.30624	-0.52	0.02	2.00	6.00	90.08	1062.23	12/20	78.08	80.08	1072.23	90.08	1062.23	112.00	1040.31	NP	NP	NP

Table 2-2
New Monitoring Well Construction Details Table
Former Nebraska Ordnance Plant, Mead, Nebraska

ID	DNR registration No.	E-83 Easting (NAD83)	N-83 Northing (NAD 83)	TOC-88 TOC Elev (ft NAVD 88)	Ground Surface Elev (ft NAVD 88)	STICK UP	SLOT SIZE	Well Dia. (inches)	Boring Dia. (inches)	Bottom of Well Depth (ft bgs)	Bottom of Well Elevation (ft NAVD88)	Filter pack size	Depth to Top of Filter Pack (ft bgs)	Top of Screen Depth (ft bgs)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Depth (ft bgs)	Bottom of Screen Elevation (ft NAVD88)	Bottom of Boring Depth (ft bgs)	Bottom of Boring Elevation (ft NAVD88)	Top of Bedrock Depth (ft bgs)	Top of Bedrock Elevation (ft NAVD88)	Bedrock Type
MW-175B	Awaiting # from DNR	2622680.348	501098.072	1151.031892	1151.44189	-0.41	0.01	2.00	6.00	75.73	1075.71	20/40	63.73	65.73	1085.71	75.73	1075.71	76.73	1074.71	NP	NP	NP
MW-176A	Awaiting # from DNR	2632839.137	499810.439	1090.006174	1090.35617	-0.35	0.02	2.00	6.00	53.50	1036.86	12/20	41.50	43.50	1046.86	53.50	1036.86	55.00	1035.36	NP	NP	NP
MW-176B	Awaiting # from DNR	2632839.673	499818.354	1089.107931	1089.85793	-0.75	0.01	2.00	6.00	34.10	1055.76	20/40	22.10	24.10	1065.76	34.10	1055.76	35.10	1054.76	NP	NP	NP
MW-177A	Awaiting # from DNR	2609971.19	492953.374	1104.428014	1102.37801	2.05	0.02	2.00	6.00	83.30	1019.08	12/20	71.30	73.30	1029.08	83.30	1019.08	83.30	1019.08	NP	NP	NP
MW-177B	Awaiting # from DNR	2609974.652	492954.438	1105.898024	1103.87802	2.02	0.01	2.00	6.00	44.68	1059.20	20/40	32.68	34.68	1069.20	44.68	1059.20	45.68	1058.20	NP	NP	NP
MW-178B	Awaiting # from DNR	2628870.63	506851.746	1140.337562	1140.95756	-0.62	0.01	2.00	6.00	88.87	1052.09	20/40	76.87	78.87	1062.09	88.87	1052.09	89.87	1051.09	NP	NP	NP
MW-179A	Awaiting # from DNR	2611664.673	493135.134	1107.446745	1105.63901	1.81	0.02	2.00	6.00	84.51	1021.13	12/20	72.51	74.51	1031.13	84.51	1021.13	85.00	1020.64	NP	NP	NP
MW-179B	Awaiting # from DNR	2611658.781	493134.484	1107.644159	1105.19791	2.45	0.01	2.00	6.00	44.81	1060.39	20/40	32.81	34.81	1070.39	44.81	1060.39	45.81	1059.39	NP	NP	NP

Notes:
ft = feet
bgs = below ground surface
NGVD = National Geodetic Vertical Datum
DNR - Department of Natural Resources
MW = Monitoring Well
NA = Information not available
NP = Top of bedrock was not penetrated

Table 2-3

Results for the Baseline 2012 Sampling Event

Groundwater Monitoring Program

Former Nebraska Ordnance Plant, Mead, Nebraska

Explosives							
	Sampling Date	**2,4-DNT**	**2A-DNT**	**4A-DNT**	**RDX**	**TNB**	**TNT**
MW-145B	12/05/2012	0.096 U	0.096 U	**1.2 J**	**50.0**	0.048 U	0.096 U
MW-148A	12/05/2012	**0.11 J**	0.096 U	**0.23 J**	0.048 U	0.048 U	0.096 U
MW-155B	12/06/2012	0.096 U	0.096 U	**0.060 J**	**0.29 J**	0.048 U	0.096 U
MW-160A	12/06/2012	0.096 U	0.096 U	**0.38 J**	**1.6**	0.048 U	0.096 U
MW-160B	12/06/2012	0.096 U	0.096 U	**0.10 J**	**0.59**	0.048 U	0.096 U
MW-161A	12/06/2012	0.096 U	0.096 U	**0.19 J**	0.048 U	0.048 U	0.096 U
MW-161B	12/06/2012	0.13 U	0.13 U	**4.4 J**	**7.4**	**0.14 J**	0.13 U
MW-162A	12/05/2012	0.096 U	0.096 U	**0.53 J**	**66.0**	0.048 U	0.096 U
MW-163A	12/05/2012	0.096 U	0.096 U	**0.45 J**	**14.0**	0.048 U	0.096 U
MW-164A	12/05/2012	0.096 U	0.096 U	**0.95 J**	**76.0**	0.048 U	0.096 U
MW-165B	12/05/2012	0.096 U	0.096 U	**2.9 J**	**170**	0.048 U	0.096 U
MW-166A	12/05/2012	0.096 U	0.096 U	**0.34 J**	**44.0**	0.048 U	0.096 U
MW-166B	12/05/2012	0.096 U	0.096 U	0.048 UJ	**2.1**	0.048 U	0.096 U
MW-167A	12/05/2012	0.096 U	0.096 U	**0.88 J**	**31.0**	0.048 U	0.096 U
MW-167B	12/05/2012	0.096 U	0.096 U	**0.27 J**	**17.0**	0.048 U	0.096 U
MW-168A	12/05/2012	0.096 U	0.096 U	**0.048 J**	**8.1**	0.048 U	0.096 U
MW-168B	12/05/2012	0.096 U	0.096 U	0.048 UJ	**0.31 J**	0.048 U	0.096 U
MW-169A	12/05/2012	0.096 U	0.096 U	**0.12 J**	**10.0**	0.048 U	0.096 U
MW-169B	12/05/2012	0.096 U	0.096 U	**0.31 J**	**51.0**	0.048 U	0.096 U
MW-170A	12/05/2012	0.096 U	0.096 U	0.048 UJ	**5.8**	0.048 U	0.096 U
MW-171A	12/05/2012	**0.64**	**0.96**	**1.2 J**	**71.0**	0.048 U	0.096 U
MW-171B	12/05/2012	**2.1**	**4.5**	**2.9 J**	**100**	**0.029 J**	0.096 U
MW-172A	12/05/2012	0.096 U	0.096 U	**0.83 J**	**3.8**	0.048 U	0.096 U
MW-172B	12/05/2012	0.096 U	0.096 U	**0.54 J**	**2.9**	0.048 U	0.096 U
MW-173A	12/05/2012	0.096 U	0.096 U	**0.65 J**	**6.7**	0.048 U	0.096 U
MW-174A	12/05/2012	0.096 U	0.096 U	**0.078 J**	**0.14 J**	0.048 U	0.096 U
MW-174B	12/05/2012	0.096 U	0.096 U	**0.36 J**	**1.2**	0.048 U	0.096 U
MW-175A	12/06/2012	0.096 U	**0.52**	**2.5 J**	**8.5**	0.048 U	0.096 U
MW-175B	12/06/2012	0.11 U	**0.098 J**	**1.8 J**	**3.6**	0.056 U	0.11 U
MW-176A	12/06/2012	0.096 U	0.096 U	**0.068 J**	**0.25 J**	0.048 U	0.096 U
MW-176B	12/06/2012	0.096 U	0.096 U	**0.061 J**	**0.67**	0.048 U	0.096 U
MW-178B	12/06/2012	0.096 U	0.096 U	**0.048 J**	**1.4**	0.048 U	0.096 U

Table 2-3

Results for the Baseline 2012 Sampling Event

Groundwater Monitoring Program

Former Nebraska Ordnance Plant, Mead, Nebraska

Volatile Organic Compounds							
	Sampling Date	**1,2-DCP**	**CIS-1,2-DCE**	**Methylene Chloride**	**TCE**	**TRANS-1,2-DCE**	**Vinyl Chloride**
MW-155B	12/06/2012	0.85 U	0.85 U	0.85 U	**180**	0.85 U	0.85 U
MW-160A	12/06/2012	3.0 U	**6.4 J**	3.0 U	**2900 J**	3.0 U	3.0 U
MW-160B	12/06/2012	1.3 U	1.3 U	1.3 U	**370 J**	1.3 U	1.3 U
MW-161A	12/06/2012	7.9 U	**69.0**	7.9 U	**13000**	7.9 U	7.9 U
MW-161B	12/06/2012	5.5 U	**23.0**	**7.2 J**	**6900 J**	**5.6 J**	5.5 U
MW-175A	12/06/2012	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
MW-175B	12/06/2012	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
MW-176A	12/06/2012	0.50 U	**0.50 J**	0.50 U	**120**	0.50 U	0.50 U
MW-176B	12/06/2012	1.3 U	**3.4 J**	1.3 U	**720**	1.3 U	1.3 U
MW-177A	12/06/2012	0.25 U	0.25 U	0.25 U	**0.21 J**	0.25 U	0.25 U
MW-177B	12/06/2012	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
MW-178B	12/06/2012	0.25 U	**0.86 J**	0.25 U	**19.0**	0.25 U	0.25 U
MW-179A	12/06/2012	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
MW-179B	12/06/2012	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

Notes:
2,4-DNT = 2,4-dinitrotoluene
2ADNT = 2-amino-4,6-dinitrotoluene
4ADNT = 4-amino-2,6-dinitrotoluene
1,2-DCP = 1,2-dichloropropane
cis 1,2-DCE = cis-1,2-dichloroethylene
J = estimated
MW = monitoring well
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
TCE = trichloroethene
TNB = 1,3,5-trinitrobenzene
Trans 1,2-DCE = trans-1,2-dichloroethene
TNT = 2,4,6-trinitrotoluene
U = not detected at laboratory limit of quantitation
Unless designated otherwise, all samples are water samples.
Detections are displayed in bold font
COC Results above the Final Target Groundwater Cleanup Goals
Results for Water are reported in micrograms/liter (µg/L)

Table 2-4
Monitoring Wells Abandoned
Monitoring Well Network Optimization
Former Nebraska Ordnance Plant, Mead, Nebraska

Well Identification	Easting	Northing	Aquifer Zone Designation	Associated Plume
MW-22B	2606604	510403	Shallow	LL1
MW-25D	2608309	504865	Deep	LL1
MW-79A	2610432	492336	Intermediate	LL1
MW-79B	2610428	492345	Shallow	LL1
MW-81A	2611638	492369	Intermediate	LL1
MW-81B	2611636	492360	Shallow	LL1
MW-81D	2611633	492350	Deep	LL1
MW-92A	2610047	492723	Intermediate	LL1
MW-92B	2610048	492734	Shallow	LL1
MW-71B	2613383	506090	Intermediate	LL2
MW-94D	2617023	496423	Deep	LL2
MW-128D	2624833	498184	Deep	LL3
MW-34D	2624442	498796	Deep	LL3
MW-132A	2625255	497254	Intermediate	LL3
MW-132B	2625258	497262	Shallow	LL3
MW-132D	2625251	497247	Deep	LL3
MW-39A	2640062	499305	Intermediate	LL4
MW-39D	2640059	499299	Deep	LL4
MW-41A	2624371	512001	Intermediate	LL4
MW-41B	2624362	512001	Shallow	LL4
MW-41D	2624353	512001	Deep	LL4
MW-52A	2627013	508785	Intermediate	LL4
MW-52B	2627004	508779	Shallow	LL4
MW-54A	2627894	508858	Intermediate	LL4
MW-54B	2627884	508856	Shallow	LL4
MW-55A	2628135	508378	Intermediate	LL4
MW-55B	2628126	508374	Shallow	LL4
MW-87A	2635040	491898	Intermediate	LL4
MW-87B	2635035	491901	Shallow	LL4
MW-87D	2635044	491895	Deep	LL4
MW-102D	2622936	514541	Deep	AMA
MW-106D	2630549	506843	Deep	AMA
MW-108A	2631916	505912	Intermediate	LL4
MW-108B	2631917	505899	Shallow	LL4
MW-108D	2631916	505906	Deep	LL4
MW-137D	2622827	511701	Deep	AMA
MW-117A	2631041	495048	Intermediate	LL3
MW-117B	2631041	495054	Shallow	LL3
MW-117D	2631042	495042	Deep	LL3
MW-74A	2623094	511935	Intermediate	LL4

Table 2-4
Monitoring Wells Abandoned
Monitoring Well Network Optimization
Former Nebraska Ordnance Plant, Mead, Nebraska

Well Identification	Easting	Northing	Aquifer Zone Designation	Associated Plume
MW-74B	2623085	511935	Shallow	LL4
MW-75A	2623130	511962	Intermediate	LL4
MW-75B	2623120	511962	Shallow	LL4
MW-76A	2623159	511983	Intermediate	LL4
MW-76B	2623149	511983	Shallow	LL4
MW-77A	2623192	512008	Intermediate	LL4
MW-77B	2623181	512007	Shallow	LL4

Notes:
AMA = Atlas Missile Area
LL = Load Line
MW = monitoring well

Table 2-5
Summary of Slug Test Results
Groundwater Monitoring Program Optimization
Former Nebraska Ordnance Plant

Load Line	Transect or Well	Formation	K (ft/day)	Ss	Solution Method
LL1	MW-124A	Todd Valley	195	NA	Springer-Gelhar
	MW-124D	Omadi	46	2.88E-09	KGS
	MW-125A	Todd Valley	232		Previous Test
	MW-125D	Omadi	8	7.03E-06	KGS
	MW-21A	Todd Valley	132	NA	Springer-Gelhar
	MW-21D	Omadi	33-49		Previous Test
	MW-90A	Todd Valley	15		Previous Test
	MW-90D	Omadi	2	8.26E-05	KGS
LL3	MW-86A	Todd Valley	73	7.98E-08	KGS
	MW-86D	Omadi	81		Previous Test
	MW-99A	Todd Valley	349	NA	Springer-Gelhar
	MW-99D	Omadi	27		Previous Test
LL4	MW-09A*	Todd Valley/Omadi	27	NA	Springer-Gelhar
	MW-09D	Omadi	43		Previous Test
	MW-42A	Todd Valley	238	NA	Springer-Gelhar
	MW-42D	Omadi	51	1.35E-05	KGS
	MW-44A	Todd Valley	130	NA	Springer-Gelhar
	MW-44D	Omadi	21		Previous Test
	MW-104A	Todd Valley	--	--	--
	MW-104D	Omadi	33	2.54E-07	KGS
	MW-135D	Omadi	--	--	--

Notes:
Slug test analysis presented in Appendix E
The results from MW-135D and MW-104A (air leak) were not usable.
Shaded data indicates new results collected during the Groundwater Monitoring Program Optimization Phase II
Non-shaded data provided for comparison.
*MW-09A screened over both Todd Valley Aquifer and Omadi formation
Slug tests at MW-104A (compromised seal on equipment) and MW-135D (data logger malfunction) did not provide useable data.

LL - Load Line
ft Feet
ft/day - Feet per day
K - Hydraulic Conductivity
MW - Monitoring Well
KGS - Kansas Geological Survey

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Table 2-6

Summary of Soil Analytical Detections - Total Organic Carbon

Groundwater Monitoring Program Optimization, Operable Unit No.2

Former Nebraska Ordnance Plant, Mead, Nebraska

Wet Chemistry		
	Sampling Date	**Total Organic Carbon**
MW-148A	10/24/2012	510 U
MW-160A	10/24/2012	480 U
MW-161A	10/24/2012	430 U
MW-162A	10/23/2012	450 U
MW-164A	10/23/2012	480 U
MW-166A	10/27/2012	450 U
MW-167A	10/27/2012	450 U
MW-168A	10/25/2012	450 U
MW-169A	10/27/2012	480 U
MW-170A	10/26/2012	490 U
MW-171A	10/25/2012	470 U
MW-172A	10/25/2012	460 U
MW-173A	10/25/2012	470 U
MW-174A	10/27/2012	460 U
MW-175A	10/26/2012	450 U

Notes:

MW = monitoring wells

U = non-detect

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FIGURES

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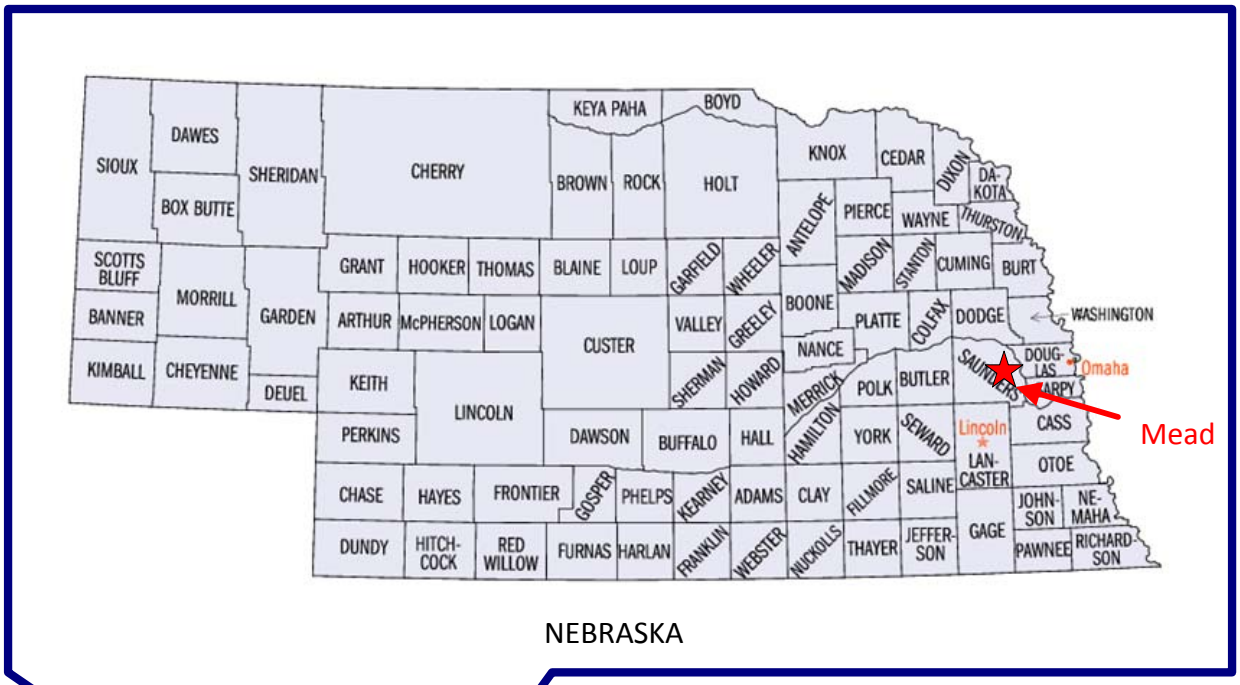

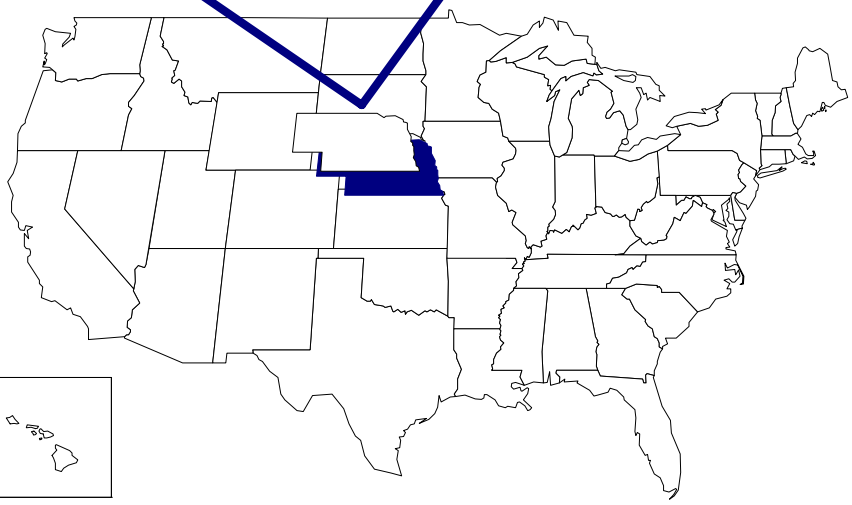

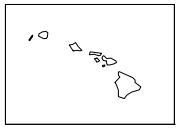

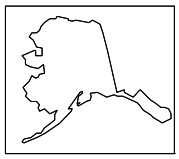

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Kansas City District

Designed by: DM	FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA	
Drawn by: ROW	Site Location Map	
Checked by: BB		
Submitted by: MJ	Drawing No: Figure 1-1	Date: 1/8/2010

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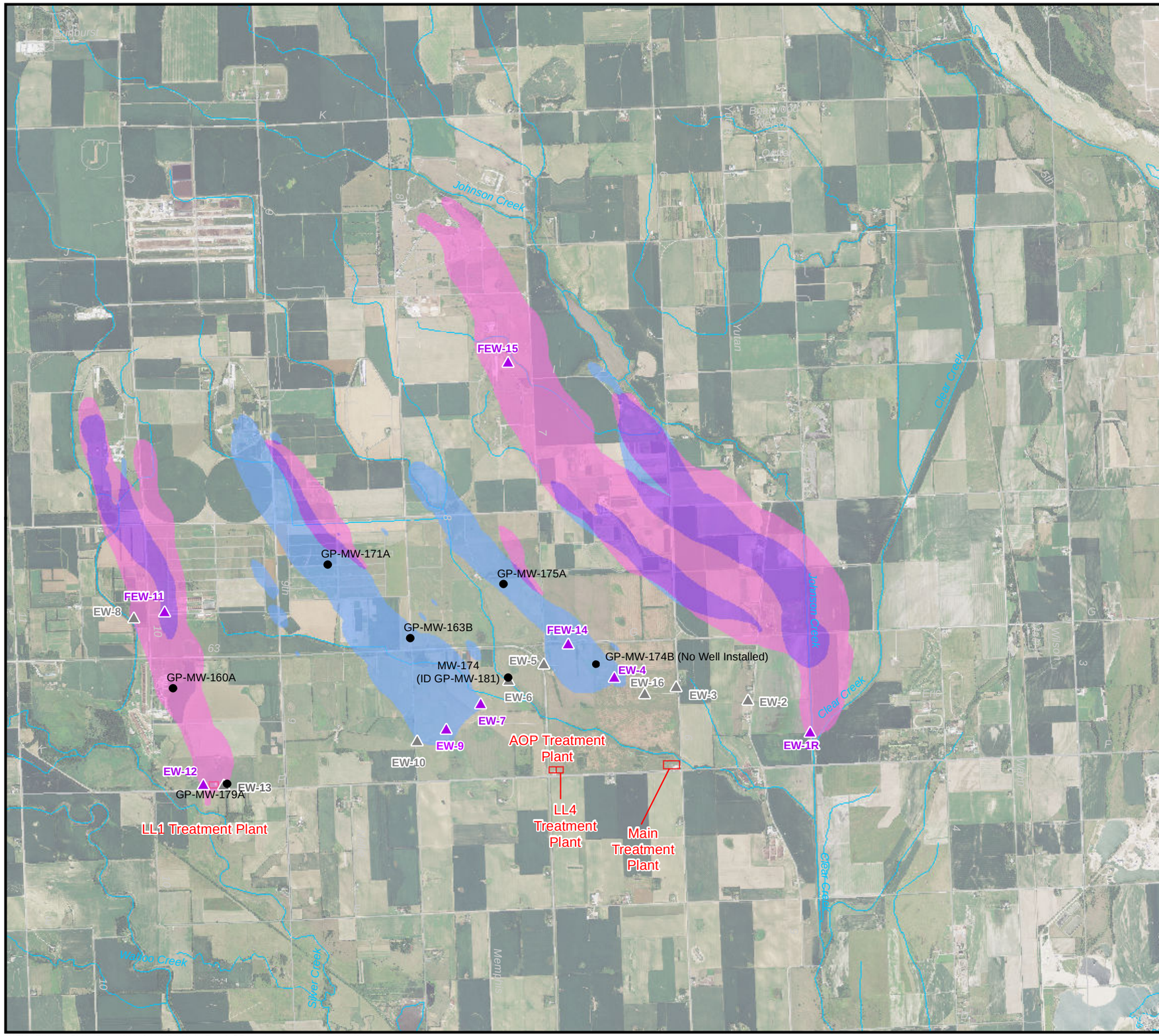

Legend

- Direct Push Groundwater Sample Location
- USACE Extraction Well - Active
- USACE Extraction Well - Inactive
- Approximate Area of TCE at a Concentration of 5 ug/L or Greater (2012)
- Approximate Area of RDX at a Concentration of 2 ug/L or Greater (2012)
- Approximate Area of Both TCE at a Concentration of 5 ug/L or Greater and RDX at a Concentration of 2 ug/L or Greater (2012)
- Treatment Plant

Notes:

1. TCE and RDX plume delineations for 2012 (ECC & B&McD, 2012) are based on Groundwater Monitoring Program data, Direct-Push data, and other data. The plume delineations represent a combination of the Shallow Zone data and the Intermediate Zone data.

TCE - trichloroethene

RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine

ug/L - micrograms per liter

NOP - Nebraska Ordnance Plant

2012 Aerial Photography
Saunders County
USDA-APFO NAIP

0 4,000
SCALE IN FEET

N

US Army Corps of Engineers ®
Kansas City District

Figure 2-1
Direct Push Groundwater Sampling Locations

GMP Optimization - Phase II
Former NOP

K:\ENV\ECC\site\51469\Data\GIS\2013\GMPO-Wells\Fig2-1_DP locations.mxd jmf Jan 31, 2013

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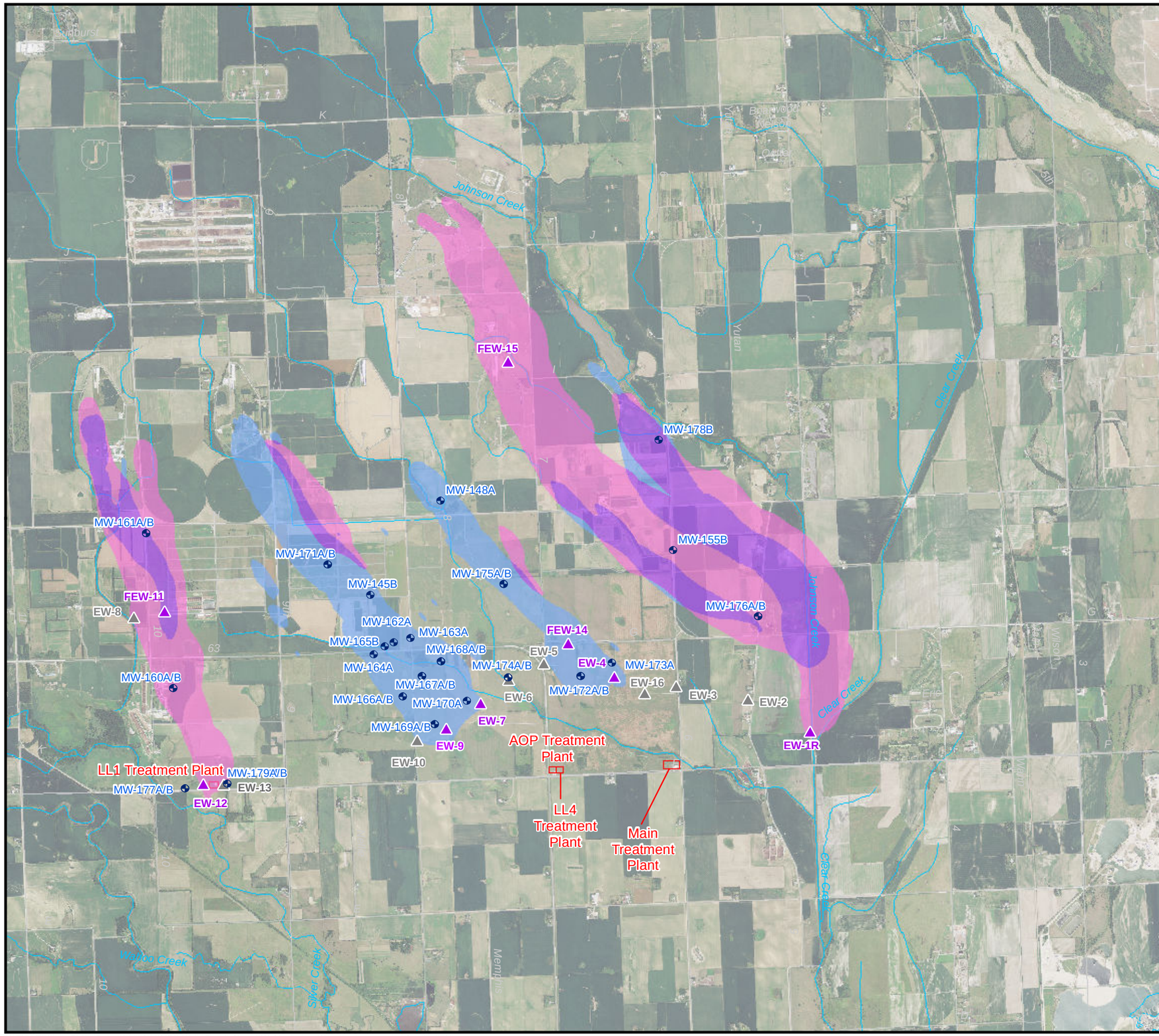

Legend

- New Monitoring Well
- USACE Extraction Well - Active
- USACE Extraction Well - Inactive
- Approximate Area of TCE at a Concentration of 5 ug/L or Greater (2012)
- Approximate Area of RDX at a Concentration of 2 ug/L or Greater (2012)
- Approximate Area of Both TCE at a Concentration of 5 ug/L or Greater and RDX at a Concentration of 2 ug/L or Greater (2012)
- Treatment Plant

Notes:

1. TCE and RDX plume delineations for 2012 (ECC & B&McD, 2012) are based on Groundwater Monitoring Program data, Direct-Push data, and other data. The plume delineations represent a combination of the Shallow Zone data and the Intermediate Zone data.

TCE - trichloroethene

RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine

ug/L - micrograms per liter

NOP - Nebraska Ordnance Plant

2012 Aerial Photography
Saunders County
USDA-APFO NAIP

0 4,000
SCALE IN FEET

N

US Army Corps of Engineers ®
Kansas City District

Figure 2-2

New Monitoring Wells

GMP Optimization - Phase II
Former NOP

K:\ENV\ECC\site\51469\Data\GIS\2013\GMPO-Wells\Fig2-2_New_GW_Monitoring_Well_Clusters.mxd jmf Jan 22, 2013

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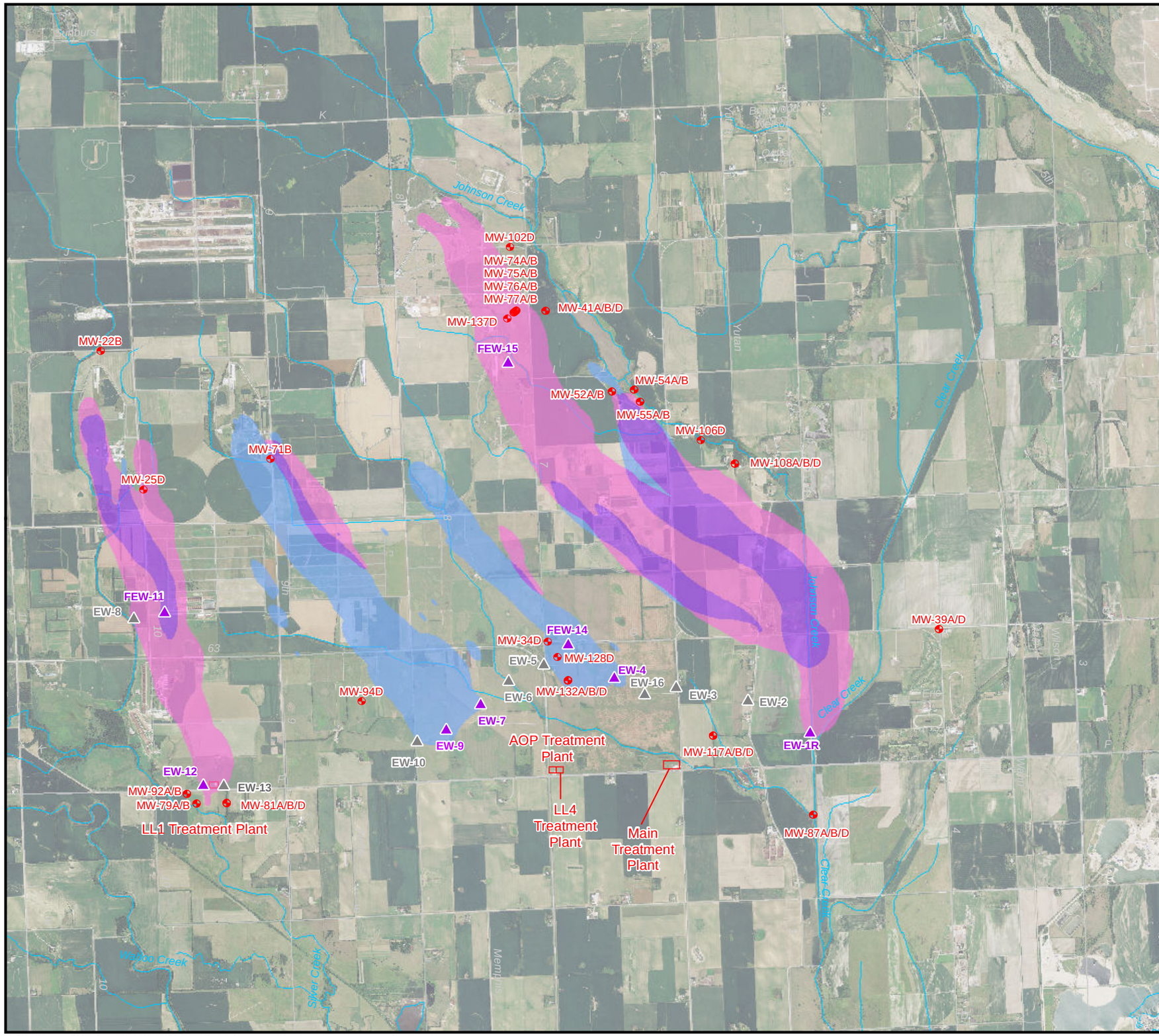

Legend

- Abandoned Monitoring Well
- USACE Extraction Well - Active
- USACE Extraction Well - Inactive
- Approximate Area of TCE at a Concentration of 5 ug/L or Greater (2012)
- Approximate Area of RDX at a Concentration of 2 ug/L or Greater (2012)
- Approximate Area of Both TCE at a Concentration of 5 ug/L or Greater and RDX at a Concentration of 2 ug/L or Greater (2012)
- Treatment Plant

Notes:

1. TCE and RDX plume delineations for 2012 (ECC & B&McD, 2012) are based on Groundwater Monitoring Program data, Direct-Push data, and other data. The plume delineations represent a combination of the Shallow Zone data and the Intermediate Zone data.

TCE - trichloroethene

RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine

ug/L - micrograms per liter

NOP - Nebraska Ordnance Plant

2012 Aerial Photography
Saunders County
USDA-APFO NAIP

0 4,000
SCALE IN FEET

N

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Kansas City District

Figure 2-3

Monitoring Wells Abandoned

GMP Optimization - Phase II
Former NOP

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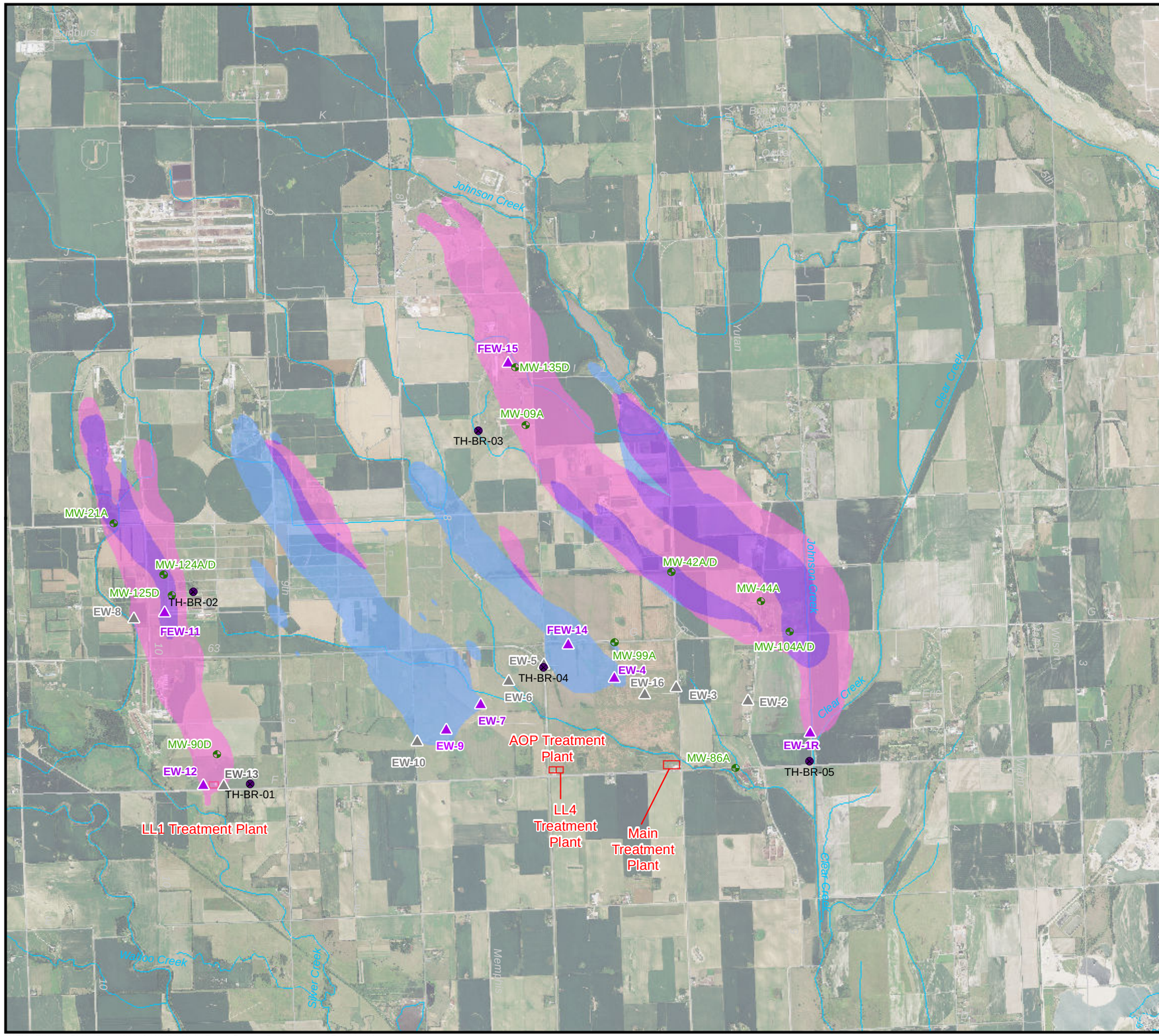

Legend

- Slug Test Location
- Bedrock Boring
- USACE Extraction Well - Active
- USACE Extraction Well - Inactive
- Approximate Area of TCE at a Concentration of 5 ug/L or Greater (2012)
- Approximate Area of RDX at a Concentration of 2 ug/L or Greater (2012)
- Approximate Area of Both TCE at a Concentration of 5 ug/L or Greater and RDX at a Concentration of 2 ug/L or Greater (2012)
- Treatment Plant

Notes:

1. TCE and RDX plume delineations for 2012 (ECC & B&McD, 2012) are based on Groundwater Monitoring Program data, Direct-Push data, and other data. The plume delineations represent a combination of the Shallow Zone data and the Intermediate Zone data.

TCE - trichloroethene

RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine

ug/L - micrograms per liter

NOP - Nebraska Ordnance Plant

2012 Aerial Photography
Saunders County
USDA-APFO NAIP

0 4,000
SCALE IN FEET

N

US Army Corps of Engineers ®
Kansas City District

Figure 2-4
Bedrock Borings and Slug Test Locations

GMP Optimization - Phase II
Former NOP

K:\ENV\ECC\site\51469\Data\GIS\2013\GMPO-Wells\Fig2-4_Bedrock Borings.mxd jmf Feb 20, 2013

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Appendix A

Daily Quality Control Reports

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#001 Date Wednesday, October 10, 2012

Contract No. W912DQ-08-D-0001 CTO No. 0002

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 28 Max. 69
Conditions: Sunny
Wind: 5 to 20 mph from N
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby Hinz	X		ECC	Field Manager	9.5
Daryl Biere		X	ICR	Field Tech	2.5
Ronnie Fiscus		X	ICR	Field Tech	6.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic 'working alone"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	9.5	Chevy 1500 Pickup (Hinz)
ECC	6.75	Gator
ECC	6.75	Slug Test Kit
ECC	6.75	Rugged Reader
ECC	6.75	Compressor

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities
Slug tested the following wells
MW-99A
MW-104A
MW-104D
MW-42A
MW-42D
MW-44A

(Projected work)
8 Wells are left to slug test and should be done by end of day Friday.
DP GW profiling scheduled the week of Oct 15.
Drilling program to start the week of Oct 22 continuing about 1 month.

(Work Progress and Delays)
Good progress no delays.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- GMPO Preparatory Meeting will be held Monday, October 15 when geoprobe is on site, and revisited when drilling rigs arrive Monday, October 22.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/11/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#002 Date Friday, October 12, 2012

Contract No. W912DQ-08-D-0001 CTO No. 0002

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 41 Max. 71
Conditions: Sunny
Wind: 5 to 10 mph from N
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby Hinz	X		ECC	Field Manager	9.75
Ronnie Fiscus		X	ICR	Field Tech	8.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic 'work clothing attire"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	9.75	Chevy 1500 Pickup (Hinz)
ECC	8.75	Gator
ECC	8.75	Slug Test Kit
ECC	8.75	Rugged Reader
ECC	8.75	Compressor

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms, oversight, data reviewed

6. Submittal Action
- None

7. Activities

Slug tested the following wells

MW- 135D
MW- 125D
MW- 124D
MW- 124A
MW- 21A
MW- 86A
MW- 90D
MW- 09A

(Projected work)

DP GW profiling scheduled Monday the week of Oct 15.
Drilling program to start the week of Oct 22 continuing about 1 month.

(Work Progress and Delays)

The Y piece of slug testing equipment broke while getting ready on Thursday morning. No work was done that day. Friday brought good progress no delays. Slug testing is complete.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- GMPO Preparatory Meeting will be held Monday, October 15 when geoprobe is on site, and revisited when drilling rigs arrive Monday, October 22.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/12/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#003 Date Monday, October 15, 2012

Contract No. W912DQ-08-D-0001 CTO No. 0002

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 37 Max. 78
Conditions: Sunny
Wind: 5 to 10 mph from N
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	10.5
Ronnie Fiscus		X	ICR	Field Tech	9
Daryl Biere		X	ICR	Field Tech	9
Floyd Armstrong		X	ICR	Field Tech	9

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic 'Geoprobe Hazards"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500 Pickup (Hinz)
ICR	9	Geoprobe
ICR	9	Trailer
ICR	9	2500 Dodge
ICR	9	2500 Chevy

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Took groundwater profile samples with Geoprobe:

Profiled MW-160 location for TCE

Profiled MW-179A location for TCE

(Projected work)

Drilling program to start the week of Oct 22 continuing about 1 month.

(Work Progress and Delays)

Good progress no delays, two of seven geoprobe locations complete

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- GMPO Preparatory Meeting will be held Monday, October 22 when drilling rigs arrive.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/15/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#004 Date Tuesday, October 16, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 37 Max. 81
Conditions: Sunny
Wind: 5 to 15 mph from N
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	11.25
Ronnie Fiscus		X	ICR	Field Tech	10.75
Daryl Biere		X	ICR	Field Tech	2
Floyd Armstrong		X	ICR	Field Tech	10.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Eye Protection"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11.25	Chevy 1500 Pickup (Hinz)
ICR	10.75	Geoprobe
ICR	10.75	Trailer
ICR	2	2500 Dodge
ICR	10.75	2500 Chevy

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Collected groundwater profiles at direct push locations:

MW-163 location for RDX
MW-171 location for RDX
Moved on to MW-181, Pushed down to refusal and deployed screen

(Projected work)

Drilling program to start the week of Oct 22 continuing about 1 month.

(Work Progress and Delays)

Good progress no delays, four of seven geoprobe locations complete

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- GMPO Preparatory Meeting will be held Monday, October 22 when drilling rigs arrive.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/16/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#005 Date Wednesday, October 17, 2012

Contract No. W912DQ-08-D-0001 CTO No. 0002

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 51 Max. 59
Conditions: Mostly Cloudy
Wind: 20 to 45 mph from NW
Precipitation: 0.10 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	9.5
Ronnie Fiscus		X	ICR	Field Tech	9
Floyd Armstrong		X	ICR	Field Tech	9

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Lightning Strikes"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	9.5	Chevy 1500 Pickup (Hinz)
ICR	9	Geoprobe
ICR	9	Trailer
ICR	9	2500 Chevy

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Collected groundwater profile samples with Direct Push:

sampled MW-181AB location for RDX
sampled MW-175 Location for RDX
Moved on to MW-174B, Pushed down to refusal and opened screen

(Projected work)

Direct Push groundwater profiling will wrap up tomorrow Thursday, October 18, 2012
Drilling program to start Tuesday, October 23, 2012 continuing about 1 month.
Well abandonments planned to begin November 5 pending Omaha real-estate letters.

(Work Progress and Delays)

Good progress no delays, six of seven geoprobe locations complete

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- GMPO Preparatory Meeting will be held Tuesday, October 23 when drilling rigs arrive.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/17/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#006 Date Thursday, October 18, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 41 Max. 58
Conditions: Cloudy
Wind: 25 to 45 mph from NW
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	4
Ronnie Fiscus		X	ICR	Field Tech	3.5
Floyd Armstrong		X	ICR	Field Tech	3.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Pinch Points"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	6	Chevy 1500 Pickup (Hinz)
ICR	3.5	Geoprobe
ICR	3.5	Trailer
ICR	3.5	2500 Chevy

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Collected groundwater profile samples with Direct Push:
sampled MW-174B location for RDX

(Projected work)
Drilling program to start Tuesday, October 23, 2012 continuing about 1 month.

(Work Progress and Delays)
Good progress no delays, all direct push groundwater sampling locations are complete.
Final samples have been packed up and shipped overnight through Fed-ex

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- GMPO Preparatory Meeting will be held Tuesday, October 23 when drilling rigs arrive.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/18/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#007 Date Tuesday, October 23, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 57 Max. 72
Conditions: Cloudy
Wind: 5 mph
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	10
David Dander	X		ECC	Hydrogeologist/ Task Manager	10
Tim Langlois	X		ECC	H&S/QC	10
Sam Woodland		X	Burns & McDonnell	Geologist	10
Lewis Turner		X	Burns & McDonnell	Geologist	10
Ryann Oder		X	Burns & McDonnell	Geologist	10
Bill Boening		X	Boart Longyear	Driller	10
Chris Huther		X	Boart Longyear	Driller	10
John Posterick		X	Boart Longyear	Helper	10
Kevin Finicum		X	Boart Longyear	Helper	10
Ben Price		X	Boart Longyear	Helper	10
Travis Weisenbeck		X	Boart Longyear	Helper	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "proper lifting"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500 Pickup
ECC	10	Chevy Captiva
ECC	10	Jeep Liberty
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup

Burns & McDonnell	10	Chevy 1500 Pickup
Boart Longyear	10	Ford F-350
Boart Longyear	10	Ford F-350
Boart Longyear	10	2235 Mack Support Truck A
Boart Longyear	10	GP24300RS Sonic Drill Rig A
Boart Longyear	10	7755 Mack Support Truck B
Boart Longyear	10	GP24300RS Sonic Drill Rig B

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Preparatory Meeting, QC forms & Oversight

6. Submittal Action
- None

7. Activities

Drilled and Installed MW- 164A(screen 74-85, TD 105), decon equipment, setup at MW-148A
Drilled and Installed MW- 162A(screen 89-99, TD 103), decon equipment, setup at MW-160A
Commenced drilling of MW-160A advanced to 65ft.

(Projected work)

Tomorrow-Drill and Install MW-148A & MW-160A
Continue intermediate MW drilling into next week
Next week-begin surface completions and well development

(Work Progress and Delays)

Good progress no delays, drilling operations went smoothly
Sonic Bedrock drilling rig arrival delayed until November 5

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Direct push groundwater profiling prelim data received today and used along with past site lithological data to propose associated MW depths:

MW-xxx(screen top/screen bottom)
MW-179A(75/85)
MW-179B(35/45)
MW-180A(75/85)
MW-180B(35/45)
MW-160A(113/123)
MW-160B(83/93)

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/23/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#008 Date Wednesday, October 24, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 38 Max. 62
Conditions: Cloudy
Wind: 10 mph
Precipitation: 0.00 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	10
David Dander	X		ECC	Hydrogeologist/ Task Manager	6
Tim Langlois	X		ECC	H&S/QC	10
Sam Woodland		X	Burns & McDonnell	Geologist	10
Lewis Turner		X	Burns & McDonnell	Geologist	10
Ryann Oder		X	Burns & McDonnell	Geologist	10
Bill Boening		X	Boart Longyear	Driller	10
Chris Huther		X	Boart Longyear	Driller	10
John Posterick		X	Boart Longyear	Helper	10
Kevin Finicum		X	Boart Longyear	Helper	10
Ben Price		X	Boart Longyear	Helper	10
Travis Weisenbeck		X	Boart Longyear	Helper	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "physical qualifications/OSHA and safety checklist items"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500 Pickup
ECC	6	Chevy Captiva
ECC	10	Jeep Liberty
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup

Burns & McDonnell	10	Chevy 1500 Pickup
Boart Longyear	10	Ford F-350
Boart Longyear	10	Ford F-350
Boart Longyear	10	2235 Mack Support Truck A
Boart Longyear	10	GP24300RS Sonic Drill Rig A
Boart Longyear	10	7755 Mack Support Truck B
Boart Longyear	10	GP24300RS Sonic Drill Rig B

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- Preliminary direct push results with proposed well completion intervals attached

7. Activities

Finished drilling and Installed MW-160A (screen 113-123, TD 127), decon equipment
Drilled and Installed MW-161A (screen 105.5-115.5, TD 134)
Drilled and Installed MW- 148A (screen 95-105, TD 110), decon equipment
Commenced drilling of MW-171A advanced to 100ft.

(Projected work)

-Tomorrow-decon then new well locations will be determined after site evaluation from expected rain event overnight.
-Continue intermediate MW drilling and installations into next week
-Next week-begin surface completions and well development

(Work Progress and Delays)

-Excellent progress no delays
-Bedrock drilling rig mobilization delayed until November 5 see remarks below.

(Instructions Given and Corrective Actions Taken)

-None

(Safety Hazards Encountered)

-None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Awaiting corp approval of advance notification to subcontract for bedrock drilling contractor (mobilization postponed until November 5)
- Notification letters have been sent out to private residences regarding MW abandonments also beginning November 5.

10. Attachments/ Materials received
- Safety log.
- working schedule
- prelim direct push results with proposed well completion intervals (highlighted a couple unexpected results)

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/24/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#009 Date Thursday, October 25, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 35 Max. 45
Conditions: Rain
Wind: 30 mph
Precipitation: 0.41 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	10
Tim Langlois	X		ECC	H&S/QC	10
Sam Woodland		X	Burns & McDonnell	Geologist	10
Lewis Turner		X	Burns & McDonnell	Geologist	10
Ryann Oder		X	Burns & McDonnell	Geologist	10
Bill Boening		X	Boart Longyear	Driller	10
Chris Huther		X	Boart Longyear	Driller	10
John Posterick		X	Boart Longyear	Helper	10
Kevin Finicum		X	Boart Longyear	Helper	10
Ben Price		X	Boart Longyear	Helper	10
Travis Weisenbeck		X	Boart Longyear	Helper	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "lightning safety"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500 Pickup
ECC	10	Jeep Liberty
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup
Boart Longyear	10	Ford F-350
Boart Longyear	10	Ford F-350

Boart Longyear	10	2235 Mack Support Truck A
Boart Longyear	10	GP24300RS Sonic Drill Rig A
Boart Longyear	10	7755 Mack Support Truck B
Boart Longyear	10	GP24300RS Sonic Drill Rig B

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Finished drilling and installation of MW-171A (screen 97-87, TD 100), decon equipment.
Drilled and Installed MW-172A (screen 95-85) TD 99, decon equipment.
Set up at MW-166A.
Drilled and Installed MW- 173A (screen 90-80, TD 105), decon equipment.
Commenced drilling of MW-168A advanced to 105ft.

(Projected work)

10/26-Well locations will be determined after crews finish current well locations.
Continue intermediate MW drilling into next week possibly wrapping up Sunday.
Next week-begin surface completions and well development

(Work Progress and Delays)

Excellent progress no delays
Sonic Bedrock drilling rig arrival delayed until November 5

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Awaiting corp approval of advance notification to subcontract for bedrock drilling contractor (mobilization postponed until November 5)
- Variance request related to minor well installation adjustments based on direct push data expected by end of Friday.

10. Attachments/ Materials received
- Safety log.
- prelim direct push results with proposed well completion intervals (highlighted a couple unexpected results that are being rerun by monday)

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander 10/25/2012
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#010 Date Friday, October 26, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 30 Max. 42
Conditions: Rain
Wind: 6 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	Field Manager	10
Tim Langlois	X		ECC	H&S/QC	10
Sam Woodland		X	Burns & McDonnell	Geologist	10
Lewis Turner		X	Burns & McDonnell	Geologist	10
Ryann Oder		X	Burns & McDonnell	Geologist	10
Bill Boening		X	Boart Longyear	Driller	10
Chris Huther		X	Boart Longyear	Driller	10
John Posterick		X	Boart Longyear	Helper	10
Kevin Finicum		X	Boart Longyear	Helper	10
Ben Price		X	Boart Longyear	Helper	10
Travis Weisenbeck		X	Boart Longyear	Helper	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Always Read Signs"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500 Pickup
ECC	10	Jeep Liberty
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup
Boart Longyear	10	Ford F-350
Boart Longyear	10	Ford F-350

Boart Longyear	10	2235 Mack Support Truck A
Boart Longyear	10	GP24300RS Sonic Drill Rig A
Boart Longyear	10	7755 Mack Support Truck B
Boart Longyear	10	GP24300RS Sonic Drill Rig B

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Drilled and Installed MW-166A (screen 91-101) TD 105, decon equipment,
Drilled MW-167A advancing to 90ft
Drilled and Installed MW-168A (screen 91-81, TD 104), decon equipment.
Drilled and installed MW-175A (screen 80-90, TD 112, decon equipment
Drilled MW-170A advancing to 105ft

(Projected work)

-Drilling crews to finish current wells tomorrow and begin drilling final two well locations MW-174A and MW-169A
-Demob 2 sonic rigs on Sunday after completing the planned intermediate MWs
-Monday-Friday begin surface completions and well development

(Work Progress and Delays)

Excellent progress no delays
Sonic Bedrock drilling rig arrival delayed until November 5

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Awaiting corp approval of advance notification to subcontract for bedrock drilling contractor (mobilization postponed until November 5)
- Variance request related to minor well installation adjustments based on direct push data expected submittal over weekend.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/26/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#011 Date Saturday, October 27, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 30 Max. 50
Conditions: Rain
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Tim Langlois	X		ECC	H&S/QC	10
Sam Woodland		X	Burns & McDonnell	Geologist	10
Lewis Turner		X	Burns & McDonnell	Geologist	10
Ryann Oder		X	Burns & McDonnell	Geologist	10
Bill Boening		X	Boart Longyear	Driller	10
Chris Huther		X	Boart Longyear	Driller	10
John Posterick		X	Boart Longyear	Helper	10
Kevin Finicum		X	Boart Longyear	Helper	10
Ben Price		X	Boart Longyear	Helper	10
Travis Weisenbeck		X	Boart Longyear	Helper	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Eye Protection"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Jeep Liberty
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup
Burns & McDonnell	10	Chevy 1500 Pickup
Boart Longyear	10	Ford F-350
Boart Longyear	10	Ford F-350
Boart Longyear	10	2235 Mack Support Truck A
Boart Longyear	10	GP24300RS Sonic Drill Rig A

Boart Longyear	10	7755 Mack Support Truck B
Boart Longyear	10	GP24300RS Sonic Drill Rig B

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities

Finished Drilling and Installed MW-170A (screen 90-100) TD 100, decon equipment.
Drilled and Installed MW-117A (screen 93-83 TD 105), decon equipment.
Drilled and Installed MW-167A (screen 97-87, TD 105), decon equipment.
Drilled MW-179A advancing to 105ft

(Projected work)

-Drilling crews to finish final well MW-179A Sunday 10-28
-Monday-Friday begin surface completions and well development

(Work Progress and Delays)

Excellent progress no delays
Sonic Bedrock drilling rig arrival delayed until November 5

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Awaiting corp approval of advance notification to subcontract for bedrock drilling contractor (mobilization postponed until November 5)
- Variance request related to minor well installation adjustments based on direct push data under separate cover (changes correspond to hollow stem auger installations beginning November 12).

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/27/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#012 Date Sunday, October 28, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 30 Max. 55
Conditions: Rain
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Tim Langlois	X		ECC	H&S/QC	6
Sam Woodland		X	Burns & McDonnell	Geologist	6
Lewis Turner		X	Burns & McDonnell	Geologist	6
Ryann Oder		X	Burns & McDonnell	Geologist	6
Bill Boening		X	Boart Longyear	Driller	6
Chris Huther		X	Boart Longyear	Driller	6
John Posterick		X	Boart Longyear	Helper	6
Kevin Finicum		X	Boart Longyear	Helper	6
Ben Price		X	Boart Longyear	Helper	6
Travis Weisenbeck		X	Boart Longyear	Helper	6

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Unsafe acts vs Unsafe Conditions"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	6	Jeep Liberty
Burns & McDonnell	6	Chevy 1500 Pickup
Burns & McDonnell	6	Chevy 1500 Pickup
Boart Longyear	6	Ford F-350
Boart Longyear	6	Ford F-350
Boart Longyear	6	2235 Mack Support Truck A
Boart Longyear	6	GP24300RS Sonic Drill Rig A
Boart Longyear	6	7755 Mack Support Truck B

Boart Longyear	6	GP24300RS Sonic Drill Rig B

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- QC forms & Oversight

6. Submittal Action
- None

7. Activities
Drilled and Installed MW-179A (screen 89-99 TD105ft)
MW installations with sonic rig complete-Boart Longyear demobilized today
(Projected work)
-Surface Completion of new wells
(Work Progress and Delays)
Sonic Drilling with MW installations completed ahead of schedule
(Instructions Given and Corrective Actions Taken)
None
(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Direct push groundwater profile data variability in dups to discuss with USACE during or after biweekly status call.
- Awaiting corp approval of advance notification to subcontract for bedrock drilling contractor (mobilization postponed until November 4 with drilling to begin the morning of November 5)
- Variance request related to minor well installation adjustments based on direct push data submitted under separate cover (changes correspond to hollow stem auger installations beginning November 12).

10. Attachments/ Materials received
- Safety log.
- MW completion log summary

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander 10/28/2012
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#013 Date Monday, October 29, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 30 Max. 55
Conditions: P.Cloudy
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Tim Langlois	X		ECC	H&S/QC	10
Daryl Biere		X	ICR	Foreman	10
Ronnie Fiscus		X	ICR	Worker	10
Floyd Armstrong		X	ICR	Worker	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Proper Workwear"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Jeep Liberty
ICR	10	Dodge Ram 3500
ICR	10	Chevy 2500 Pick Up
ICR	10	Hand Tools
ICR	10	Concrete mixer

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Oversight

6. Submittal Action
- None

7. Activities
Surface Completions of new MW's

- MW-170A
- MW-160A
- MW-169A
- MW-167A
- MW-166A

(Projected work)
-Surface Completion of new wells
-Development of new wells
(Work Progress and Delays)
None
(Instructions Given and Corrective Actions Taken)
None
(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Awaiting corp approval of advance notification to subcontract for bedrock drilling contractor (mobilization and drilling postponed until November 5)

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/29/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#014 Date Tuesday, October 30, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 26 Max. 58
Conditions: P.Cloudy
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	11.25
Ronnie Fiscus		X	ICR	Worker	10.25
Floyd Armstrong		X	ICR	Worker	10.25

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Proper ways to lift"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11.25	Chevy 1500
ICR	10.25	Chevy 2500 Pick Up
ICR	10.25	Hand Tools
ICR	10.25	Concrete mixer

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Made sure surface completions are up to state well regulations.

6. Submittal Action
- None

7. Activities
Surface Completions of new MW's

- MW-168A
- MW-181A
- MW-164A
- MW-171A
- MW-175A

(Projected work)

-Surface Completion of new wells
-Development of new wells
-Layne Drilling will be on site the week of 11/05/12 to start Soil borings
-Peterson Drilling will be on site the week of 11/05/12 to start well abandonments and 11/12/12 to begin drilling shallow wells

(Work Progress and Delays)

-Good progress on surface completions no delays

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Received corps approval of advance notification package for bedrock drilling contract

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/30/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#015 Date Wednesday, October 31, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 24 Max. 68
Conditions: Sunny
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	9
Ronnie Fiscus		X	ICR	Field Laborer	9
Floyd Armstrong		X	ICR	Field Laborer	9

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "s with Cattle"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	9	Chevy 1500
ICR	9	Chevy 2500 Pick Up
ICR	9	Hand Tools
ICR	9	Concrete mixer

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Verify surface completions are up to state regulations.

6. Submittal Action
- None

7. Activities
Surface Completions of new MW's

- MW-161A
- MW-148A
- MW-162A
- MW-173A

(Projected work)
-Surface Completion of new wells
-Development of new wells
-Layne Drilling will be on site the week of 11/05/12 to start bedrock borings
-Peterson Drilling will be on site the week of 11/12/12 to Drill/set shallow wells
(Work Progress and Delays)
-Good progress on surface completions no delays
(Instructions Given and Corrective Actions Taken)
None
(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- None

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____10/31/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#016 Date Thursday, November 01, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 33 Max. 58
Conditions: Sunny
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10
Ronnie Fiscus		X	ICR	Field Laborer	9.5
Floyd Armstrong		X	ICR	Field Laborer	9.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Physical Hazards"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500
ICR	9.5	Chevy 2500 Pick Up
ECC	9.5	Development Equipment
ECC	9.5	Compressor
ECC	9.5	YSI 556 and Turbidity Meter

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Well Development Checklists.

6. Submittal Action
- None

7. Activities
Development of new MW's

- MW-172A
- MW-173A

(Projected work)
-Development of new wells
-Layne Drilling will be on site Monday 11/05/12 to start bedrock borings
-Peterson Drilling will be on site the week of 11/05/12 to abandon MWs; and the week of 11/12/12 to Drill/Set shallow wells
(Work Progress and Delays)
-Good progress on well development all went well, no delays
(Instructions Given and Corrective Actions Taken)
None
(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- None

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/01/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#017 Date Friday, November 02, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 28 Max. 56
Conditions: Sunny
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10
Ronnie Fiscus		X	ICR	Field Laborer	9
Floyd Armstrong		X	ICR	Field Laborer	9

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Flammable Liquids"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500
ICR	9	Chevy 2500 Pick Up
ECC	9	Development Equipment
ECC	9	Compressor
ECC	9	YSI 556 and Turbidity Meter

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Well Development Checklists.

6. Submittal Action
- None

7. Activities
Development of new MW's

- MW-166A
- MW-167A
- MW-169A

(Projected work)
-Development of new wells
-Layne Drilling will be on site Monday 11/05/12 to start bedrock borings
-Peterson Drilling will be on site the week of 11/05/12 to abandon MWs; and the week of 11/12/12 to Drill/Set shallow wells
(Work Progress and Delays)
-Good progress on well development all went well, no delays
(Instructions Given and Corrective Actions Taken)
None
(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- None

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/02/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#018 Date Monday, November 05, 2012

Contract No. W912DQ-08-D-0001 CTO No. 0002

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 39 Max. 46
Conditions: Sunny
Wind: 5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.75
Ben Schescke		X	Peterson Drilling	Labor	8.75
Shaun Thomas		X	Peterson Drilling	Labor	8.75
Ryan Patterson		X	Peterson Drilling	Labor	8.75
Kyle Brandenburg		X	Layne Drilling	Driller	10.25
Danny Kenney		X	Layne Drilling	Labor	10.25
Santiago Moran		X	Layne Drilling	Labor	10.25
Janet Mathews-Flynn		X	BMcD	Geologist	5
Bob Walston	X		ECC	Geologist	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Muddy Conditions"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.75	Chevy 1500
Peterson Drilling	8.75	Chevy 2500 Pick Up
ECC	8.75	Development Equipment
ECC	8.75	Compressor
ECC	8.75	YSI 556 and Turbidity Meter
ECC	8.75	Gator
Peterson Drilling	8.75	Grouting Equipment
Peterson Drilling	8.75	Skid Loader
ECC	10	Jeep Rental
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1

Layne	10.25	Support Truck 2
BMcD	5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Well Development Checklists.
- Decon Checklists
- Equipment Calibration Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Mob / Demob Checklists

6. Submittal Action
- None

7. Activities
Development of new MW's
- MW-168A
- MW-164A

Sonic Boring at:
- TH-BR-02 Retrieved soil from first 60′ then drilled down to 70′

Well Abandonment: Grouted the following wells
- MW-79A
- MW-79B
- MW-92A
- MW-92B
- MW-81A
- MW-81B
- MW-81D
- MW-34D
- MW-94D

(Projected work)
-Peterson Drilling will continue development of new wells
-Layne Drilling will continue bedrock borings
-Peterson Drilling will continue to abandon MWs
-Peterson's Drill Rig will be on site the week of 11/12/12 to Drill remaining new wells

(Work Progress and Delays)
-Good progress on well development and well abandonments, Layne had a small delay at the end of the day with a bad battery. They went, picked up a new one and are ready to go for tomorrow.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- Brad Brink (USACE)

9. Remarks / Rework
- None

10. Attachments/ Materials received
- Safety log.
- Note some non-GMPO field support also shown on safety sign-in sheet.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	11/05/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#019 Date Tuesday, November 06, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 30 Max. 62
Conditions: Sunny
Wind: 20-35 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	11
Ben Schescke		X	Peterson Drilling	Labor	11
Shaun Thomas		X	Peterson Drilling	Labor	11
Ryan Patterson		X	Peterson Drilling	Labor	11
Kyle Brandenburg		X	Layne Drilling	Driller	10.25
Danny Kenney		X	Layne Drilling	Labor	10.25
Santiago Moran		X	Layne Drilling	Labor	10.25
Janet Mathews-Flynn		X	BMcD	Geologist	8
Bob Walston	X		ECC	Geologist	10.25

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Physical Hazards while Abandoning wells"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11	Chevy 1500
Peterson Drilling	11	Chevy 2500 Pick Up
ECC	11	Development Equipment
ECC	11	Compressor
ECC	11	YSI 556 and Turbidity Meter
ECC	11	Gator
Peterson Drilling	11	Grouting Equipment
Peterson Drilling	11	Skid Loader
ECC	10.25	Jeep Rental
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1

Layne	10.25	Support Truck 2
BMcD	8	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Well Development Checklists.
- Decon Checklists
- Equipment Calibration Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Mob / Demob Checklists

6. Submittal Action
- None

7. Activities
Development of new MW's
- MW-162A
- MW-174A
- MW-175A

Sonic Boring at:
- TH-BR-02 Retrieved soil from 60′ to 150′

Well Abandonment: Grouted the following wells
- MW-117A
- MW-117B
- MW-117D
- MW-128D
- MW-132A
- MW-132B
- MW-132D
- MW-74A
- MW-74B
- MW-75A
- MW-75B
- MW-76A
- MW-76B
- MW-77A
- MW-77B
- MW-137D
- MW-41A
- MW-41B
- MW-41D
- MW-102D
- MW-108A
- MW-108B
- MW-108D
- MW-106D

(Projected work)

-Peterson Drilling will continue development of new wells

-Layne Drilling will continue bedrock borings

-Peterson Drilling will continue to abandon MWs

-Peterson's Drill Rig will be on site the week of 11/12/12 to Drill remaining new wells

(Work Progress and Delays)

-Good progress on well development and well abandonments, Layne had another small delay at 16:15 with a loss of power. They have found that the Drill Rig batteries are not charging properly. The problem has been fixed and Drilling will continue tomorrow as planned.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- Brad Brink (USACE)

9. Remarks / Rework

- None

10. Attachments/ Materials received

- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	11/06/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#020 Date Wednesday, November 07, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 28 Max. 67
Conditions: Sunny
Wind: 0-5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.5
Ben Schescke		X	Peterson Drilling	Labor	10
Shaun Thomas		X	Peterson Drilling	Labor	10
Ryan Patterson		X	Peterson Drilling	Labor	10
Kyle Brandenburg		X	Layne Drilling	Driller	10.25
Danny Kenney		X	Layne Drilling	Labor	10.25
Santiago Moran		X	Layne Drilling	Labor	10.25
Janet Mathews-Flynn		X	BMcD	Geologist	5
Bob Walston	X		ECC	Geologist	10.25

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Beautiful Days"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500
Peterson Drilling	10	Chevy 2500 Pick Up
ECC	10	Development Equipment
ECC	10	Compressor
ECC	10	YSI 556 and Turbidity Meter
ECC	10	Gator
Peterson Drilling	10	Grouting Equipment
Peterson Drilling	10	Skid Loader
ECC	10.25	Jeep Rental
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1

Layne	10.25	Support Truck 2
BMcD	5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Well Development Checklists.
- Decon Checklists
- Equipment Calibration Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Mob / Demob Checklists

6. Submittal Action
- None

7. Activities
Development of new MW's

- MW-161A
- MW-171A
- MW-148A

Sonic Boring at:

- TH-BR-02 Retrieved soil from 150′ to 157′

Well Abandonment: Grouted the following wells

- MW-87A
- MW-87B
- MW-87D
- MW-39A
- MW-39B
- MW-52A
- MW-52B
- MW-54A
- MW-54B
- MW-55A
- MW-55B
- MW-71B
- MW-25D
- MW-22B

(Projected work)

-Peterson Drilling will continue development of new wells / only 2 wells remain to be developed until Peterson drills the remaining wells. These two will be developed tomorrow.
-Layne Drilling will continue bedrock borings
-Peterson Drilling will continue to abandon MWs. All wells have been grouted and will be dug out starting tomorrow.
-Peterson's Drill Rig will be on site the week of 11/12/12 to Drill remaining new wells
-Peterson Drilling will start developing the wells 48 hours after wells have been set.

-Blaine Closwer (UNL) stopped by TH-BR-02 and spoke to Brad Brink (USACE) about moving TH-BR-03 about 20 feet west of the original location. This would put the location out of the fenced off area he uses for cattle grazing. The location has been moved and will be surveyed in along with all other TH-BR sites once the work is complete.

(Work Progress and Delays)

-Good progress on well development and well abandonments.

Layne did have another delay Wednesday, this time being a pressure sensor that showed no pressure not allowing the rig to operate. The problem has been fixed and drilling will continue tomorrow as planned. Layne is using a different soil coring technique using 8 inch rods through the unconsolidated (poorly consolidated) sand stone layer.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- Brad Brink (USACE)
- Ken Rapplean (EPA)
- Brady Bigelow (ECC)
- Meaghan Peters (ECC)

9. Remarks / Rework

- Thursday evening and Friday morning discussions with team are planned to hash out any adjustments to the bedrock drilling phase of work with respect to coring problems to date.

10. Attachments/ Materials received

- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/07/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#020 Date Thursday, November 08, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 30 Max. 69
Conditions: Sunny
Wind: 0-5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	11
Ben Schescke		X	Peterson Drilling	Labor	11
Shaun Thomas		X	Peterson Drilling	Labor	11
Ryan Patterson		X	Peterson Drilling	Labor	11
Kyle Brandenburg		X	Layne Drilling	Driller	10.25
Danny Kenney		X	Layne Drilling	Labor	10.25
Santiago Moran		X	Layne Drilling	Labor	10.25
Bob Walston	X		ECC	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Rigging Heavy Equipment"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11	Chevy 1500
Peterson Drilling	11	Chevy 2500 Pick Up
ECC	11	Development Equipment
ECC	11	Compressor
ECC	11	YSI 556 and Turbidity Meter
ECC	11	Gator
Peterson Drilling	11	Grouting Equipment
Peterson Drilling	11	Skid Loader
ECC	10.5	Jeep Rental
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1

Layne	10.25	Support Truck 2

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Well Development Checklists.
- Decon Checklists
- Equipment Calibration Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Mob / Demob Checklists

6. Submittal Action
- None

7. Activities
Development of new MW's
- MW-160A
- MW-170A

Sonic Boring at:
- TH-BR-02 Retrieved soil from 157′ to 165′

Well Abandonment: Removed the following wells (Bollards, Flush mounts and Stickups)
- MW-87A
- MW-87B
- MW-87D
- MW-39A
- MW-39D
- MW-108A
- MW-108B
- MW-108D
- MW-106D
- MW-41A
- MW-41B
- MW-41D
- MW-102D
- MW-137D
- MW-74A
- MW-74B
- MW-75A
- MW-75B
- MW-76A
- MW-76B
- MW-77A
- MW-77B
- MW-34D

(Projected work)

-Layne Drilling will continue bedrock borings

-Peterson Drilling will continue to abandon MWs. All wells have been grouted and are now being dug out.

-Peterson's Drill Rig will be on site the week of 11/12/12 to Drill remaining wells

-Peterson Drilling will start developing the wells 48 hours after wells have been set (November 14, 2012.

(Work Progress and Delays)

-Good progress on well development and well abandonments.

-Layne is moving ahead slowly, but should start to speed up once on a new hole.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- Brad Brink (USACE)
- Brady Bigelow (ECC)
- Meaghan Peters (ECC)

9. Remarks / Rework

- Alternate drilling approaches used on bedrock drilling, appears they have something in place to finish up first hole Friday; other boreholes are expected to go much smoother and faster. Poor/no consolidation of the bedrock sandstone is making coring difficult and problematic.

10. Attachments/ Materials received

- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/08/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#022 Date Friday, November 09, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 42 Max. 73
Conditions: P.Sunny
Wind: 0-5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10
Ben Schescke		X	Peterson Drilling	Labor	10
Shaun Thomas		X	Peterson Drilling	Labor	10
Ryan Patterson		X	Peterson Drilling	Labor	10
Kyle Brandenburg		X	Layne Drilling	Driller	10
Santiago Moran		X	Layne Drilling	Labor	10
Bob Walston	X		ECC	Geologist	4
Nick Kiusalaas	X		ECC	Geologist	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Dealing with Cattle"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500
Peterson Drilling	10	Chevy 2500 Pick Up
Peterson Drilling	10	Grouting Equipment
Peterson Drilling	10	Skid Loader
ECC	10	Jeep Rental
Layne	10	Mini Sonic Rig
Layne	10	Support Truck 1
Layne	10	Support Truck 2
ECC	4	Jeep Rental

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities

Sonic Boring at:

- TH-BR-02 Retrieved soil from 157′ to 181.5′ Hit Limestone and finished boring. Will be moving onto TH-BR-01 after cleaning up at TH-BR-02.

Well Abandonment: Removed the following wells (Bollards, Flush mounts and Stickups)

- MW-52A
- MW-52B
- MW-54A
- MW-54B
- MW-55A
- MW-55B
- MW-71B
- MW-25D
- MW-22B
- MW-92A
- MW-92B
- MW-79A
- MW-79B
- MW-81A
- MW-81B
- MW-81D

(Projected work)

-Layne Drilling will continue bedrock borings
-Peterson Drilling will continue to abandon MWs. All wells have been grouted and are now being dug out.
-Peterson's Drill Rig will be on site Monday 11/12/12 to Drill remaining wells
-Peterson Drilling will start developing 48 hours after wells have been set (November 14, 2012).

(Work Progress and Delays)

-Good progress on Well abandonments. Abandonments will be finished up end of day Monday.
-Layne finished up TH-BR-02 at 1645 after hitting limestone and will be moving onto TH-BR-01.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- Brad Brink (USACE)

9. Remarks / Rework
- Once in consolidated bedrock coring seems to work better.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	11/09/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#023 Date Saturday, November 10, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 61 Max. 78
Conditions: Sunny
Wind: 35-45 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Nick Kiusalaas	X		ECC	Geologist	11
Kyle Brandenburg		X	Layne Drilling	Driller	11
Santiago Moran		X	Layne Drilling	Labor	11

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Physical Qualifications of Employees"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11	Jeep Rental
Layne	11	Mini Sonic Rig
Layne	11	Support Truck 1
Layne	11	Support Truck 2

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities

Sonic Boring at:

- TH-BR-02 Grouted the hole, tripped all the casing out, deconed, and loaded the trucks to set up on TH-BR-01 Monday morning.

(Projected work)

-No site work Sunday
-Layne Drilling will continue bedrock borings
-Peterson Drilling will continue to abandon MWs. All wells have been grouted and are now being dug out. Abandonments should be done Monday November 12, 2012.
-Peterson's Drill Rig will be on site mid-morning Monday 11/12/12 to Drill remaining wells
-Peterson Drilling will start developing 48 hours after wells have been set (November 14, 2012).

(Work Progress and Delays)

-Good progress on Well abandonments. Abandonments will be finished up end of day Monday.
-Layne finished up TH-BR-02 tripped out rods, grouted the hole, deconed and loaded the truck they will be moving onto TH-BR-01.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

None

9. Remarks / Rework
- Once in consolidated bedrock coring seems to work better.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/10/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#024 Date Monday, November 12, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 15 Max. 41
Conditions: Sunny
Wind: 10-15 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.75
Ben Schescke		X	Peterson Drilling	Labor	8
Shaun Thomas		X	Peterson Drilling	Labor	8
Ryan Patterson		X	Peterson Drilling	Labor	8
Sam Wulf		X	Peterson Drilling	Driller	8
Kyle Brandenburg		X	Layne Drilling	Driller	10.75
Santiago Moran		X	Layne Drilling	Labor	10.75
Lewis Turner		X	BMcD	Geologist	10.75
Nick Kiusalaas	X		ECC	Geologist	10.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Cold Weather Hazards"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.75	Chevy 1500
Peterson Drilling	8	Chevy 2500 Pickup
Peterson Drilling	8	Drill Rig
Peterson Drilling	8	Skid Loader
Peterson Drilling	8	Chevy 2500 Pickup
Peterson Drilling	8	Support Trailer
ECC	10.75	Jeep Rental
Layne	10.75	Mini Sonic Rig
Layne	10.75	Support Truck 1

Layne	10.75	Support Truck 2
BMcD	10.75	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:
- TH-BR-01 Retrieved soil from 0' to 110' Started into shale at 104.5 feet.

Well Drilling:
- Peterson drilled and set wells at MW-178B, MW-155B then Drilled down to 50' at MW-172B.

(Projected work)
-Layne Drilling will continue bedrock borings
-Peterson Drilling will continue to abandon MWs. All wells have been grouted and are now being dug out.
-Peterson's Drill Rig will continue on drilling remaining wells
-Peterson Drilling will start developing 48 hours after wells have been set (November 15, 2012).

(Work Progress and Delays)
-Peterson Drilling Well abandonments almost complete, one day remaining for abandonments.
-Layne bedrock borings are progressing slowly but better on TH-BR-01.
-Peterson Drilling hollow stem well installations are going smoothly.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- No site work or DQCR Sunday November 11.
- Once in consolidated bedrock coring seems to progress better.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/12/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#025 Date Tuesday, November 13, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 17 Max. 52
Conditions: Sunny
Wind: 5-15 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	11.75
Ben Schescke		X	Peterson Drilling	Labor	11.75
Shaun Thomas		X	Peterson Drilling	Labor	11.75
Ryan Patterson		X	Peterson Drilling	Labor	11.75
Sam Wulf		X	Peterson Drilling	Driller	11.75
Kyle Brandenburg		X	Layne Drilling	Driller	10.75
Santiago Moran		X	Layne Drilling	Labor	10.75
Lewis Turner		X	BMcD	Geologist	10.75
Nick Kiusalaas	X		ECC	Geologist	5
David Dander	X		ECC	Task Manager	10.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Accident Reporting"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11.75	Chevy 1500
Peterson Drilling	11.75	Chevy 2500 Pickup
Peterson Drilling	11.75	Drill Rig
Peterson Drilling	11.75	Skid Loader
Peterson Drilling	11.75	Chevy 2500 Pickup
Peterson Drilling	11.75	Support Trailer
ECC	10.75	Jeep Rental
Layne	10.75	Mini Sonic Rig
Layne	10.75	Support Truck 1

Layne	10.75	Support Truck 2
BMcD	10.75	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:
- TH-BR-01 Retrieved soil from 110' to 139.5' shale

Well Drilling:
- Peterson drilled and set wells at MW-172B (Finished), MW-174B, MW-175B, MW-168B and MW-145B

(Projected work)
-Layne Drilling will continue bedrock boring TH-BR-01
-Peterson Drilling will continue to abandon MWs. All wells have been grouted and are now being dug out.
-Peterson's Drill Rig will continue to drill remaining wells
-Peterson Drilling will continue developing wells >48 hours after installations (November 15, 2012).

(Work Progress and Delays)
-Peterson Drilling well abandonments almost complete, one day remaining.
-Layne bedrock borings are progressing slowly at TH-BR-01.
-Peterson Drilling shallow well installations are going smoothly and efficiently.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Consolidated bedrock coring progressing but slow.

10. Attachments/ Materials received
- Safety log.

____x_**Certifications**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander 11/13/2012
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#026 Date Wednesday, November 14, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 25 Max. 52
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10
Ben Schescke		X	Peterson Drilling	Labor	11
Shaun Thomas		X	Peterson Drilling	Labor	11
Ryan Patterson		X	Peterson Drilling	Labor	11
Sam Wulf		X	Peterson Drilling	Driller	11
Kyle Brandenburg		X	Layne Drilling	Driller	9
Santiago Moran		X	Layne Drilling	Labor	9
Lewis Turner		X	BMcD	Geologist	10.75
Jay Kolb		X	BMcD	Geologist	6.75
David Dander	X		ECC	Task Manager	9

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "FLAMMABLE AND COMBUSTIBLE LIQUIDS"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10	Chevy 1500
Peterson Drilling	11	Chevy 2500 Pickup
Peterson Drilling	11	Drill Rig
Peterson Drilling	11	Skid Loader
Peterson Drilling	11	Chevy 2500 Pickup
Peterson Drilling	11	Support Trailer
ECC	9	Jeep Rental
Layne	9	Mini Sonic Rig
Layne	9	Support Truck 1

Layne	9	Support Truck 2
BMcD	10.75	Chevy 1500
BMcD	6.75	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:
- TH-BR-01 Retrieved soil from 139.5' to 147' shale

Well Drilling:
- Peterson drilled and set wells at MW-165B, MW-166B, MW-167B, MW-169B and MW-171B (Drilled to 40ft.)

(Projected work)
-Layne Drilling will start (Thursday) using drilling mud to retrieve deeper sandstone bedrock from boring TH-BR-01
-Peterson Drilling will continue to abandon MWs. All wells have been grouted and are now being dug out.
-Peterson's Drill Rig will continue to drill remaining wells
-Peterson Drilling will continue developing wells >48 hours after installations (November 15, 2012).

(Work Progress and Delays)
-Peterson Drilling well abandonments almost complete, one day remaining.
-Layne bedrock borings are progressing slowly at TH-BR-01. They will be using drill mud to help out with sandstone retrieval.
-Peterson Drilling shallow well installations are going smoothly and efficiently.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Consolidated bedrock coring progressing but slow.

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/14/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#027 Date: Thursday, November 15, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 27 Max. 55
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	12
Ben Schescke		X	Peterson Drilling	Labor	12
Shaun Thomas		X	Peterson Drilling	Labor	12
Ryan Patterson		X	Peterson Drilling	Labor	12
Sam Wulf		X	Peterson Drilling	Driller	12
Kyle Brandenburg		X	Layne Drilling	Driller	10
Santiago Moran		X	Layne Drilling	Labor	10
Lewis Turner		X	BMcD	Geologist	10.75
Jay Kolb		X	BMcD	Geologist	12

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Driving in unknown areas"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	12	Chevy 1500
Peterson Drilling	12	Chevy 2500 Pickup
Peterson Drilling	12	Drill Rig
Peterson Drilling	12	Skid Loader
Peterson Drilling	12	Chevy 2500 Pickup
Peterson Drilling	12	Support Trailer
Layne	10	Mini Sonic Rig
Layne	10	Support Truck 1
Layne	10	Support Truck 2

BMcD	10.75	Chevy 1500
BMcD	12	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:

- TH-BR-01 Retrieved interval from 157' to 167' using drilling mud with limited recovery sand (unconsolidated). Attempt to clear hole rods became stuck at depth (with uppermost rod threading starting to spilt) Layne is speaking with their head office this evening. They are looking into the best way to go about getting them out without losing their rod string.

Well Drilling:

- Peterson drilled and set wells at MW-171B (Finished), MW-163A, MW-160B, MW-161B.

(Projected work)

-Layne Drilling will be talking with their head office on ways to get their rods from being stuck and how to remove core moving forward at boring TH-BR-01. Path forward on bedrock drilling to be discussed Friday.

-Peterson Drilling will continue to abandon MWs and construct surface completions early next week.

-Peterson's Drill Rig will continue to drill remaining wells

-Peterson Drilling will continue developing wells >48 hours after installations (November 16, 2012).

(Work Progress and Delays)

-Peterson Drilling well abandonments almost complete, one day remaining.

-Layne bedrock borings are progressing slowly at TH-BR-01. They are working on a way to get soil core from TH-BR-01.

-Peterson Drilling shallow well installations are going smoothly and efficiently.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Lighting set up and utilized for drilling late afternoons due to limited daylight hours
- Deeper bedrock sandstone has not been as consolidated as expected and causing coring complications.

The bedrock coring of sandstone intervals has not been successful in either hole with limited sand or no recovery. Discussing further with drillers and other team geologists, and team wishes to speak further with corps Friday on potential paths forward.

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/15/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#028 Date: Friday, November 16, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 24 Max. 59
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.25
Ben Schescke		X	Peterson Drilling	Labor	9
Shaun Thomas		X	Peterson Drilling	Labor	9
Ryan Patterson		X	Peterson Drilling	Labor	9
Sam Wulf		X	Peterson Drilling	Driller	9
Kyle Brandenburg		X	Layne Drilling	Driller	10.5
Santiago Moran		X	Layne Drilling	Labor	10.5
Lewis Turner		X	BMcD	Geologist	10.5
Jay Kolb		X	BMcD	Geologist	9.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Housekeeping"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.25	Chevy 1500
Peterson Drilling	9	Chevy 2500 Pickup
Peterson Drilling	9	Drill Rig
Peterson Drilling	9	Skid Loader
Peterson Drilling	9	Chevy 2500 Pickup
Peterson Drilling	9	Support Trailer
Layne	10.5	Mini Sonic Rig
Layne	10.5	Support Truck 1
Layne	10.5	Support Truck 2
BMcD	10.5	Chevy 1500
BMcD	9.5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:

- TH-BR-01 Ran sonic 6" casing down to depth to free up stuck wireline coring sleeve. Continued using typical sonic to sample intervals from 167' to 190' through Sandstone, have not contacted limestone by end of day.

Well Drilling:

- Peterson drilled and set wells at MW-177B, MW-177A, MW-179B, and MW-179A.

(Projected work)

-Layne Drilling will continue sonic sampling through the sandstone tomorrow targeting limestone contact at TH-BR-01, then abandon borehole. Possibly setting up at TH-BR-05 for Monday Sonic drilling. (off Sunday)

-Peterson Drilling will continue to abandon MWs and construct surface completions early next week.

-Peterson's Drill Rig will drill final wells MW-176A/B Tuesday morning at 0830 once OPPD shuts down overhead power lines.

-Peterson Drilling will continue developing wells through weekend.

(Work Progress and Delays)

-Peterson Drilling well abandonments almost complete, one day remaining.

-Layne bedrock borings are progressing slowly at TH-BR-01. Sonic sampling seems to work better than the wireline sampling previously employed.

-Peterson Drilling shallow well installations are going smoothly and efficiently.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Conference call with ECC and corps PM and geologist regarding bedrock drilling problems and path forward. Decision to allow drillers scoped with the work to recommend solutions and path forward. They have chosen to flush sonic rods to depth to free up stuck wireline sampling rods, then advance the borehole using typical sonic sampling. They have indicated they want to continue next hole using only sonic methods continuing throughout the bedrock.
- Lighting set up and utilized for drilling late afternoons due to limited daylight hours

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/16/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#029 Date: Saturday, November 17, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 34 Max. 63
Conditions: Sunny
Wind: 15-20 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	9.25
Ben Schescke		X	Peterson Drilling	Labor	10.25
Kyle Brandenburg		X	Layne Drilling	Driller	10.5
Santiago Moran		X	Layne Drilling	Labor	10.5
Lewis Turner		X	BMcD	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Careless and Unsafe Acts"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	9.25	Chevy 1500
ECC	10.25	Trailer
ECC	10.25	Control Box
ECC	10.25	Tank
ECC	10.25	YSI / Turbidity Meter
ECC	10.25	Development Items
Layne	10.5	Mini Sonic Rig
Layne	10.5	Support Truck 1
Layne	10.5	Support Truck 2
BMcD	10.5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists

- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Development Checklist
- Equipment Checklist

6. Submittal Action
- None

7. Activities
Sonic Boring at:
- TH-BR-01 Continued using typical sonic to sample intervals from 190' to 225' through Sandstone then back to Shale, have not contacted limestone by end of day.

Well Development:
- Peterson developed wells MW-178B, MW-155B, MW-172B, MW-174, MW-168 and MW-175B.

(Projected work)

-Layne Drilling will continue sonic sampling through the Shale Monday targeting limestone contact at TH-BR-01, then abandon borehole. Possibly setting up at TH-BR-05 for Tuesday Sonic drilling. (Off Sunday)

-Peterson Drilling will continue to abandon MWs and construct surface completions Monday.

-Peterson's Drill Rig will drill final wells MW-176A/B Tuesday morning at 0830 once OPPD shuts down overhead power lines.

-Peterson Drilling will continue developing wells through weekend.

(Work Progress and Delays)

-Peterson Drilling well abandonments almost complete, one day remaining.

-Layne bedrock borings are progressing slowly at TH-BR-01. Sonic sampling seems to work better than the wire line sampling previously employed. Rod became unthreaded time involved retrieving from borehole before continuing advancement.

-Peterson Drilling shallow well installations are going smoothly and efficiently. Final two wells to be drilled Tuesday morning.

-Well Development is going smoothly and efficiently, surface completions to begin Monday.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Bedrock drilling rods became unthreaded downhole, drillers able to retrieve and continue drilling.
- Some miscommunication to usace regarding depths drilled due to limited sporadic LL1 phone coverage.
- Bedrock borehole advanced to 225' beyond the expected 160' suspected limestone depth; approximately 250' of sonic rods available.
- Lighting set up and utilized for drilling late afternoons due to limited daylight hours

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/17/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#030 Date: Sunday, November 18, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 44 Max. 64
Conditions: Sunny
Wind: 15-30 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Lewis Turner		X	BMcD	Geologist	10
Ben Schescke		X	Peterson Drilling	Labor	10

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Strong Winds"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
BMcD	10	Chevy 1500
ECC	10	Trailer
ECC	10	Control Box
ECC	10	Tank
ECC	10	YSI / Turbidity Meter
ECC	10	Development Items
Peterson	10	Chevy 2500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists

- Health and Safety Checklists
- Development Checklist
- Equipment Checklist

6. Submittal Action
- None

7. Activities

Well Development:

- Peterson Drilling developed wells MW-161B, MW-160B, MW-165B, MW-145, MW-163 and MW-171B.

(Projected work)

-Layne Drilling will continue sonic sampling Monday targeting limestone contact at TH-BR-01, then abandon borehole. Possibly setting up at TH-BR-05 for Tuesday Sonic drilling.
-Peterson Drilling will continue to abandon MWs and construct surface completions Monday.
-Peterson Drilling's Rig will drill final wells MW-176A/B Tuesday morning at 0830 once OPPD shuts down overhead power lines.
-Peterson Drilling will continue developing wells through next week.

(Work Progress and Delays)

-Peterson Drilling's well abandonments almost complete, one day remaining.
-Layne Drilling's bedrock borings are progressing slowly at TH-BR-01. Sonic sampling seems to work better than the wire line sampling previously employed.
-Peterson Drilling's shallow well installations are going smoothly and efficiently. Final two wells to be drilled Tuesday morning.
-Well Development is going smoothly and efficiently, final two wells will need to be developed next Monday. .
-New well surface completions to begin this Monday and complete this week.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Bedrock borehole remains at 225' beyond the expected 160' suspected limestone depth; approximately 250' of sonic rods available.

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	11/18/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#031 Date: Monday, November 19, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 42 Max. 64
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.5
Ben Schescke		X	Peterson Drilling	Labor	10.5
Shaun Thomas		X	Peterson Drilling	Labor	10.5
Ryan Patterson		X	Peterson Drilling	Labor	10.5
Chris Pankonin		X	Peterson Drilling	Labor	10.5
Kyle Brandenburg		X	Layne Drilling	Driller	10.75
Santiago Moran		X	Layne Drilling	Labor	10.75
Lewis Turner		X	BMcD	Geologist	10.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Ladder Safety"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500
Peterson Drilling	10.5	Chevy 2500 Pickup
Peterson Drilling	10.5	Chevy 1500
Peterson Drilling	10.5	Skid Loader
Peterson Drilling	10.5	Chevy 2500 Pickup
Peterson Drilling	10.5	Support Trailer
Layne	10.75	Mini Sonic Rig
Layne	10.75	Support Truck 1
Layne	10.75	Support Truck 2
BMcD	10.75	Chevy 1500
ECC	10.5	Trailer

ECC	10.5	Control Box
ECC	10.5	Tank
ECC	10.5	YSI / Turbidity Meter
ECC	10.5	Development Items
ECC	10.5	Gator

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Development Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:

- TH-BR-01 Continued using typical sonic to sample intervals from 225' to 228.5' through Shale, Limestone was then contacted at 226'. Once Limestone was confirmed Layne grouted the hole shut and picked up their supplies to move on TH-BR-05, decon to be completed in the morning.

Development:

- Peterson Drilling developed wells MW-177A, MW-177B, MW-166B, MW-167B and MW-169B.

Well Abandonments:

- Peterson Drilling finished up abandoning final wells early afternoon. They spent the rest of the day hauling loads of debris to the landfill.

(Projected work)

-Layne Drilling will start tomorrow by deconing equipment from TH-BR-01 and then set up and drill at TH-BR-05.
-Peterson Drilling will haul off final load of debris then start on surface completions of new wells.
-Peterson's Drill Rig will drill final wells MW-176A/B Tuesday morning at 0830 once OPPD shuts down overhead power lines.
-Peterson Drilling will develop MW-179A/B in the morning then develop MW-176A/B next Monday.

(Work Progress and Delays)

-Peterson Drilling well abandonments almost complete, half day remaining.
-Layne bedrock borings are finished at TH-BR-01 and moving on to TH-BR-05. Sonic sampling seems to work better than the wire line sampling previously employed.
-Peterson Drilling well installations are going smoothly and efficiently.
-Peterson Drilling Well Development is going smoothly and efficiently.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework

- Note, some names on Tailgate Safety form are not related to GMPO activities

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/19/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#032 Date: Tuesday, November 20, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 27 Max. 69
Conditions: Sunny
Wind: Calm-5 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.5
Ben Schescke		X	Peterson Drilling	Labor	10.25
Shaun Thomas		X	Peterson Drilling	Labor	10.25
Ryan Patterson		X	Peterson Drilling	Labor	10.25
Chris Pankonin		X	Peterson Drilling	Labor	10.25
Sam Wulf		X	Peterson Drilling	Labor	10.25
Kyle Brandenburg		X	Layne Drilling	Driller	10.75
Santiago Moran		X	Layne Drilling	Labor	10.75
Lewis Turner		X	BMcD	Geologist	10.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Watching for Deer during travel"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500
Peterson Drilling	10.25	Chevy 2500 Pickup
Peterson Drilling	10.25	Chevy 1500
Peterson Drilling	10.25	Skid Loader
Peterson Drilling	10.25	Chevy 2500 Pickup
Peterson Drilling	10.25	Support Trailer
Layne	10.75	Mini Sonic Rig
Layne	10.75	Support Truck 1
Layne	10.75	Support Truck 2
BMcD	10.75	Chevy 1500
ECC	4	Trailer

ECC	4	Control Box
ECC	4	Tank
ECC	4	YSI / Turbidity Meter
ECC	4	Development Items
ECC	4	Gator

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Development Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:
- TH-BR-05 Cored using typical sonic to sample intervals from 0' to 80' through alluvial materials and into sandstone,

Development:
- Peterson Drilling developed wells MW-179A and MW-179B.

Well Abandonments:
- Peterson Drilling finished hauling off Abandonment material, and then brought in top soil to fill in small holes.

Hollow Stem Drilling:
- Peterson drilled final two wells. MW-176A/B (all new wells are drilled some awaiting surface completion)

(Projected work)
-Layne Drilling will continue drilling at TH-BR-05 tomorrow.
-Peterson Drilling will start well surface completions tomorrow.
-Peterson Drilling will develop MW-176A/B Monday the 26th (2-7 day grout set time).

(Work Progress and Delays)
-Peterson Drilling well abandonments are complete.
-Layne bedrock borings are finished at TH-BR-01 and TH-BR-02, now working on TH-BR-05. Sonic sampling seems to work better than the wire line sampling previously employed.
-Peterson Drilling and Boart Longyear well installations (all subsurface) are complete.
-Peterson Drilling Well Development will finish up on Monday.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- A few remaining GMPO items will continue after this week. Surface completions and well development expected to wrap up early next week. Well installations and well abandonments complete. Bedrock coring will continue through next week.
- Note, some names on Tailgate Safety form are not related to GMPO

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	11/20/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#033 Date: Wednesday, November 21, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 40 Max. 72
Conditions: Sunny
Wind: 15 - 25 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Lewis Turner		X	BMcD	Geologist	5
Ben Schescke		X	Peterson Drilling	Labor	4.5
Shaun Thomas		X	Peterson Drilling	Labor	4.5
Ryan Patterson		X	Peterson Drilling	Labor	4.5
Chris Pankonin		X	Peterson Drilling	Labor	4.5
Sam Wulf		X	Peterson Drilling	Labor	4.5
Kyle Brandenburg		X	Layne Drilling	Driller	3.5
Santiago Moran		X	Layne Drilling	Labor	3.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Exposure Routes"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
Peterson Drilling	4.5	Chevy 2500 Pickup
Peterson Drilling	4.5	Chevy 1500
Peterson Drilling	4.5	Skid Loader
Peterson Drilling	4.5	Chevy 2500 Pickup
Peterson Drilling	4.5	Support Trailer
Layne	3.5	Mini Sonic Rig
Layne	3.5	Support Truck 1
Layne	3.5	Support Truck 2
BMcD	5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring at:

- TH-BR-05 Drove 6" Casing to 80' and cleared out the boring. 30' of sand came in overnight. Drilled 4" casing and took sample from 80 to 90 foot (Sandstone). Layne then cleaned up and headed to the airport.

Well Completions:

- Peterson worked on surface completions. Completions should be done Monday afternoon or Tuesday.

(Projected work)

-Layne Drilling will continue drilling at TH-BR-05 Monday.
-Peterson Drilling will continue well surface completions Monday.
-Peterson Drilling will develop MW-176A/B Monday.
-ECC will collect remaining well survey coordinates upon surface completions.
-ECC will begin new well registrations and well abandonments with the state of NE.

(Work Progress and Delays)

-Peterson Drilling well abandonments are complete.
-Layne bedrock borings are finished at TH-BR-01 and TH-BR-02, now working on TH-BR-05. Sonic sampling seems to work better than the wire line sampling previously employed.
-Peterson Drilling and Boart Longyear well installations (all subsurface) are complete.
-Peterson Drilling Surface completions and Well Development will finish early next week.

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Crews off for holiday/weekend and remaining GMPO work will resume Monday.
- Surface completions and well development expected to wrap up early next week. Well installations and well abandonments complete. Bedrock coring will continue through next week.

10. Attachments/ Materials received
- Safety log (will be scanned and sent with Mondays DQCR)

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/21/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#034 Date: Monday, November 26, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 27 Max. 28
Conditions: Sunny
Wind: 5-15 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.75
Ben Schescke		X	Peterson Drilling	Labor	8.5
Shaun Thomas		X	Peterson Drilling	Labor	8.5
Chris Pankonin		X	Peterson Drilling	Labor	8.5
Kyle Brandenburg		X	Layne Drilling	Driller	6
Erick Sandoral		X	Layne Drilling	Labor	6
Lewis Turner		X	BMcD	Geologist	6.25

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Sample Bottles"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.75	Chevy 1500
Peterson Drilling	8.5	Chevy 2500 Pickup
Peterson Drilling	8.5	Chevy 1500
Peterson Drilling	8.5	Skid Loader
Peterson Drilling	8.5	Chevy 2500 Pickup
Peterson Drilling	8.5	Support Trailer
Layne	6	Mini Sonic Rig
Layne	6	Support Truck 1
Layne	6	Support Truck 2
BMcD	6.25	Chevy 1500
ECC	3	Trailer

ECC	3	Control Box
ECC	3	Tank
ECC	3	YSI / Turbidity Meter
ECC	3	Development Items
ECC	3	Gator

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Development Checklists
- Surface Completion Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring
- TH-BR-05 cored from 90' to 118' (Sandstone), Shale at 118' and drilled on to 125'

Development
- Peterson Drilling developed wells MW-176A and MW-176B.

Surface Completions
- Peterson Drilling finished surface completions at 4 locations today.

(Projected work)
-Layne Drilling will continue drilling at TH-BR-05.
-Peterson Drilling will continue well surface completions.

(Work Progress and Delays)
-Peterson Drilling well abandonments are complete.
-Layne bedrock borings are finished at TH-BR-01 and TH-BR-02, now working on TH-BR-05. Sonic sampling seems to work better than the wire line sampling previously employed.
-Peterson Drilling and Boart Longyear well installations (all subsurface) are complete.
-Peterson Drilling Well Development will finish up on Thursday.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- A few remaining GMPO items will continue this week. Surface completions are expected to wrap up this week. Well installations and well abandonments and well development complete. Bedrock coring will continue throughout the week.
- Note, some names on Tailgate Safety form are not related to GMPO

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/26/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#035 Date: Tuesday, November 27, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 6 Max. 42
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.75
Ben Schescke		X	Peterson Drilling	Labor	10.5
Shaun Thomas		X	Peterson Drilling	Labor	10.5
Chris Pankonin		X	Peterson Drilling	Labor	10.5
Kyle Brandenburg		X	Layne Drilling	Driller	9
Erick Sandoral		X	Layne Drilling	Labor	9
Lewis Turner		X	BMcD	Geologist	9.25

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Lifting Safely"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.75	Chevy 1500
Peterson Drilling	10.5	Chevy 2500 Pickup
Peterson Drilling	10.5	Chevy 1500
Peterson Drilling	10.5	Skid Loader
Peterson Drilling	10.5	Chevy 2500 Pickup
Peterson Drilling	10.5	Support Trailer
Layne	9	Mini Sonic Rig
Layne	9	Support Truck 1
Layne	9	Support Truck 2
BMcD	9.25	Chevy 1500
ECC	10.5	Gator

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Surface Completion Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring
- TH-BR-05 completed cored from 118' to 132'(Sandstone), Limestone at 132' and total depth 134'

Surface Completions
- Peterson Drilling finished surface completions at 8 locations today. 12 of 21 locations complete

(Projected work)
-Layne Drilling will set up and start drilling at TH-BR-03 Wednesday.
-Peterson Drilling will continue well surface completions.

(Work Progress and Delays)
-Peterson Drilling well abandonments are complete.
-Layne bedrock borings are finished at TH-BR-01, TH-BR-02 and TH-BR-05, setting up on TH-BR-03. Sonic sampling seems to work better than the wire line sampling previously employed.
-Peterson Drilling and Boart Longyear well installations (subsurface) are complete.
-Peterson Drilling Well Development is complete.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- A few remaining GMPO items will continue this week. Surface completions are expected to wrap up this week. Well installations and well abandonments complete. Bedrock coring will continue throughout the week.
- Note, some names on Tailgate Safety form are not related to GMPO

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/27/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#036 Date: Wednesday, November 28, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 15 Max. 48
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	11
Ben Schescke		X	Peterson Drilling	Labor	10.5
Shaun Thomas		X	Peterson Drilling	Labor	10.5
Chris Pankonin		X	Peterson Drilling	Labor	10.5
Kyle Brandenburg		X	Layne Drilling	Driller	10
Erick Sandoral		X	Layne Drilling	Labor	10
Lewis Turner		X	BMcD	Geologist	5.5
Nick Kiusalaas	X		ECC	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "General Electric"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11	Chevy 1500
Peterson Drilling	10.5	Chevy 2500 Pickup
Peterson Drilling	10.5	Chevy 1500
Peterson Drilling	10.5	Skid Loader
Peterson Drilling	10.5	Chevy 2500 Pickup
Peterson Drilling	10.5	Support Trailer
Layne	10	Mini Sonic Rig
Layne	10	Support Truck 1
Layne	10	Support Truck 2
BMcD	5.5	Chevy 1500
ECC	10.5	Gator
ECC	10.5	Jeep Rental

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Surface Completion Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring
- TH-BR-04 Set up and cored from 0' to 90' (alluvial)

Surface Completions
- Peterson Drilling finished surface completions at 6 locations today. 17 of 21 locations complete

(Projected work)
-Layne Drilling will continue drilling at TH-BR-04 Wednesday.
-Peterson Drilling will continue well surface completions.

(Work Progress and Delays)
-Peterson Drilling well development and well abandonments are complete.
-Layne bedrock borings are finished at TH-BR-01, TH-BR-02 and TH-BR-05, coring at TH-BR-04.
-Peterson Drilling and Boart Longyear well installations (all subsurface) are complete.
-Peterson Drilling surface completions progressing to finish up thursday.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- A few remaining GMPO items will continue this week. Surface completions are expected to wrap up Thursday. Well installations and well abandonments complete. Bedrock coring will continue throughout the week.
- Note, some names on Tailgate Safety form are not related to GMPO

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/28/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#037 Date: Thursday, November 29, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 28 Max. 54
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	11.5
Ben Schescke		X	Peterson Drilling	Labor	11.5
Shaun Thomas		X	Peterson Drilling	Labor	11.5
Chris Pankonin		X	Peterson Drilling	Labor	11.5
Santiago Moran		X	Layne Drilling	Driller	10
Erick Sandoral		X	Layne Drilling	Labor	10
Nick Kiusalaas	X		ECC	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Beautiful Days"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11.5	Chevy 1500
Peterson Drilling	11.5	Chevy 2500 Pickup
Peterson Drilling	11.5	Chevy 1500
Peterson Drilling	11.5	Skid Loader
Peterson Drilling	11.5	Chevy 2500 Pickup
Peterson Drilling	11.5	Support Trailer
Layne	10	Mini Sonic Rig
Layne	10	Support Truck 1
Layne	10	Support Truck 2
ECC	11.5	Gator
ECC	10.5	Jeep Rental

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists
- Surface Completion Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring
- TH-BR-04 Cored from 90' to 154' (Shale bedrock at 104')

Surface Completions
- Peterson Drilling finished surface completions at 4 locations today. All surface completions are complete

(Projected work)
-Layne Drilling will continue drilling at TH-BR-04 Friday.
-Peterson Drilling will clean up and leave the site.

(Work Progress and Delays)
-All well development, surface completions and well abandonments are complete.
- Bedrock borings are completed at TH-BR-01, TH-BR-02 and TH-BR-05, currently coring at TH-BR-04. (Layne)
-All well installations are complete.

(Instructions Given and Corrective Actions Taken)
None

(Safety Hazards Encountered)
None

8. Record of Visitors to the Work Site
- None

9. Remarks / Rework
- Well abandonments and new well registrations underway.
- Note, some names on Tailgate Safety form are not related to GMPO

10. Attachments/ Materials received
- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/29/2012_____
Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#038 Date: Friday, November 30, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 28 Max. 58
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	H&S/QC	10.5
Santiago Moran		X	Layne Drilling	Driller	10.25
Erick Sandoral		X	Layne Drilling	Labor	10.25
Nick Kiusalaas	X		ECC	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "proper PPE"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500
ECC	10.5	Jeep Rental
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1
Layne	10.25	Support Truck 2

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities

Sonic Boring

- TH-BR-04 Cored from 154' to 170' (Shale bedrock at 104') spent a large amount of the day driving the 8" casing to depth to help sampling.

(Projected work)

-Layne Drilling will continue drilling at TH-BR-04 Saturday.

(Work Progress and Delays)

-All well installations, development, surface completions, well abandonments, slug tests, and direct push gw profiles are complete.

- Bedrock borings are completed at TH-BR-01, TH-BR-02 and TH-BR-05, currently coring at TH-BR-04. (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- None

9. Remarks / Rework

- Well abandonments and new well registrations underway.
- Note, some names on Tailgate Safety form are not related to GMPO efforts

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____11/30/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#039 Date: Saturday, December 1, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 41 Max. 61
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Nick Kiusalaas	X		ECC	Geologist	10.5
Santiago Moran		X	Layne Drilling	Driller	10.25
Erick Sandoral		X	Layne Drilling	Labor	10.25

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Careless and unsafe acts"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Jeep Rental
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1
Layne	10.25	Support Truck 2

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities

Sonic Boring

- TH-BR-04 Cored from 170’ to 188’ (Limestone bedrock at 186.5’). This boring is complete.

(Projected work)

-Layne Drilling will grout TH-BR-04 Sunday then decon, the final location TH-BR-03 will start Monday morning.

(Work Progress and Delays)

-All well installations, development, surface completions, well abandonments, slug tests, and direct push gw profiles are complete.

- Bedrock borings are completed at TH-BR-01, TH-BR-02, TH-BR-04 and TH-BR-05, grouting at coring at TH-BR-04 will continue Sunday, TH-BR-03 planned to start after grouting is completed. (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- None

9. Remarks / Rework

- Well abandonments and new well registrations underway.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____12/01/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#040 Date: Sunday, December 2, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 44 Max. 64
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Nick Kiusalaas	X		ECC	Geologist	13.75
Santiago Moran		X	Layne Drilling	Driller	13.75
Erick Sandoral		X	Layne Drilling	Labor	13.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Rigging of Heavy Equipment"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	13.75	Jeep Rental
Layne	13.75	Mini Sonic Rig
Layne	13.75	Support Truck 1
Layne	13.75	Support Truck 2

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities

Sonic Boring

- TH-BR-04 Grouting borehole, problems pulling casing described below (layne)

(Projected work)

-Layne Drilling will finish pulling rods at TH-BR-04 Monday then decon, the final location TH-BR-03 will start Monday afternoon or Tuesday morning.

(Work Progress and Delays)

While grouting the borehole the 6-inch casing got stuck at about 160 feet bgs. To try to free it, the drillers extended the 8-inch to 125 feet bgs. No luck. Because the 6-inch was full of grout, they thought it was absorbing some of the vibrations from the sonic head so they went back down with the 4-inch to remove the grout. They pulled 10 feet of 6 inch casing and 10 feet of 8 inch. We will continue to pull tomorrow morning, clean up and prepare to move onto location TH-BR-03. (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- None

9. Remarks / Rework

- Well abandonments and new well registrations underway.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____12/02/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#041 Date: Monday, December 3, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 44 Max. 61
Conditions: Foggy Morning /Sunny Afternoon
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	HS / QC	10.5
Santiago Moran		X	Layne Drilling	Driller	10.25
Erick Sandoral		X	Layne Drilling	Labor	10.25
Nick Kiusalaas	X		ECC	Geologist	3.5
David Barker		X	BMcD	Geologist	7.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "All Terrain Vehicles"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500
Layne	10.25	Mini Sonic Rig
Layne	10.25	Support Truck 1
Layne	10.25	Support Truck 2
ECC	3.5	Jeep Rental
BMcD	7.75	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities

Sonic Boring

- TH-BR-04 Removed stuck rods, grouted on the way up and mobed to plant for decon in the morning.

(Projected work)

-Layne Drilling will decon first thing in the morning then start coring at the final location TH-BR-03.

(Work Progress and Delays)

Rods stuck on Sunday were freed and pulled as TH_BR-04 was grouted today, cleaned up and prepared to move onto location TH-BR-03. (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- None

9. Remarks / Rework

- Well abandonments and new well registrations underway.
- Note some name on safety sign-in are for other non GMPO site activities.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____12/03/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#042 Date: Tuesday, December 4, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 28 Max. 62
Conditions: Sunny
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	HS / QC	10.5
Santiago Moran		X	Layne Drilling	Driller	10.5
Erick Sandoral		X	Layne Drilling	Labor	10.5
David Barker		X	BMcD	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Careless and Unsafe Acts"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	10.5	Chevy 1500
Layne	10.5	Mini Sonic Rig
Layne	10.5	Support Truck 1
Layne	10.5	Support Truck 2
BMcD	10.5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities
Sonic Boring

- TH-BR-03 Deconed this morning then cored alluvium from GS to 80'.

(Projected work)

-Layne Drilling will continue with coring at TH-BR-03.

(Work Progress and Delays)

No delays, all went well today (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- None

9. Remarks / Rework

- Well abandonments and new well registrations underway.
- Note some names on safety sign-in are for other non GMPO site activities.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	12/04/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#043 Date: Wednesday, December 5, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 27 Max. 64
Conditions: Sunny
Wind: 5-20 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	HS / QC	11
Santiago Moran		X	Layne Drilling	Driller	10
Erick Sandoral		X	Layne Drilling	Labor	10
David Barker		X	BMcD	Geologist	10.5

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Snow Cover"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11	Chevy 1500
Layne	10	Mini Sonic Rig
Layne	10	Support Truck 1
Layne	10	Support Truck 2
BMcD	10.5	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities

Sonic Bedrock Boring

- TH-BR-03 Cored from 80’ to 150’ alternating between Shale and Sandstone.

(Projected work)

-Layne Drilling will continue with coring at file borehole TH-BR-03.

(Work Progress and Delays)

No delays, all went well today (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- Brad Brink (USACE)

9. Remarks / Rework

- Well abandonments and new well registrations underway.
- Note some names on safety sign-in are for other non GMPO site activities.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	12/05/2012
Quality Control System Manager	Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#044 Date: Thursday, December 6, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 42 Max. 57
Conditions: M.Cloudy
Wind: 5-20 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
Toby D. Hinz	X		ECC	HS / QC	11
Santiago Moran		X	Layne Drilling	Driller	11
Erick Sandoral		X	Layne Drilling	Labor	11
David Barker		X	BMcD	Geologist	11

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Working Alone"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
ECC	11	Chevy 1500
Layne	11	Mini Sonic Rig
Layne	11	Support Truck 1
Layne	11	Support Truck 2
BMcD	11	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Soil Logging Checklists
- Health and Safety Checklists
- Drilling Checklists

6. Submittal Action
- None

7. Activities

Sonic Bedrock Boring

- TH-BR-03 Cored from 150’ to 179’ Limestone was hit at 175.9’.

(Projected work)

-Layne Drilling will pull rods and grout TH-BR-03, decon at the main plant and demob from the site on Friday.

(Work Progress and Delays)

No delays, all went well today (Layne)

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- Brad Brink (USACE)

9. Remarks / Rework

- Well abandonments and new well registrations underway.
- Note some names on safety sign-in are for other non GMPO site activities.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____David Dander_____ _____12/06/2012_____

Quality Control System Manager Date

Environmental Chemical Corporation

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. GMPO-P2#045 Date: Friday, December 7, 2012

Contract No. _____W912DQ-08-D-0001_____ CTO No.___0002____

Project Title and Location: Groundwater Monitoring Program Optimization Phase 2 / Mead NE FNOP

Weather: Temperature Min. 42 Max. 57
Conditions: M.Cloudy
Wind: 5-10 mph
Precipitation: 0.0 inches

1. Personnel On-Site

NAME	ECC	SUB	EMPLOYEE	TYPE OF WORK	HRS
David Barker		X	BMcD	Geologist	11.75
Santiago Moran		X	Layne Drilling	Driller	11.75
Erick Sandoral		X	Layne Drilling	Labor	11.75
Charles Halbert		X	Layne Drilling	Labor	11.75

2. Job Safety Actions/Safety Inspections Conducted
See attachment – safety topic "Always Read the Signs"
Was the Job Safety Meeting Held? Yes____X____ No_____(Attach. Minutes)
Were there lost time accidents? Yes_____ No_____X ___ (Attach. OSHA Report)
high voltage Yes_____ No ___X_____ (Attach. Statement)
Haz. Mat. Released into environment? Yes _____No __X_____ (Desc. Of Incident)

3. List of Construction Equipment on Work Site and Hours Used

Contractor	Hours used	Equipment
Layne	11.75	Pickup
Layne	11.75	Mini Sonic Rig
Layne	11.75	Support Truck 1
Layne	11.75	Support Truck 2
BMcD	11.75	Chevy 1500

4. Instructions Received from the Contracting Officer on Deficiencies or Work Required
- None

5. Quality Control Inspections Conducted
- Decon Checklists
- Field Doc. Checklists
- Health and Safety Checklists

6. Submittal Action
- None

7. Activities
Sonic Bedrock Boring

- TH-BR-03 Grouted and loaded trucks for demob. Went back to the plant and deconed equipment.

(Projected work)

- All GMPO field work is completed.

(Work Progress and Delays)

No delays, all went well today

(Instructions Given and Corrective Actions Taken)

None

(Safety Hazards Encountered)

None

8. Record of Visitors to the Work Site

- None

9. Remarks / Rework

- All GMPO field activities complete, final DQCR
- Well abandonments and new well registrations underway.

10. Attachments/ Materials received

- Safety log.

____x_**Certification**: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor (and each subcontractor) and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

David Dander	12/07/2012
Quality Control System Manager	Date

Appendix B
Boring Logs

HTW DRILLING LOG

HOLE NO. MW 148A

1. COMPANY NAME	Burns + McDonnell
2. DRILLING SUBCONTRACTOR	Boart Longyear
SHEET 1 OF 1 SHEETS 15	
3. PROJECT	Mead FNOP
4. LOCATION	LL3
5. NAME OF DRILLER	Bill Buening
6. MANUFACTURER'S DESIGNATION OF DRILL	CP24-300 RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sampler 4" + 6" OD Outer Casing 6" Lubricant: King Stuff
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-24-12
11. DATE COMPLETED	10-24-12
12. OVERBURDEN THICKNESS	102.0'
15. DEPTH GROUNDWATER ENCOUNTERED	42.0'
13. DEPTH DRILLED INTO ROCK	9.0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	WL: 44.45' 1365 @ 1345
14. TOTAL DEPTH OF HOLE	111.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
MW-148A-102-102.5	NA	NA	TOC	NA	NA	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed	NA	Flush mount	NA	Burns + McDonnell (BMcD) Sam Woodland

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Silt Trace Clay, ML, Very Dark Grayish Brown (2.5Y 3/2) Damp, Medium Consistency Non Plastic, Trace Roots					Begin Drilling @ 0754 6" Sampler 6" Casing
	1	Silt Trace Clay, ML, Brown (10YR 4/3) Damp, Stiff Consistency Trace Plasticity					Drill Water From Main Plant
	2						Recovery 4/5
	3						
	4						

MRK FORM JUN 89 55

PROJECT Mead FNOP

HOLE NO. MW-148A

HTW DRILLING LOG

HOLE NO. MW148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 2 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Silt Trace clay, ML, Brown (10YR 4/3), Damp Stiff Consistency Trace Plasticity					Recovery 4/5 0755
	5	Clay, CH, Light Olive Brown (2.5Y 5/3, Damp, Soft Consistency, High Plasticity					0759
	6						
	7						
	8						
	9						
	10						
	11						
	12						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-148A

HTW DRILLING LOG

HOLE NO. MW 148 A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 3 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Clay, CH, Light Olive Brown (2.5Y 5/3) Damp Soft Consistency High Plasticity					
	13						Recovery 8/10
	14						
	15						0803
		Clay Trace Sand, Olive Brown (2.5Y 4/3) Damp Soft Consistency, High Plasticity					0809
	16	Sand, Light Yellowish Brown (2.5Y 6/3) Loose, Fine Grain Poorly Graded, Sub Rounded					
	17						Recovery 7.5/10.0
	18						
	19	Sand, Light Gray (2.5Y 7/2) loose, Fine Grain, Poorly Graded Sub Rounded					
	20						

HTW DRILLING LOG

HOLE NO. MW 148 A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 4 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, Light Gray (2.5Y 7/2) loose, Fine Grain, Poorly Graded Sub Rounded					
	21						
	22						Recovery 7.5/10.0
	23						
	24						
	25						0814
							0824
	26						
	27						Recovery 8/10
	28						

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodlawn (BMCD)

SHEET 1 OF 5 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose, Fine Grain, Poorly Graded Sub Rounded					
	29						
	30						Recovery 8/10
	31						
	32						
	33						
	34						
	35						0829
							0839
	36						Recovery 6/10

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 6 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) loose, Fine Grain, Poorly Graded, Sub Rounded					
	37						
	38						Recovery 6/10
	39						
	40						
	41						
	42	wet					▼
	43						
	44						

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 7 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose, Fine Grain Poorly Graded, Sub Rounded. wet					Recovery 6/10 0844
	45						0857 4" Sample Barrel Temporary Casing to 45.0'
	46						
	47						
	48						Recovery 8/10
	49						
	50	Sand, SP, Light Brownish Gray (2.5Y 6/2), Loose Fine Grain, Poorly Graded Sub Rounded, wet					
	51	Sand, SP, Light Gray (2.5Y 7/2) Loose, Fine Grain Trace Medium Poorly Graded, Sub Rounded, wet					
	52						

HTW DRILLING LOG

HOLE NO. MW 148 A

PROJECT Mead, FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 8 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose, Fine Grain Trace Medium Poorly Graded, Sub Rounded, Wet					
	53						Recovery 8/10
	54						
							0859
	55						0915
	56						
	57						Recovery 10/20
	58						
	59						
	60						

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 9 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, light Gray (2.5Y 7/2) Loose, Fine Grain Trace Medium Poorly Graded, Subrounded, Wet					
	61						
	62						Recovery 10/20
	63						
	64						
	65						
	66						
	67						
	68						

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 10 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose, Fine Grain Trace Medium Poorly Graded, SubRounded, Wet					
	69						
	70						Recovery 10/20
	71						
	72						
	73						
	74						
	75						0925
							0938
	76						Recovery 13/20

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S Woodland (BMcD)

SHEET 1 OF 11 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	Sand, SP, Light Gray (2.5Y 7/2) Loose, Fine Grain Trace Medium Poorly Graded, Sub Rounded, wet					
	78						Recovery 13/20
	79	Sand, SP, Very Dark Grayish Brown (2.5Y 3/2) loose, Medium Trace Fine Grain Poorly Sorted, Sub Rounded, wet					
	80	Sand, SP, Light Brownish Gray (10YR 6/2) loose, Fine Grain Poorly Sorted, Sub Rounded, wet					
	81						
	82						
	83	Sand, SP, Pale Brown (10YR 6/3) Loose, Fine with Medium Grain Poorly Sorted, Sub Rounded, wet					
	84						

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 12 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Pale Brown (10YR 6/3) Loose, Fine with Medium Grain Poorly Sorted, Sub Rounded, Wet					
	85						
	86						Recovery 13/20
	87						
	88						
	89						
	90						
	91						
	92						

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 13 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Pale Brown (10YR 6/3) loose, Fine with Medium Grain Poorly Sorted, Sub Rounded wet					
	93						Recovery 13/20
	94						
							0950
	95	Sand, SP, Gray (2.5Y 5/1) loose, Fine Trace Course Grain Poorly Graded, Sub Rounded, wet					1000
	96						
	97						Recovery 16/16
	98						
	99						
	100						

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PROJECT Mead FNOP

HOLE NO. MW-148A

HTW DRILLING LOG

HOLE NO. MW 148A

PROJECT Mead FWOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 14 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Gray (2.5Y 5/1) loose, Fine Trace Coarse Grain Poorly Graded, Sub Rounded Wet					
	101						
	102	Shale, Medium Gray (N5) Moderately Strong, Fine Grain Weathered, Damp			Collect MW-148A 102-102.5		Recovery 16/16
		Sandstone, Dark Yellowish Orange (10YR 6/6), Weak, Fine Grain Weathered, Damp					
	103						
	104						
	105						
	106						
	107						
	108						

HTW DRILLING LOG

HOLE NO. MW148A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 15 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sandstone, Dark Yellowish Orange (10YR 6/6) Weak, Fine Grain Weathered, Damp					
	109						Recovery 1 6/1 6
	110						
	111						1015
		Bottom of Hole @ 111.0'					Used 100 gal of water 2" MW Installed

HTW DRILLING LOG

HOLE NO. MW-160A

1. COMPANY NAME Burns and McDonnell	2. DRILLING SUBCONTRACTOR Boart Longyear
SHEET 1 OF 16 SHEETS	
3. PROJECT Mead FNOP	4. LOCATION
5. NAME OF DRILLER Chris	6. MANUFACTURER'S DESIGNATION OF DRILL GP-24-300 RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4" sampler, 6" temporary casing	8. HOLE LOCATION
	9. SURFACE ELEVATION
	10. DATE STARTED 10-23-12 / 11. DATE COMPLETED 10-24-12
12. OVERBURDEN THICKNESS 132.4	15. DEPTH GROUNDWATER ENCOUNTERED 49
13. DEPTH DRILLED INTO ROCK 0.6	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED ~~1602~~ 50.05 1125 10-24-12
14. TOTAL DEPTH OF HOLE 133	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		NA	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-160A-116	NA	NA	TOC	NA	NA	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring well	NA	2" flush	NA	Ryann Odor Ryann Odor

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	Silt, OL, some clay, very dark grayish brown (10YR 3/2), dry, non-plastic, hard consistency					Start drilling at 1645
	1						Recovery 5/5
	2						
	3	Silt, OL, some clay, dark yellowish brown (10YR 3/3), dry, non-plastic, hard consistency					
	4						
	5						

HTW DRILLING LOG

Ryann Oder Burns and McDonnell

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Oder (BMcD)

SHEET 2 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	Silt, OL, some clay, dark yellowish brown (10YR3/3) non-plastic, hard consistency					Recovery 3/5
	6	SILT, OL, with clay, dark yellowish brown (10YR3/3), low plasticity, stiff consistency					
	7						
	8						
	9			Lost 2' of recovery			
	10	Clay, CH, trace silt, brown (10YR 4/3), moist, medium plasticity, very soft					1700 10ft
	11						Recovery 5/5
	12						
	13						
	14						

HTW DRILLING LOG

Ryann Oder

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Oder BMcD

SHEET 3 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	Clay, CH, trace silt, brown (10YR 4/3), moist, medium plasticity, very soft					Recovery 5/5
							1705 15ft.
	15						
	16						Recovery 10/10
	17						
	18	Sand, SP, trace silt, light yellowish brown (10YR 6/4), Subrounded, fine grain trace medium, poorly graded, damp, loose					
	19						
	20						
	21						
	22						
	23						

HTW DRILLING LOG

Rijarn Odor

HOLE NO. MW-160 A

PROJECT Mead FNOP

INSPECTOR Rijarn Odor BMcD

SHEET 4 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	Sand, SP, trace silt, light yellowish brown (10YR 6/4), subrounded, fine grain trace medium, poorly graded, damp, loose					Recovery 10/10
	24						
	25						1710 25ft.
	26			Lost 5' of recovery			Recovery 5/10
	27						
	28						
	29						
	30						
	31						
	32						

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PROJECT Mead FNOP

HOLE NO. MW-160A

HTW DRILLING LOG Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMCD

SHEET 5 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	Sand, SP, trace silt, light yellowish brown (10YR 6/4), subrounded, fine grain trace medium, poorly graded, damp, loose		Lost 5' of recovery			Recovery 5/10
	33						
	34						
	35						1723 35ft
	36			Lost 5' of recovery			Recovery 5/10
	37	Sand, SP, light gray (10YR 7/2), subrounded, medium grain some fine trace coarse, moderately graded, damp, loose					
	38						
	39						
	40						
	41						

HTW DRILLING LOG Ryann Odor

HOLE NO. MW-160 A

PROJECT MEAD FNOP

INSPECTOR Ryann Odor BMcD

SHEET 6 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	Sand, SP, lightgray (10YR 7/2), subrounded, medium grain some fine trace coarse, moderately graded, damp, loose		Lost 5' of recovery			Recovery 5/10
	42						
	43						
	44						
	45						1728 45ft
	46			Lost 5' of recovery			Recovery 5/10
	47						
	48	Sand, SW, very pale brown (10YR 7/4), subrounded, medium and coarse grain, well graded, moist, loose					
	49	Becomes wet					water ▼ collect bagged samples
	50						

HTW DRILLING LOG Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 7 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	Sand, SW, very pale brown (10YR 7/4), subrounded, medium and coarse grain, well graded, moist, loose		Lost 5' of recovery			Recovery 5/10
	51						
	52						
	53						
	54						
	55						1747 55ft.
	56	Sand, SP, pale brown (10YR 6/3), subangular, medium grain trace fine trace coarse, poorly graded, wet, loose					Recovery 10/10
	57						
	58						
	59						

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Form MRK-55-2

HTW DRILLING LOG Ryann Odor

HOLE NO. MW-160 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 8 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	Sand, SP, pale brown (10YR 6/3) subangular, medium grain trace fine trace coarse, poorly graded, wet, loose					Recovery 10/10
	60						
	61	Sand, SM, trace silt, grayish brown (10YR 5/2), subrounded, medium and fine grain, trace coarse, poorly graded, wet, loose					
	62						
	63	2" coarse grain gravel lense at 63 ft.					
	64	Sand, SM, some silt, brown (10YR 4/3), subrounded, fine grain, poorly graded, wet, loose					
	65						1805 65 ft
	66	Sand, SP, grayish brown (10YR 5/2), subrounded, medium grain trace fine trace coarse, poorly graded, wet, loose		Lost 5' of recovery			Recovery 15/20
	67						
	68						

PROJECT Mead FNOP

HOLE NO. MW-160 A

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Form MRK-55-2

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 9 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	Sand, SP, grayish brown (10YR 5/2), subrounded, medium grain trace fine trace coarse, poorly graded, wet, loose					
	69			Lost 5' of recovery			Recovery 15/20
	70						
	71						
	72	5" lense coarse grain sand fine gravel					
	73	Sand, SM, some silt, grayish brown (10YR 5/2), subrounded, medium grain and fine grain, poorly graded, wet, loose					
	74						
	75						
	76						
	77						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor (BMCD)

SHEET 10 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	Sand, SM, some silt, grayish brown (10YR 5/2), Subrounded, medium grain, and fine grain, poorly graded, wet, loose		Lost 5' of recovery			Recovery 15/20
	78						
	79						
	80						
	81						
	82						
	83						
	84						
	85						0803 85ft
							Recovery 20/20
	86						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 11 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	Gravel, GP, some sand some silt, brown (10YR 5/3), subangular, fine grain Some coarse trace cobble, well graded, wet, loose					
	87						Recovery 20/20
	88						
	89						
	90						
	91						
	92						
	93						
	94						
	95						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 12 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	Gravel, GP, some sand some silt, brown (10YR 5/3), subangular, fine grain some coarse trace cobble, well graded, wet, loose					Recovery 20/20
	96						
	97						
	98						
	99						
	100	Sand, SP, trace silt, grayish brown (10YR 5/2), subrounded, medium grain some coarse trace fine, wet, loose, moderately graded					
	101						
	102						
	103						
	104						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW160 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 13 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	104	Sand, SP, trace silt, grayish brown (10YR 5/2), subrounded, medium grain some coarse trace fine, moderately graded, wet, loose					Recovery 20/20
	105						0824 105ft
		Sand, SW, some fine gravel, brown (10YR 5/3), Subangular to subrounded, coarse grain some medium trace fine, moderately graded, wet, loose					Recovery 20/20
	106						
	107						
	108						
	109						
		1" iron staining					
	110						
	111						
	112						
	113						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 14 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	113	Sand, SW, some fine gravel, brown (10YR5/3), coarse grain some medium trace fine, subangular to subrounded, moderately graded, wet, loose					Recovery 20/20
	114	Sand, SP, trace cobble, grayish brown (10YR5/2), subrounded, medium grain trace coarse trace fine, poorly graded, wet, loose					
	115						
	116				collect MW-160A-116 at 0919 for TOC		
	117						
	118						
	119	Sand, SW, trace fine gravel, yellowish brown (10YR 5/4), subrounded to subangular, coarse grain some medium trace fine, well graded, wet, loose					
	120						
	121						
	122						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 15 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	122	Sand, SW, trace fine gravel, yellowish brown (10YR 5/4), subrounded to subangular, coarse grain some medium trace fine, well graded, wet, loose					Recovery 20/20
	123						
	124						
	125						0853 125ft.
	126						Recovery 7/7
	127						
	128						
	129						
	130						
	131						

PROJECT Mead FNOP

HOLE NO. MW-160A

051601
Form MRK-55-2

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-160A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMCD

SHEET 16 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	131	Sand, SW, trace fine gravel, yellowish brown (10YR 5/4), subrounded to subangular, coarse grain some medium trace fine, well graded, wet, loose					Recovery 7/7
	132						
		Sandstone, weak, fine grain, subangular, yellowish gray (5Y 7/2) moderate yellow (5Y 7/6), weathered, moist					0930 133ft.
	133	Bottom of Boring - Bedrock					Install 2" monitoring well

HTW DRILLING LOG

HOLE NO. MW-161A

1. COMPANY NAME: Burns and McDonnell	2. DRILLING SUBCONTRACTOR: Boart Longyear
SHEET 1 OF 15 SHEETS	
3. PROJECT: Mead FNOP	4. LOCATION:
5. NAME OF DRILLER: Chris	6. MANUFACTURER'S DESIGNATION OF DRILL: GP 24-300 RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4" sampler; 6" temporary casing	8. HOLE LOCATION:
	9. SURFACE ELEVATION:
	10. DATE STARTED: 10-24-12 / 11. DATE COMPLETED: 10-24-12
12. OVERBURDEN THICKNESS: 133 feet	15. DEPTH GROUNDWATER ENCOUNTERED: 45 feet BGS
13. DEPTH DRILLED INTO ROCK: ~~135~~ 2	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 44.10 0814 (10-25-12)
14. TOTAL DEPTH OF HOLE: 135	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-161A-10-08	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
monitoring well	NA	2" flush	NA	Ryann Odor Ryann Odor

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, CL, trace silt, very dark gray (10YR 3/1), damp, low to non-plastic, very stiff consistency, some plant roots					Begin drilling at 1227
	1			Lost 2' of recovery			Recovery 3/5
	2	CLAY, some silt, brown (10YR 4/3), damp, non-plastic, very stiff consistency					
	3						
	4						
	5						1234 5 ft.

HTW DRILLING LOG

Ryann Oclor Burns and McDonnell

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Oclor BMcD

SHEET 2 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SILT, ML, trace clay, yellowish brown (10YR 5/4), damp, non-plastic, stiff consistency					
	6						Recovery 5/5
	7	CLAY, CL, yellowish brown (10YR 5/4), damp, trace plasticity, medium consistency					
	8						
	9						
	10						1245 10ft.
		CLAY, CL, some silt, brown (10YR 4/3), damp, medium plasticity, soft consistency					
	11						Recovery 5/5
	12						
	13	SAND, SP, trace silt, pale brown (10YR 6/3), subrounded, fine grain, trace medium, poorly graded, damp, loose					
	14						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 3 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, SP, trace silt, pale brown (10YR 6/3), sub-rounded, fine grain trace medium, poorly graded, damp, loose					Recovery 5/5
	15						1255 15 ft.
	16						Recovery 10/10
	17						
	18						
	19						
	20						
	21	SAND, SP, trace silt, light gray (10YR 7/2), subrounded, fine grain trace medium, poorly graded, damp, loose					
	22						
	23						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 4 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SAND, SP, trace silt, light gray (10YR 7/2), subrounded, fine grain trace medium, poorly graded, damp, loose					Recovery 10/10
	24						
	25						1306 25 ft.
	26						
	27						Recovery 10/10
	28						
	29						
	30	SAND, SP, some silt, yellowish brown (10YR 5/4), subrounded, fine grain trace medium, poorly graded, damp, loose					
	31	SAND, SP, trace silt, light gray (10YR 7/2), subrounded, fine grain some medium, poorly graded, damp, loose					
	32						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 5 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SAND, SP, trace silt, light gray (10YR 7/2), subrounded, fine grain some medium poorly graded, damp, loose					
	33						Recovery 10/10
	34						
							1314 35 ft
	35	dark greenish gray (GLEY1 4/10Y) slightly cemented sand lamenations					
	36	SAND, SP, trace silt, pale brown (10YR 6/3), sub-rounded, fine grain, poorly graded, damp, loose					Recovery 10/10
	37						
	38						
	39						
	40						
	41						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 6 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SAND, SP, trace silt, pale brown (10YR 6/3), sub-rounded, fine grain, poorly graded, damp, loose					Recovery 10/10
	42						
	43						
	44						
	45	SAND, SP, light brownish gray (10YR 6/2), sub-rounded to subangular, medium grain trace coarse, wet, moderately graded, loose					water ▼
	46						
	47						Recovery 10/10
	48						
	49						
	50	2" lense of some fine gravel					

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 7 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	SAND, SP, light brownish gray (10YR 6/2), subrounded to subangular, medium grain trace coarse, moderately graded, wet, loose					
	51						Recovery 10/10
	52						
	53						
	54						
	55						1341 55 ft.
	56						Recovery 10/10
	57						
	58						
	59						

HTW DRILLING LOG

Ryann Oder

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Oder BMCD

SHEET 9 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SAND, SP, trace fine gravel, light brownish gray (10YR 6/2), subrounded, fine grain some medium, poorly graded, wet, loose					
	69						
							Recovery 20/20
	70						
	71						
	72						
	73						
	74						
	75						
	76						
	77						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 8 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SAND, SP, light brownish gray (10YR 6/2), subrounded to subangular, medium grain trace coarse, moderately graded, wet, loose					
	60						Recovery 10/10
	61	SAND, SP, trace fine gravel, light brownish gray (10YR 6/2), subrounded, fine grain some medium, poorly graded, wet, loose					
	62						
	63	3" lense with coarse sand and fine gravel					
	64						
	65						1359 65 ft.
	66						Recovery 20/20
	67						
	68						

HTW DRILLING LOG

Ryann Oder, BMcD

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Oder

SHEET 9 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	5" lense of coarse sand					
	78	GRAVEL, GW, trace medium sand, brown (10YR5/3), subrounded, fine grain some coarse, well graded, wet, loose					Recovery 20/20
	79						
	80	SAND, SM, some silt, grayish brown (10YR5/2), subrounded, fine grain, poorly graded, wet, loose					
	81						
	82	SAND, SP, light brownish gray (10YR6/2), subrounded, medium grain trace coarse, poorly graded, wet, loose					
	83						
	84						
	85						1411 85ft. Recovery 20/20
	86						

HTW DRILLING LOG Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 10 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	SAND, SP, light brownish gray (10YR 6/2), subrounded, medium grain trace coarse, poorly graded, wet, loose					
	87						
	88	SAND, SP-SW, trace silt, grayish brown (10YR 5/2), subrounded, medium grain some fine some coarse, moderately graded, wet, loose					Recovery 20/20
	89						
	90	SAND, SW, brown (10YR 5/3), subrounded, medium grain some fine some coarse, trace fine gravel, well graded, wet, loose					
	91						
	92						
	93						
	94	Black (10YR 2/1) stain, silty, 2" thick					
	95						

PROJECT

HOLE NO.

051601

HTW DRILLING LOG

Ryann Oder

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Oder BMcD

SHEET 11 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	SAND, SW, brown (10YR 5/3), Subrounded, medium grain some fine to coarse					
	96						
	97						Recovery 20/20
	98						
	99						
	100						
	101	GRAVEL, GW, some sand, dark greenish gray (GLEY1 4/10Y), subrounded, fine grain trace coarse grain, sand is fine grain some medium to coarse grain, well graded, wet, loose					green staining present throughout
	102						
	103						
	104						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 12 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	104	GRAVEL, GW, some sand, dark greenish gray (GLEY1 4/10Y), subrounded, fine grain trace coarse, sand is fine grain some medium to coarse grain, well graded, wet, loose					Recovery 20/20
	105						1449 105ft
	106	GRAVEL, GW, some sand, brown (10YR 5/4), subrounded, fine grain to coarse grain, sand is medium to coarse grain, well graded, wet, loose					Recovery 2/10
	107	CLAY, CL, some silt some sand some gravel, grayish brown (10YR 5/2), subrounded, sand and gravel are fine grain, well graded, non-plastic, wet, hard consistency					Will trip sampler back in to try and retrieve sample Sample will be disturbed
	108	GRAVEL, GW, trace medium sand trace fine sand, grayish brown (10YR 5/2), subrounded, fine grain some coarse grain, moderately graded, wet, loose					Sampler was pushed to 123 ft. and sample was received
	109						Hard drilling 110'-115'
	110						Recovery 10/10
	111						
	112						
	113						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 13 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	113	2' of clasts longer than 2"					Recovery 10/10
	114	GRAVEL, GM, some coarse sand some silt, grayish brown (10YR5/2), sub-angular to subrounded, fine grain some coarse, well graded, wet, loose					
	115						1515 115ft.
	116						
	117						
	118						Recovery 10/10
	119						
	120						
	121						
	122						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 14 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	122	SAND, SP, gray (10YR 5/1), subrounded, medium grain trace coarse, poorly graded, wet, loose					Recovery 10/10
	123						
	124						
	125	GRAVEL, GM, some sand, some silt, grayish brown (10YR 5/2), subrounded to subangular, gravel is fine grain with some coarse grain, sand is medium grain, well graded, wet, loose					1545 125ft.
	126						
	127	SAND, SW, trace silt some gravel, brown (10YR 5/3), subangular to subrounded, sand is coarse grain with some medium grain, gravel is fine grain with some coarse grain, well graded, wet, loose					Recovery 10/10
	128						
	129						
	130						
	131						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-161A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 15 OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	131	SAND SW, trace silt some gravel, brown (10YR 5/3), sub-angular to subrounded, coarse grain with some medium grain, gravel is fine grain with some coarse grain, well graded, wet, loose					
	132						Recovery 10/10
	133	SANDSTONE, weak, fine grain, subangular, pale yellowish brown (10YR 6/2), slightly weathered, moist					
	134						
	135	Bottom of boring - bedrock					install 2" monitoring well
	136						
	137						
	138						
	139						
	140						

HTW DRILLING LOG

HOLE NO. MW 162A

1. COMPANY NAME	Burns & McDonnell
2. DRILLING SUBCONTRACTOR	Boart Longyear
SHEET 1 OF 1 SHEETS 14	
3. PROJECT	Mead FNOP
4. LOCATION	LL2
5. NAME OF DRILLER	Bill Buehing
6. MANUFACTURER'S DESIGNATION OF DRILL	6P24-300 RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sampler 4" + 6" OD outer Casing 6" Lubricant - King Stuff
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-23-12
11. DATE COMPLETED	10-23-12
12. OVERBURDEN THICKNESS	95.0'
15. DEPTH GROUNDWATER ENCOUNTERED	44.5' BGS
13. DEPTH DRILLED INTO ROCK	10.0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	WL: 45.61 TOC @ 1755
14. TOTAL DEPTH OF HOLE	105.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	N/A	N/A	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-162-80-81	N/A	N/A	TOC	N/A	N/A	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed	N/A	Flush Mount	N/A	Sam Woodland Burns & McDonnell BMcD

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Silt, ML, Trace clay Very Dark Gray (5YR 3/1) Dry, Soft Consistency, Non Plastic, Some Roots					Start Drilling 1025 6" Sampler 6" Casing Drilling Water From Main Plant
	1	Silt, ML, Trace Clay Yellowish Brown (10YR 5/4) Damp, Stiff Consistency, Trace Plasticity					
	2						Recovery 4/5
	3						
	4						

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PROJECT Mead FNOP

HOLE NO. MW-162A

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BHCD)

SHEET ~~1~~ ~~2~~ OF 2 SHEETS 1/1

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Clay, CL, Trace silt Yellowish Brown (10YR 5/4) Damp, Stiff Consistency Trace Plasticity					Recovery 4/5 1026
	5	Clay, CH, Light Olive Brown (2.5Y 5/3), Damp, Very Soft High Plasticity					1035
	6						
	7						
	8						
	9						Recovery 9/10
	10						
	11						
	12						

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 4 OF 3 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	13						Recovery 9/10
	14	Some Fine Sand					
							1037
	15	Sand, SP, Light Gray (10YR 7/2) Very loose, Fine Grain, Poorly Graded, Sub Rounded					1043
	16						
	17						Recovery 4.5/5.0
	18						
	19						
	20						1046
							1050
							Recovery 4.5/5.0

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 4 SHEETS 1/1

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (10YR 7/2) very loose, Fine Grain, Poorly Graded, Sub Rounded					
	21						
	22						Recovery 4.5/5.0
	23						
	24						
	25						1046
							1058
	26						
	27						Recovery 6.5/10.0
	28						

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead · FNOP

INSPECTOR S. Woodland

SHEET 1 OF 5 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (10YR 7/2) Very loose, Fine Grain Poorly Graded, Sub Rounded					
	29						
	30						
	31						Recovery 6.5/10.0
	32						
	33						
	34						
	35						1105 1119
	36						Recovery 7.5/10.0

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HOLE NO. MW-162A

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 6 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (10YR 7/2) Very loose, Fine Grain Poorly Graded, Sub Rounded					
	37						
	38						
	39						Recovery 2.5/10.0
	40						
	41						
	42						
	43						
	44						
		Sand, SP, with Silt Grayish Brown (2.5Y 5/2) Medium Density, Fine Grain Poorly Graded, Sub Rounded					

HTW DRILLING LOG

HOLE NO. MW 162 A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 7 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (10YR 7/2) Very loose, Fine Grain Poorly Graded, Sub Rounded					▼
		Sand, SP, with silt Grayish Brown (2.5Y 5/2) Medium Density, Fine Grain Poorly Graded, Sub Rounded, wet					Recovery 7.5/10.0 1128
	45						Temporary Casing to 45.0' 4" Sample Barrel Begin Drilling 1325
	46						
	47						
	48						
	49						Recovery 6.5/10.0
	50						
	51						
	52						

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Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-162A

HTW DRILLING LOG

HOLE NO. MW 162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 8 SHEETS 1/4

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, with silt Grayish Brown (2.5Y 5/2) Medium Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	53						Recovery 6.5/10.0
	54						
							1328
	55						1344
	56	Sand, SP, Dark Gray (2.5Y 4/1) Medium Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	57						
		Sand, SP, Grayish Brown (2.5Y 5/2) Medium Density, Fine Grain Poorly Graded, Sub Rounded, wet					Recovery 8/10
	58						
	59						
	60						

HTW DRILLING LOG

HOLE NO. MW 162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 9 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Grayish Brown (2.5Y 5/2) Medium Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	61						
	62						Recovery 8/10
	63						
	64						
							1347
	65						1353
	66						
	67						Recovery 4/10
	68						

PROJECT Mead FNOP

HOLE NO. MW-162A

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Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW 162 A

PROJECT Mead · FNOP

INSPECTOR S. Woodland (BHCD)

SHEET 1 OF 10 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Grayish Brown (2.5Y 5/2 Medium Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	69	Sand, SP, Grayish Brown (2.5Y 5/2) Loose Density, Medium Grain Poorly Graded, Sub Rounded, wet					
	70						
	71						Recovery 4/10
	72						
	73						
	74						
	75						1358 1408
		Sand, SP, Grayish Brown (2.5Y 5/2) Loose Density, Medium Width Fine Grain, Poorly Graded Subrounded, wet					
	76	Sand, SP, Strong Brown (7.5YR 4/6) Loose Density, Coarse Trace Fine Grain, Poorly Graded, wet					Recovery 6/10

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMCD)

SHEET 1 OF 11 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Strong Brown (7.5YR 4/6) Loose Density, Course Trace Fine Grain, Poorly Graded Sub Rounded, wet					
	77						
	78						
	79	Sand, SP, Grayish Brown (2.5Y 5/2) Loose Density, Medium with Fine Grain, Poorly Graded, Sub Rounded, wet					
	80				Collect MW-162A 80-81'		Recovery 6/10
	81						
	82						
	83						
	84						

HTW DRILLING LOG

HOLE NO. MW 162 A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 12 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Grayish Brown (2.5Y 5/2) loose Density, Medium with Fine Grain, Poorly Graded, SubRounded Wet					Recovery 6/10 1419
	85	Sand, SP, Redish Brown (5YR 4/4) Loose Density, Coarse with Fine Grain, Poorly Graded SubRounded, Wet					1430
	86						
	87	Sand, SP, Gray (10YR 6/1) Loose Density, Fine Trace Medium Grain, Poorly Graded SubRounded, Wet					Recovery 7/10
	88						
	89	Sand, SP, Brown (10YR 5/3) Loose Density, Coarse with Fine Grain, Poorly Graded SubRounded, Wet					
	90						
	91						
	92						

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead NFOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 13 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, Brown (10YR 5/3) loose density, course with fine grain, poorly graded Subrounded, wet					
	93						Recovery 7/10
	94						
							1436
	95	Sandstone, Dark yellowish orange (10YR 6/6) weak, fine grain weathered, subrounded, damp					1443
	96	Yellowish Gray (5Y 7/2)					
		Dark Yellowish orange (10YR 6/6)					
	97	Light Brown (5YR 5/6)					
							Recovery 7.5/10
	98						
	99						
	100						

HTW DRILLING LOG

HOLE NO. MW-162A

PROJECT Mead FNOP

INSPECTOR S. Woodland (BMcD)

SHEET 1 OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sandstone, Light Brown (5YR 5/6) Weak, Fine Grain, Weathered Sub Rounded, damp					
	101						
	102						Recovery 7.5/10
	103						
	104						
	105						1453
		Bottom of Hole @ 105.0'					Used 150gal of water 2" MW Installed

HTW DRILLING LOG

HOLE NO. MW-164A

1. COMPANY NAME	Burns and McDonnell
2. DRILLING SUBCONTRACTOR	Boart Longyear
SHEET 1 OF 10 SHEETS	
3. PROJECT	MEAD FNOP
4. LOCATION	
5. NAME OF DRILLER	Chris Huther
6. MANUFACTURER'S DESIGNATION OF DRILL	SONIC RD300S
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	6" Outer Casing; 4" SAMPLER
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10/23/12
11. DATE COMPLETED	10/23/12
12. OVERBURDEN THICKNESS	100.00
15. DEPTH GROUNDWATER ENCOUNTERED	45.5
13. DEPTH DRILLED INTO ROCK	3.00
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	46.60 1635
14. TOTAL DEPTH OF HOLE	103.00
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-164A-92	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring Well	NA	2" Flush	NA	Lewis Turner, Burns and McDonnell

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, CL, with silt, dark grayish brown (10YR 4/2), damp, non plastic hard consistency, some roots.					Start Drilling 1037
	1						Drilling water from Main Treatment Plant.
							Recovery 5/5
	2						
	3						
	4	SILT, OL, with clay, brown (10YR 5/3) dry, nonplastic, hard consistency.					
	5						1043 5'

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR LT Lewis Turner BMCD

SHEET 2 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SILT, OL, with clay, brown (10YR 5/3), dry, nonplastic, hard consistency.					Recovery 5/5
	6	CLAY, CL, with silt, brown (10YR 4/3) damp, trace plasticity, stiff consistency.					
	7						
	8						
	9						
	10						1053 10'
	11	SAND, SP, very pale brown (10YR 7/3), damp, subrounded, fine to medium grain, poorly graded, loose.					Recovery 5/5
	12						
	13						
	14						

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Form MRK-55-2

PROJECT MEAD FNOP.

HOLE NO. MW-164A

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR LT7 Lewis Turner BMCD

SHEET 3 OF 10 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, SP, very pale brown (10YR 7/3) damp, sub rounded, fine to medium grain, poorly graded, loose.					
	15						1059 15
	16						Temporary 6" CASING BEING DRIVEN AFTER SAMPLE. Recovery 10/10
	17						
	18	SAND, SP, very pale brown (10YR 7/3), damp, subrounded, fine to medium grain, trace fine gravel. poorly graded, loose					
	19						
	20						
	21						
	22	SAND, SP, very pale brown (10YR 7/3) damp, subrounded, fine grain, trace medium grain, poorly graded, loose					
	23						

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 4 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SAND, SP, very pale brown (10YR 7/3), damp, subrounded, fine grain, trace medium grain, poorly graded, loose.					
	24						
	25						1109 25
	26			Lost 5' of Recovery			Recovery 5/10
	27						
	28						
	29						
	30	Continued SAND					
	31						
	32						

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR JT7 Lewis Turner BMCD

SHEET 5 OF 10 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SAND, SP, very pale brown (10YR 7/3) damp, subrounded, fine grain, trace medium grain, poorly graded, loose.					
	33						
	34						
	35						1115 35
	36			Lost 3' of Recovery			Temporary Casing Advanced after Sampling each run. Recovery 7/10
	37						
	38						
	39	SAND, SP, very pale brown (10YR 7/3) damp, subrounded, fine grain, some medium grain, poorly graded, loose.					
	40						
	41						

HTW DRILLING LOG

HOLE NO. MW-146A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 6 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SAND, SP, very pale brown (10YR 7/3) damp, subrounded, fine grain, some medium grain, poorly graded, loose.					
	42						
	43						
	44						
	45	SAND, SP-SW, light brownish gray (10YR 6/2) moist, subangular, medium grain, some coarse grain, trace fine grain, moderately graded, loose.					1128 45'
	46	Becomes wet					WATER ▽ Collect Bagged Samples for Possible Geotech Analysis. Recovery 10/10
	47						
	48						
	49						
	50						

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR LT Lewis Turner BMCD

SHEET 7 OF 10 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	SAND, SP-SW, Light brownish gray (10YR 6/2), wet, subrounded, medium grain, some coarse grain, trace fine grain, moderately graded, Loose.					Recovery 10/10
	51						
	52	SAND, SP, very pale brown (10YR 7/3) wet, subrounded, fine grain, trace medium grain, poorly graded, Loose.					
	53						
	54						
	55	SAND, SP-SW, Light brownish gray (10YR 6/2) wet, ~~medi~~ LT subrounded, medium grain, some coarse grain, trace fine grain, moderately graded, Loose.					1149 55
	56						1150 Lunch 1313 Resume Recovery 10/10
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 8 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SAND, SP-SW, light brownish gray (10YR 6/2), wet, subrounded, medium grain, some coarse and fine grain, moderately graded, loose.					
	60						Recovery 10/10
	61						
	62	SAND, SP, light brownish gray (10YR 6/2), wet, subrounded, medium grain, trace fine grain, poorly graded, loose.					
	63						
	64						
	65						1320 65'
	66	SAND, SP, light brownish gray (10YR 6/2) wet, subrounded, medium grain, some fine and coarse grain, poorly graded, loose.					Recovery 10/10
	67						
	68						

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner

SHEET 9 OF 18 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SAND, SP, light brownish gray (10YR 6/2) wet, subrounded, medium grain, some fine and coarse grain, poorly graded, loose.					
	69						Recovery 10/10
	70						
	71						
		2" sand lense w/more coarse grain.					
	72						
		SAND, SP, light brownish gray (10 YR 6/2) wet, subrounded, fine grain, some medium grain, poorly graded, loose.					
	73						
	74						
	75						1325 75
	76	SAND, SW, light brownish gray, (10YR 6/2), wet, subrounded medium grain, with fine and coarse grain, some fine gravel, moderate to well graded, loose.					Recovery 10/10
	77						

PROJECT MEAD FNOP

HOLE NO. MW-164A

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Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR LJT Lewis Turner, Bmcd

SHEET 10 OF 18 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	SAND, SW, light brownish gray (10YR 6/2) wet, subrounded, medium grain, with fine and coarse grain, some fine gravel, moderate to well graded, loose.					Recovery 10/10
	78						
	79						
	80						
	81						
	82						
	83						
	84						
	85	SAND, SP, light brownish gray, (10YR 6/2) wet, subrounded, fine grain, trace medium grain, poorly graded, loose					1336 85
	86						

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR LT Lewis Turner BMCD

SHEET 11 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	SAND, SP, Light brownish gray (10YR 6/2), wet, Subrounded, Fine grain, trace medium grain, Poorly graded, loose.					
	87						
	88						
		SAND, SW, Light brownish gray (10YR 6/2), wet, Subrounded,					
	89	Fine grain, with fine gravel, well graded some medium to Coarse grain sand, loose					
	90						
	91						
	92				COLLECT MW-164A 92' (TOC)		
	93						
	94						
	95						1358 95

PROJECT MEAD FNOP

HOLE NO. MW-164A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-164A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner

SHEET 12 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	SAND, SW, light brownish gray (10YR 6/2) wet, subrounded, fine grain, some medium to coarse grain, with fine gravel, well graded, loose.					
	96						
	97	SAND, SW, light brownish gray (10YR 6/2) wet, subrounded, fine grain with medium to coarse grain, with fine and coarse grain gravels. well graded, loose.					
	98						Drive casing to 99'
	99						
	100	SANDSTONE, weak, fine grain subangular, yellowish gray (5Y 7/2), moderate yellow (5Y 7/6). weathered, moist.					
	101						water used for drilling 110 Gallons
	102						
	103						1400 103
		Bottom of Boring - Bedrock					Install 2" Monitoring well.

HTW DRILLING LOG

HOLE NO. MW-166A

1. COMPANY NAME	Burns + McDonnell
2. DRILLING SUBCONTRACTOR	Boart longyear
SHEET 1 OF 1 SHEETS 15	
3. PROJECT	Mead FNOP
4. LOCATION	LL2
5. NAME OF DRILLER	Bill Beuning
6. MANUFACTURER'S DESIGNATION OF DRILL	CP24-300 RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sampler 4" + 6"; OD outer casing 6"; Lubricant - king stuff
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-26-12
11. DATE COMPLETED	10-26-12
12. OVERBURDEN THICKNESS	104.0'
15. DEPTH GROUNDWATER ENCOUNTERED	49.0' bgs
13. DEPTH DRILLED INTO ROCK	110.0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	WL: 49.85 @ 1520
14. TOTAL DEPTH OF HOLE	110.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-166A-96.5-97.5	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed	NA	Flush mount	NA	Sam Woodland, Burns & McDonnell (BMCD)

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	1	SILT, ML, trace clay, Very Dark grey (10YR 3/1), Damp, Soft consistency, nonplastic trace roots,					Begin Drilling 0757 6" Sampler 6" casing
	2	SILT, ML, Black (5Y 2.5/1) damp, stiff consistency, nonplastic					Recovery 5/5
	3						
	4	Clay, CH, light olive brown (2.5Y 5/3) damp, soft consistency high plasticity					

MRK FORM JUN 89 55

PROJECT Mead FNOP

HOLE NO. MW-166A

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 2 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		CLAY, CH, light olive brown (2.5Y 5/3), damp, soft consistency, high plasticity					
	5						0758 0807
	6						
	7						
	8						Recovery 10/10
	9						
	10						
	11						
	12						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 3 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	13	CLAY, CH, light olive brown (2.5Y 5/3), damp Soft consistency high plasticity					Recovery 10/10
	14						
							0804
	15						0810
	16						
	17	Sand, SP, light gray (2.5Y 7/2) loose density, fine grain, Poorly graded, subrounded					Recovery 10/10
	18						
	19						
	20						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 4 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine grain, poorly graded, subrounded					
	21						
	22						Recovery 10/10
	23						
	24						0815
	25						0833
	26						
	27						Recovery 10/10
	28						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodlaird (BMcD)

SHEET 1 OF 5 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine grain poorly graded, subrounded					
	29						
	30						Recovery 10/10
	31						
	32						
	33						
	34						
	35						0838
							0859
	36						

HTW DRILLING LOG

HOLE NO. MW-1606A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 6 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine grain Poorly graded, subrounded					
	37						
	38						
	39						Recovery 10/10
	40						
	41						
	42						
	43						
	44						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 7 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine grain Poorly graded, subrounded					Recovery 10/10
							0859
	45						0910
	46						
	47						
							Recovery 10/10
	48						
	49						
		Sand, SP, light brownish gray (10YR 6/2), loose density fine grain, Poorly graded Subrounded, wet					
	50						
	51						
	52						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 8 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	53	SAND, SP, light brownish gray (10YR 6/2), loose density fine grain, poorly graded Subrounded, wet					Recovery 10/10
	54						
							0915
	55						0940 Temporary Casing to 55.0'
	56						4" sampler
	57						
	58						Recovery 10/10
	59						
	60						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 9 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (10YR 6/2), loose density fine grain, poorly graded subrounded, wet					
	61						
	62						Recovery 10/10
	63						
	64						
	65						0945
							0953
	66						
							Recovery 20/20
	67						
	68						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcJ)

SHEET 1 OF 10 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (10YR 6/2), loose density fine grain, poorly graded subrounded, wet					
	69						
	70						
	71						
	72						Recovery 20/20
	73						
	74						
	75						
	76	SAND, SP, light brownish gray (10YR 6/2), medium trace fine grain, poorly graded, subrounded loose density, wet					

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Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-166A

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 11 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	SAND, SP, light brownish gray (10YR 6/2), medium trace fine grain, poorly graded, subrounded loose density, wet					
	78						
	79						
	80						Recovery 20/20
	81						
	82						
	83	SAND, SP, light brownish gray (10YR 6/2) loose density, fine grain, poorly graded Subrounded, wet					
	84						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 12 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (10YR 6/2), loose density fine grain, poorly graded Subrounded, wet					Recovery 20/20 0959
	85	Medium grain					1012
	86						
	87						
	88						Recovery 20/20
	89						
	90						
	91						
	92						

PROJECT Mead FNOP

HOLE NO. MW-166A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 13 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (10YR 6/2) loose density, medium grain, poorly graded subrounded, wet					
	93						Recovery 20/20
	94						
							1020
	95						1023
	96	fine grain					
					Collect MW-166A-96.5-97.5 For TPC		
	97						Recovery 8/10
	98	SAND, SW, brown (10YR 5/3) loose density, medium grain, trace silt, trace fine gravel well graded, subrounded, wet					
	99						
	100						

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FWOP

INSPECTOR Sam Wooellam (BMcD)

SHEET 1 OF 14 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SW, brown (10YR 5/3) loose density, medium grain trace silt, trace fine gravel well graded, subrounded, wet					
	101						
	102						Recovery 8/10
	103						
	104	SANDSTONE, pale yellow brown (10YR 6/2) weak, fine grain weathered, sub rounded, damp					
	105	Pale yellowish orange (10YR 8/6)					1025 1038
	106	moderate yellowish brown (10YR 5/4)					
	107	moderate brown (5YR 4/4)					Recovery 5/5
	108	Moderate yellowish brown (10YR 5/4)					

PROJECT Mead FWOP

HOLE NO. MW-166A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-166A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 15 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SANDSTONE, moderate yellowish brown (10YR 5/4) weak, fine grain weathered, subrounded, damp					
	109	Light brown (5YR 5/6)					Recovery 5/5
	110	Bottom of Hole @ 110.0'					Stop Drilling @ 1043 Used 100 gal of water 2" MW Installed

HTW DRILLING LOG

HOLE NO. MW 167A

1. COMPANY NAME	Burns + McDonnell
2. DRILLING SUBCONTRACTOR	Boart longyear
SHEET 1 OF 1 SHEETS 14	
3. PROJECT	Mead FNOP
4. LOCATION	LL2
5. NAME OF DRILLER	Bill Buening
6. MANUFACTURER'S DESIGNATION OF DRILL	CP 24-300RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sampler 4" + 6"; OD outer casing 6"; Lubricant King Stuff
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-26-12
11. DATE COMPLETED	10-27-12
12. OVERBURDEN THICKNESS	98.0'
15. DEPTH GROUNDWATER ENCOUNTERED	49.0' Bgs
13. DEPTH DRILLED INTO ROCK	70'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	WL: 47.3' @ 1155
14 TOTAL DEPTH OF HOLE	105.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-167A-87-88	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed	NA	Flush Mount	NA	Burns + McDonnell (BMcD) Sam Woodland

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SILT, trace clay, ML, Brown (10YR 4/3) damp, Soft consistency, nonplastic trace roots					Begin Drilling 1551
	1						6" sampler 6" casing
							Water from main plant
	2						
	3	SILT, trace clay, ML, Black (10YR 2/1) damp stiff consistency, nonplastic					Recovery 5/5
	4						

MRK FORM JUN 89 55

PROJECT Mead FNOP

HOLE NO. MW-167A

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 2 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SILT, trace clay, ML, brown (10YR 4/3), damp Stiff consistency, nonplastic					
	5						1551
		CLAY, CH, yellowish brown (10YR 5/4) damp, Soft consistency, High plasticity					1554
	6						
	7						
	8						Recovery 10/10
	9						
	10						
	11						
	12						

HTW DRILLING LOG

HOLE NO. MW-167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 3 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		CLAY, CH, yellowish brown (10YR 5/4), damp, soft consistency high plasticity					
	13						Recovery 10/10
	14						
	15						1557
		Olive Gray (5Y 5/2)					1602
	16						
	17						Recovery 10/10
	18	SAND, SP, light gray (2.5Y 7/2) Soft consistency, fine grain Poorly graded, subrounded					
	19						
	20						

HTW DRILLING LOG

HOLE NO. MW167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 4 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) soft consistency, fine grain poorly graded, subrounded					
	21						
	22						Recovery 10/10
	23						
	24						
	25						1606 1621
	26						
	27						Recovery 10/10
	28						

HTW DRILLING LOG

HOLE NO. MW167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (DMcD)

SHEET 1 OF 5 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) Soft consistency, fine grain Poorly graded, subrounded					
	29						
	30						
	31						Recovery 10/10
	32						
	33						
	34						
	35						1624 1636
	36						Recovery 10/10

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 6 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5 y 7/2) Soft consistency, fine grain Poorly graded, subrounded					
	37						
	38						
	39						
	40						Recovery 10/10
	41						
	42						
	43						
	44						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-167A

HTW DRILLING LOG

HOLE NO. MW-167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 7 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) soft consistency, fine grain poorly graded, subrounded					1641
	45						1653
	46						
	47						
	48						Recovery 10/10
	49	SAND, SP, pale yellow (2.5Y 7/3) loose density, fine trace medium, poorly graded, subrounded, wet					
	50						
	51	fine grain					
	52	fine trace medium grain					

HTW DRILLING LOG

HOLE NO. MW167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BHCD)

SHEET 1 OF 8 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, pale yellow (2.5Y 7/3) loose density, fine trace medium grain, poorly graded subrounded, wet					
	53						Recovery 10/10
	54						
							1656
	55						1707
							Temporary Casing 55.0'
	56						4" sampler
	57						Recovery 10/10
	58						
	59						
	60						

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 9 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, pale yellow (2.5Y 7/3) loose density, fine trace medium grain, poorly graded Subrounded, wet					
	61						
	62						Recovery 10/10
	63						
	64	SAND, SP, light brownish gray (2.5Y 6/2), loose density fine grain, poorly graded Subrounded, wet					1710
	65						1714
	66	SAND, SP, pale yellow (2.5Y 7/3) loose density, fine trace medium grain, poorly graded Subrounded, wet					Recovery 10/10
	67						
	68						

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 10 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, pale yellow (2.5Y 7/3) loose density, fine trace medium grain, Poorly graded Subrounded, wet					
	69						
	70						
	71						Recovery 10/10
	72						
	73	SAND, SW, brown (10YR 5/3) loose density, fine grain trace silt, trace medium to coarse sand, well graded Subrounded, wet					
	74						
	75						1715
							10/27/12 Continue Drilling 0800
	76						Recovery 8/10

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 11 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SW, brown (10YR 5/3) loose density, fine grain trace silt, trace medium to coarse sand, well graded, subrounded wet					
	77	SAND, SP, brown (10YR 5/3) loose density, fine grain poorly graded, subrounded, wet					
	78						
	79						Recovery 8/10
	80						
	81						
	82						
	83						
	84						

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 12 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, brown (10YR 5/3) loose density, fine grain poorly graded, subrounded, wet					Recovery 8/10 0801
	85						0813
	86						
	87				Collect MW-167A 87-88 for TOC		
	88	SAND, SW, brown (10YR 5/3) loose density, coarse grain trace silt, trace fine to medium sand, well graded subrounded, wet					Recovery 9/10
	89						
	90						
	91						
	92						

HTW DRILLING LOG

HOLE NO. MW 167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 13 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLDW COUNTS g	REMARKS h
	93	SAND, SW, brown (10YR 5/3) loose density, coarse grain trace silt, trace fine to medium sand, well graded subrounded, wet					Recovery 9/10
	94						
	95						0815 0835
	96						
	97	trace course gravel					Recovery 10/10
	98	SANDSTONE, very pale orange (10YR 8/2) weak, fine grain weathered, subrounded, damp					
	99	dark yellowish orange (10YR 6/6)					
	100						

HTW DRILLING LOG

HOLE NO. MW-167A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 14 SHEETS 14

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SANDSTONE, dark yellowish orange (10YR 6/6) weak, fine grain, weathered, subrounded, damp					
	101						
	102						Recovery 10/10
	103	very pale orange (10YR 8/2)					
	104						
	105	Bottom of Hole @ 105.0'					Stop Drilling 0837 Used 100gal of water 2" MW Installed

PROJECT Mead FNOP

HOLE NO. MW-167A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-168A

1. COMPANY NAME	Burns and McDonnell
2. DRILLING SUBCONTRACTOR	Boart Longyear
SHEET 1 OF 13 SHEETS	
3. PROJECT	Mead FNOP
4. LOCATION	
5. NAME OF DRILLER	Chris Huther
6. MANUFACTURER'S DESIGNATION OF DRILL	GP24-300RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" sampler 6" outer casing
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-25-12
11. DATE COMPLETED	10-26-12
12. OVERBURDEN THICKNESS	102.2
15. DEPTH GROUNDWATER ENCOUNTERED	54
13. DEPTH DRILLED INTO ROCK	2.8
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	~~60.80~~ ~~1430~~ 53.30 0859 (10-26-12)
14. TOTAL DEPTH OF HOLE	105
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	X	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-168A-G5	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
monitoring well	NA	2" stickup	NA	Ryann Odor Ryann Odor

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, CL, trace silt, very dark grayish brown (10YR3/2), damp, medium plasticity, stiff consistency, some plant roots					Begin drilling 1517
	1						
	2	CLAY, CL, trace silt, brown (10YR4/3), damp, non-plastic, hard consistency					Recovery 5/5
	3						
	4						
	5						1520 5'

MRK FORM JUN 89 55

PROJECT Mead FNOP

HOLE NO. MW-168A

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Odor Burns and McDonnell

SHEET 2 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SILT, ML, trace clay, yellowish brown (10YR 5/4), dry, non-plastic, hard consistency					
	6						Recovery 5/5
	7						
	8						
	9						
	10						1525 10'
	11						Recovery 5/5
	12	SAND, SP, trace silt, very pale brown (10YR 7/3), subrounded, fine grain, poorly graded, dry, loose					
	13						
	14						

HTW DRILLING LOG

Ryann Oglor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Oglor Burns and McDonnell (BMcD)

SHEET 3 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, SP, trace silt, very pale brown (10YR 7/3), subrounded, fine grain, poorly graded, dry, loose					Recovery 5/5
	15						1529 15'
	16						Recovery 5/5
	17						
	18						
	19						
	20						1548 20'
	21						Recovery 5/5
	22	SAND, SP, light gray (10YR 7/2), subrounded, fine grain trace medium, poorly graded, dry, loose					
	23						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-168 A

HTW DRILLING LOG

Ryan Odor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryan Odor BMcD

SHEET 4 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SAND, SP, light gray (10YR 7/2), subrounded, fine grain trace medium, poorly graded, dry, loose					Recovery 5/5
	24						
							1557 25'
	25						
		SAND, SP, light gray (10YR 7/2), subrounded, medium grain, poorly graded, dry, loose					
	26						Recovery 5/8
	27						
	28						
	29						
	30						
	31						
	32						

HTW DRILLING LOG

Ryann Oder

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Oder BMcD

SHEET 5 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SAND, SP, light gray (10YR 7/2), subrounded, medium grain, poorly sorted, dry, loose					Recovery 5/8
	33						1612 33'
	34						
	35						Recovery 8/12
	36						
	37						
	38	SAND, SP, pale brown (10YR 6/3), subrounded, fine grain, poorly graded, dry, loose					
	39						
	40						
	41						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 6 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SAND, SP, pale brown (10YR 6/3), subrounded, fine grain, poorly graded, dry, loose					
	42						Recovery 8/12
	43	SAND, SP, light brownish gray (10YR 6/2), subrounded, medium and fine grain, moderately graded, dry, loose					
	44						
	45						1620 45'
	46						Recovery 5/7
	47						
	48	SAND, SP, pale brown (10YR 6/3), subrounded, medium grain trace fine trace coarse, poorly graded, dry, loose					
	49						
	50						

HTW DRILLING LOG

HOLE NO. MW-168 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 7 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	SAND, SP, pale brown (10YR 6/3), subrounded, medium grain trace fine trace coarse, poorly graded, dry, loose					Recovery 5/7
	51						
							1645 52'
	52						
	53						
	54	SAND, SP, Some silt and clay, very dark gray (GLEY1 3/N), wet, trace plasticity, medium consistency, fine grain.					water ▼
	55	SAND, SP, trace silt, light brownish gray (10 YR 6/2), subrounded, fine grain, some medium grain, poorly graded, wet, loose.					Recovery 13/13
	56						
	57	6" Gravel seam. (Fine grain)					
	58						
	59						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 8 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SAND, SP, trace silt, light brownish gray, (10YR 6/2) subrounded, fine grain, some medium grain, poorly graded, wet, loose					
	60						
	61						Recovery 13/13
	62						
	63						
	64						
	65						1708 65'
	66						Recovery 20/20
	67	SAND, SP- SAME AS ABOVE					
	68						

HTW DRILLING LOG

Ryann Odor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 9 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SAND, SP, trace silt, light brownish gray (10YR 6/2), subrounded fine grain, some medium grain. poorly graded, wet, loose					
	69						Recovery 24/24
	70						
	71						
	72	SAND, SW, with gravel, trace silt. Pale brown (10YR 6/3), subrounded, fine to coarse grain, gravel is fine grain, well graded, wet, loose					
	73						
	74	SAND, SP, trace silt, light brownish gray (10YR 6/2) subrounded, fine grain, poorly graded, wet, loose.					
	75						
	76						
	77						

HTW DRILLING LOG Ryann Oder

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Oder BMcD

SHEET 10 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	SAND, SP, trace silt, light brownish gray (10YR 6/2) subrounded, fine grain, poorly graded, wet, loose					Recovery 20/20
	78						
	79						
	80						
	81						
	82						
	83						
	84	SAND, SP-SW, trace gravel, pale brown (10YR 6/3), subrounded, medium grain, some fine and coarse grain, gravel is fine grain, moderately graded, wet loose.					
	85						1720 85'
							Recovery 20/20
	86						

HTW DRILLING LOG Rijanu Odor

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Rijanu Odor BMcD

SHEET 11 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	SAND, SP-SW, trace gravel, pale brown (10YR 6/3), subrounded, medium grain, some fine and coarse grain, gravel is fine grain, moderately graded, wet, loose					
	87						
	88						Recovery 20/20
		SAND, SP, trace silt, light brownish gray (10YR 6/2) subrounded, fine grain, poorly graded, wet, loose					
	89						
		4" Gravel seam, some medium to coarse sand.					
	90	SAND, SP, trace gravel, pale brown (10YR 6/3), subrounded, fine grain, some medium grain, trace coarse grain, gravel is fine grain, poorly graded, wet, loose					
	91						
	92						
	93						
	94				1800 Collect MW-168A-65 For TOC		
	95						

HTW DRILLING LOG

HOLE NO. MW-168A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 12 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	SAND, SP, trace gravel, pale brown (10YR6/3), subrounded, fine grain, some medium grain, trace coarse grain, gravel is fine grain, poorly graded, wet, loose					Recovery 20/20
	96						
	97						
	98						
	99	GRAVEL, SP-SW, some sand, pale brown (10YR 6/3) subrounded, fine grain, sand is medium, some fine and coarse grain, moderately graded, wet, loose.					
	100						
	101						
	102	SANDSTONE, weak, fine grain subangular, weathered, dark yellowish orange (10YR 6/6). moist.					
	103						
	104						

HTW DRILLING LOG Ryann Odor

HOLE NO. MW-168 A

PROJECT Mead FNOP

INSPECTOR Ryann Odor BMcD

SHEET 13 OF 13 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	104	SANDSTONE, weak, fine grain, subangular, weathered, dark yellowish orange (10YR 6/6), moist					1748 105
	105	Bottom of Boring - Bedrock					Install 2" monitoring well 10/26/12

HTW DRILLING LOG

HOLE NO. MW-169 A

1. COMPANY NAME	Burns + McDonnell
2. DRILLING SUBCONTRACTOR	Beart longyear
SHEET 1 OF 1 SHEETS 15	
3. PROJECT	Mead FNOP
4. LOCATION	LL2
5. NAME OF DRILLER	Bill Buening
6. MANUFACTURER'S DESIGNATION OF DRILL	6P 24-300RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sampler 4" + 6" OD outer casing 6" Lubricant: King stuff
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-27-12
11. DATE COMPLETED	10-27-12
12. OVERBURDEN THICKNESS	102.0'
15. DEPTH GROUNDWATER ENCOUNTERED	52.0'
13. DEPTH DRILLED INTO ROCK	3.0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	10-28-12 WL: 49.85' BGS @ 1025
14. TOTAL DEPTH OF HOLE	105.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-169A-94-95	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed	NA	Flushmount	NA	Burns + McDonnell (BMcD) Sam Woodland

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SILT, trace clay, ML, Brown (10YR 4/3) damp, Soft consistency, nonplastic trace roots					Begin Drilling 1403 6" sampler 6" casing Water from Main Plant
	1						
		SILT, trace clay, ML, very dark brown (10YR 4/3) damp, stiff consistency nonplastic					Recovery 4/5
	2						
	3						
	4						

MRK FORM JUN 89 55

PROJECT Mead FNOP

HOLE NO. MW-169A

HTW DRILLING LOG

HOLE NO. MW-169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 2 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SILT, trace clay, ML, Very dark brown (10YR 4/3) damp, stiff consistency non plastic					Recovery 4/5
	5						1404
		CLAY, brown (10YR 5/3) damp, soft consistency high plasticity					1407
	6						
	7						
	8						Recovery 10/10
	9						
	10						
	11						
	12						

HTW DRILLING LOG

HOLE NO. MW-169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 3 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		CLAY, CH, brown (10YR 5/3) clamp, soft consistency high plasticity					
	13						Recovery 10/10
	14						
	15						1411
							1416
	16						
	17						
	18	SAND, SP, light gray (2.5Y 7/2) loose density, fine grain, poorly graded, subrounded					Recovery 9/10
	19						
	20						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-169A

HTW DRILLING LOG

HOLE NO. MW 169 A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 4 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine grain poorly graded, subrounded					
	21						
	22						Recovery 9/10
	23						
	24						1420
	25						1430
	26						
	27						Recovery 10/10
	28						

PROJECT Mead FNOP

HOLE NO. MW-169A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 5 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (7.5Y 7/2) loose density, fine grain Poorly graded, subrounded					
	29						
	30						
	31						Recovery 10/10
	32						
	33						
	34						
	35						1436
							1445
	36						Recovery 10/10

PROJECT Mead FNOP

HOLE NO. MW-169A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 6 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine grain poorly graded, subrounded					
	37						
	38						
	39						Recovery 10/10
	40						
	41						
	42						
	43						
	44						

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 7 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light gray (2.5Y 7/2) loose density, fine-grain poorly graded, subrounded					Recovery 10/10
	45						1451
							1501
	46						
	47						Recovery 8/10
	48						
	49						
	50						
	51						
	52	SAND, SP, light brownish gray (2.5Y 6/2) loose density fine-grain, poorly graded subrounded, wet					

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-169A

HTW DRILLING LOG

HOLE NO. MW-169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 8 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (2.5Y 6/2) loose density fine grain, poorly graded Subrounded, wet					
	53						Recovery 8/10
	54						
							1506
	55						Temporary Casing 55.0' 4" sampler 1527
	56						
	57						
	58						Recovery 10/10
	59						
	60						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-169A

HTW DRILLING LOG

HOLE NO. MW-169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 9 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (2.5Y 6/2), loose density, fine grain, poorly graded subrounded, wet					
	61						
	62						Recovery 10/10
	63						
	64						
	65						1530
							1545
	66						
	67						Recovery 8/10.
	68						

PROJECT Mead FNOP

HOLE NO. MW-169A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 10 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (2.5Y 6/2) loose density fine grain, poorly graded Subrounded, wet					
	69						
	70						Recovery 9/10
	71						
	72						
	73						
	74						
	75						1552
							1559
	76						Recovery 10/10

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 11 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (2.5Y 6/2), loose density fine grain, poorly graded subrounded, wet					
	77						
	78						Recovery 10/10
	79	trace coarse sand					
	80						
	81						
	82						
	83						
	84						

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 12 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (2.5Y 6/2), loose density fine grain trace coarse sand Poorly graded, subrounded, wet					Recovery 10/10 1603
	85	SAND, SW, brown (10YR 5/3) loose density, medium with fine, trace silt, well graded Subrounded, wet					1625
	86						
	87						
	88						Recovery 7/10
	89						
	90						
	91						
	92	trace fine gravel					

HTW DRILLING LOG

HOLE NO. MW 169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BHCD)

SHEET 1 OF 14 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SW, brown (10YR 5/3) loose density, medium with fine, trace silt, trace well graded, subrounded trace fine gravel, wet					
	93	SAND, SP, light brownish gray (10YR 6/2) loose density, fine grain trace silt, poorly graded subrounded, wet					Recovery 7/10
	94				Collect MW-169A 94-95 For TOC		
							1630
	95						1640
	96						
	97						Recovery 7/10
	98						
	99						
	100						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-169A

HTW DRILLING LOG

HOLE NO. MW-169A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 15 SHEETS 15

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND, SP, light brownish gray (10YR 6/2) loose density, fine grain trace silt, Poorly graded Subrounded, wet					
	101						
		trace medium to coarse sand, trace fine gravel,					
	102	SANDSTONE, moderate yellow (5Y 7/6), weak, fine grain weathered, subrounded, Damp					Recovery 7/10
	103						
	104						
	105	Bottom of Hole @ 105.0'					Stop Drilling 1640 Used 120 gal of water 2" PVC Installed

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-169A

HTW DRILLING LOG

HOLE NO. MW-170A

1. COMPANY NAME Burns and McDonnell	2. DRILLING SUBCONTRACTOR Boart Longyear
SHEET 1 OF 12 SHEETS	
3. PROJECT Mead FNOP	4. LOCATION
5. NAME OF DRILLER Chris Huther	6. MANUFACTURER'S DESIGNATION OF DRILL GP 24-300RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4" Sampler; 6" Temporary Casing	8. HOLE LOCATION
	9. SURFACE ELEVATION
	10. DATE STARTED 10/26/12 — 11. DATE COMPLETED 10/26/12
12. OVERBURDEN THICKNESS 98.00'	15. DEPTH GROUNDWATER ENCOUNTERED 50.00'
13. DEPTH DRILLED INTO ROCK 2.00'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 51.20 10/27/12 0935
14. TOTAL DEPTH OF HOLE 100.00'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-170A-80-81	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring well	NA	Flush mount	NA	Lewis Turner LT Burns and McDonnell

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, CL, very dark gray (10YR 3/1) damp, trace plasticity, stiff consistency					1521 START DRILLING water from main treatment plant. Recovery 3/5
	1						
	2	CLAY, CL, some silt, dark grayish brown (10YR 4/2), damp, trace plasticity, very stiff consistency					
	3						
	4						
	5						1526 5'

MRK FORM JUN 89 55 | PROJECT MEAD FNOP | HOLE NO. MW-170A

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 2 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, CL, trace silt, brown (10YR 4/3) damp, medium plasticity, medium consistency,					Recovery 5/5
	6						
	7						
	8						
	9						
	10						1532 10'
	11						Recovery 5/5
	12	CLAY, CL, some silt, brown (10YR 4/3), damp, medium plasticity, soft consistency					
	13						
	14						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 3 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, SP, trace silt, light brownish gray (10YR 6/2), subrounded, fine grain, poorly graded, damp, loose					
	15						1538 15
		SAND, SP, light brownish gray (10YR 6/2) subrounded, fine grain, some medium and coarse grain. Poorly graded, loose, damp					
	16						Recovery 5/5
		SAND, SP, trace silt, light brownish gray (10YR 6/2), subrounded, fine grain, poorly graded, damp, loose.					
	17						
	18						
	19						
		SAND, SP, light brownish gray (10YR 6/2) subrounded, medium grain, trace fine and coarse grain, poorly graded, damp loose					
	20						1544 20
	21						Recovery 5/5
	22						
	23						

PROJECT MEAD FNOP

HOLE NO. MW-170A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 4 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SAND, SP, light brownish gray (10YR 6/2) subrounded, medium grain, trace fine and coarse grain, poorly graded, damp, loose					
	24						
	25						1550 25
	26						
	27	SAND, SP - SAME AS ABOVE					Recovery 9/10
	28						
	29						
	30						
	31						
	32	SAND, SP- SAME AS ABOVE					

PROJECT MEAD FNOP

HOLE NO. MW-170A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner

SHEET 5 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SAND, SP, Light brownish gray (10YR 6/2), subrounded, medium grain, trace fine and coarse grain, poorly graded, damp, loose					
	33						
	34						
	35						1556 35
	36						Recovery 8/10
	37						
	38						
	39	SAND, SP, Light brownish gray (10YR 6/2) subrounded, fine grain, trace medium grain, poorly graded, damp, loose					
	40						
	41						

PROJECT MEAD FNOP

HOLE NO. MW-170A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 6 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SAND, SP, light brownish gray (10YR 6/2) subrounded, fine grain, trace medium grain, poorly graded, damp, loose.					
	42						
	43						
	44						
	45						1607 45
		SAND, SP- SAME AS ABOVE					Recovery 2/2
	46						Drive 6" Temp Casing and Clean out boring
	47						
	48						1641 48
		SAND, SP, grayish brown (10YR 5/2) subrounded, medium grain, trace fine grain, some coarse grain, poorly graded, ~~dult~~ damp, loose					
	49						Recovery 15/17
	50						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR JT Lewis Turner BMD

SHEET 7 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE ND. f	BLOW COUNTS g	REMARKS h
	50	SAND, SP, grayish brown (10YR 5/2) Subrounded, medium grain, trace fine grain, some coarse grain, poorly graded, wet, loose					water ▽
	51						Recovery 5/7
	52						
	53						
	54						
	55						
	56	SAND, SP-SW, grayish brown (10YR 5/2) subrounded, coarse grain, with medium grain, some fine grain, moderately graded, wet loose.					
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner TBM ID

SHEET 8 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SAND, SP-SW, grayish brown (10YR 5/2) subrounded, coarse grain, with medium grain, some fine grain, moderately graded, wet loose.					
	60						Recovery 15/17
	61						
	62	SAND, SP, grayish brown (10YR 5/2) subrounded, fine grain, trace medium grain, poorly graded wet, loose					
	63						
	64						
	65						1659 65
	66	SAND, SP, grayish brown (10YR 5/2) subrounded, medium grain, some fine grain. poorly graded, wet loose					Recovery 20/20
	67						
	68						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR LT Lewis Turner BMSD

SHEET 9 OF 18 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SAND, SP, grayish brown (10YR 5/2) subrounded, medium grain, some fine grain, poorly graded, wet, loose					
	69						Recovery 20/20
	70						
	71						
	72						
	73						
	74						
	75						
	76	SAND, SP - SAME AS ABOVE					
	77						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR Lewis Turner

SHEET 10 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	SAND, SP, grayish brown (10YR 5/2) Subrounded, medium grain, some fine grain, poorly graded, wet, loose					Recovery 20/20
	78	SAND, SP-SW, trace gravel, grayish brown (10YR 5/2) subrounded, coarse grain, with medium and fine grain, gravel is fine grain, moderately graded, wet, loose.					
	79	SAND, SP, grayish brown (10YR 5/2) subrounded, medium grain, some fine grain, poorly graded, wet, loose			1720 Collect MW-170A-80-81 for TOC		
	80						
	81						
	82	SAND, SP-SW, trace gravel, grayish brown (10YR 5/2) subrounded, coarse grain, with medium and fine grain, gravel is fine grain, moderately graded, wet, loose					
	83						
	84						
	85						1712 85
	86						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR YF Lewis Turner BMW

SHEET 11 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	SAND, SP-SW, trace gravel, grayish brown (10YR 5/2) subrounded coarse grain, with fine and medium grain, gravel is fine grain, moderately graded, wet, loose.					
	87	SAND, SW, grayish brown (10YR 5/2) subrounded, coarse grain, some fine to medium grain, well graded, wet, loose					Recovery 15/15
	88						
	89						
	90	GRAVEL, GW, some sand, grayish brown (10YR 5/2) subrounded, fine grain, trace coarse grain, sand is fine to coarse grain, well graded, wet, loose.					
	91						
	92						
	93						
	94						
	95						

HTW DRILLING LOG

HOLE NO. MW-170A

PROJECT MEAD FNOP

INSPECTOR LT Lewis Turner - BMD

SHEET 12 OF 12 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	GRAVEL, GW, some sand, grayish brown (10YR 5/2), subrounded, fine grain, trace coarse grain, sand is fine to coarse grain, well graded, wet, loose					Recovery 15/15
	96						
	97						
	98	SANDSTONE, weak, fine grain, subangular, weathered, grayish yellow (5Y 8/4) moist.					
	99						
	100						1730 100
		Bottom of Boring - Bedrock					2" Monitoring well installed on 10/27/12.

HTW DRILLING LOG

HOLE NO. MW 171 A

1. COMPANY NAME	Burns & McDonnell
2. DRILLING SUBCONTRACTOR	Boart Longyear
SHEET 1 OF 1 SHEETS 13	
3. PROJECT	Mead FNOP
4. LOCATION	LL2
5. NAME OF DRILLER	Bill Boening
6. MANUFACTURER'S DESIGNATION OF DRILL	6P24-300RS
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sampler 4" & 6" OD outer Casing 6" Lubricant: King Stuff
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	10-24-12
11. DATE COMPLETED	10-25-12
12. OVERBURDEN THICKNESS	100.0'
15. DEPTH GROUNDWATER ENCOUNTERED	41.0' BGS
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	10/25/12 WL: 45.0' BGS @ 0940
14. TOTAL DEPTH OF HOLE	100.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
MW-171A-87-88	NA	NA	TOC	NA	NA	NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed	NA	Flush Mount	NA	Burns + McDonnell (BMcD) Sam Woodland

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Silt Trace Clay, ML, Brown (10YR 4/3) Damp, Medium Consistency Non Plastic, Trace Roots					Begin Drilling @ 1425 6" Sampler 6" Casing Drilling Water From Main Plant
	1						
	2						Recovery 5/5
	3	Silt Trace Clay, ML, Very Dark Grayish Brown (10YR 3/2) Damp, Stiff Consistency Non Plastic					
	4						

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PROJECT MEAD FNOP

HOLE NO. MW-171A

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead · FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 2 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Silt Trace Clay, ML, Very Dark Grayish Brown (10YR 3/2) Damp, Stiff Consistency Non Plastic					1426
	5	Clay, CH, Very Dark Gray (10YR 3/1) Damp, Stiff Consistency High Plasticity					1428
	6						
		Clay Trace Silt, CH, Yellowish Brown (10YR 5/4) Moist, Medium Consistency High Plasticity					
	7						Recovery 15/15
	8						
	9						
	10						
	11						
	12						

HTW DRILLING LOG

HOLE NO. MW 171 A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 3 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Clay Trace Silt, CH, Yellowish Brown (10YR 5/4) Moist, Medium Consistency High Plasticity					
	13						Recovery 10/10
	14						
							1432
	15						1437
	16						
	17						Recovery 7/7
	18	Sand, SP, Pale Yellow (2.5Y 7/3) Loose Density, Fine Grain Poorly Graded, Sub Rounded					
	19						
	20						

PROJECT Mead FNOP

HOLE NO. MW-171A

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. MW 171 A

PROJECT Mead · FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 4 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Pale Yellow (2.5Y 7/3) Loose, Fine Grain Poorly Graded, Subrounded					
	21						Recovery 7/7
							1442
	22						1450
	23						Recovery 3/3
	24						
							1455
	25						1457
	26						
	27						Recovery 8/10
	28						

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead FNOP

INSPECTOR Sam Woodland

SHEET 1 OF 5 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Pale Yellow (2.5Y 7/3) Loose Density, Fine Grain Poorly Graded, Sub Rounded					
	29						
	30						Recovery 8/10
	31						
	32						
	33						
	34						
	35						1500
							1505
	36						Recovery 10/10

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 6 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Pale Yellow (2.5Y 7/3) Loose Density, Fine Grain Poorly Graded, Sub Rounded					
	37						
	38						
	39						
	40						
	41	Wet					▼
	42						
	43						
	44						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW 171A

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 7 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Pale Yellow (2.5Y 7/3) Loose Density, Fine Grain Poorly Graded, Sub Rounded, Wet					
	45						1515
		Sand, SP, Light Yellowish Brown (10YR 6/4) Loose Density, Fine Grain Poorly Graded, Sub Rounded, Wet					1522 4" Sampler Temporary Casing to 45.0'
	46						
	47						
	48	Sand, SP, Light Gray (2.5Y 7/2) Loose Density, Fine Grain Poorly Graded, Sub Rounded, Wet					Recovery 8/10
	49						
	50						
	51						
	52						

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead FNOP

INSPECTOR Sam Woodland

SHEET 1 OF 3 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	53						Recovery 8/10
	54						
							1530
	55						1536
	56						
	57						
	58						Recovery 15/20
	59						
	60						

HTW DRILLING LOG

HOLE NO. MW 171 A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 9 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose Density, Fine Grain Poorly Graded, Sub Rounded, Wet					
	61						
	62						
	63						Recovery 15/20
	64						
	65						
	66						
	67						
	68						

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW 171A

HTW DRILLING LOG

HOLE NO. MW 171 A

PROJECT Mead · FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 10 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose Density, Fine Grain Poorly Graded, Subrounded wet					
	69						
	70						
	71						Recovery 15/20
	72						
	73						
	74						
	75						1550 1558 1602 - Stop 1614 - Begin
	76						

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMCD)

SHEET 1 OF 11 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Light Gray (2.5Y 7/2) Loose Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	77						
	78						
	79						
	80						Recovery 15/20
	81						
	82						
	83	Sand, SP, Yellowish Brown (10YR 5/4) Loose Density Medium Trace Fine Grain Poorly Graded, Subrounded, wet					
	84	Sand, SP, Gray (10YR 6/1) Loose Density, Fine Grain Poorly Graded, Subrounded, wet					

051601
Form MRK-55-2

PROJECT Mead FNOP

HOLE NO. MW-171A

HTW DRILLING LOG

HOLE NO. MW 171A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 12 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Sand, SP, Gray (10YR 6/1) loose Density, Fine Grain Poorly Graded, Sub Rounded, wet					
	85						
	86						
	87				Collect MW-171A 87-88 FOR TOC		
	88						Recovery 15/20
	89	Sand, SP, Yellowish Brown (10YR 5/4) Loose Density, Medium Grain Poorly Graded, Sub Rounded, wet					
	90						
	91						
	92						

HTW DRILLING LOG

HOLE NO. MW-171 A

PROJECT Mead FNOP

INSPECTOR Sam Woodland (BMcD)

SHEET 1 OF 13 SHEETS 13

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	93	Sand, SP, Yellowish Brown (10YR 5/4) Loose Density, Medium Grain Poorly Graded, SubRounded, Wet					Recovery 15/20
	94						
							1623
	95	Sand, SP, Gray (2.5Y 5/1) loose Density, Trace Silt, fine grain, Poorly graded Subrounded, Wet					1633
	96						
	97						
	98						
	99						
	100	Bottom of Hole @ 100.0'					Stop Drilling 1650 Used 110 gal of water 2" MW Installed

PROJECT Mead FNOP

HOLE NO. MW-171A

051601
Form MRK-55-2

HTW DRILLING LOG

1. COMPANY NAME	ECC
2. DRILLING SUBCONTRACTOR	LAYNE
HOLE NO.	TH-BR01
SHEET 1 OF 1 SHEETS	
3. PROJECT	FNOP GMPO Bedrock Coring
4. LOCATION	FNOP L61 south
5. NAME OF DRILLER	
6. MANUFACTURER'S DESIGNATION OF DRILL	MINI SONIC
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Sonic 6" w/ 4.5" sample
8. HOLE LOCATION	TH-BR-01
9. SURFACE ELEVATION	
10. DATE STARTED	11/12/17
11. DATE COMPLETED	
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	—				

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	1	OL: Organic rich topsoil now plastic clay! silty clay 5YR3/3					START water source main treatment plant ~~01~~
	2						
	3	SM: sandy clay, yellow 10YR7/6					Lubricant: Well Gaurd by Jet Lube
	4	—					
	5	SP: poorly graded fine to very fine sand w/ some silt 10YR 8/2 very pale brown					SP
	6						
	7						
	8						
	9			1			
	10						

MRK FORM JUN 86 55

PROJECT GMPO Bedrock

HOLE NO. TH-BR-01

HTW DRILLING LOG

PROJECT: FMOP GMPO Bedrock

INSPECTOR: N. Kunsicuns

HOLE NO.: 4H BR01

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	11	Same as above SP: fine to very fine sand. Wthn some silt. Light gray 10YR 7/2 moisture increasing w/ depth.					
	12						
	13		(2)				
	14						
	15		15-20'				SP
	16						
	17						
	18		(3)				
	19						
	20		20 to 30'				
	21						
	22						
	23						
	24		(4)				
	25						
	26						
	27						
	28						

MRK FORM JUN 86 55-2

PROJECT: GMPO Bedrock

HOLE NO.: 4H-BR-01 (2)

HTW DRILLING LOG

PROJECT: FMOP GMPO Bedrock
INSPECTOR: N. Kulsakar
HOLE NO.: TH BR01
SHEET: OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Same as above					
	29	SP: Very fine to fine sand, some silt light grey 10YR 7/2	4				SP
	30						
	31	SW: well graded medium to v fine sand. Saturated 10YR 6/2 light brownish grey					
	32						
	33						
	34	↓ Lessens w/ depth					SW
	35						
	36		5				
	37						
	38						
	39						
	40						
	41	SW: same as above but getting finer w/ depth	6				
	42						
	43	SATURATED	5/10' recovery				
	44						
	45						
	46						

MRK FORM JUN 86 55-2

PROJECT: GMPO Bedrock
HOLE NO.: TH-BR-01

HTW DRILLING LOG

PROJECT: FNDP GMRD Bedrock
INSPECTOR: Nikhusakhk
HOLE NO.: TH-BR-01
SHEET 4 OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	47	SW: same as above med-v fine sand w/ some silt 10YR 6/2 light brownish gray	6				
	48		5/10' recovery				SW
	49						
	50	SW: very fine to fine sand w/ some silt 10YR 6/2					
	51						SP
	52	SW: v. fine to med sand w/ some silt 10YR 6/2 some coarse sand					
	53						SW
	54		7				
	55						
	56						
	57						
	58						
	59						
	60						SW
	61	SW: Same as above w/ more rig 0% coarse fragment					
	62		8				
	63						
	64						

MRK FORM JUN 88 55-2

PROJECT: GMRD Bedrock
HOLE NO.: TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT FNOR GMPO Bedrock

INSPECTOR N Kmarkum

SHEET OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	65	SW: well graded coarse to v. fine sand w/ some silt. 10YR 6/2 light brownish ~~olive~~ grey.					
	66						
	67		8				SW
	68						
	69						
	70	very coarse w/ some gravel					
	71	GW: well graded gravel w/ fine to coarse sand					GW
	72						
	73						
	74	CL: low plasticity clay with sand and some gravel					CL
	75		9				
	76	SP: v. fine to fine sand 10YR 6/2					SP
	77						
	78	SW to GW lense					SW/GW
	79	SP: v fine to fine sand 10YR 6/2					SP
	80						
	81		10				
	82						

MRK FORM JUN 89 55-2

PROJECT GMPO BEDROCK

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT GMPO Bedrock

INSPECTOR N Kuwsalem

SHEET OF 10 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SP: same as above					SD
	83						
	84						
	85	GW: well graded gravel to fine sand. Gravel up to 3" dia. w/ increased gravel content to 90'					GW
	86						
	87			10			
	88						
	89						
	90	SAME AS ABOVE					
	91						
	92						
	93						
	94	V. coarse gravel up to 3"-4"		11			
	95	SP: fine to very fine poorly sorted sand. 10YR6/4					SP
	96						
	97						
	98						
	99						
	100						

MRK FORM JUN 86 55-2

PROJECT GMPO Bedrock

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT FNOP GMPO Bedrock

INSPECTOR N Kilkeatts

SHEET 1 OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	101	GW: Same as Above					GW
	102						
	103	CL: Low plasticity silty CLAY 10YR 6/2					
	104						CL
		SANDSTONE poorly consolidated 10YR 6/8 Brownish Yellow	104.5'		12		SANDSTONE
	106			BEDROCK			
	107	SHALE 10YR 6/1 Moderately consolidated					SHALE
	108						
	109						
	110	SHALE, moderate strength, medium dark gray (N4) to medium gray (N5) silty, thickly bedded, moderately decomposed, trace dissolution, slightly fractured, damp, shows trace plasticity.	No reaction to HCl				Run 1 Start
	111						Run = 7.00' Recovery = 7.00'
	112			Run 1 Box 1			RQD = 5.80/6.00 x100 = 96.7%
	113						8" casing at 60.0'
	114						6" casing at 110'
	115						
	116						
	117			1155 117'			Run 1 stop 1155
	118			1204			Run 2 Start 1204

MRK FORM JUN 88 55-2

PROJECT GMPO Bedrock

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	118	SHALE, moderate strength, medium dark gray (N4) to medium gray (N5) silty, thickly bedded, slightly weathered, damp					
	119	SHALE, moderate strength, brownish gray (5YR4/1) thickly bedded, moderately decomposed, damp. trace plasticity.					
	120			Run 2 Box 2/ Box 3			Box 3 STARTS 120'
	121	SHALE, moderate strength, light olive gray (5Y 6/1) with dark reddish brown throughout (10R 3/4) thickly bedded, moderately decomposed, damp. shows trace plasticity					Run = 10.00 Recovery = 10.00 RQD = 100%
	122						
	123						
	124	Trace moderate olive brown (5Y 4/4) throughout					
	125						
	126						
	127	SHALE, moderate to strong, light gray (N7). moderate olive brown (5Y 4/4) oxidization around fractures. moderately weathered, trace dissolution, slightly fractured (healed) dry. trace plasticity		127' 127'			* SHALE Had to remove from Core barrell. Run 2 STOP 127'

MRK FORM JUN 88 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD Frop

INSPECTOR Lewis Turner YTF BMD

SHEET OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	127	SHALE, moderate to strong, light gray (N 7), moderate olive brown (5Y 4/4) oxidization around healed fractures, moderately weathered, trace dissolution, slightly fractured, damp. trace plasticity.					START RUN #3 1425
	128			Run 3 Box 3/4			Run = 10.00' Recovery = 9.98' RQD = 98%
	129	SHALE, moderate strength, olive gray (5Y 4/1), moderately weathered, silty thickly bedded, moderately weathered, damp - trace plasticity.					SILT STONE LENS
	130						130.0' Begin Box 4 for core samples.
	131						
	132						
	133						
	134						
	135						
	136	Becomes sandy fine grain, some silt.					

MRK FORM JUN 86 55-2

PROJECT MEAD Frop

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT Mead FNUP

INSPECTOR Lewis Turner LT7 BMD

SHEET 10 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	136	SHALE, moderate to strong, olive gray (5Y 4/1) moderately weathered, silty and sandy, thinly bedded, dense.					silt stone
	137	0.5 inch hard clasts do not react to acid. several.		1538 137'			1538 End Run #3
							START Run #4 1600
				Run 4 Box 4			
	138	SHALE - same as above					* 1630 lost circulation core plugged up trip out.
	139						
				1630 1395			End Run 4 1630
							START Run 5 1640
	140			Box 5 start 140'			1648 DECIDE TO STOP DRILLING FOR DAY SUNSET. 11/14/12 0810 Boring sealed off due to shale swelling CLEAN BARREL 0905 START RUN 5 on 11/14/12
		0.5" thin bed of light olive gray shale, strong strength.		Run 5			
	141			Box 4 Box 5			
	142						Run = 7.00' Recovery = 5.66' RQD = 5.66/7.00 x100 =
		1" thin bed of light olive gray shale, strong					
	143						
	144						
	145						

MRK FORM JUN 86 55-2

PROJECT

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD ENVP

INSPECTOR Lewis Turner LT BMCD

SHEET 11 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	145	SHALE, moderate, olive gray (5Y 4/1) non weathered, silty and sandy, thickly bedded, damp.					Silt stone.
	146						
	147			1030 147'			End Run 5 1030
		SILT STONE, moderate strength, dark gray (N3), non weathered, damp, thickly bedded,					START Run 6 1110
	148						
				Run 6			
	149			Box 5 and Box 6			Run = 10.00 Recovery = 4.69 RQD = NA
							Lost 5.31' Recovery Sandstone.
	150			Begin Box 6			Box 6
	151	LIMONITE, Seam 0.4' thick, strong, dusky brown (5YR 2/3), dark yellowish orange (10YR 6/6) moderately weathered;					Iron Stone 4"
		SANDSTONE, moderate strength, fine grain subround, dark yellowish orange (10YR 6/6), non weathered, damp.					Some limonite banding in SS.
	152	Recovery Lost					Lost recovery
							* Driller Notes: EASY DRILLING (152-157) No resistance
	153						
	154						

MRK FORM JUN 90 55-2

PROJECT MEAD ENVP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner ATJ BMO

SHEET 12 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	154	Recovery lost					Recovery lost Sandstone. 151.69-157'
	155			Run 6 Box 6			
	156						
	157			1147 157			End Run 6 1147
				1302 157 11/15/12			START Run 7 1220
	158			Run 7 No Recovery			1300 CIRCULATION IS BEING LOST AT 154.00' ATTEMPT ROD ADVANCE 1351 RODS AND BIT ARE "STUCK" IN THE BORING ATTEMPT TO VIBRATE FREE.
	159						GOING TO HAVE TO SWITCH TO MUD TO FINISH BORING.
	160					11/16/12 AHNG Extracted WILL ADVANCE FROM 165-175 w/4" Sonic	1600 11/14/12 STOP FOR DAY TO PICK UP BENTONITE MUD MIX. 11/15/12
	161					Boring Filled in to 165' w/sand.	Boring Closed off AT 151', clean out boring. 1132 mix mud 1250 cleaned out boring.
	162						1302 Begin Coring w/mud drill fluid Baroid Bore-Gel Baroid EZ-Mud polymer
	163						

MRK FORM JUN 86 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 13 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	163	No Recovery					
							No Recovery
	164						
	165						11/16/12 1320 BEGIN 4" Sonic drilling. RUN #8 BEGINS 166.5'
	166						1430 HQ not clear to bottom, sand filled.
				1404 166.5'			End RUN #7 1404
	167	SANDSTONE, very weak, fine grain, subangular, light brownish gray (5YR6/1), damp, no cementation remains.		11/16/12 1320 Sonic Core			1444 Attempt to clear HQ stem by flushing 1455 HQ wedged in during.
	168			Run 8 Box 7/8			11/16/12 Over flush 6" casing to 167' free HQ Remove all HQ Will advance w/ 4" Sonic to get to bedrock LS. 1130
	169						
	170			Box 8 BEGINS			Recovery 100%
	171						Drilled w/ Sonic.
	172						

MRK FORM JUN 88 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 14 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	172	SANDSTONE, very weak, fine grain, subangular, light brownish gray (5YR 6/1), damp, no cementation left					Drilled w/ sonic
	173			Run 8 Box 8			
	174						
	175			1430 175'			End Run 8 1430
		SANDSTONE, very weak, fine to medium grain, dark yellowish orange (10YR 6/6), damp, no cementation left.					
	176	SANDSTONE, very weak, fine grain, grayish yellow (5Y 8/4). damp, no cementation left.		Run 9 Box 8			
	177						Recovery 5/5 100%
	178						
	179						
	180			1530 180'			End Run 9
				1548			START 10 1548
	181			Run 10 Box 9			

MRK FORM JUN 86 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 15 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	181	SANDSTONE, very weak, fine grain grayish yellow (5Y 8/4), damp, no cementation left.					
	182	SANDSTONE, very weak, fine grain, pale yellowish orange (10YR 8/6) damp, no cementation left.		Run 10 Box 9			Recovery 10/10
	183						
	184	SANDSTONE, very weak, fine grain dark yellowish orange (10YR 6/6), damp, traces of slightly cemented sandstone.					
	185						
	186						
	187						
	188	Bottom 6" contains fine quartz gravel. rounded					
	189	SANDSTONE, very weak, fine grain trace medium, grayish yellow (5Y 8/4) damp, no cementation left. Top 6" contains fine quartz gravel rounded.					Drive 6" CASING From 167-
	190			1605 190'			1720 STOP FOR DAY End Run 10 1605

MRK FORM JUN 86 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 16 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	190	SANDSTONE, very weak, fine grain dark yellowish orange (10YR 6/6) damp very weak cementation.					Start Drilling 0804 11/17/88 4" Sonic 6" casing
	191	SANDSTONE, very weak, fine grain pale yellowish orange (10YR 8/6) damp, very weak cementation,		Run 11 Box 10			
	192						Recovery 10/10
		Limonite staining					
	193	SANDSTONE - same as above					0847 Drive 6" casing
	194	SANDSTONE, weak, fine grain, trace quartz gravel (fine), dark yellowish orange (10YR 6/6) damp, weak cementation.					
	195						
	196	SANDSTONE, weak, fine grain, some quartz gravel (fine), pale yellowish orange (10YR 8/6) damp, loose					
		SHALE, weak, light olive gray (5Y 6/1), moderately weathered, damp slight plasticity, some oxidization staining throughout.					
	197	SANDSTONE medium bedded 6" fine grain with gravel.					
	198	SHALE, weak, silty and sandy, light olive gray (5Y 6/1), moderately weathered, damp, slight plasticity, oxidization present. Interbedded sand and gravel throughout.					
	199						

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner JT7 BMCD

SHEET 17 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	199	SHALE, weak, silty and sandy, light olive gray (5Y 6/1) moderately weathered, damp, slight plasticity, oxidization present, interbedded sand and gravel throughout.		Run 11 Box 10			
	200			0830 200'			End run 11 0830
		SANDSTONE, weak, fine grain, trace coarse, trace fine gravel, grayish orange (10YR 7/4) damp, no cementation left.		0911			0911 START Run 12
	201						
	202						
				Run 12 Box 11			Recovery 10/10
	203						
	204						
	205						
	206						
		SANDSTONE, weak, fine grain, silty, moderate yellowish brown (10YR 5/4) damp, no cementation. Subangular					
	207						
	208	SANDSTONE, very strong, fine grain, some medium to coarse, dark yellowish brown (10YR 4/2) non weathered, subrounded, strong cementation					

MRK FORM JUN 86 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNDP

INSPECTOR Lewis Turner LT BMD

SHEET 18 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	208	SANDSTONE, very weak, fine grain Sub angular, trace gravel, moderate yellowish brown (10YR 5/4) damp, loose.					
	209						
	210			0930 210'			End Run 12 0930
				1015			START 13 1015
	211	SANDSTONE, very weak, fine grain trace medium and coarse, Light olive gray (5Y 6/1) damp, loose Subangular					
	212			Run 13 Box 12			
	213	213-214' color grayish orange (10YR 7/4)					1110 Drive 6" CASING
	214						
	215						
	216						
	217						

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 19 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	217	SANDSTONE, very weak, fine grain trace medium and coarse, subangular, light olive gray (5Y 6/1) damp, loose.					
	218			Run 13 Box 12			
	219	219-220 some grayish orange (10YR 7/4) coloration staining.					
	220			1035 220'			End Run 13 1035
				1640			START Run 14 1640
	221	SHALE, moderate strength, grayish green (5G 5/2) no apparent weathering, damp, fissle.					
	222	Becomes silty grayish yellow green (5GY 7/2) 121.8-122.5'		Run 14 Box 13			Recovery 5/5
	223						
	224	SHALE, very strong, silty, massive, greenish gray (5G 6/1) when wet, no apparent weathering, dry, no reaction to HCl.					
	225			1720 225'			End Run 14 1720
				0835 11/19/12			START Run 15 0835 Resume Drilling 11/19/12
	226						

MRK FORM JUN 86 55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-01

HTW DRILLING LOG

HOLE NO. TH-BR-01

PROJECT MEAD FNOP

INSPECTOR Lewis Turner & T BMW

SHEET 20 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	226	LIMESTONE, very light gray (N8), powdered by sonic, structure destroyed. Damp to dry, very strong reaction to HCl.		0850 226.5			Bottom 1.0' fell out attempt to retrieve. on next run. End Run 25 0850
				0941			START Run 16 0941
	227						LS destroyed by sonic. Strong reaction to HCl (powdered)
	228			1012 228.5			End Run 16 1012
	229	Bottom of Boring - Limestone contact reached.					Abandon boring on 11/19/12 w/ bentonite grout.
	230						

HTW DRILLING LOG

HOLE NO. TH-BR-02

SHEET 1 OF SHEETS

1. COMPANY NAME ECC	2. DRILLING SUBCONTRACTOR LAYNE CHRISTENSEN
3. PROJECT BEDROCK CORING GMPO	4. LOCATION FNOP (MEAD, NE)
5. NAME OF DRILLER SANTIAGO, DANNY	6. MANUFACTURER'S DESIGNATION OF DRILL SONIC
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: SONIC (6" DRIVE CASING & 4.5" SAMPLING RODS); NQ DIAMOND CORE BIT	8. HOLE LOCATION
	9. SURFACE ELEVATION
	10. DATE STARTED 11-05-2012 / 11. DATE COMPLETED 11/9/12
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
14. TOTAL DEPTH OF HOLE	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	5

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
GROUTED			AB	[signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	1	CLAY, SILTY, MEDIUM BROWN, MODERATELY SOFT, w/ ROOTLETS, SANDY @ 1', DAMP					(CORE RUNS)
	2	SILT, CLAYEY, LIGHT BROWN, SLIGHTY DAMP					
	3	CLAY, SILTY, MED. BROWN, STIFF,					
	4						
	5	-- CLAY, V. SLTY SILTY -- WET ZONE ? -- DAMP CLAY, SLIGHTY SILTY					#1
	6						
	7						
	8						
8.	9	~~SAND, SILTY, LT. BROWN, V.F., QUARTZ, SUB ROUNDED DRY~~					#2
	10						

MRK FORM JUN 86 55

PROJECT BEDROCK CORING GMPO

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT BEDROCK CORING GMPO

INSPECTOR

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
18.9	19	SAND, SILTY, LT. BROWN, V. FINE-FINE QUARTZ, SUB-ROUNDED, DRY					#3 ↓ 20
	20	(WET ZONE? 20'-21')					
		↳ SLIGHTLY SILTY					
	21						
	22						#4 ↓ 22.5
	23						
	24						
	25	(GRAYISH-BROWN 25'-26')					#5 ↓ 25
		(VERY LIGHT BROWN 26'-30')					
	26						
	27						
	28						

MRK FORM JUN 86 55-2

PROJECT BEDROCK CORING GMPO

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT BEDROCK CORING GMPO

INSPECTOR

SHEET 3 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	29						
							#6
	30						30
	31						
	32						
	33						
	34						
	35						
	36	(35'-37' BROWNISH-GRAY)					
	37						
	38						
	39	FINE SAND					
							#7 (50%)
	40						40
	41						
	42						
	43						
	44						
	45	(MOIST)					
	46						

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT BEDROCK CORING GMPO

INSPECTOR

SHEET 4 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	47						
	48						
	49						#8 (60%)
	50	MED TO COARSE SAND, ORANGE-BROWN (50'-52') MOIST					50
	51						
	52					52'	
	53	LIGHT BROWN TO VERY LIGHT BROWN, FINE, (52'-60') MOIST					
	54						
	55						
	56			50'-60' SAMPLE IN ZIPLOCK BAG			
	57						
	58						
	59						#9 (100%)
	60					60'	60
	61						
	62			SAMPLE 60'-70'			
	63						
	64						

MRK FORM JUN 90 55-2

PROJECT BEDROCK CORING GMPO

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. THrBR-02

PROJECT BEDROCK CORING GMPO

INSPECTOR

SHEET 5 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	65	SAND, LT. BROWN, FINE QTZ. WET, SUB-ROUNDED		SAMPLE IN ZIPLOCK 60-70'			
	66						
	67						
	68						~~#10~~ ~~100%~~
	69						#10 100%
	70					70'	
	71			SAMPLE IN ZIPLOCK 70'-80'			
	72						
	73						
	74						
	75						
	76						
	77						
	78						
	79						#11 100%
	80	80'-84 BECOMING MEDIUM SAND, WET		80'-84' SAMPLE		80'	
	81						
	82						

MRK FORM JUN 88 55-2

PROJECT BEDROCK CORING GMPO

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT

INSPECTOR

SHEET 6 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	83	MEDIUM SAND, WET	80'-84' SAMPLE				
	84	BECOMING FINE SAND @ 84'			84'		
	85						
	86		SAMPLE IN ZIPLOCK 84'-91'				
	87						
	88						
	89						
	90						#12 10%
	91	? MED-TO-COARSE SAND, ORANGE-BROWN			91'		
	92	? ~~MED~~ SAND, LT. BROWN, MED-COARSE					
	93	? MED-TO-COARSE SAND, ORANGE-BROWN					
	94	FINE ~~CLAY~~ SILTY SAND STRINGER @ 93'? RED,	SAMPLE 91'-102'				
	95						
	96						
	97						
	98						
	99						#13 25%
	100						

MRK FORM JUN 86 55-2

PROJECT

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT

INSPECTOR

SHEET 7 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	101	VERY COARSE SAND, ORANGE BROWN WET, POORLY SORTED		SAMPLE 91'-102'			
	102	? FINE SAND, LT. BROWN, WELL SORTED					
	103	MED SAND, LT. BR - OR.-BR, POORLY SORTED					
	104	FINE TO MED SAND LT.-BROWN POORLY SORTED					
	105	FINE SAND, LT.-BROWN, WELL SORTED					
	106			SAMPLE 102'-110'			
	107	MED SAND, POORLY SORTED, LT-ORANGE BROWN					
	108						
	109						#14 80%
	110						
	111	110'-111'					
	112	LOSS					
	113	110'-120' 10% RECOVERED					
	114	(SAND, ORANGE-BROWN, MED-COARSE, POORLY SORTED, WET)					
	115						
	116						
	117						
	118						

FORM No. 55-2

PROJECT

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT

INSPECTOR

SHEET 8 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	119						#15
	120						10%
	121						
	122						LOSS
	123	LOST					
	124						
	125	SAND, BROWNISH-GRAY, MED-COARSE, POORLY SORTED QTZ 60%, SLIGHTLY SILTY					
	126	SAND, LT. GRAY, FINE, MOD. WELL SORTED, QTZ 75%, SLIGHTLY SILTY					#16
	127						
	128						
	129						
	130	SAND, GRAY, FINE TO MEDIUM, SILTY, POORLY SORTED, QTZ 70% (VERY SILTY 130.8'-131.2')					
	131						
	132	SAND, BROWNISH-GRAY, MEDIUM SL. SILTY, POORLY SORTED, QTZ 60%					
	133						
	134						#16 100%
	135						
	136						

PROJECT

HOLE NO. TH-BR-02

MRK FORM JUN 86 55-2

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT

INSPECTOR

SHEET 9 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	137						
	138						
	139						
	140	BEDROCK: SANDSTONE WEATHERED, SOFT, 5Y 7/2 - 5Y 7/4 (@ 144') YELLOWISH-GREY, V/F GRAINED SUB-ANGULAR TO SUB ROUNDED WELL SORTED, WEAKLY CEMENTED, QTZ 90% (FIRST 6" - V. LT. GRAY) N 8/5) LIMONITE STAINING 142'-143'				BOX 1	140'
	141				BOX 1 140'-150'		
	142						
	143						
	144						#17 100%
	145						145'
	146						
	147						
	148						
	149					NO RECOVERY	
	150						150'
	151				BOX 2 150'-160'		
	152						
	153						
	154						

MRK FORM JUN 86 55-2

PROJECT

HOLE NO. TH-BR-02

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT

INSPECTOR

SHEET 10 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	155						
	156						
	157	RECOVERED 4' OMAN					
	158	SANDSTONE, ~~ORANGE~~ YELLOW-YELLOW FINE GRAINED, QTZ SUB ANGULAR TO SUB-ROUNDED WELL SORTED, V. WEAKLY CEMENTED (ORANGE BROWN @ 58'-60') 10YR 7/6		BOX 2 150'-160'			
	159				LOST 12" (BIT)		
	160	YELLOW-GRAY @ 160' 5Y 7/4			160		
	161						
	162	ORANGE BROWN (10YR 7/6) SHALE, GRAY, SILTY, STIFF (N5.5) DENSE W OCCAS SMALL WHITE INCLUSIONS (SHELL FRAGMENTS?), SLIGHTLY FISSILE		BOX 3 160'-165'			
	163						
	164	DARK GRAY, W CRINOID STEMS (N4) @ 164.3' (WHITE, V. SMALL)					
	165						
	166	~~organic rich~~					
	167	organic rich shale w/ coal seams 1/2" thick					
	168	2.5 15G		BOX 3			
	169	Grey shale 6/N to 172'					
	170			170' BOX 4			
	171						
	172						

PROJECT

HOLE NO. TH-BR-02

MRK FORM JUN 80 55-2

HTW DRILLING LOG

HOLE NO. TH-BR-02

PROJECT

INSPECTOR

SHEET 11 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Shale mod consolidated grey					
	173						
		Limestone					
	174						
		Shale w/N					
	175						
		? shale not retrieved					
	176						
	177						
	178	↓					
		LIMESTONE					
	179						
	180						
	181	↑					
		TD = 181.5'					
	182						

PROJECT

HOLE NO.

MRK FORM JUN 88 55-2

HTW DRILLING LOG

HOLE NO. TH-BR-03

SHEET 1 OF 21 SHEETS

1. COMPANY NAME: BURNS & McDONNELL	2. DRILLING SUBCONTRACTOR: LAYNE
3. PROJECT: MEAD ENOP	4. LOCATION: LL4
5. NAME OF DRILLER: SANTIAGO MORAN	6. MANUFACTURER'S DESIGNATION OF DRILL: LAYNE DRILLING TECHNOLOGY CENTER SCR-13/001
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~4¼" SAMPLER OB~~; ~~6" CASING OB~~ 6" SAMPLER; 8" CASING; 6" CASING; 4¼" SAMPLER	8. HOLE LOCATION
	9. SURFACE ELEVATION
	10. DATE STARTED: 12/4/12
	11. DATE COMPLETED: 12/7/12
12. OVERBURDEN THICKNESS: 103.5 FEET	15. DEPTH GROUNDWATER ENCOUNTERED: 19 FEET BGS
13. DEPTH DRILLED INTO ROCK: 74.5 FEET	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 178 FEET	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	—	—	6

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	—	—	—	—	—

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	X	—	—	David H Barker

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	0	SILT, trace Sand, Dark Brown (10YR 3/3), Dry, Nonplastic, roots top 0.5'	OL			1034	12/4/12 BEGIN DRILLING
	1					2.5 / 2.5	WATER SOURCE: ENOP MAIN TREATMENT PLANT; LUBRICANT: WELL GUARD (JETLUBE)
		grading to Dark Yellowish Brown (10YR 4/4)	ML				WATER USED ADVANCING 8" CASING
	2					1038	
						1040	
	3					2.5 / 2.5	
	4	CLAY, trace Sand, trace Silt, Yellowish Brown (10YR 5/6), Damp, Stiff, Nonplastic to Trace Plasticity	CL				
	5					1042	

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 2 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	5	(continued) CLAY, trace Sand to trace Silt, Yellowish Brown (10YR 5/6), Damp, Stiff, Nonplastic to Trace Plasticity	CL			1046	
	6						
	7					5/5	
	8	Plasticity increasing, trace Light Brownish Gray (10YR 6/2) mottling					
	9						
	10	CLAY, trace Sand, Yellowish Brown (10YR 5/6) Damp, Medium, Trace Plasticity	CL			1050 1058	
	11						
	12					7.5/7.5 ~~10~~/10 DB	
	13	SAND, Very Pale Brown (10YR 7/3 to 10YR 8/2), ~~Dry~~ Damp, Loose, Fine Grained, Poorly Graded, Subangular	SP				
	14						

PROJECT MEAD FNOP

HOLE NO. TH-BR-03

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 3 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	14	(continued) SAND, Very Pale Brown (10YR 7/3 to 10YR 8/2), Damp, Loose, Fine Grained, Poorly Graded, Subangular	SP				
	15					7.5/7.5	
						~~10/10~~ 08	
	16						
	17					1105 / 1145	DRIVE 8" CASING
	18					2.5 / 2.5	
	19	becoming moist					water encountered
	20	grading to Light Yellowish Brown (10YR 6/4) to Yellowish Brown (10YR 5/6)				1151 / 1155	
	21	SAND, Light Brownish Gray (10YR 6/2), ~~Damp~~ Moist, Loose, Fine to Medium Grained, Poorly Graded, Subangular to Subrounded	SP			10/10	
	22						
	23						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 4 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	23	~~SAND (SP~~ (continued) SAND, Light Brownish Gray (10YR 6/2), Moist, Loose, Fine to Medium Grained, Poorly Graded, Subangular to Subrounded	SP				
	24						
	25	SAND, Light Gray (10YR 7/2), Damp, Medium, Very Fine to Fine Grained, Poorly Graded, Subangular to Subrounded	SP				
	26					10/10	
	27						
	28						
	29						
	30					1205 1238	DRIVE 8" CASING
	31					10/10	
	32						

PROJECT MEAD FNOP

HOLE NO. TH-BR-03

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 5 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	32	SAND, Pale Brown (10YR 6/3), Moist, Loose, Fine Grained, Poorly Graded, Subangular to Subrounded	SP				
	33						
	34						
	35						
	36					10/10	
	37						
	38						
	39						
	40	Same as above				1247 / 1331 / 10/10	DRIVE 8" CASING
	41						

PROJECT MEAD FNOP

HOLE NO. TH-BR-03

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HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 6 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	41	(continued) SAND, Pale Brown (10YR 6/3) Moist, Loose, Fine Grained, Poorly ~~Sorted~~ Graded, Subangular to Subrounded	SP				
	42	SAND, Very Pale Brown (10YR 7/4), Moist Loose, Fine ~~to M~~ + trace Medium Grained, Subangular to Subrounded, Poorly to Moderately Graded	SW				
	43						
	44						
	45					10/10	
	46						
		SAND, Light Yellowish Brown (10YR 6/4), Moist, Loose, Fine Grained, Poorly Graded, Subangular	SP				
	47						
	48						
	49						
	50					1333	DRIVE 8" CASING

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HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 7 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	50	(continued) SAND, Light Yellowish Brown (10YR 6/4), Moist, Loose, Fine Grained, Poorly Graded, Subangular	SP			15/6	REFILL WATER TANK AT PLANT
	51	50-53 Very Fine to Fine Grained					
	52						
	53						
	54	54-55 Very Fine to Fine Grained				10/10	
	55	SAND, Light Gray (10YR 7/2) to Very Pale Brown (10YR 7/3) Moist, Loose, Fine to Medium Grained, Well Graded, Subangular	SW				
	56						
	57						
	58	SAND, Pale Brown (10YR 6/3), Moist to Wet, Dense, Very Fine Grained, Poorly Graded, Subangular to Subrounded	SP				
	59						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 8 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	59	(continued) SAND, Pale Brown (10YR 6/3), Moist to Wet, Dense, Very Fine Grained, Poorly Graded, Subangular to Subrounded	SP			10/10	
	60					1519 / 1552	DRIVE 8" CASING
	61	SAND, Very Light Grayish Brown (10YR 6/4), Moist, Loose, Fine to Medium Grained, Moderately Graded, Subangular	SW				
	62	Grain size increasing with depth					
	63	SAND, Yellowish Brown (10YR 5/4), Moist to Wet, Dense, Very Fine Grained, Poorly Graded, Subangular to Subrounded	SP			10/10	
	64	SAND, Light Yellowish Brown (10YR 6/4), Moist to Wet, Medium, Fine Grained, Moderately ~~Sorted~~ Graded Subangular to Subrounded	SW				
	65	64-65 Fine to Medium Grained					
	66	65-67 Very Fine to Fine Grained					
	67						
	68						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 9 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	68	(continued) SAND, Light Yellowish Brown (10YR 6/4), Moist to Wet, Medium, Fine Grained, Moderately Graded, Subangular to Subrounded	SW			10/10	
	69						
	70	SAND, Brown (10YR 5/3), Moist, Loose, Medium to Coarse Grained, Well Graded, Subangular to Subrounded	SW			1555 1622	DRIVE 8" CASING
	71	70.25-71.75 Very Fine to Fine Grained					
	72	SAND, Pale Brown (10YR 6/3), Moist, Medium to Dense, Very Fine to Fine Grained, Poorly Graded, Subangular	SP				
	73						
	74					10/10	
	75	SAND, trace Gravel, Pale Brown (10YR 6/3) to Light Yellowish Brown (10YR 6/4), Moist to Wet, Loose, Fine to Coarse Sand trace Fine Gravel, Well Graded, Subangular to Subrounded	SW				
	76	SAND, Pale Brown (10YR 6/3), Wet, Medium to Dense, Very Fine to Fine Grained, Poorly to Moderately Graded, Subangular	SP				
	77						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP | INSPECTOR DAVID BARKER | SHEET 10 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	77	(continued) SAND, Pale Brown (10YR6/3), Wet, Medium to Dense, Very Fine to Fine Grained, Poorly to Moderately Graded, Subangular	SP				
	78	SAND, Pale Brown (10YR6/3) Wet, Loose, Fine to Coarse Grained, Well Graded, Subangular to Subrounded	SW			10/10	
	79	SAND, Brown (10YR5/3), Wet, Dense, Very Fine Grained, Poorly Sorted, Subangular	SP				12/4/12 STOP FOR DAY DRIVE 8" CASING
	80					1627 / 0847	12/5/12 RESUME DRILLING
	81						
	82					5/5	
	83						
	84						
	85	trace Gravel; SAND, Light Yellowish Brown (10YR6/4), Wet, Loose, Fine to Coarse Sand, trace Fine Gravel, Well Graded, Subangular to Subrounded	SW			0853 / 0906 / 5/5	
	86						

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HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 11 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	86	~~SAND trace Gravel, Li~~ DB (continued) SAND, trace Gravel, Light Yellowish Brown (10YR 6/4), Wet, Loose, Fine to Coarse Sand, trace Fine Gravel, Well Graded, Subangular to Subrounded	SW				
	87					5/5	
	88	88-88.25 Fine Grained 88.25-88.5 Dark Yellowish Brown (10YR 4/6) to Yellowish Brown (10YR 5/6)					
	89						
	90	GRAVEL, some Sand, Yellowish Brown (10YR 6/6), Wet, Loose, Fine Gravel, trace Coarse Gravel, some Medium to Coarse Sand, trace Fine Sand, Moderately to Well Graded, Subrounded to Subangular	GW			0909 0953	DRIVE 8" CASING
	91						
	92					8.5/10	
	93	SAND, some Gravel, trace Silt, Pale Brown (10YR 6/3), Silt-Very Dark Gray (10YR 3/1), Wet, Loose, Fine to Coarse Sand, some Fine Gravel, trace Coarse Gravel, Moderately to Well Graded, Subangular to Subrounded	SW				
	94						
	95						

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HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 12 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	95	(continued) SAND, Some Gravel, trace Silt, Pale Brown (10YR 6/3), Silt-Very Dark Gray (10YR 3/1), Wet, Loose, Fine to Coarse Sand, Some Fine Gravel, trace Coarse Gravel, Moderately to Well Graded, Subangular to Subrounded	SW				
	96						
	97					8.5/10	
	98						
	99	99-101 trace Gravel					INITIALLY 2/10 RECOVERY 90-100, TRIP BACKDOWN RECOVER ADDITIONAL 6.5
	100					1000 / 1112	DRIVE 8" CASING
	101	Gravel % increasing with depth					
	102					8/8	
	103	102.5-103.5 Yellowish Brown (10YR 5/6) to Dark Yellowish Brown (10YR 4/6)					
	104	SANDSTONE, Moderate Yellowish Brown (10YR 5/4) Very Weak, Fine Grained, Subrounded to Subangular, Not Cemented	OMADI	CORE BOX 1			

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP | INSPECTOR DAVID BARKER | SHEET 13 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	104	(continued) SANDSTONE, Moderate Yellowish Brown (10YR 5/4), Very Weak, Fine Grained, Subrounded to Subangular, Not Cemented 0.25" Yellowish Gray (5Y 7/2)	OMADI	CORE BOX 1			
	105	SHALE, Light Gray (N7), Very Weak, ~~Highly Weathered~~ Extremely Weathered, Laminated with Sand (Yellowish Gray 5Y 7/2 to Dark Yellowish Orange 10YR 6/6)	OMADI	CORE BOX 1		8/8	
	106						
	107	SANDSTONE, Dark Yellowish Orange (10YR 6/6) to Yellowish Gray (5Y 7/2) Very Weak, Fine Grained, Subrounded, Not Cemented	OMADI	CORE BOX 1			
	108	SANDSTONE, Yellowish Gray (5Y 7/2), Very Weak, Fine Grained, Subangular, Not Cemented trace Shale laminations at 108.5	OMADI	CORE BOX 1		1124 1154	DRIVE 8" CASING
	109	trace Medium Grained Sand at 109.5				2.5/2.5	
	110					1159 1233	DRIVE 8" CASING
		110.5-111.5 Ironstone Fragments					
	111						
	112	SHALE, Medium Light Gray (N6), Very Weak, Extremely Weathered, Laminated with Dark Yellowish Orange (10YR 6/6) Very Fine to Fine Sand.	OMADI	CORE BOX 1		9.5/9.5	
	113	SANDSTONE, Yellowish Gray (~~10YR~~ 5Y 7/2), Very Weak, Very Fine to Fine Grained, Subangular to Subrounded, Not Cemented	OMADI	CORE BOX 1			

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 14 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	113	(continued) SANDSTONE, Yellowish Gray (5Y 7/2), Very Weak, Very Fine to Fine Grained, Subangular to Subrounded, Not Cemented	0MADI	CORE BOX 1			
	114						
	115						
	116					9.5/9.5	
	117						
	118	SHALE, Medium Light Gray (N6), Weak to Moderate, Moderate to Highly Weathered Laminated with Dark Yellowish Orange (10YR 6/6) Sand in top 0.5'	0MADI	CORE BOX 1			
	119	grading to Medium Dark Gray (N4)					SAMPLED WITH 6" SAMPLER, PULL SAMPLE BEFORE SETTING CASING
	120	SANDSTONE Yellowish Gray (5Y 7/2) Very Weak, Fine Grained trace Medium Grained, Subangular, trace to some Fines	0MADI	CORE BOX 2		1239 ~~1407~~ 1427	DRIVE 6" CASING SWITCH TO 4 1/4" SAMPLER CLEAN OUT BOREHOLE
	121					7.5/7.5	6" CASING TO BE ADVANCED DRY
	122						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 15 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	122	SHALE, Medium Dark Gray (N4), Weak to Moderate, Slightly weathered, Laminated with Dark Yellowish Orange (10YR 6/6) and Very Light Gray (N9) Sand	OMADI	CORE BOX 2			
	123	SANDSTONE, Yellowish Gray (5Y 7/2) to Moderate Yellow (5Y 7/6) Very Weak, Fine Grained, Subangular, Not Cemented	OMADI	CORE BOX 2			
		top 0.3' Dark Yellowish Orange (10YR 6/6)					
	124					7.5/7.5	
	125						
	126						
	127					1440 / 1511	DRIVE 6" CASING
	128						
	129					12.5 / 12.5	
		Iron Staining 129.5-129.75					
	130						
	131	SANDSTONE, Moderate Brown (5YR 4/4), Very Fine to Fine Grained, Subangular to Subrounded, Weakly Cemented	OMADI	CORE BOX 2			

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HTW DRILLING LOG

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PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 16 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	131	(continued) SANDSTONE, Moderate Brown (5YR 4/4), Very Fine to Fine Grained, Subangular to Subrounded, Weakly Cemented	OMADI	CORE BOX 2			
	132	SANDSTONE, Dark Yellowish orange (10YR 6/6), Fine Grained, Subangular, Weakly Cemented	OMADI	CORE BOX 2 (to 133)			
	133			CORE BOX 3			
	134						
						12.5	
	135					12.5	
	136						
	137						
		137.5-138 Yellowish Gray (5Y 7/2)					
	138						
	139	grading to Yellowish Gray (5Y 7/2)					
	140					12.5	

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 17 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	140	(continued) SANDSTONE, Dark Yellowish Orange (10YR 6/6), Fine Grained, Subangular, Weakly Cemented, grading to Yellowish Gray (5Y 7/2)	OMADI	CORE BOX 3		1,550	
	141						
	142						
	143						
	144					10/10	
	145						
	146						
	147						
	148						
	149						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 18 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	149	(continued) SANDSTONE, Dark Yellowish Orange (10YR 6/6), Fine Grained, Subangular, Weakly Cemented, grading to Yellowish Gray (5Y 7/2)	OMADE	CORE BOX 3		10/10	12/5/12 STOP FOR DAY
						1610	DRIVE 6" CASING TO 140'
	150	trace Coarse Sand, Fine Gravel				0927	12/6/12 RESUME DRILLING
	151	SANDSTONE, Dark Yellowish Orange (10YR 6/6), Fine Grained, Subangular, Weakly Cemented	OMADI	CORE BOX 3 (to 154)			CLEANOUT BOREHOLE THEN CONTINUE SAMPLING
	152					6/6	
	153						
	154	trace Coarse Sand, Fine Gravel		CORE BOX 4			
	155						
	156	SANDSTONE, Dark Yellowish Orange (10YR 6/6) to Moderate Yellowish Brown (10YR 5/4), Fine Grained, trace medium to Coarse Sand, trace Fine Gravel, Subangular to Subrounded, weakly Cemented	OMADI	CORE BOX 4		0944 / 1009	
	157	157-158 Medium Dark Gray (N4) Fines				4/4	
	158						

HTW DRILLING LOG

HOLE NO. TH-BR-03

PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 19 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	158	(continued) SANDSTONE, Dark Yellowish Orange (10YR 6/6) to Moderate Yellowish Brown (10YR 5/4), Fine Grained, trace Medium to Coarse Sand, trace Fine Gravel, Subangular to Subrounded, Weakly Cemented	OMADI	CORE BOX 4		4/4	
	159	iron concretion fragments at 159					
		Medium Grained Sand 159-159.5					
						1019	DRIVE & CASING
	160	SANDSTONE, Dark Yellowish Orange (10YR 6/6) to ~~Moderate~~ Grayish Orange (10YR 7/4), Fine Grained, trace Medium to Coarse Sand, trace Fine Gravel, Subangular to subrounded, Weakly Cemented	OMADI	CORE BOX 4		1100	
	161						
	162					5/5	
	163						
	164	164-165 Moderate Yellow (5Y 7/6)					
						1112	
	165					1146	
	166					5/5	
	167						

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PROJECT MEAD FNOP | INSPECTOR DAVID BARKER | SHEET 20 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	167	(continued) SANDSTONE, Dark Yellowish Orange (10YR 6/6) to Grayish Orange (10YR 7/4), Fine Grained, trace Medium to Course Sand, trace Fine ~~Granet~~ PC Gravel, Subangular to Subrounded, Weakly Cemented	OMADI	CORE BOX 5			
	168	167.5-168.5 Dark Gray (N3) fines				5/5	
	169						
						1153	DRIVE 6" CASING
	170					1240	
	171					2/2	
						1245	
	172	SAND, Moderate Yellowish Brown (10YR 5/4), Fine Grained, trace Medium and Course Grained, Subangular, Weakly Cemented 172.75-173 0.5-1" ~~Thousand~~ Ironstone Band and Fine Gravel Conglomerate cemented with ironstone	OMADI	CORE BOX 5		1407	
	173	SHALE, Medium Light Gray (N6) to Medium Dark Gray (N4), Very Weak to Weak, Fresh, 173-173.9 Consolidate Mudstone/Siltstone fragments within/underlain by clayey matrix (soft, medium plasticity)	PENNSYLVANIAN?	CORE BOX 5		2/2	
						1420	
	174	174 weak to moderate reaction with acid SHALE, Medium Light Gray (N6), Very weak (high plasticity, soft - behaves like clay), limestone clasts 2" diameter limestone fragment at 174.5	PENNSYLVANIAN?	CORE BOX 5		1512	
	175	~~SHALE~~ SHALE, Light Gray (N7) to Medium Light Gray (N6), Moderate, Fresh, Weak to Moderate reaction with acid	PENNSYLVANIAN?	CORE BOX 5		2/2	
						1521	TO 170 DRIVE 6" CASING
	176						

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PROJECT MEAD FNOP

INSPECTOR DAVID BARKER

SHEET 21 OF 21 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	~~BLOW COUNTS~~ g	REMARKS h
	176	(contact at 175.9) LIMESTONE, white (N9) to Very Light Gray (N8), Mostly pulverized by drilling method, some fragments remain - range from weak to strong, strong reaction to acid	PENNSYLVANIAN	CORE BOX 6	~~167~~ 7DB	1617	
	177					2/2	
						1629	12/6/12 STOP FOR DAY
	178	BOTTOM OF BOREHOLE 178 FT BGS					12/7/12 ABANDONED BOREHOLE WITH GROUT BEGIN 0820 FINISH 1157
	179						
	180						
	181						
	182						
	183						
	184						
	185						

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PROJECT MEAD FNOP

HOLE NO. TH-BR-03

HTW DRILLING LOG

HOLE NO. TH-BR-04

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR LAYNE
3. PROJECT MEAD FNOP	4. LOCATION
5. NAME OF DRILLER Santiago	6. MANUFACTURER'S DESIGNATION OF DRILL
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8. HOLE LOCATION
	9. SURFACE ELEVATION
	10. DATE STARTED 11/23/12 / 11. DATE COMPLETED
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
14. TOTAL DEPTH OF HOLE	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
				Lewis Turner LT / Burton McDonnell

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	SILT, ML some clay, brown (10YR 5/3) damp, trace plasticity, very stiff consistency, some roots in the top 6" organic.					START Drilling 1027 4" ID Sampler 6" ID Casing. Water source MAIN TREATMENT PLANT
	1						Lubricant "Setlube" "well gard"
	2						
	3	SILT, ML some clay, very pale brown (10YR 7/4) damp, trace plasticity. Stiff consistency, trace limonite staining throughout.					Recovery 5/5
	4						
	5						1028 5'

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PROJECT MEAD FNOP

HOLE NO. TH-BR-04

HTW DRILLING LOG

PROJECT: MEAD FNOP

INSPECTOR: Lewis Turner JTT BMED

HOLE NO.: TH-BR-04

SHEET 2 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SILT, ML, some clay, very pale brown (10YR 7/4) damp, trace plasticity, stiff consistency, trace limonite staining throughout.					1031
	6						
	7						Recovery 5.0/5
	8						
	9						
		Bottom 6" becomes very stiff consistency.					
	10						1033 10'
							1041
	11	SILT, ML, some clay, yellowish brown (10YR 5/4) damp, trace plasticity, medium consistency.					
	12						
	13						
	14						

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PROJECT: MEAD FNOP

HOLE NO.: TH-BR-04

HTW DRILLING LOG

PROJECT: MEAD FNOP

INSPECTOR:

HOLE NO.: TH-BR-04

SHEET 3 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, SP, trace silt, light gray (10YR 7/2), fine grain, subangular poorly graded, damp, loose,					Sand AT 14' Begin driving 6" casing.
	15						Recovery 7.5/7.5
	16						
	17						
		SAND SP - SAME AS ABOVE					1057 17.5
							1101
	18						
	19						Recovery 2.5/2.5
	20						1108 20'
		SAND SP- SAME AS ABOVE.					1114 6" AT 20'
							1120
	21						Slow drilling
	22						Recovery 10/10
	23						

HTW DRILLING LOG

PROJECT MEAD FNOP

INSPECTOR

HOLE NO. TH-BR-04

SHEET 4 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SAND, SP, trace silt, light gray (10YR 7/2), fine grain, subangular poorly graded, damp loose					
	24						
	25	trace medium grain.					Recovery 10/10
				SP			
	26						
	27						
	28						
	29						1151 Drive 6" Casing to 30'
	30	SAND, SP, trace silt & med to coarse sand, light gray (10YR 7/2) sub angular, poorly graded, loose, moist					1145 30'
	31			SP			
	32						

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNOP

INSPECTOR

SHEET 5 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32						
		same as above with increasing SILT content to 40'					10/10 (30-40')
	33						
				SR			
	34						
	35						
	36						
	37						
				SR			
	38						
	39						
	40						
	41						

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNOP

INSPECTOR

SHEET 6 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	Sand, SP, very fine to fine sand w/ trace silt & medium sand grey (10YR 5/1) wet sub angular, poorly graded, loose.					
	42						
	43						
	44	↓ increasing med sand to 48' bgs	SP				10/10' recovery 40-50'
	45						
	46						
	47						
	48	→ sand, SP, very fine sand w/ trace silt, NO med sand light grey (10YR 7/2)					
	49						
	50						

HTW DRILLING LOG

PROJECT MEAD FNOP

INSPECTOR NJK

HOLE NO. TA-BR-04

SHEET 7 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	Sand, SP, fine to very fine, poorly graded, light grey (10YR 7/2), sub angular, ~~per~~ wet. ~~Some~~ trace silt loose	SP				6/10' recovery 14:00
	51						
	52						
	53						
	54						
	55						
	56						
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNDP

INSPECTOR NJK

SHEET 8 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59						6/10 recovery
	60	Same as above ST Saturated					
	61						10/10' recovery
	62		SP				15:05
	63						8" casing to 70'
	64						
	65						
	66						
	67						
	68						

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNOP

INSPECTOR

SHEET 9 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68						
	69		SP				10/10
	70						
		SP: same as above but grey (10YR 6/2) saturated					
	71						10/10
	72						
	73		SP				
	74						
	75						
	76						
	77						

051601
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PROJECT MEAD FNOP

HOLE NO. TH-BR-04

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNOP

INSPECTOR

SHEET 10 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77						
	78		SP				10/10 (cont)
	79						
	80						
		Same as above					
	81						9/10' recovery
	82						16:45
	83						
	84						
	85						
	86						

PROJECT MEAD FNOP

HOLE NO. TH-BR-04

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNOP

INSPECTOR

SHEET 11 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	SAND, SW, well graded v. fine to medium sand w/ trace large sand. grey (10YR 6/2), SAT. sub angular to sub rounded	SW				9/10 cont.
	87						
	88	SAND, SP, poorly graded v. fine to fine sand. Trace silt. SAT. grey (10YR 6/2) sub angular to sub rounded	SP				16:50 stop drilling for the day
	89						
	90						07:50 11/29 Arrive on site Drillers working equipment. 8:45 start drilling
	91	Same as above	SP				
	92						10/10 recovery
	93						09:30
	94						
	95						

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT MEAD FNOP

INSPECTOR

SHEET 12 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	SP continued	SP				
	96	Gravel, GW, well graded gravel with sand and trace silt, rounded to subrounded, sat. loose, light brownish grey (10YR6/2)	GW				10/10
	97						
	98						SLUFF on top of recovered sample
	99						
	100						
	101						10/10
	102						101 15
	103						
	104						

051601
Form MRK-55-2

PROJECT MEAD FNOP

HOLE NO. TH-BR-04

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT

INSPECTOR

SHEET 13 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	104	SANDSTONE BEDROCK OMADI FM. yellow (10YR 7/8)	BR (SS)				
	105	fine grained sand poorly graded w/ some silt. Loose					
	106						
	107						
	108						
	109						
	110	SAME AS ABOVE					
	111						10/10 11:25
	112						
	113						

HTW DRILLING LOG

HOLE NO. TH-BR-04

PROJECT

INSPECTOR

SHEET 14 OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	113						
	114						10/10 cont
	115						
	116	sandstone, fine grained w/ some silt, loose poorly graded					
	117	WHITE (10YR 8/1)					
	118						
	119						
	120	SAME AS above					10/10 12:35
	121						
	122						

PROJECT

HOLE NO. TH-BR-04

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH BR04

PROJECT FNOP BEDROCK

INSPECTOR MHC

SHEET OF 15 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		WHITE (10YR 8/1)					
	123						
		----					10/10
	124	VERY PALE BROWN (10YR 8/3)					CONT
		SAME AS ABOVE					

	125	WHITE (10YR 8/1)					
		SAME AS ABOVE					
	126						
	127						
	128						
	129						
	130	----					
		SAME AS ABOVE					10/10

MRK FORM JUN 88 55-2

PROJECT FNOP

HOLE NO. TH BR-04

HTW DRILLING LOG

PROJECT: FNOP Bedrock
INSPECTOR: NJVL
HOLE NO.: THBR04
SHEET 1 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		WHITE (10YR 8/1)					
	132						10/10 CONT
	133		SS				
	134						
	135	SAME AS ABOVE grading to yellow (10YR 8/6) AT 138'					
	136						
	137						
	138	SHALE DARK yellowish Brown 139 (10YR 4/4) to MOTTLED WITH greyish Brown (10YR 5/2) STIFF, mod fissile	SHALE				

MRK FORM JUN 86 55-2

PROJECT: FNOP

HOLE NO.: THBR04

HTW DRILLING LOG

HOLE NO. THBR04

PROJECT FNOP BEDROCK

INSPECTOR NJK

SHEET 7 OF 7 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	141						
		SHALE / FISSILE dark grey (10YR 4/1) STIFF / HARD					
	142						
							10/10 RECOVERY 15:20
	143						
	144						
	145						
	146						
	147						
	148						PARTIAL RECOVERY?

MRK FORM JUN 89 55-2

PROJECT FNOP

HOLE NO. THBR04

HTW DRILLING LOG

HOLE NO.

PROJECT: FNOP BEDROCK

INSPECTOR: NTK

SHEET OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							CONT.
		SHALE: SAME AS ABOVE					
	150						
			SHALE				4/5
							150-154'
	151						PARTIAL RECOVERY?
	152						
							17:15
	153						
	154	Shale / mudstone with gravel up to 2" dia. dark gray (10YR 4/1)	SHALE W/ GRAVEL			↑ 11/29/12	154'
	155	SHALE: dark gray (10YR 4/1)	SHALE			11/30/12 ↓	0830 START DRILLING
	156	SILTSTONE light olive brown 2.5Y (5/3)	SILTSTONE				6/6 10:00
	157	Sandstone yellowish brown (10YR 5/6)	SANDSTONE				

MRK FORM JUN 88 55-2

PROJECT: FNOP

HOLE NO. TTB204

HTW DRILLING LOG

HOLE NO. TH BR04

PROJECT FNOP Bedrock

INSPECTOR NK

SHEET 9 OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	158	Sandstone as above: poorly consolidated	Sandstone				6/6 CONT
	159	SHALE: grey(10Y 5/2). Hard, mod fissile	Shale				
	160	SANDSTONE: poorly consolidated. Fine to very fine grained. Trace to no silt. light brownish grey (10YR 6/2)	9 6				Driller add 8" casing start 10:11 8" to 90' bgs complete at 13:00
	161						
	162						5/10' recovery 13:30
	163						
	164						
	165						
	166						
	167						

MRK FORM JUN 88 55-2

PROJECT FNOP

HOLE NO. TH BR04

HTW DRILLING LOG

HOLE NO. TMB R04

PROJECT FNOP Bedrock

INSPECTOR NJK

SHEET OF 10 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	168						5/10' recovery cont.
	169						
	170	--- sandstone, omadi, vfine to fine grained, loose, sat, pale yellow (2.5Y 7/3) to 172 feet					END DAY 17:00 12/11/12 ↓
	171						10/10 recovery 13:20
	172	Brownish yellow (10YR 6/8) ~~to~~ 172 – 176.1 feet	↑ SAMPLE #2 ↓				
	173						
	174						
	175						
	176	~~Pale~~ pale yellow (2.5Y 7/4 to 180'					
	177						

MRK FORM JUN 86 55-2

PROJECT FNOP

HOLE NO. TM BR 04

HTW DRILLING LOG

HOLE NO. TH BR04

PROJECT FNOP Bedrock | INSPECTOR NHL | SHEET OF 11 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	177						
		SANDSTONE AS ABOVE (176.1 - 180')					
	178						10/10 CONT.
	179						
	180	---- SANDSTONE, OMADI, v fine grained w/ some f. fine sand a trace med to coarse sand brownish yellow (10YR 6/6) loose					
	181						8/8 recovery 14:35
	182	--- — SHALE / MUDSTONE Firm, non-fissile brownish yellow (10YR 6/8)					
	183	SHALE (From 83.4') light greenish grey (5GY 7/10 GY) slightly fissile, hard, trace silt, damp to dry.					
	184						
	185						
	186						

HTW DRILLING LOG

HOLE NO. TMBR 04

PROJECT FNOP BEDROCK

INSPECTOR MK

SHEET OF 17 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	186	SHALE AS ABOVE	SHALE				
		LIMESTONE HARD, DRY WHITE (5Y 8/1)	LIMESTONE				2/2 RECOVERY 16\00
	187						
	188	END OF BORING TD= 188'					

MRK FORM JUN 89 55-2

PROJECT FNOP

HOLE NO. TMBR 04

HTW DRILLING LOG

HOLE NO.	TH-BR-05
SHEET 1 OF 16 SHEETS	
1. COMPANY NAME	Burns and McDonnell
2. DRILLING SUBCONTRACTOR	LAYNE
3. PROJECT	MEAD FNOP
4. LOCATION	
5. NAME OF DRILLER	KYLE
6. MANUFACTURER'S DESIGNATION OF DRILL	Track Sonic
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	6" Temporary Casing; 4 1/4" Sonic barrel sampler
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	11/20/12
11. DATE COMPLETED	11/27/12
12. OVERBURDEN THICKNESS	38.5
15. DEPTH GROUNDWATER ENCOUNTERED	5-6
13. DEPTH DRILLED INTO ROCK	125.5
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	134.0
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	X		10

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA	NA	NA	NA	NA	NA	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Abandoned	bentonite grout	NA	NA	Lewis Turner LT Burns and McDonnell

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, CL, with silt, black (10YR 2/1) damp, medium plasticity, stiff consistency, organic rich.					START 1118 WATER SOURCE: MAIN TREATMENT PLANT. LUBRICANT: WELL GARD BY JET LUBE
	1						
	2						Recovery 10/10 4 1/4" core barrel Advance 6" casing after sample.
	3	CLAY, CL, with silt, black (10YR 2/1) wet, high plasticity, very soft consistency, organic.					
	4						
	5						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 2 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SILT, ML, some clay, dark greenish gray (Gley 1 4/5GY) moist trace plasticity, soft consistency,					
	6						Recovery 10/10
	7						
	8						
	9	SAND, SP, trace silt, greenish gray (Gley 1 5/10Y) moist, fine grain subangular, poorly graded, loose. odor					
	10						1133 10'
							1147
	11						
	12	SILT, ML, some clay, black (10YR 2/1) wet, trace plasticity to medium, soft consistency, odor organic SOME PEAT (PT)					Recovery 10/10
	13						
	14						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner / YT7 BMCO

SHEET 3 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SILT, ~~MH~~ OL, some clay, black (10YR 2/1), wet, trace to medium plasticity, soft consistency, odor organic Some peat (PT)					
	15						
	16						Recovery 10/10
	17	SAND, SM, some silt, greenish gray (Gley 1 5/10y), wet, fine grain subangular, poorly graded Some plasticity, loose, odor					
	18						
	19						
	20						1815 20'
	21						
	22	SILT, OL, some fine sand, greenish gray (Gley 1 5/10y) damp, trace plasticity, soft consistency, odor					Recovery 10/10
	23						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMLD

SHEET 4 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SILT, OL, some fine sand, greenish gray (Gley1 5/10y) damp, trace plasticity, soft consistency, odor					
	24	SAND, SP, trace silt, greenish gray (Gley1 5/10y) wet, fine grain, subangular, poorly graded, loose.					
	25	SAND, SP, some silt and clay, greenish gray (Gley1 5/10y) damp, moist, fine grain, subangular, poorly graded, loose.					
	26	SILT, OL, some clay, very dark grayish brown (10YR 3/2), damp, trace plasticity, medium consistency, odor. Organics. some peat (PT)					Recovery 10/10
	27						
	28						
	29	SAND, SP, trace silt, gray (10YR 6/1) moist, fine grain, subangular, poorly graded, loose.					
	30						1230 30'
							1236
	31						
	32						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 5 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SAND, SP, trace silt, gray (10YR6/1) wet, fine grain trace coarse, sub-angular, poorly graded, loose					
	33						
	34						Recovery 10/10
	35						
	36						
	37	SAND, SW, some fine gravel, light brownish gray (10YR 6/2), wet, fine to coarse grain, subangular, well graded, loose.					
	38						
	39	SANDSTONE, weak, fine grain, dark yellowish orange (10YR 6/6), highly weathered, wet, subangular, loose					
		SHALE, moderate strength, silty, light olive gray (5Y 6/1) w/ dark yellowish orange (10YR 6/6) staining, slightly weathered, damp,		Box 1			
	40						1302 40'
		SANDSTONE, very weak, fine grain, dark yellowish orange (10YR 6/6) weathered, damp, loose.					
	41						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner JFT BMcD

SHEET 6 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SANDSTONE, very weak, fine grain subangular, dark yellowish orange (10YR 6/6) weathered, damp, loose					
	42			Box 1			
	43						Recovery 10/10
	44						
	45						1340 6" CASING AT 45'
	46	45.5-46.5 Interbedded shale, highly plastic <1/4" thick. Yellowish gray (5Y8/1) sand near this zone also lighter in color.					
	47						
	48						
	49			48.5 Box 2 Box 2			
	50						1332 50'

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner BMCD

SHEET 7 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	SANDSTONE, very weak, fine grain, subangular, dark yellowish orange (10YR 6/6), weathered, damp, loose.					1340
	51			Box 2			
	52						Recovery 10/10
	53						
	54						
	55						
	56	SHALE, moderate strength, olive gray (5Y 4/1), no signes of weathering, damp.					
	57						
		SANDSTONE. very weak, fine grain subangular, dark yellowish orange (10YR 6/6) damp, loose,					CASING AT 60'
	58	58.0 color becomes grayish orange (10YR 7/4)		Box 2			
				Box 3			
	59						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 8 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SANDSTONE, very weak, fine grain, sub angular, grayish orange (10YR 7/4) damp, loose.		Box 3			
	60	SANDSTONE, weak, fine grain, sub. angular, moderate brown (10YR 5/4) to dark yellowish orange (10YR 6/6) damp, loose. Some hard sandstone 8" pieces consolidated. Some limonite / hematite nodules.					1400 60' 1415
	61	6" of SANDSTONE, grayish orange (10YR 7/4 from ABOVE.					
		SANDSTONE, very weak, fine grain, subangular, dark yellowish orange (10YR 6/6), damp, loose.		Box 3			
	62						Recovery 10/10
	63						
	64						
	65						
	66	SANDSTONE - SAME AS ABOVE					
	67						
	68						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner

SHEET 9 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SANDSTONE, very weak, fine grain, Subangular, dark yellowish orange, (10YR 6/6), damp, loose		Box 3 Box 4			Recovery 10/10
	69						
	70						1505 70'
		SANDSTONE, weak, fine grain Subangular, moderate yellowish brown (10YR 5/4) to dark yellowish orange (10YR 6/6) damp, slightly consolidated very weak.					1527
	71			Box 4			
	72						Recovery 10/10
	73	Some limonite nodules up to 1.5" throughout.					
	74						
	75						
	76						
	77						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner FTI BMCD

SHEET 10 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	77	SANDSTONE, weak, fine grain, subangular, moderate yellowish brown (10YR 5/4), dark yellowish orange (10YR 6/6) damp, slightly consolidated.					
		SHALE, moderate strength, silty, yellowish gray (5Y 7/2) and medium bluish gray (5B 5/1) throughout, highly weathered, damp, trace plasticity		Box 4			Recovery 10/10
	78	SANDSTONE, weak, fine grain, subangular, moderate yellowish brown dark yellowish orange (10YR 5/4) (10YR 6/6) damp, slightly consolidated.					6" CASING TO 78'
	79						
	80						1611 80'
		SANDSTONE, very weak, fine grain trace medium, subangular, dark yellowish orange (10YR 6/6), damp loose.		Box 5			1620 11/21/12 Drive 6" CASING TO 80' 0830 clean boring 0837 Begin drilling 80-90'
	81						
	82						Had 30' of heave to clear
							Recovery 10/10
	83						
	84						
	85						
	86						

PROJECT MEAD FNOP

HOLE NO. TH-BR-05

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner YF BMCD

SHEET 11 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	86	SANDSTONE, very weak, fine grain trace medium, subangular, dark yellowish orange (10 YR 6/6), damp loose.					
	87			Box 5			Recovery 10/10
	88	SANDSTONE, weak, fine grain, some medium to coarse, subangular, dark yellowish orange (10 YR 6/6) to moderate yellowish brown (10 YR 5/4), damp loose, some limonite gravel.					
	89						Stop for DAY 1021 Drillers offsite for Holiday, will continue on 11/26
	90						1017 90'
		SANDSTONE, weak, fine grain, some medium to coarse, subangular, dusky yellow (5Y 6/4) damp, loose. trace silt and clay.					11/26/17 1223 Drive 6" casing to 90' Clear casing. 1310 START Drilling 90-100'
	91						
				Box 6			
	92						Recovery 10/10
	93	some weathered shale lenses <0.5"					
	94						
		SHALE, moderate strength, light olive gray (5Y 5/2) and dark yellowish orange (10 YR 6/6) damp, highly weathered, silt/sandy.					
	95						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner YT BMCD

SHEET 12 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	95	SHALE, moderate strength, silty/sandy light olive grey and dark yellowish orange (10YR 6/6) and (5Y 5/2), damp highly weathered.					
	96						Recovery 10/10
	97			Box 6			
	98	SANDSTONE, very weak, fine grain. Subangular, grayish orange (10YR 7/4) damp, loose. Top 5 inches is very pale orange (10YR 8/2).					CASING DOWN TO 100'
	99						
	100						1376 100' / 1350
	101	SANDSTONE, weak, fine grain subangular, darky yellowish orange (10YR 6/6) damp, loose		Box 7			
	102						Recovery 10/10
	103						
	104						

PROJECT MEAD FNOP

HOLE NO. TH-BR-05

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 13 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	104	SANDSTONE, weak, fine grain, subangular, dark yellowish orange (10YR 6/6), damp, loose.					
	105						
				Box 7			
	106						Recovery 10/10
	107						
	108						
		SANDSTONE, weak, fine grain subangular, dark yellowish ~~brown~~ orange (10YR 6/6) to moderate yellowish brown (10YR 5/4), damp, loose, trace limonite nodules.					6" Casing driven to 110'
	109						
							1415 110'
	110						1440
	111			Box 8			Recovery 10/10
	112						
		SANDSTONE, weak, fine grain, subangular, moderate brown (5YR 4/4), damp, slight consolidation.					
	113						

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 14 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	113	SANDSTONE, weak, fine grain, Subangular, moderate yellowish orange (10YR 6/6), damp, loose,					
	114	some fine to coarse gravel round) to sub angular, no reaction to HCl. 114 - 115'					
	115			Box 8			Recovery 4/10
	116						
	117						
	118	SANDSTONE with gravel, weak, fine grain, gravel is fine grain, Subangular, moderate yellowish orange (10YR 6/6), damp, loose.					6" casing At 120'
	119	6" LAYER OF yellowish gray (5Y 7/2) with higher gravel content. At 119'					
	120						1509 120'
		SANDSTONE, weak, fine grain, subangular, yellowish gray (5Y 7/2), damp, loose, trace cementation.					1535
	121	SHALE, moderate strength, silty, pale olive (10Y 6/2), highly weathered damp, limonite staining throughout.		Box 9			Recovery 5/5
	122						

PROJECT MEAD FNOP

HOLE NO. TH-BR-05

051601
Form MRK-55-2

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNDP

INSPECTOR Lewis Turner YT BMCD

SHEET 15 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	122	SHALE, Strong, dusky yellow green (5GY 5/2), no apparent weathering, damp.					
	123	SHALE, Strong, dark gray (N3), non weathered, damp.		Box 9			Recovery 5/5
	124	Becomes medium dark gray (N4) 124-124.6.					11/26/12 Stop for Day at 125'
	125	SHALE, very weak, silty, greenish gray (5G 6/1), slightly weathered, damp, trace plasticity.					1631 125'
	126	SHALE, Strong, grayish brown (5YR 3/2), non weathered, damp. small greenish gray areas throughout (5GY 6/1).					0825 11/27/12 START Drilling AT 125'
	127			Box 9			Recovery 5/5
	128						
	129						
	130						0909 130'
	131	SHALE, Strong, silty, greenish gray (5G 5/2), slightly weathered, damp.		Box 10			1001

HTW DRILLING LOG

HOLE NO. TH-BR-05

PROJECT MEAD FNOP

INSPECTOR Lewis Turner LT BMCD

SHEET 16 OF 16 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	131	SHALE, very strong, silty, grayish green (5G 5/2) to dusky yellow green (5GY 5/2) when damp. Damp to dry, non weathered.		Box 10			Recovery 2/4
	132	Limestone, powdered by sonic drilling, very light gray (N8) to Yellowish gray (5Y 8/1). Strong reaction to Hcl.		Lost 2' of recovery			powder from 132' reacts with Hcl
	133						
	134						1121 134'
		Bottom of boring - Limestone reached At 132'. ~~te~~					1135 prepare to abandon boring with grout.
	135						1327 Boring grouted to 5.0' BGS 6" Casing 130' TD = 134'

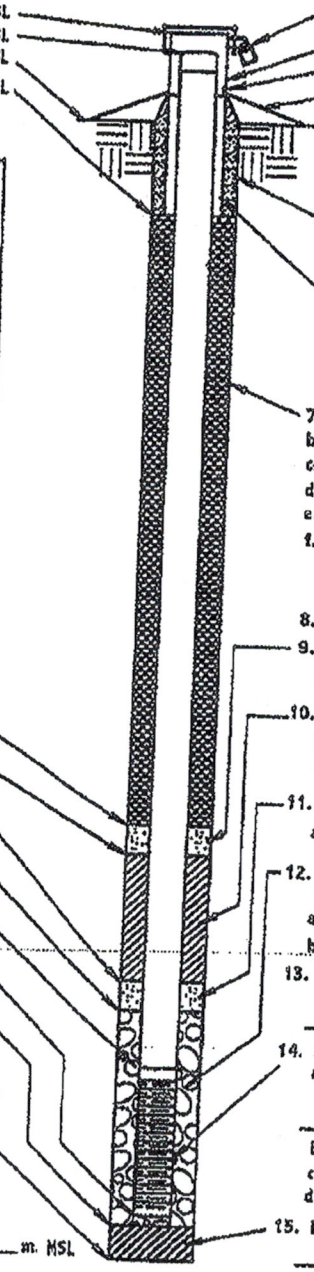
Appendix C

Monitoring Well Construction Diagrams

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-145B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 09 0492 Long. 96 27 0150 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 11/13/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NW¼ of SE¼ of Sec. 30 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 11/13/12
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) David Dander (ECC) Sam Wolf (Petersen drilling)
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1158.00 m. MSL
B. Well casing, top elevation 1157.57 m. MSL
C. Land surface elevation 1158.00 m. MSL
D. Surface seal, bottom 1156.50 m. TOC or ____ m. MSL ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12 mm. in.
   b. Length: 10 m. ft.
4. Drainage port(s) ☐ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☒ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☒ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 11 bags/m³ volume added for any of the above
   f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. bentonite slurry seal Other ☒
11. Secondary Filter 30/70 ☒ Yes ☐ No
    a. Volume added ____ m³ 1/50 Bags/Size lb
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filters 20/40
    b. Volume added ____ m³ 6/50 Bags/Size lb
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material:
    a. Screen type: PVC Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer Premium Perma Flow
    c. Slot size: 0.010 in.
    d. Slotted length: 10 ft
15. Backfill material (below filter pack): None ☒ Other ☐ Bentonite chips

16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐

19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

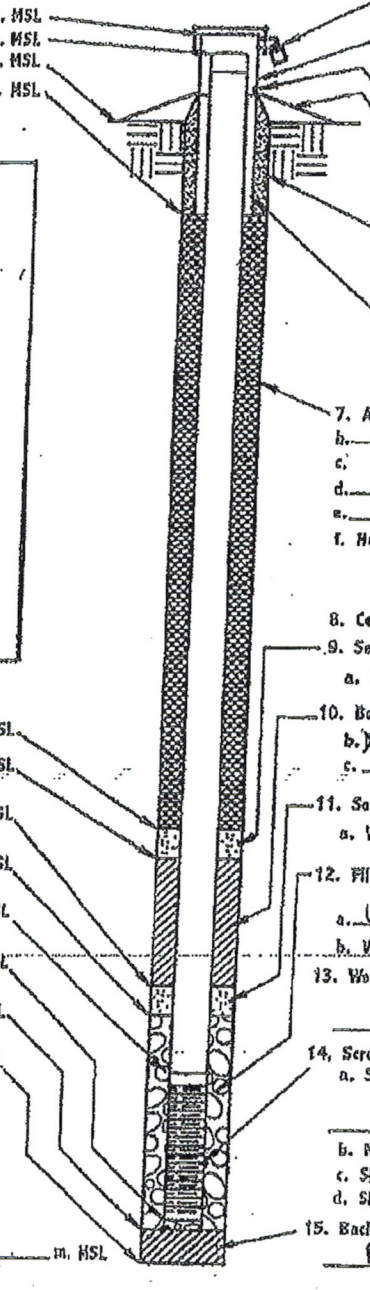
21. Source of water (attach analysis):
main ground water treatment plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 fbgs m. TOC or ____ m. MSL
G. Secondary filter, top 48.0 fbgs m. TOC or ____ m. MSL
H. Primary filter, top 50.0 fbgs m. TOC or ____ m. MSL
I. Screen joint, top 52.0 fbgs m. TOC or ____ m. MSL
J. Well bottom 62.0 fbgs m. TOC or ____ m. MSL
K. Filter pack, bottom 63.0 fbgs m. TOC or ____ m. MSL
L. Borehole, bottom 63.0 fbgs m. TOC or ____ m. MSL
M. Borehole, diameter 7.25 inch mm.
N. O.D. well casing 2.375 inch mm.
O. I.D. well casing 2.047 inch mm.
P. 24-hr water level after completion ____ fbgs m. TOC or ____ m. MSL

Facility/Project Name: Mead FNDP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-148A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 09 45.8 Long. 96 26 22.70 or	Date Well Installed (Start): 10-24-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 10-24-12
Well Distance From Waste/Source Boundary: .5 Mile +	Section Location of Waste/Source: SW 1/4 of SW 1/4 of Sec. 20 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Sam Woodland
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	Burns & McDonnell

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1158.03 m. MSL
B. Well casing, top elevation 1152.59 m. MSL
C. Land surface elevation 1152.02 m. MSL
D. Surface seal, bottom 1156.50 m. TOC or ____ m. MSL (ft)



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☐ — Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☒ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒
    c. ____ Other ☐
11. Secondary Filter X Yes No
    a. Volume added ____ m³ .5/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, Filtersil 12/20
    b. Volume added ____ m³ 5.5/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Sch 40
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0.____ in.
    d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐ Other ☐ — Bentonite chips

16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☐ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☐ — Sonic

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis): Main Treatment Plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 88.0' m. TOC (BGS) or ____ m. MSL
G. Secondary filter, top 90.0' m. TOC (BGS) or ____ m. MSL
H. Primary filter, top 93.0' m. TOC (BGS) or ____ m. MSL
I. Screen joint, top 94.7 m. TOC (BGS) or ____ m. MSL
J. Well bottom 105.0' m. TOC (BGS) or ____ m. MSL
K. Filter pack, bottom 107.0' m. TOC (BGS) or ____ m. MSL
L. Borehole, bottom 111.0' m. TOC (BGS) or ____ m. MSL
M. Borehole, diameter 4" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Well Distance From Waste/Source Boundary: Mile +

Maximum Depth of Frost Penetration (estimated): 18"

Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.

Grid Origin Location: Lat. 47 09 25.54 Long. 96 24 22.21 or — St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: SW¼ of NW¼ of Sec. 27 T. 14 N.R. 9 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known

Well Number: MW-155 B

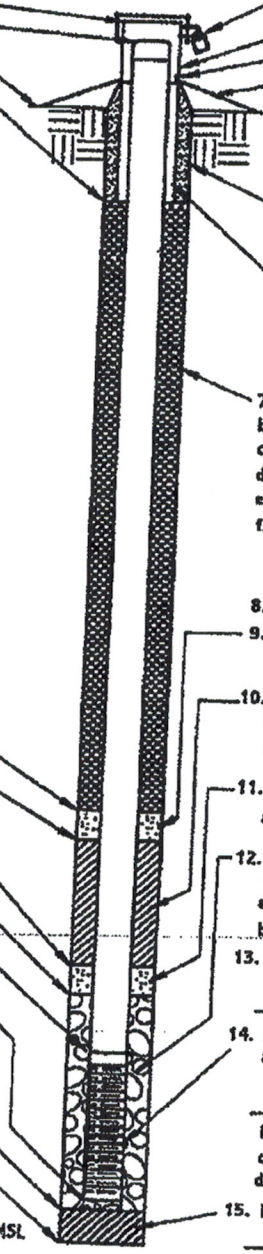
Date Well Installed (Start): 11/12/12

Date Well Installed (Completed): 11/12/12

Well Installed By: (Person's Name & Firm) Lewis Turner (BMCD); Sam Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1138.74 m. MSL
B. Well casing, top elevation 1138.28 m. MSL
C. Land surface elevation 1138.74 m. MSL
D. Surface seal, bottom 1.13720 m. TOC or ____ m. MSL ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12 mm.
   b. Length: 18 m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil; Bentonite ☐ Cement ☐ Other ☐
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. 8 Bags m³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added 1 bags 1/50 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filter Sil, 30/40
    b. Volume added ____ m³ 6/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer: Premium-Perma-Flow
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft.
15. Backfill material (below filter pack): None ☒ Other ☐ Bentonite Chips

16. USCS classification of soil near screen:
    GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): MAIN TREATMENT PLANT

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 ft BGS m. TOC or ____ m. MSL
G. Secondary filter, top 50.0 ft BGS m. TOC or ____ m. MSL
H. Primary filter, top 52.0 ft BGS m. TOC or ____ m. MSL
I. Screen joint, top 54.8 ft BGS m. TOC or ____ m. MSL
J. Well bottom 64.80 ft BGS m. TOC or ____ m. MSL
K. Filter pack, bottom 65 ft BGS m. TOC or ____ m. MSL
L. Borehole, bottom 65 ft BGS m. TOC or ____ m. MSL
M. Borehole, diameter 7¼ in. mm.
N. O.D. well casing 2.375 in mm.
O. I.D. well casing 2.047 in mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Well Distance From Waste/Source Boundary: 80'

Maximum Depth of Frost Penetration (estimated): 18

Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.

Grid Origin Location: Lat. 41 08 36.38 Long. 96 28 46.20 or St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 36 T. 14 N. R. 8 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient ☒ Downgradient; s ☐ Sidegradient; n ☐ Not Known

Well Number: MW-160 A

Date Well Installed (Start): 10-23-12

Date Well Installed (Completed): 10-24-12

Well Installed By: (Person's Name & Firm) Boart Longyear, Burns and McDonnell

Note: Use top of casing (TOC) for all depth measurements.

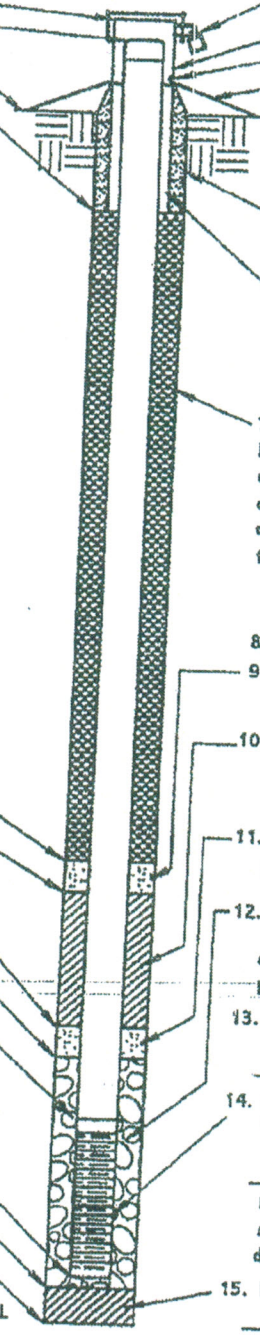
A. Protective casing, top elevation 1154.92 m. MSL

B. Well casing, top elevation 1154.35 m. MSL

C. Land surface elevation 1154.92 m. MSL

D. Surface seal, bottom 1153.42 m. TOC or ____ m. MSL

1.5 Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12 ~~mm.~~ in
   b. Length: 18 ~~m.~~ ft
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☐ — 50:1
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. ____ m^3 volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m^3 NA Bags/Size
10. Bentonite seal: a. Bentonite granules ☐ Bentonite pellets ☐
    b. ☐ ¼in. ☒ ⅜in. ☐ ½in.
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m^3 1½x50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, filtersil, 12/20
    b. Volume added ____ m^3 4x50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Schedule 40 PVC
    a. Screen type: Factory cut ☐ Continuous slot ☐ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0.020 in.
    d. Slotted length: 10.01 m.
15. Backfill material (below filter pack): None ☐ Other ☒ — Sand

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☐ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☐ — Sonic
19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main treatment plant.

E. Secondary filter, top NA m. TOC or ____ m. MSL

F. Bentonite seal, top 106 to 5 feet m. TOC or ____ m. MSL

G. Secondary filter, top 108.0 BGS m. TOC or ____ m. MSL

H. Primary filter, top 110.5 BGS m. TOC or ____ m. MSL

I. Screen joint, top 113.01 BGS m. TOC or ____ m. MSL

J. Well bottom 123.02 ft BGS m. TOC or ____ m. MSL

K. Filter pack, bottom 124 BGS m. TOC or ____ m. MSL

L. Borehole, bottom 133 BGS m. TOC or ____ m. MSL

M. Borehole, diameter 6 ~~mm.~~ in

N. O.D. well casing 2 ~~mm.~~ in

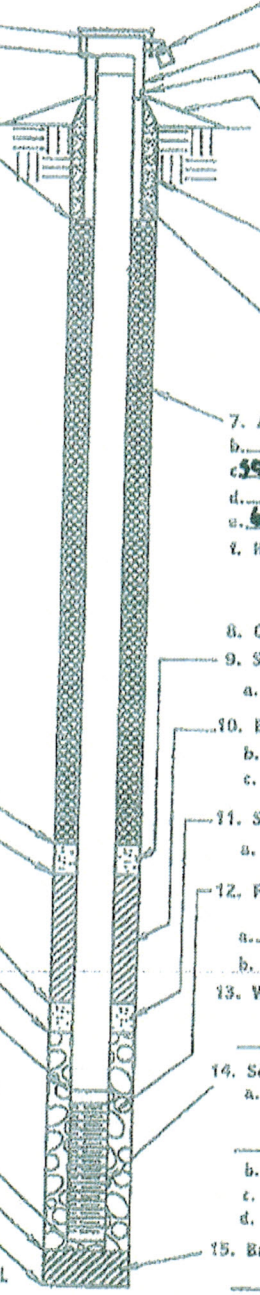
O. I.D. well casing ____ mm.

P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-1608
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 36.38 Long. 96 28 46.20 or	Date Well Installed (Start): 11-15-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11-15-12
Well Distance From Waste/Source Boundary: 80'	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 36 T. 14 N.R. 8 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☒ Downgradient, n ☐ Not Known	Sam Wolf (Petersen)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1154.79 m. MSL
B. Well casing, top elevation 1154.17 m. MSL
C. Land surface elevation 1154.79 m. MSL
D. Surface seal, bottom 1153.29 m. TOC or ____ m. MSL



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" in.
   b. Length: 18" in.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/4 lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ % Bentonite ... Bentonite-cement grout ☐
   e. 6 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ 1/4in. ☐ 3/8in. ☐ 1/2in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☐ Yes ☐ No
    a. Volume added 1 BAG m³ 30/40 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. UNIMIN FILTERSIL 20/40
    b. Volume added 5 BAGS m³ 50 lbs Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer PREMIUM-PERM-FLOW
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft. in.
15. Backfill material (below filter pack): None ☒ Other ☐ Sand

16. USCS classification of soil near screen:
    GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): MAIN TREATMENT PLANT

E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 77.5 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 80 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 82.8 ft bgs m. TOC or ____ m. MSL
J. Well bottom 92.8 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 93 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 93 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 9 1/4 in. mm.
N. O.D. well casing 2.375 in. mm.
O. I.D. well casing 2.047 in. mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Well Distance From Waste/Source Boundary: mile +

Maximum Depth of Frost Penetration (estimated): 18"

Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.

Grid Origin Location: Lat. 41 09 32.71 Long. 96 28 56.40 or St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: NW 1/4 of NW 1/4 of Sec. 25 T. 14 N.R. 8 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known

Well Number: MW-161A

Date Well Installed (Start): 10-24-12

Date Well Installed (Completed): 10-24-12

Well Installed By: (Person's Name & Firm) Boart Longyear / Burns and McDonnell

Note: Use top of casing (TOC) for all depth measurements.

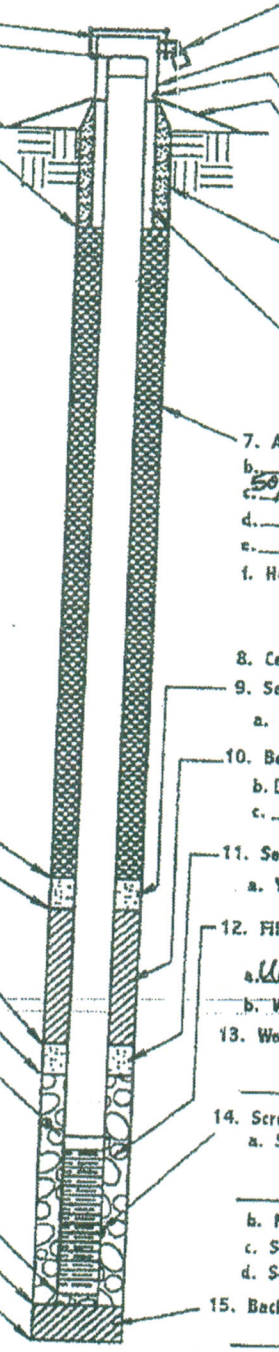
A. Protective casing, top elevation 1166.97 m. MSL

B. Well casing, top elevation 1166.47 m. MSL

C. Land surface elevation 1166.97 m. MSL

D. Surface seal, bottom 1164.47 m. TOC or ____ m. MSL

Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 15" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒
   Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 lbs/gal mud weight ..... Bentonite slurry ☐
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2 x 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, Filtersil, 12/20
    b. Volume added ____ m³ 4 x 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☐ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Schedule 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0.020 in.
    d. Slotted length: 10.01 m.
15. Backfill material (below filter pack): None ☐ Other ☒
    Sand

16. USCS classification of soil near screen:
    GP ☐ GM ☒ GC ☐ GW ☒ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☒
    Sonic
19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    main treatment plant

E. Secondary filter, top ____ m. TOC or ____ m. MSL

F. Bentonite seal, top 5 BGS m. TOC or ____ m. MSL

G. Secondary filter, top 101 BGS m. TOC or ____ m. MSL

H. Primary filter, top 103 BGS m. TOC or ____ m. MSL

I. Screen joint, top 105.40 BGS m. TOC or ____ m. MSL

J. Well bottom 115.40 BGS m. TOC or ____ m. MSL

K. Filter pack, bottom 116 BGS m. TOC or ____ m. MSL

L. Borehole, bottom 135 BGS m. TOC or ____ m. MSL

M. Borehole, diameter 6 in mm.

N. O.D. well casing 2 in mm.

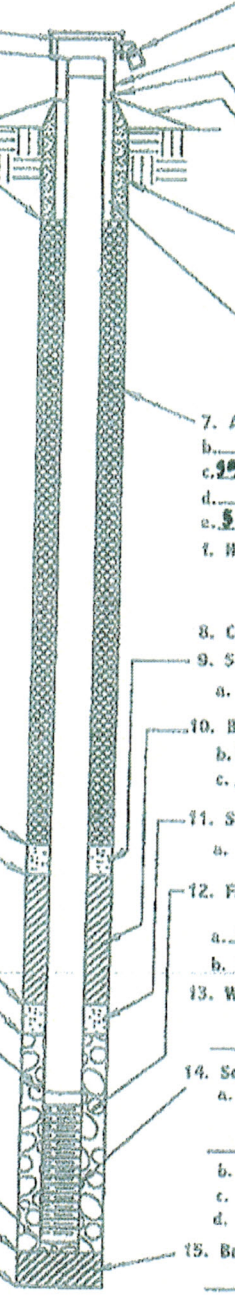
O. I.D. well casing ____ mm.

P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-161B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 09 37.71 Long. 96 28 56.40 or —	Date Well Installed (Start): 11-15-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11-15-12
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: NW¼ of NW¼ of Sec. 25 T. 14 N. R. 8 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCO)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	Sam Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1167.46 m. MSL
B. Well casing, top elevation 1162.00 m. MSL
C. Land surface elevation 1167.46 m. MSL
D. Surface seal, bottom 1165.9 m. TOC or ____ m. MSL
FT.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: ____ mm.
   b. Length: ____ m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒
   Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 9.0/14 lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ % Bentonite ..... Bentonite-cement grout ☐
   e. 5 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m.³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added 1 BAG m.³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. UNIMIN FILTERSIL 20/40
    b. Volume added 6 BAGS m.³ 50 lbs Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer PREMIUM-PERM-FLOW
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft m.
15. Backfill material (below filter pack): None ☒ Other ☐
    Sand

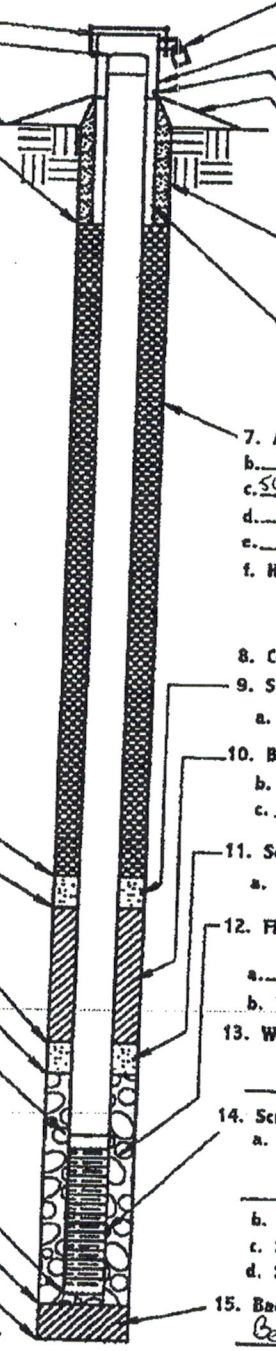
16. USCS classification of soil near screen:
    GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    MAIN TREATMENT PLANT

E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 73 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 71 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 74.8 ft bgs m. TOC or ____ m. MSL
J. Well bottom 84.8 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 85 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 85 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7¼ in mm.
N. O.D. well casing 2.375 in mm.
O. I.D. well casing 2.047 in mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FDOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-162 A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 50.82 Long. 96 26 50.33 or St. Plane — m. N. — m. E.	Date Well Installed (Start): 10-23-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: SE ¼ of SE ¼ of Sec. 30 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed):
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Sam Woodland, Burns + McDonnell
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1149.38 m. MSL
B. Well casing, top elevation 1148.9 m. MSL
C. Land surface elevation 1149.33 m. MSL
D. Surface seal, bottom 1147.83 m. TOC or ____ m. MSL TH



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil — Bentonite ☐ Cement ☐ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☐
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m³ NA Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filtersil 12/20
    b. Volume added ____ m³ 5 x 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Sch 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer Environmental Manufacturing
    c. Slot size: 0. ____ in.
    d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐ Other ☐ Bentonite Chips

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☐ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☒ Sonic
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main Treatment Plant

E. Secondary filter, top 5.0 m. ~~TOC~~ BGS or ____ m. MSL
F. Bentonite seal, top 67.5 m. ~~TOC~~ BGS or ____ m. MSL
G. Secondary filter, top 69.9 m. ~~TOC~~ BGS or ____ m. MSL
H. Primary filter, top 71.9 m. ~~TOC~~ BGS or ____ m. MSL
I. Screen joint, top 73.7 m. ~~TOC~~ BGS or ____ m. MSL
J. Well bottom 84.0 m. ~~TOC~~ BGS or ____ m. MSL
K. Filter pack, bottom 87.0 m. ~~TOC~~ BGS or ____ m. MSL
L. Borehole, bottom 105.0 m. ~~TOC~~ BGS or ____ m. MSL
M. Borehole, diameter 6" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Well Distance From Waste/Source Boundary: Mile +

Maximum Depth of Frost Penetration (estimated): 18"

Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.

Grid Origin Location: Lat. 41 ° 52.71 Long. 86 26 41.50 or

St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: SE ¼ of SE ¼ of Sec. 30 T. 14 N.R. 9 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known

Well Number: MW-163A

Date Well Installed (Start): 11-15-12

Date Well Installed (Completed): 11-15-12

Well Installed By: (Person's Name & Firm) Jay Kolb (BMED); Sam Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

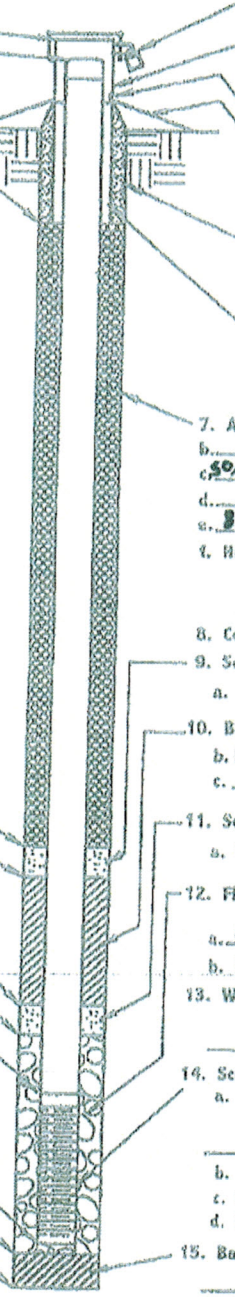
A. Protective casing, top elevation 1160.26 m. MSL

B. Well casing, top elevation 1159.74 m. MSL

C. Land surface elevation 1160.26 m. MSL

D. Surface seal, bottom 1158.76 m. TOC or ____ m. MSL

ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: ____ mm.
   b. Length: ____ m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil — Bentonite ☐ Cement ☐ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ % Bentonite ... Bentonite-cement grout ☐
   e. 3 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added 1 BAG m.³ 30/70 Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☐ Yes ☐ No
    a. Volume added ____ m.³ ____ Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. NATORAL SAND
    b. Volume added ____ m.³ ____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer PREMIUM-PERM-FLOW
    c. Slot size: 0.020 in.
    d. Slotted length: 10.00 m.
15. Backfill material (below filter pack): Sand — None ☒ Other ☐

16. USCS classification of soil near screen:
    GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): MAIN TREATMENT PLANT

E. Secondary filter, top ____ m. TOC or ____ m. MSL

F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL

G. Secondary filter, top 95 ft bgs m. TOC or ____ m. MSL

H. Primary filter, top 97 ft bgs m. TOC or ____ m. MSL

I. Screen joint, top 99.7 ft bgs m. TOC or ____ m. MSL

J. Well bottom 109.7 ft bgs m. TOC or ____ m. MSL

K. Filter pack, bottom 110 ft bgs m. TOC or ____ m. MSL

L. Borehole, bottom 110 ft bgs m. TOC or ____ m. MSL

M. Borehole, diameter 7¼ in. mm.

N. O.D. well casing 2.375 in. mm.

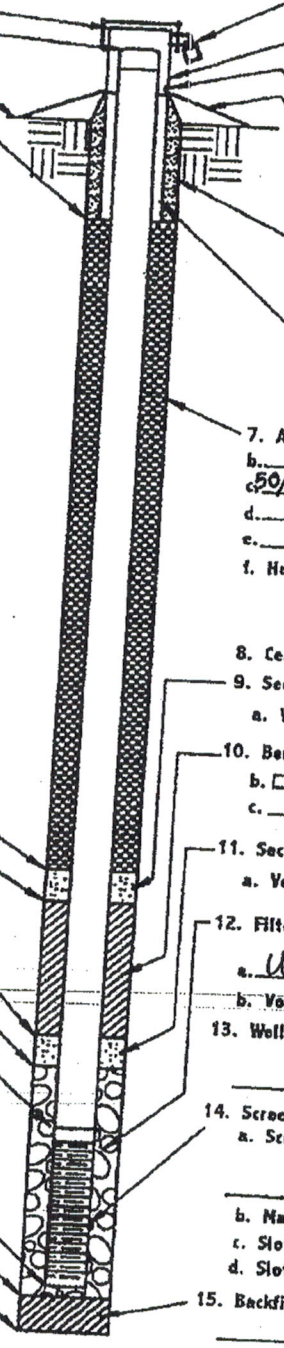
O. I.D. well casing 2.047 in. mm.

P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-164A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 08 46.56 Long. 96 22 01.12 or	Date Well Installed (Start): 10-23-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 10-23-12
Well Distance From Waste/Source Boundary: mile +	Section Location of Waste/Source: NW¼ of NE¼ of Sec. 31 T. 14 N.R. ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm): Boart Longyear
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1150.50 m. MSL
B. Well casing, top elevation 1150.10 m. MSL
C. Land surface elevation 1150.50 m. MSL
D. Surface seal, bottom 114800 m. TOC or ____ m. MSL FT.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil ____ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m³ N/A Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☒ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2X50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimen, Filtersil, 12/20
    b. Volume added ____ m³ 4x50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: schedule 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0.020 in.
    d. Slotted length: 10 ft. m.
15. Backfill material (below filter pack): None ☐ Sand ____ Other ☒

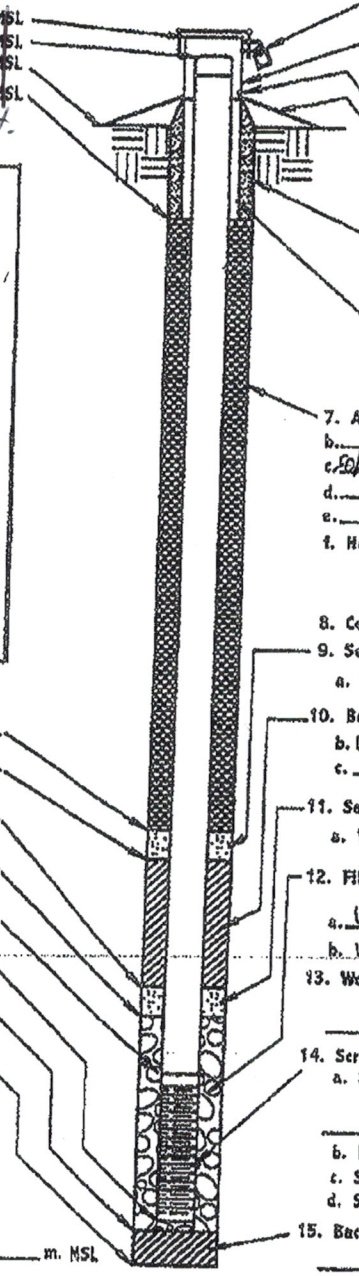
16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic ____ Other ☒
19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main treatment plant

E. Secondary filter, top N/A m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft. BGS m. TOC or ____ m. MSL
G. Secondary filter, top 84 ft. BGS m. TOC or ____ m. MSL
H. Primary filter, top 86 ft. BGS m. TOC or ____ m. MSL
I. Screen joint, top ____ m. TOC or ____ m. MSL
J. Well bottom ____ m. TOC or ____ m. MSL
K. Filter pack, bottom 103 ft. BGS m. TOC or ____ m. MSL
L. Borehole, bottom 103 ft. BGS m. TOC or ____ m. MSL
M. Borehole, diameter 6 mm. in.
N. O.D. well casing 2 mm. in.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-165B
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 08 42.95 Long. 96 26 55.38 or	Date Well Installed (Start): 11/14/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11/14/12
Well Distance From Waste/Source Boundary: mile +	Section Location of Waste/Source: SW ¼ of SE ¼ of Sec. 30 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) David Dandor (FCC) Sam Wolf (Peterson drilling)
Maximum Depth of Frost Penetration (estimated): 78	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1149.31 m. MSL
B. Well casing, top elevation 1148.88 m. MSL
C. Land surface elevation 1149.31 m. MSL
D. Surface seal, bottom 1147.81 m. TOC or ____ m. MSL



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12 mm.
   b. Length: 18 m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ % Bentonite ... Bentonite-cement grout ☐
   e. ____ m³ volume added for any of the above
   f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. bentonite slurry seal Other ☒
11. Secondary Filter 30/70 ☒ Yes ☐ No
    a. Volume added ____ m³ 150 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filter-S 20/40
    b. Volume added ____ m³ 150 Bags/Size lb
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material:
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer Premium Permaflow
    c. Slot size: 0.010 in.
    d. Slotted length: 10 m.ft
15. Backfill material (below filter pack): None ☒ Other ☐ Sand

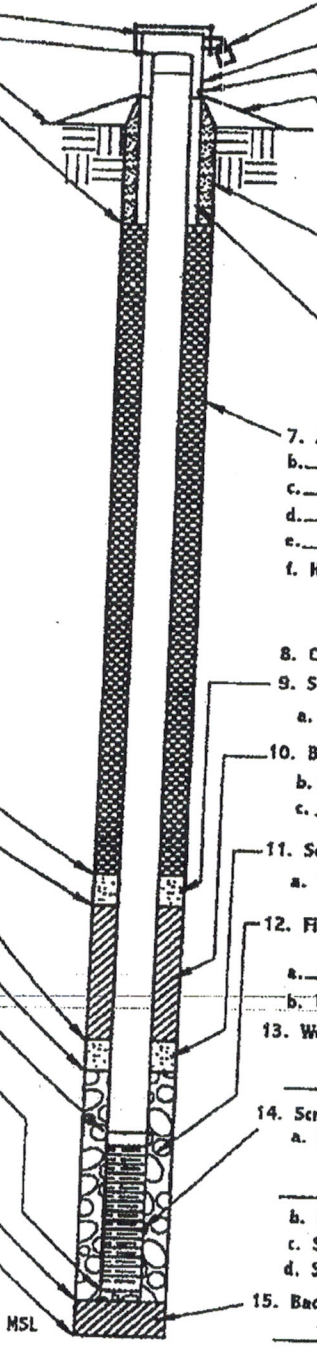
16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): main ground water treatment plant

E. Secondary filter, top NA ~~m. TOC~~ or ____ m. MSL
F. Bentonite seal, top 5.0 ~~m. TOC~~ fbgs or ____ m. MSL
G. Secondary filter, top 70.0 ~~m. TOC~~ fbgs or ____ m. MSL
H. Primary filter, top 72.0 ~~m. TOC~~ fbgs or ____ m. MSL
I. Screen joint, top 74.0 ~~m. TOC~~ fbgs or ____ m. MSL
J. Well bottom 84.0 ~~m. TOC~~ fbgs or ____ m. MSL
K. Filter pack, bottom 85.0 ~~m. TOC~~ fbgs or ____ m. MSL
L. Borehole, bottom 85.0 ~~m. TOC~~ fbgs or ____ m. MSL
M. Borehole, diameter 7.25 ~~mm.~~ inch
N. O.D. well casing 2.375 ~~mm.~~ inch
O. I.D. well casing 2.047 ~~mm.~~ inch
P. 24-hr water level after completion ____ ~~m. TOC~~ fbgs or ____ m. MSL

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-1066A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 29.73 Long. 96 26 45.77 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 11/15/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: SE ¼ of NE ¼ of Sec. 31, T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 11/15/12
Well Distance From Waste/Source Boundary: 1 mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Boart Longyear
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1151.21 m. MSL
B. Well casing, top elevation 1150.73 m. MSL
C. Land surface elevation 1151.21 m. MSL
D. Surface seal, bottom 1149.71 m. TOC or ____ m. MSL
Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m³ NA Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2 X 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, Filtrasil, 12/20
    b. Volume added ____ m³ 4X50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: S.S. 40 PC
    a. Screen type: Factory cut ☐ Continuous slot ☐ ____ Other ☐
    b. Manufacturer E&I
    c. Slot size: 0.02 in.
    d. Slotted length: 10 Ft m.
15. Backfill material (below filter pack): None ☐ Sand Other ☒

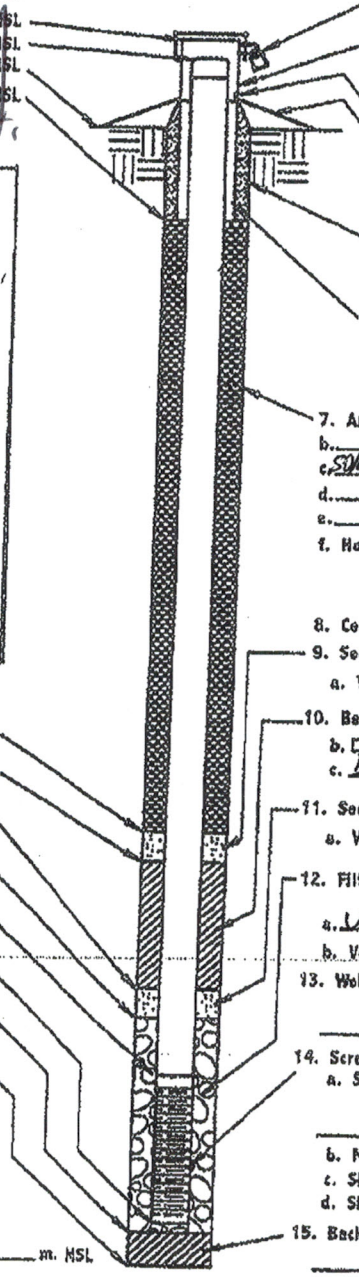
16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☐ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☒
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☐ No
    Describe ____
21. Source of water (attach analysis): Main Plant

E. Secondary filter, top 5.0' m. ~~TOC~~ BGS or ____ m. MSL
F. Bentonite seal, top 85' m. ~~TOC~~ BGS or ____ m. MSL
G. Secondary filter, top 87' m. ~~TOC~~ BGS or ____ m. MSL
H. Primary filter, top 89.5 m. ~~TOC~~ BGS or ____ m. MSL
I. Screen joint, top 91.7' m. ~~TOC~~ BGS or ____ m. MSL
J. Well bottom 102' m. ~~TOC~~ BGS or ____ m. MSL
K. Filter pack, bottom 104' m. ~~TOC~~ BGS or ____ m. MSL
L. Borehole, bottom 4" m. TOC or ____ m. MSL
M. Borehole, diameter 2" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-166B
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 02 21.20 Long. 96 26 45.77 or	Date Well Installed (Start): 11/14/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11/14/12
Well Distance From Waste/Source Boundary: mile +	Section Location of Waste/Source: SE ¼ of NW ¼ of Sec. 31 T. 14 N. R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) David Dander (EEI) Sam Wolf (Peterson drilling)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1151.35 m. MSL
B. Well casing, top elevation 1150.81 m. MSL
C. Land surface elevation 1151.35 m. MSL
D. Surface seal, bottom 1149.75 m. TOC or ____ m. MSL ft



16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐

19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis): main ground water treatment plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 fbgs m. TOC or ____ m. MSL
G. Secondary filter, top 47.0 fbgs m. TOC or ____ m. MSL
H. Primary filter, top 49.0 fbgs m. TOC or ____ m. MSL
I. Screen joint, top 51.0 fbgs m. TOC or ____ m. MSL
J. Well bottom 61.0 fbgs m. TOC or ____ m. MSL
K. Filter pack, bottom 62.0 fbgs m. TOC or ____ m. MSL
L. Borehole, bottom 62.0 fbgs m. TOC or ____ m. MSL
M. Borehole, diameter 7.25 inch mm.
N. O.D. well casing 2.375 inch mm.
O. I.D. well casing 2.047 inch mm.
P. 24-hr water level after completion ____ fbgs m. TOC or ____ m. MSL

1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
a. Inside diameter: 12" mm.
b. Length: 10" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
c. 50% Lbs/gal mud weight ..... Bentonite slurry ☒
d. ____ % Bentonite ..... Bentonite-cement grout ☐
e. ____ m.³ volume added for any of the above
f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
c. bentonite slurry seal Other ☒
11. Secondary Filter 30/70 ☒ Yes ☐ No
a. Volume added ____ m³ 150 lb Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
a. Unimin Filter 20/40
b. Volume added ____ m³ 150 lb Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: PVC sch 40
a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
b. Manufacturer Premium Permaflow
c. Slot size: 0.010 in.
d. Slotted length: 10 mm.
15. Backfill material (below filter pack): None ☒ Other ☐ Sand

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-167 A
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 28 36.38 Long. 96 26 35.74 or	Date Well Installed (Start): 10-27-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane — m. N. — m. E.	Date Well Installed (Completed): 10-27-12
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: NW 1/4 of NW 1/4 of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Sam Woodland
Maximum Depth of Frost Penetration (estimated): 8"	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	Burns & McDonnell

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1148.15 m. MSL
B. Well casing, top elevation 1147.65 m. MSL
C. Land surface elevation 1148.15 m. MSL
D. Surface seal, bottom 1146.65 m. TOC or ____ m. MSL

Ft.

16. USCS classification of soil near screen:
GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☐ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☐

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis):
Main Treatment Plant

E. Secondary filter, top 0.0 m. TOC or ____ m. MSL
F. Bentonite seal, top 79.0 m. TOC or ____ m. MSL
G. Secondary filter, top 82.0 m. TOC or ____ m. MSL
H. Primary filter, top 84.8 m. BGS TOC or ____ m. MSL
I. Screen joint, top 86.7' m. BGS TOC or ____ m. MSL
J. Well bottom 97.0' m. BGS TOC or ____ m. MSL
K. Filter pack, bottom 98.0' m. BGS TOC or ____ m. MSL
L. Borehole, bottom 105.0' m. BGS TOC or ____ m. MSL
M. Borehole, diameter 4" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
a. Inside diameter: 12" mm.
b. Length: 10' m.
4. Drainage port(s) ☐ Yes ☐ No
5. Surface seal:
a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☒ Other ☒
Soil
7. Annular space seal: a. Granular Bentonite ☐
b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
c. ____ Lbs/gal mud weight ... Bentonite slurry ☒
d. ____ % Bentonite ... Bentonite-cement grout ☐
e. ____ m^3 volume added for any of the above
f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
b. ☒ 1/4in. ☐ 3/8in. ☐ 1/2in. Bentonite pellets ☐
c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
a. Volume added ____ m^3 .5 / 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
a. Unimin, Filtersil 12/20
b. Volume added ____ m^3 5.5 / 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Sch 40
a. Screen type: Factory cut ☐ Continuous slot ☐ Other ☐
b. Manufacturer EMI
c. Slot size: 0.02 in.
d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐ Other ☐
Bentonite Chips

Facility/Project Name: Mcd FMR	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-167B
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 08 36.38 Long. 96 26 35.74 or	Date Well Installed (Start): 11/14/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11/14/12
Well Distance From Waste/Source Boundary: mile +	Section Location of Waste/Source: NW/4 of NW/4 of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	Sam Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1147.94 m. MSL
B. Well casing, top elevation 1147.61 m. MSL
C. Land surface elevation 1147.94 m. MSL
D. Surface seal, bottom 1146.94 m. TOC or ____ m. MSL
ft.

16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

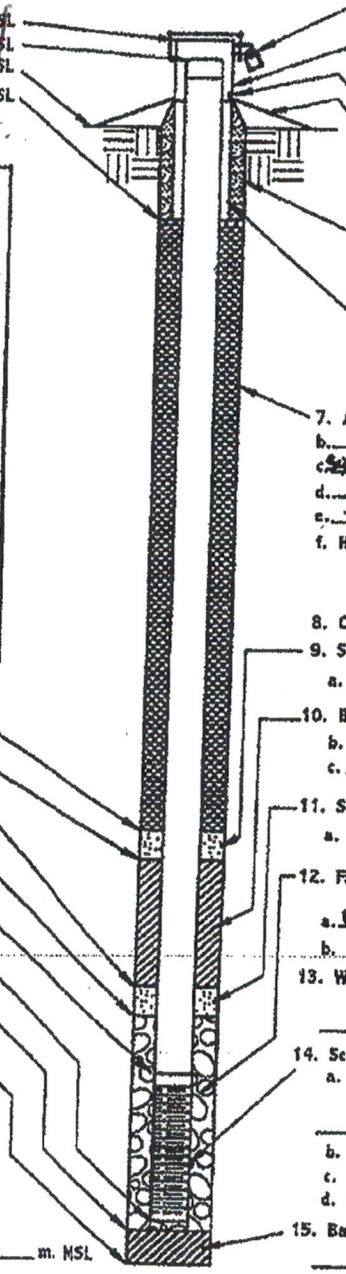
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐

19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis):
MAIN TREATMENT PLANT

E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 55 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 57.5 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 60 ft bgs m. TOC or ____ m. MSL
J. Well bottom 70 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 70 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 70 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7 1/4 IN mm.
N. O.D. well casing 2.375 IN mm.
O. I.D. well casing 2.047 IN mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

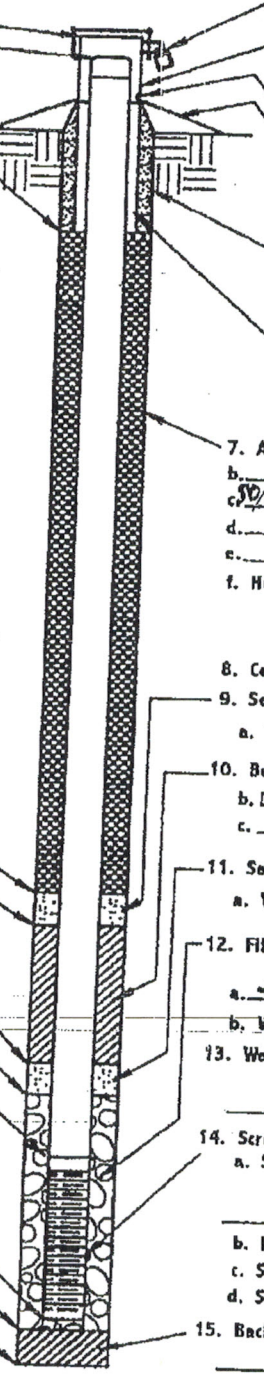


1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
a. Inside diameter: 12" mm.
b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☐
7. Annular space seal: a. Granular Bentonite ☐
b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
c. 8.4/14 Lbs/gal mud weight ... Bentonite slurry ☒
d. ____ % Bentonite ... Bentonite-cement grout ☐
e. 1 BAG m^3 volume added for any of the above
f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4in. ☐ 3/8in. ☐ 1/2in. Bentonite pellets ☐
c. ____ Other ☐
11. Secondary Filter ☐ Yes ☐ No
a. Volume added 1 BAG m^3 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
a. UNIMIN FILTERSIL 20/40
b. Volume added ____ m^3 6/30 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☐ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
b. Manufacturer PREMIUM-PERM-FLOW
c. Slot size: 0.010 in.
d. Slotted length: 10.004 m.
15. Backfill material (below filter pack): None ☒ Sand Other ☐

Facility/Project Name: MEAD FROP	Local Grid Location of Well: ☐ N. ☐ S. _____ m. ☐ E. ☐ W. _____ m.	Well Number: MW-168A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 08 42.6 Long. 96 26 25.93 or St. Plane _____ m. N. _____ m. E.	Date Well Installed (Start): 10/25/18
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NE 1/4 of NW 1/4 of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 10/26/18
Well Distance From Waste/Source Boundary: mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Lewis Turner (BMG) Chris (Boart Longyear)
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1153.06 m. MSL
B. Well casing, top elevation 1152.75 m. MSL
C. Land surface elevation 1153.06 m. MSL
D. Surface seal, bottom 1151.56 m. TOC or _____ m. MSL ft.



16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☒
Sonic

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☒ No
Describe _____

21. Source of water (attach analysis):
Main Treatment Plant.

E. Secondary filter, top NA m. TOC or _____ m. MSL
F. Bentonite seal, top 5.0' m. TOC or _____ m. MSL
G. Secondary filter, top 87.0' BGS m. TOC or _____ m. MSL
H. Primary filter, top 89' BGS m. TOC or _____ m. MSL
I. Screen joint, top 91.40 ft BGS m. TOC or _____ m. MSL
J. Well bottom 101.40 ft BGS m. TOC or _____ m. MSL
K. Filter pack, bottom 102 ft BGS m. TOC or _____ m. MSL
L. Borehole, bottom 105 ft BGS m. TOC or _____ m. MSL
M. Borehole, diameter 6" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion _____ m. TOC or _____ m. MSL

1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
a. Inside diameter: 12" mm.
b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ _____ Other ☐
b. Annular space seal: Bentonite ☐ Cement ☒ _____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☒
d. _____ x Bentonite ..... Bentonite-cement grout ☐
e. _____ m.³ volume added for any of the above
f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
a. Volume added NA m³ NA Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
b. ☐ ¼in. ☒ ⅜in. ☐ ½in. Bentonite pellets ☒
c. _____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
a. Volume added _____ m³ 1/2/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
a. ~~FMI~~ UNIMIN, FILTRESTL, 12/20
b. Volume added _____ m³ 4.5/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ _____ Other ☐
14. Screen material: FMI SCH40
a. Screen type: Factory cut ☒ Continuous slot ☐ _____ Other ☐
b. Manufacturer FMI
c. Slot size: 0.020 in.
d. Slotted length: 10 ft m.
15. Backfill material (below filter pack): None ☐
Natural sand Other ☒

Facility/Project Name: Mead FNDP

Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.

Well Number: MW-168B

Facility License, Permit or Monitoring Number:

Grid Origin Location: Lat. 41 08 42.41 Long. 96 26 25.43 or

St. Plane ____ m. N. ____ m. E.

Date Well Installed (Start): 11/13/2012

Date Well Installed (Completed): 11/13/2012

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Section Location of Waste/Source: NW 1/4 of NW 1/4 of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.

Well Installed By: (Person's Name & Firm) David Dander (Eco) Sam Wolf (Peterson drill)

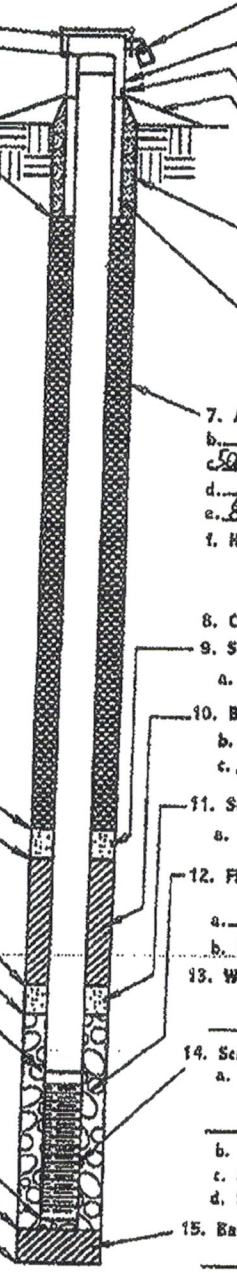
Well Distance From Waste/Source Boundary: mile +

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known

Maximum Depth of Frost Penetration (estimated): 18"

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1152.62 m. MSL
B. Well casing, top elevation 1152.76 m. MSL
C. Land surface elevation 1152.62 m. MSL
D. Surface seal, bottom 1151.12 m. TOC or ____ m. MSL
ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" min.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/4 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ % Bentonite ..... Bentonite-cement grout ☐
   e. 8 bags volume added for any of the above
   f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: NA
    a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. bentonite slurry/seal Other ☒
11. Secondary Filter ☐ Yes ☒ No
    a. Volume added ____ m^3 1/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filters 20/40
    b. Volume added ____ m^3 6/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material:
    a. Screen type: .010 Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer Premium-Perma Slot
    c. Slot size: 0.010 in.
    d. Slotted length: 10 m. ft
15. Backfill material (below filter pack): None ☒ Other ☐ Sand

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    main groundwater treatment plant

E. Secondary filter, top NA ~~m. TOC~~ or ____ m. MSL
F. Bentonite seal, top 5.0 fbgs ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 68.0 fbgs ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 70.0 fbgs ~~m. TOC~~ or ____ m. MSL
I. Screen joint, top 72.0 fbgs ~~m. TOC~~ or ____ m. MSL
J. Well bottom 82.0 fbgs ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 83.0 fbgs ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 83.0 fbgs ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 7.25 inch ~~mm.~~
N. O.D. well casing 2.375 inch ~~mm.~~
O. I.D. well casing 2.047 inch ~~mm.~~
P. 24-hr water level after completion ____ ~~m. TOC~~ or ____ m. MSL

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-169 A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 11.25 Long. 96 26 29.59 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 10-27-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NW 1/4 of SW 1/4 of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 10-28-12
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	Well Installed By: (Person's Name & Firm) Sam Woodland, Burns & McDonnell
Maximum Depth of Frost Penetration (estimated): 7 in		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1146.04 m. MSL
B. Well casing, top elevation 1145.60 m. MSL
C. Land surface elevation 1146.04 m. MSL
D. Surface seal, bottom 114454 m. TOC or ____ m. MSL Ft.

16. USCS classification of soil near screen:
GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☐ No

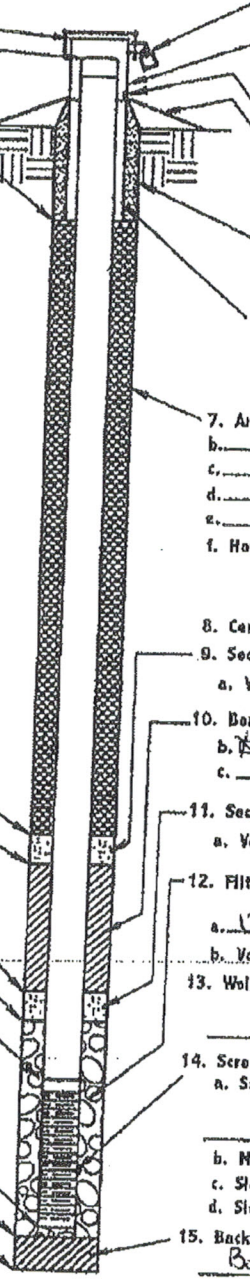
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☐

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☐ No
Describe ____

21. Source of water (attach analysis): Main Treatment Plant

E. Secondary filter, top 0.0 m. ~~TOC~~ BGS or ____ m. MSL
F. Bentonite seal, top 80.5' m. ~~TOC~~ BGS or ____ m. MSL
G. Secondary filter, top 83.5' m. ~~TOC~~ BGS or ____ m. MSL
H. Primary filter, top 86.0' m. ~~TOC~~ BGS or ____ m. MSL
I. Screen joint, top 88.7 m. ~~TOC~~ BGS or ____ m. MSL
J. Well bottom 99.0 m. ~~TOC~~ BGS or ____ m. MSL
K. Filter pack, bottom 100.0 m. ~~TOC~~ BGS or ____ m. MSL
L. Borehole, bottom 105.0 m. ~~TOC~~ BGS or ____ m. MSL
M. Borehole, diameter 4" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

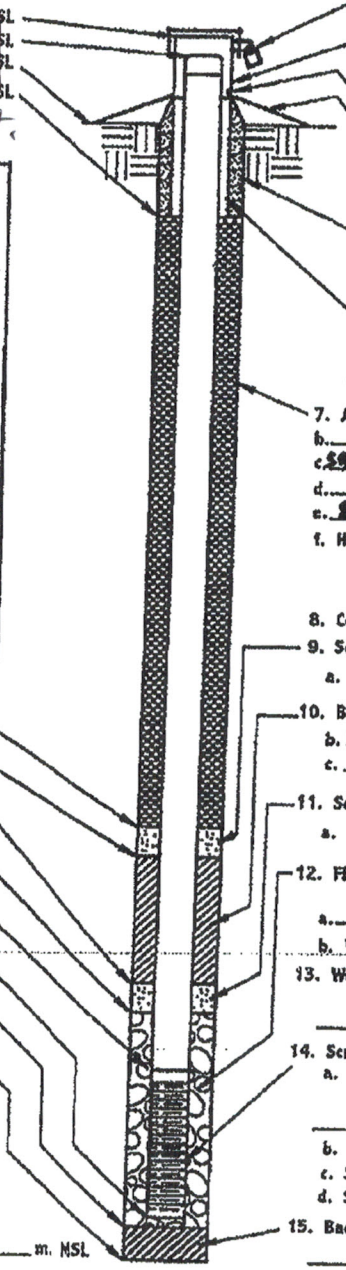


1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
a. Inside diameter: 12" mm.
b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
c. ____ Lbs/gal mud weight ..... Bentonite slurry ☐
d. ____ % Bentonite ..... Bentonite-cement grout ☐
e. ____ m^3 volume added for any of the above
f. How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☐ No
9. Secondary Filter ☒ Yes ☒ No
a. Volume added ____ m^3 ____ Bags/Size
10. Bontonite seal: a. Bentonite granules ☐
b. ☒ 1/4in. ☐ 3/8in. ☐ 1/2in. Bentonite pellets ☐
c. ____ Other ☐
11. Secondary Filter ☐ Yes ☐ No
a. Volume added ____ m^3 .5/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
a. Unimin Filter Sil 12/20
b. Volume added ____ m^3 6/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Sch 40
a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
b. Manufacturer EMI
c. Slot size: 0.____ in.
d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐ Bentonite Chips Other ☐

Facility/Project Name: Mead FROP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-169 B
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 02 8.05 Long. 96 26 29.59 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 11/14/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NW¼ of SW¼ of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 11/14/12
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD) Sam Wolf (Peterson)
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1146.06 m. MSL
B. Well casing, top elevation 1145.05 m. MSL
C. Land surface elevation 1146.06 m. MSL
D. Surface seal, bottom 1144.56 m. TOC or ____ m. MSL



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 12' m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/50 Lbs/gal mud weight ..... Bentonite slurry ☐
   d. ____ % Bentonite ..... Bentonite-cement grout ☐
   e. 8 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☐ Yes ☐ No
    a. Volume added 1 BAGS m³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. UNIMIN FILTERSIL 20/40
    b. Volume added ____ m³ 5/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☐ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer PREMIUM-PERM. SLOT
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 m.
15. Backfill material (below filter pack): None ☒ Other ☐ Sand

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    MAIN TREATMENT PLANT

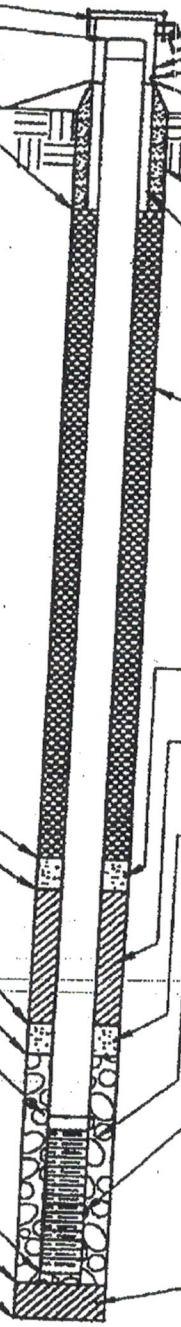
E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 60 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 62 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 65 ft bgs m. TOC or ____ m. MSL
J. Well bottom 75 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 75 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 75 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7 ¼ in mm.
N. O.D. well casing 2.375 in mm.
O. I.D. well casing 2.047 in mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FMD	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-170A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 27.01 Long. 96 26 12.20 or	Date Well Installed (Start): 10/27/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane — m. N. — m. E.	Date Well Installed (Completed): 10/27/12
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: SE ¼ of NW ¼ of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Lewis Turner (BMD)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Chris Hutler (Boot Longyear)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1146.01 m. MSL
B. Well casing, top elevation 1145.45 m. MSL
C. Land surface elevation 1146.01 m. MSL
D. Surface seal, bottom 1144.51 m. TOC or ____ m. MSL

Ft.



16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☒
Sonic

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis):
Main treatment plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 73.00 m. TOC or ____ m. MSL
G. Secondary filter, top 76.81 m. TOC or ____ m. MSL
H. Primary filter, top 77.80 m. TOC or ____ m. MSL
I. Screen joint, top 80.05 m. TOC or ____ m. MSL
J. Well bottom 90.05 m. TOC or ____ m. MSL
K. Filter pack, bottom 91' m. TOC or ____ m. MSL
L. Borehole, bottom 100' m. TOC or ____ m. MSL
M. Borehole, diameter 6" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
a. Inside diameter: 12" mm.
b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒
Soil
7. Annular space seal: a. Granular Bentonite ☐
b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☒
d. ____ x Bentonite ..... Bentonite-cement grout ☐
e. ____ m.³ volume added for any of the above
f. How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
b. ☐ ¼in. ☒ ⅜in. ☐ ½in. Bentonite pellets ☒
c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
a. Volume added ____ m³ 1/2/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
a. Unimin Filtersil 12/20
b. Volume added ____ m³ 4.50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
b. Manufacturer EMZ
c. Slot size: 0.020 in.
d. Slotted length: 10' m.
15. Backfill material (below filter pack): None ☐
Chip bentonite Other ☒

Facility/Project Name: Mead FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Well Distance From Waste/Source Boundary: Mile +

Maximum Depth of Frost Penetration (estimated): 8 ft

Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.

Grid Origin Location: Lat. 41 09 21.59 Long. 96 27 22.98 or St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: NW 1/4 of NW 1/4 of Sec. 30 T. 14 N.R. 9 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known

Well Number: MW-171A

Date Well Installed (Start): 10-25-12

Date Well Installed (Completed): 10-25-12

Well Installed By: (Person's Name & Firm) Sam Woodland, Burns & McDonnell

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1160.54 m. MSL

B. Well casing, top elevation 1160.21 m. MSL

C. Land surface elevation 1160.54 m. MSL

D. Surface seal, bottom 1159.04 m. TOC or ____ m. MSL ft.

16. USCS classification of soil near screen: GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐ SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐ Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☐ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☐

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☒ No

Describe ____

21. Source of water (attach analysis): Main Treatment Plant

E. Secondary filter, top ____ m. TOC or ____ m. MSL

F. Bentonite seal, top 5.0' m. ~~TOC~~ BGS or ____ m. MSL

G. Secondary filter, top 79.0' m. ~~TOC~~ BGS or ____ m. MSL

H. Primary filter, top 81.0' m. ~~TOC~~ BGS or ____ m. MSL

I. Screen joint, top 86.7' m. ~~TOC~~ BGS or ____ m. MSL

J. Well bottom 97' m. ~~TOC~~ BGS or ____ m. MSL

K. Filter pack, bottom 100.0' m. ~~TOC~~ BGS or ____ m. MSL

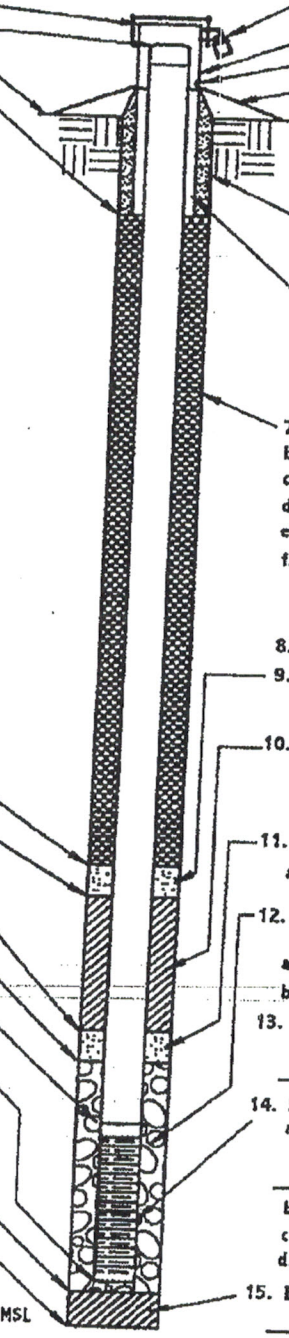
L. Borehole, bottom 100.0' m. ~~TOC~~ BGS or ____ m. MSL

M. Borehole, diameter 6" mm.

N. O.D. well casing 2" mm.

O. I.D. well casing 2" mm.

P. 24-hr water level after completion ____ m. TOC or ____ m. MSL



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ Lbs/gal mud weight ... Bentonite slurry ☐
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☒ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ .5 / 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filter Sil 12/20
    b. Volume added ____ m³ 5 / 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: Sch 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0. ____ in.
    d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☒ Sand Other ☐

Facility/Project Name: MEAD SNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-171B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 09 22.5 Long. 96 27 22.98 or	Date Well Installed (Start): 11-14-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11-15-12
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: ___ ¼ of ___ ¼ of Sec. 30 T. 14 N. R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient, g ☐ Sidegradient, d ☐ Downgradient, n ☐ Not Known	Sam Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1160.24 m. MSL
B. Well casing, top elevation 159.79 m. MSL
C. Land surface elevation 1160.24 m. MSL
D. Surface seal, bottom 1158.74 m. TOC or ____ m. MSL

Ft

16. USCS classification of soil near screen:
GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐

19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis):
MAIN TREATMENT PLANT

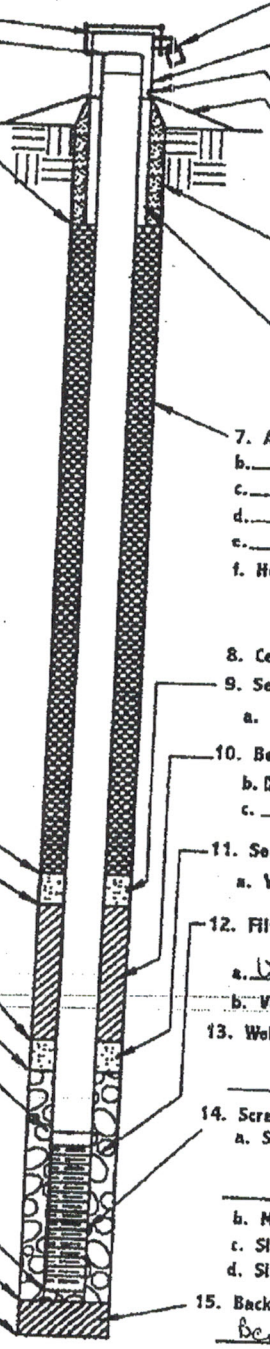
E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 50 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 54 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 56.7 ft bgs m. TOC or ____ m. MSL
J. Well bottom 66.7 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 67 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 67 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7¼ in mm.
N. O.D. well casing 2.375 in mm.
O. I.D. well casing 2.047 in mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/19 lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 6 BAGS m³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ⅛in. ☐ ¼in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added 1.5 BAGS m³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. UNIMIN FILTERSIL 20/40
    b. Volume added 6 BAGS m³ 50 lbs Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer PREMIUM-PERM-FLOW
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft m.
15. Backfill material (below filter pack): None ☒ Sand Other ☐

Facility/Project Name: Mead FNOP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-172 A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 08 3456 Long. 96 25 5152 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 10-25-12
Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐ — Above Ground	Section Location of Waste/Source: NE¼ of NW¼ of Sec. 33 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 10-25-12
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm): Sam Woodland, Burns + McDonnell
Maximum Depth of Frost Penetration (estimated): 38"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1147.32 m. MSL
B. Well casing, top elevation 1146.96 m. MSL
C. Land surface elevation 1144.32 m. MSL
D. Surface seal, bottom 1142.72 m. TOC or ____ m. MSL — Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4" mm.
   b. Length: 8" m.
4. Drainage port(s) ☒ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil. Bentonite ☐ Cement ☐ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ Lbs/gal mud weight ... Bentonite slurry ☐
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☒ Yes ☐ No
   a. Volume added ____ m³ 1/2 .5/50 Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☒ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☒
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2, 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, Filter Srl 12/20
    b. Volume added ____ m³ 5.5/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Sch 40
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer EMJ
    c. Slot size: 0. ____ in.
    d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐ Bentonite chips Other ☐

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☐ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☐
19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main Treatment Plant

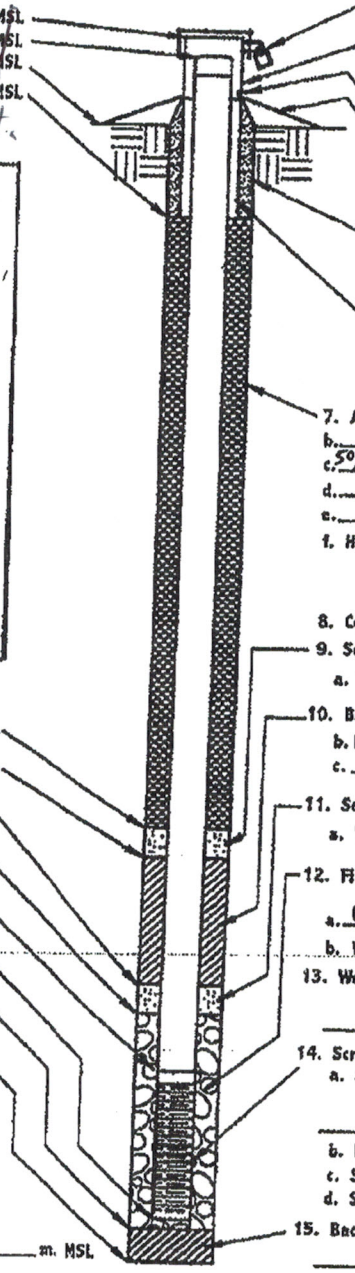
E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0' m. ~~TOC~~ BGS or ____ m. MSL
G. Secondary filter, top 79.5' m. ~~TOC~~ BGS or ____ m. MSL
H. Primary filter, top 82.0' m. ~~TOC~~ BGS or ____ m. MSL
I. Screen joint, top 84.7' m. ~~TOC~~ BGS or ____ m. MSL
J. Well bottom 95.0' m. ~~TOC~~ BGS or ____ m. MSL
K. Filter pack, bottom 97.0' m. ~~TOC~~ BGS or ____ m. MSL
L. Borehole, bottom 99.0' m. ~~TOC~~ BGS or ____ m. MSL
M. Borehole, diameter 4" mm.
N. O.D. well casing 2" mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-172B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 34.56 Long. 96 25 13.55 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 11/12/12
Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐		Date Well Installed (Completed): 11/13/12
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: NE¼ of NW¼ of Sec. 33 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Lewis Turner (BMCD)
Maximum Depth of Frost Penetration (estimated): 38"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	SAM Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1147.27 m. MSL
B. Well casing, top elevation 1146.89 m. MSL
C. Land surface elevation 1144.31 m. MSL
D. Surface seal, bottom 1142.81 m. TOC or ____ m. MSL

Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4 1/2" mm.
   b. Length: 18" m.
4. Drainage port(s) ☒ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 10 Dry ft³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1 / 50 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, Filter-1, 20/40
    b. Volume added ____ m³ 6 / 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer: Premium-Perma-Flow
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 m/ft
15. Backfill material (below filter pack): None ☒ Sand Other ☐

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    Main Treatment Plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 ft BGS ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 61.0 ft BGS ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 63.0 ft BGS ~~m. TOC~~ or ____ m. MSL
I. Screen joint, top 66.15 ft BGS ~~m. TOC~~ or ____ m. MSL
J. Well bottom 76.15 ft BGS ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 76' ft BGS ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 76' ft BGS ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 7¼ in ~~mm.~~
N. O.D. well casing 2.375 in ~~mm.~~
O. I.D. well casing 2.047 in ~~mm.~~
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐

Well Distance From Waste/Source Boundary: Mile +

Maximum Depth of Frost Penetration (estimated): 36"

Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.

Grid Origin Location: Lat. 41 02 39.25 Long. 96 24 56.47 or St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: NE ¼ of NW ¼ of Sec. 33 T. 14 N. R. 9 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known

Well Number: MW-173A

Date Well Installed (Start): 10-25-12

Date Well Installed (Completed): 10-25-12

Well Installed By: (Person's Name & Firm) Boart Longyear / Burns and McDonnell

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1148.91 m. MSL

B. Well casing, top elevation 1148.57 m. MSL

C. Land surface elevation 1146.59 m. MSL

D. Surface seal, bottom 1145.09 m. TOC or ____ m. MSL

Ft

16. USCS classification of soil near screen:
GP ☐ GW ☐ GC ☐ GW ☒ SW ☒ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☐
Sonic

19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐

20. Drilling additives used? ☐ Yes ☒ No
Describe ____

21. Source of water (attach analysis):
main treatment plant

E. Secondary filter, top ____ m. TOC or ____ m. MSL

F. Bentonite seal, top 5 BGS m. TOC or ____ m. MSL

G. Secondary filter, top 76 BGS m. TOC or ____ m. MSL

H. Primary filter, top 78 BGS m. TOC or ____ m. MSL

I. Screen joint, top 82.47 BGS m. TOC or ____ m. MSL

J. Well bottom 92.47 BGS m. TOC or ____ m. MSL

K. Filter pack, bottom 93 BGS m. TOC or ____ m. MSL

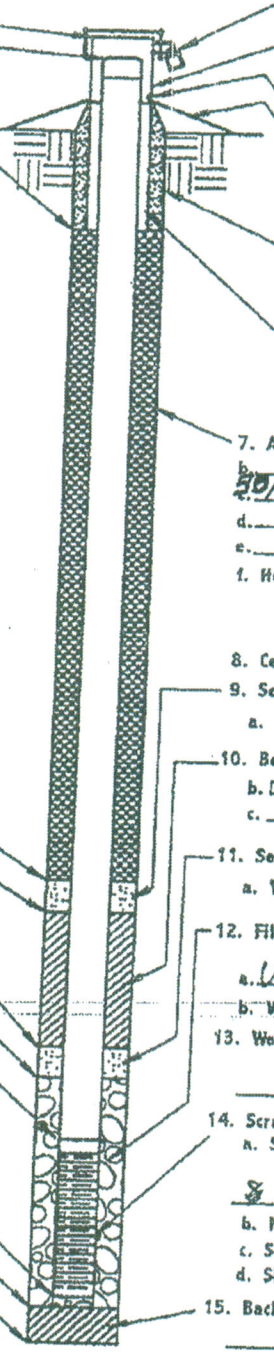
L. Borehole, bottom 105 ft. BGS m. TOC or ____ m. MSL

M. Borehole, diameter 6 mm. in

N. O.D. well casing 2 mm. in

O. I.D. well casing 2 mm. in

P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

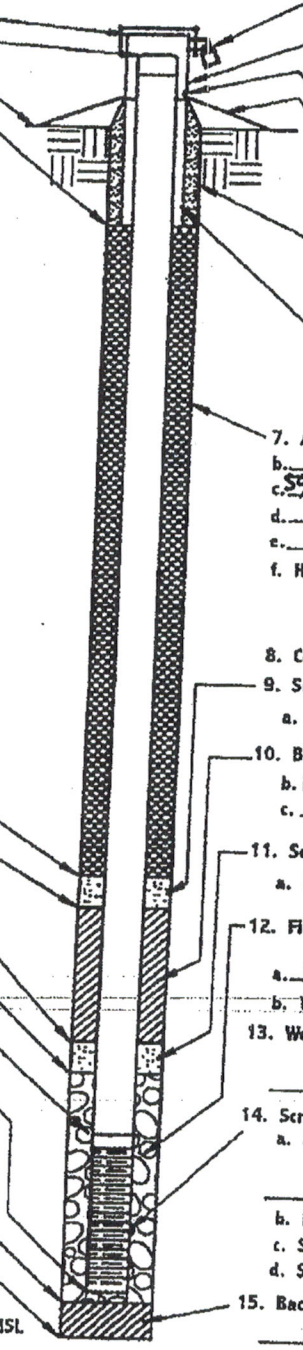


1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4" mm.
   b. Length: 18" m.
4. Drainage port(s) ☒ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒
   Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. 10/14 Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☐ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☒ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2 x 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin, Filtersil, 12/20
    b. Volume added ____ m³ 1/2 x 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: Schedule 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    S
    b. Manufacturer EMJ
    c. Slot size: 0.020 in.
    d. Slotted length: 10.01 ft m.
15. Backfill material (below filter pack): None ☐ Other ☒
    sand

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ____ m. ☐ N. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-174A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 08 35.18 Long. 96 25 51.52 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 10/27/18
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NE¼ of NE¼ of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 10/27/18
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Lewis Turner (BMCD) Chris Huther (Boart Longyear)
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1142.56 m. MSL
B. Well casing, top elevation 1142.12 m. MSL
C. Land surface elevation 1142.56 m. MSL
D. Surface seal, bottom 1141.06 m. TOC or ____ m. MSL
Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ ¼in. ☒ ⅜in. ☐ ½in. Bentonite pellets ☒
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 50 ~~30~~ 14/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filtersil 12/20
    b. Volume added ____ m³ 4/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: Sch 40 pvc
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0.020 in.
    d. Slotted length: 10 ft m.
15. Backfill material (below filter pack): ☐ None ☐ Other ☒ Bentonite chips 105-~~95~~ 95

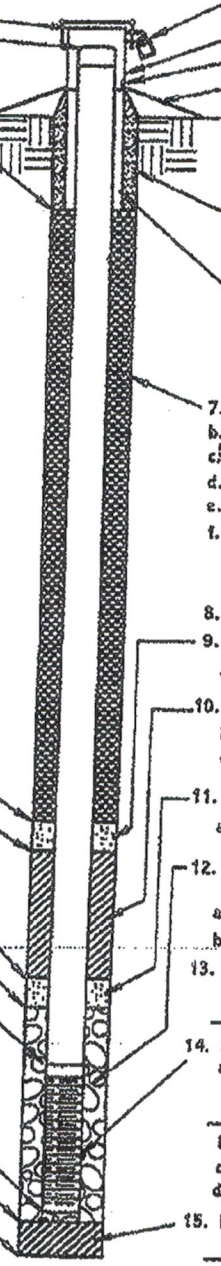
16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Other ☒ Sonic
19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main treatment plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 BGS ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 80.1 BGS ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 81.5 BGS ~~m. TOC~~ or ____ m. MSL
I. Screen joint, top 83.10 BGS ~~m. TOC~~ or ____ m. MSL
J. Well bottom 93.10 BGS ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 95 BGS ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 105 BGS ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 6" ~~mm.~~
N. O.D. well casing 2" mm.
O. I.D. well casing 2" ~~mm.~~
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD Fmcp	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-174B
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 08 35.12 Long. 96 25 15.52 or	Date Well Installed (Start): 11/13/18
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11/13/18
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: NE-1/4 of NE-1/4 of Sec. 32 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Lewis Turner (BMCD) Sam Wolf (Peterson)
Maximum Depth of Frost Penetration (estimated): 12"	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☒ Not Known	

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1142.07 m. MSL
B. Well casing, top elevation 1141.78 m. MSL
C. Land surface elevation 1142.07 m. MSL
D. Surface seal, bottom 1142.57 m. TOC or ____ m. MSL
Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil: Bentonite ☐ Cement ☐ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 6 Bags/5 volume added for any of the above
   f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ 1/4in. ☐ 3/8in. ☐ 1/2in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m^3 1 /50 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filtersil 20/40
    b. Volume added ____ m^3 6 /50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: Sch 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer: Premium-Perma-Flow
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft.
15. Backfill material (below filter pack): None ☒ Sand ____ Other ☐

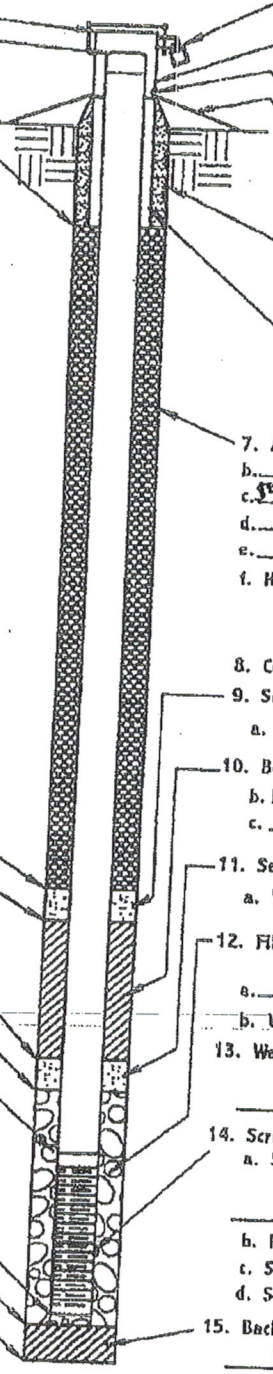
16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main Treatment Plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 Ft BGS ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 60.5 Ft BGS ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 62.0 Ft BGS m. TOC or ____ m. MSL
I. Screen joint, top 64.9 Ft BGS ~~m. TOC~~ or ____ m. MSL
J. Well bottom 74.9 Ft BGS ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 75.0 Ft BGS ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 75.0 Ft BGS ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 7.25 Ft ~~mm.~~
N. O.D. well casing 2.375 in ~~mm.~~
O. I.D. well casing 2.047 in ~~mm.~~
P. 24-hr water level after completion Ft BGS ~~m. TOC~~ or ____ m. MSL

Facility/Project Name: MEAD FNDR	Local Grid Location of Well: ____ m. ☐ N. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-175A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 09 12.41 Long. 96 25 50.60 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 10/26/18
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 29 T. 14 N. R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 10/26/18
Well Distance From Waste/Source Boundary: mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Lewis Turner (BMCD) CHRIS H. (BOART LONGYEAR)
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1152.30 m. MSL
B. Well casing, top elevation 1151.78 m. MSL
C. Land surface elevation 1152.30 m. MSL
D. Surface seal, bottom 1150.80 m. TOC or ____ m. MSL



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil — Bentonite ☐ Cement ☐ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 8.34 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. ____ m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m³ 1/2 / 50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Unimin Filtersil, 12/20
    b. Volume added ____ m³ 4 / 50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer EMI
    c. Slot size: 0.020 in.
    d. Slotted length: 10 ft. mm.
15. Backfill material (below filter pack): None ☐ Bentonite chips. Other ☒

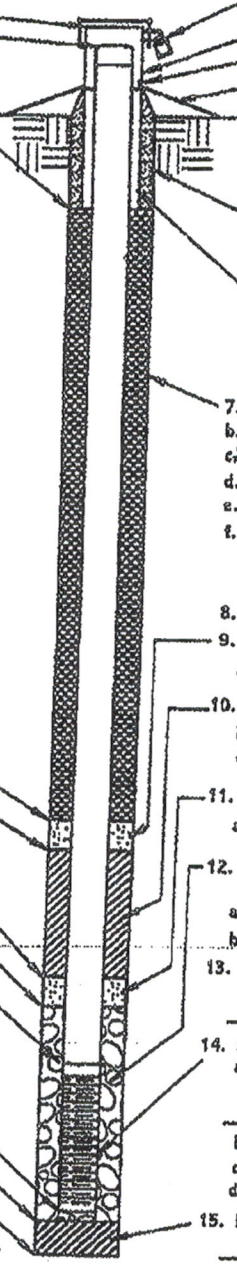
16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☐ Sonic Other ☒
19. Drilling fluid used: Water ☒ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): MAIN TREATMENT PLANT

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 73.4 BGS ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 76.4 BGS ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 77.8' BGS ~~m. TOC~~ or ____ m. MSL
I. Screen joint, top 80.00 BGS ~~m. TOC~~ or ____ m. MSL
J. Well bottom 90.00 BGS ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 91' BGS ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 112' BGS ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 6" ~~mm.~~
N. O.D. well casing 2" ~~mm.~~
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: Mead / FNOP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-175B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 04 12.4 Long. 96 25 50.10 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 11/13/12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	Section Location of Waste/Source: NW¼ of SE¼ of Sec. 24 T. 14 N. R. 9 ☒ E. ☐ W.	Date Well Installed (Completed): 11/13/12
Well Distance From Waste/Source Boundary: mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) David Dander (Eco) Sam Wolf (Peterson drill)
Maximum Depth of Frost Penetration (estimated): 18"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1151.44 m. MSL
B. Well casing, top elevation 1151.03 m. MSL
C. Land surface elevation 1151.44 m. MSL
D. Surface seal, bottom 1149.94 m. TOC or ____ m. MSL
Ft



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 18' m
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ % Bentonite ..... Bentonite-cement grout ☐
   e. 12 bags volume added for any of the above
   f. How installed: Tremie ☒ Tremie pumped ☐ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter 30/70 ☒ Yes ☐ No
    a. Volume added ____ m^3 1/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. 20/40 Unimin Filters
    b. Volume added ____ m^3 1/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: ____
    a. Screen type: .010 slot Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer Premium-Perma flow
    c. Slot size: 0.010 in.
    d. Slotted length: 10 ft
15. Backfill material (below filter pack): None ☒ Sand Other ☐

16. USCS classification of soil near screen:
    GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    main treatment plant

E. Secondary filter, top NA ~~m. TOC~~ or ____ m. MSL
F. Bentonite seal, top 5.0 fbgs ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 63.0 fbgs ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 64.0 fbgs ~~m. TOC~~ or ____ m. MSL
I. Screen joint, top 66.0 fbgs ~~m. TOC~~ or ____ m. MSL
J. Well bottom 76.0 fbgs ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 77.0 fbgs ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 78.0 fbgs ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 7.25 inch ~~mm.~~
N. O.D. well casing 2.375 inch ~~mm.~~
O. I.D. well casing 2.047 inch ~~mm.~~
P. 24-hr water level after completion ____ fbgs ~~m. TOC~~ or ____ m. MSL

Facility/Project Name: Mcad, FNOP

Facility License, Permit or Monitoring Number:

Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒

Well Distance From Waste/Source Boundary: mile +

Maximum Depth of Frost Penetration (estimated): 18"

Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.

Grid Origin Location: Lat. 41 08 55.22 Long. 96 23 34.97 or

St. Plane ____ m. N. ____ m. E.

Section Location of Waste/Source: SE ¼ of SE ¼ of Sec. 22 T. 14 N.R. 9 ☒ E. ☐ W.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known

Well Number: MW-176 A

Date Well Installed (Start): 11-26-12

Date Well Installed (Completed): 11-26-12

Well Installed By: (Person's Name & Firm): Peterson

Note: Use top of casing (TOC) for all depth measurements.

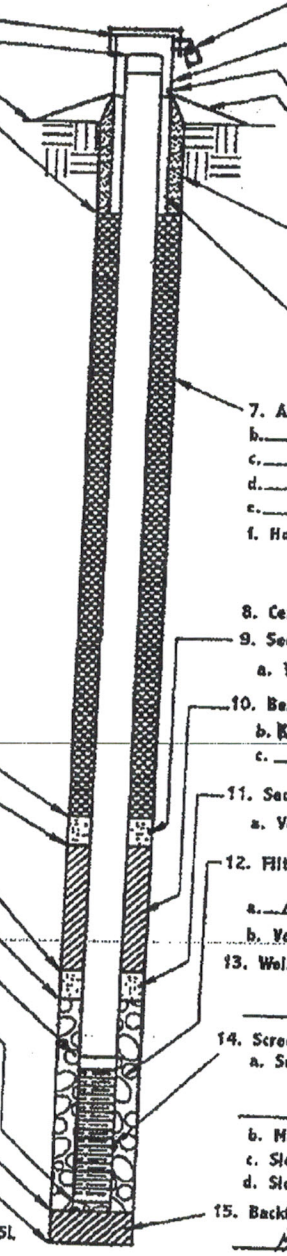
A. Protective casing, top elevation 1190.35 m. MSL

B. Well casing, top elevation 1190.00 m. MSL

C. Land surface elevation 1190.35 m. MSL

D. Surface seal, bottom 1188.85 m. TOC or ____ m. MSL

Fl.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 127 mm.
   b. Length: 1.07 m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Soil — Bentonite ☐ Cement ☐ Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ Lbs/gal mud weight ... Bentonite slurry ☒
   d. ____ x Bentonite ... Bentonite-cement grout ☐
   e. ____ m^3 volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☒ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m^3 15/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Wyman Filter Sand 12/20
    b. Volume added ____ m^3 ____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: SCH 40
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer: Beki
    c. Slot size: 0.02 in.
    d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐ Bentonite chips Other ☐

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☐ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐ — HS
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis): Main Treatment Plant

E. Secondary filter, top N/A ~~m. TOC~~ BGS or ____ m. MSL

F. Bentonite seal, top 5.0 m. TOC or ____ m. MSL

G. Secondary filter, top 29.50 m. TOC or ____ m. MSL

H. Primary filter, top 31.50 m. TOC or ____ m. MSL

I. Screen joint, top 43.50 m. TOC or ____ m. MSL

J. Well bottom 53.50 m. TOC or ____ m. MSL

K. Filter pack, bottom 55.00 m. TOC or ____ m. MSL

L. Borehole, bottom 55.00 m. TOC or ____ m. MSL

M. Borehole, diameter 4" mm.

N. O.D. well casing 2.375 mm.

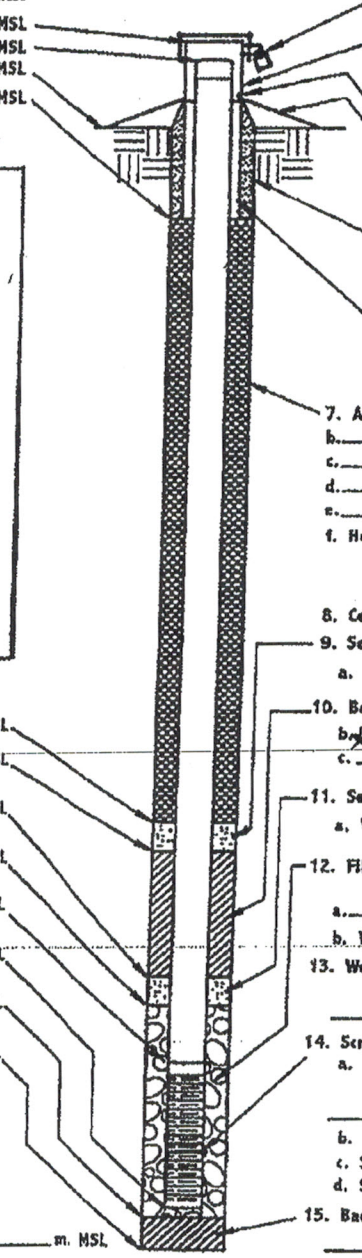
O. I.D. well casing 2" mm.

P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MCED, FMOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-176 B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 02 55.25 Long. 96 23 39.97 or	Date Well Installed (Start): 11-26-12
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11-26-12
Well Distance From Waste/Source Boundary: Mile +	Section Location of Waste/Source: SE ¼ of SE ¼ of Sec. 27 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Peter Sos
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1189.85 m. MSL
B. Well casing, top elevation 1189.10 m. MSL
C. Land surface elevation 1189.85 m. MSL
D. Surface seal, bottom 1188.35 m. TOC or ____ m. MSL
ft



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 12" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒
   Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. ____ lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. ____ m^3 volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m^3 ____ Bags/Size
10. Bentonite seal: a. Bentonite granules ☐
    b. ☒ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added ____ m^3 .5/50 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Gibson Filter Sand
    b. Volume added ____ m^3 ____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: Sch 40
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer Emi
    c. Slot size: 0.01 in.
    d. Slotted length: ____ m.
15. Backfill material (below filter pack): None ☐
    Bentonite chips Other ☐

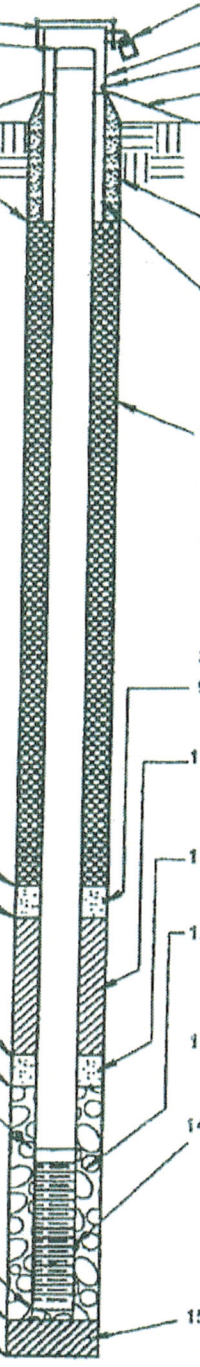
16. USCS classification of soil near screen:
    GP ☐ GW ☐ GC ☐ GW ☐ SW ☐ SP ☐
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☐ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
    HS
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☐
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    Main Treatment Plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 m. TOC or ____ m. MSL
G. Secondary filter, top 10.10 m. TOC or ____ m. MSL
H. Primary filter, top 12.10 m. TOC or ____ m. MSL
I. Screen joint, top 24.10 m. TOC or ____ m. MSL
J. Well bottom 34.10 m. TOC or ____ m. MSL
K. Filter pack, bottom 35.10 m. TOC or ____ m. MSL
L. Borehole, bottom 35.10 m. TOC or ____ m. MSL
M. Borehole, diameter 4" mm.
N. O.D. well casing 2.375 mm.
O. I.D. well casing 2" mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-177A
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 07 56.65 Long. 96 28 41.16 or St. Plane — m. N. — m. E.	Date Well Installed (Start): 11-16-12
Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐	Section Location of Waste/Source: SE ¼ of SW ¼ of Sec. 36 T. 14 N. R. 8 ☒ E. ☐ W.	Date Well Installed (Completed): 11-16-12
Well Distance From Waste/Source Boundary: 4 1/2 ft	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD) Sam Wolf (Peterson)
Maximum Depth of Frost Penetration (estimated): 36"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1104.99 m. MSL
B. Well casing, top elevation 1104.42 m. MSL
C. Land surface elevation 1102.37 m. MSL
D. Surface seal, bottom 1103.49 m. TOC or ____ m. MSL
Ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4" mm.
   b. Length: 18" m.
4. Drainage port(s) ☒ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 8.8/14 Lbs/gal mud weight ..... Bentonite slurry ☑
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 6 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☑ Gravity ☐
8. Centralizers ☐ Yes ☑ No
9. Secondary Filter ☐ Yes ☑ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ ¼in. ☐ 3/8in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☑ Yes ☐ No
    a. Volume added 1 BAG m³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. NATURAL SAND
    b. Volume added ____ m³ ____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☑ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☑ Continuous slot ☐ ____ Other ☐
    b. Manufacturer PREMIUM-PERM-FLOW
    c. Slot size: 0.020 in.
    d. Slotted length: 10.00 ft m.
15. Backfill material (below filter pack): None ☑ Sand Other ☐

16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☑
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☑ No

18. Drilling method used: Rotary ☐ Hollow Stem Auger ☑ ____ Other ☐

19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☑

20. Drilling additives used? ☐ Yes ☑ No
Describe ____

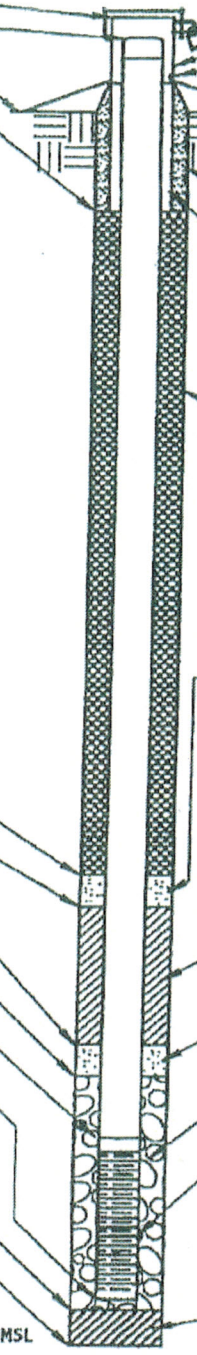
21. Source of water (attach analysis):
MAIN TREATMENT PLANT

E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 69 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 72 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 73.3 ft bgs m. TOC or ____ m. MSL
J. Well bottom 83.3 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 85 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 85 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7 1/4 in. mm.
N. O.D. well casing 2.357 in. mm.
O. I.D. well casing 2.047 in. mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-177B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 07 56.65 Long. 96 28 41.16 or St. Plane ____ m. N. ____ m. E.	Date Well Installed (Start): 11-16-12
Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐	Section Location of Waste/Source: SE ¼ of SW ¼ of Sec. 36 T. 14 N.R. 8 ☒ E. ☐ W.	Date Well Installed (Completed): 11-16-12
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD) Sam Wolf (Peterson)
Maximum Depth of Frost Penetration (estimated): 36"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1106.25 m. MSL
B. Well casing, top elevation 1105.89 m. MSL
C. Land surface elevation 1103.87 m. MSL
D. Surface seal, bottom 1102.37 m. TOC or ____ m. MSL



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4" mm.
   b. Length: 10" m.
4. Drainage port(s) ☒ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/50 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 3 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: NA
    a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added 1 BAG m³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. NATURAL SAND
    b. Volume added ____ m³ ____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer PREMIUM - PERM-FLOW
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft m.
15. Backfill material (below filter pack): None ☒ Other ☐ Sand

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    MAIN TREATMENT PLANT

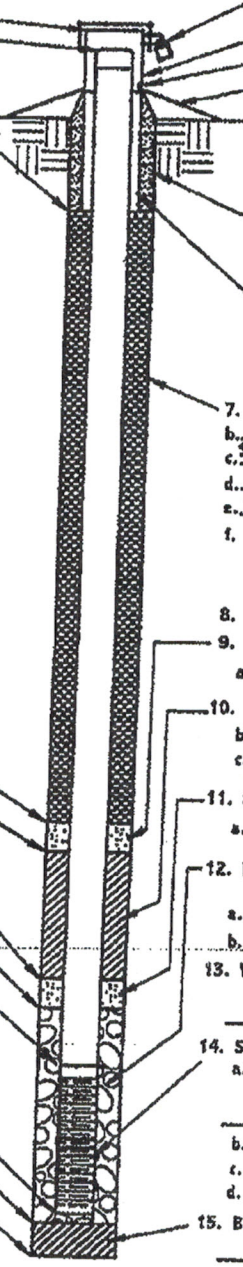
E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 29 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 32 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 35.0 ft bgs m. TOC or ____ m. MSL
J. Well bottom 45.0 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 45 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 45 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7 ¼ in. mm.
N. O.D. well casing 2.375 in. mm.
O. I.D. well casing 2.047 in. mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAD FWOP	Local Grid Location of Well: ☐ N. ☐ S. ____ m. ☐ E. ☐ W. ____ m.	Well Number: MW-17B B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 10 06.32 Long. 96 24 28.07 or	Date Well Installed (Start): 11/18/18
Type of Protective Cover: Above-Ground ☐ Flush-To-Ground ☒	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11/18/18
Well Distance From Waste/Source Boundary: Mike	Section Location of Waste/Source: SE ¼ of NE ¼ of Sec. 21 T. 14 N.R. 9 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Lewis Turner (BMD)
Maximum Depth of Frost Penetration (estimated): 18"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	SAM WOLF (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1140.95 m. MSL
B. Well casing, top elevation 1140.33 m. MSL
C. Land surface elevation 1140.95 m. MSL
D. Surface seal, bottom 1139.45 m. TOC or ____ m. MSL

Ft



1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
   a. Inside diameter: 12" mm.
   b. Length: 10" m.
4. Drainage port(s) ☐ Yes ☒ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒
   Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/1Y Lbs/gal mud weight ..... Bentonite slurry ☒
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 8 Bags m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
    c. ____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added 1.5 Bag m³ 1.5/50 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. Lonmin, Filtersil, 20/40
    b. Volume added ____ m³ 5/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ ____ Other ☐
    b. Manufacturer Premium-Perma-Flow
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 m. Ft
15. Backfill material (below filter pack): None ☒ Other ☐
    Sand

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ ____ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe ____
21. Source of water (attach analysis):
    Main Treatment Plant

E. Secondary filter, top NA m. TOC or ____ m. MSL
F. Bentonite seal, top 5.0 Ft BGS ~~m. TOC~~ or ____ m. MSL
G. Secondary filter, top 75.0 Ft BGS ~~m. TOC~~ or ____ m. MSL
H. Primary filter, top 77.0 Ft BGS ~~m. TOC~~ or ____ m. MSL
I. Screen joint, top 79.05 Ft BGS m. TOC or ____ m. MSL
J. Well bottom 89.05 Ft BGS ~~m. TOC~~ or ____ m. MSL
K. Filter pack, bottom 90' Ft BGS ~~m. TOC~~ or ____ m. MSL
L. Borehole, bottom 90' Ft BGS ~~m. TOC~~ or ____ m. MSL
M. Borehole, diameter 7¼ in. ~~mm.~~
N. O.D. well casing 2.375 in. mm.
O. I.D. well casing 2.047 in. mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL

Facility/Project Name: MEAP FNOP	Local Grid Location of Well: ☐ N. ____ m. ☐ S. ____ m. ☐ E. ☐ W.	Well Number: MW-199A
Facility License, Permit or Monitoring Number	Grid Origin Location: Lat. 41 07 58.14 Long. 96 28 18.88 or	Date Well Installed (Start): 11-16-12
Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐	St. Plane ____ m. N. ____ m. E.	Date Well Installed (Completed): 11-16-12
Well Distance From Waste/Source Boundary: mile +	Section Location of Waste/Source: SW ¼ of SE ¼ of Sec. 36 T. 14 N. R. 8 ☒ E. ☐ W.	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD)
Maximum Depth of Frost Penetration (estimated): 36"	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Sam Wolf (Peterson)

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1107.92 m. MSL
B. Well casing, top elevation 1107.44 m. MSL
C. Land surface elevation 1105.63 m. MSL
D. Surface seal, bottom 1104.13 m. TOC or ____ m. MSL

Pt.

16. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☑
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☑ No

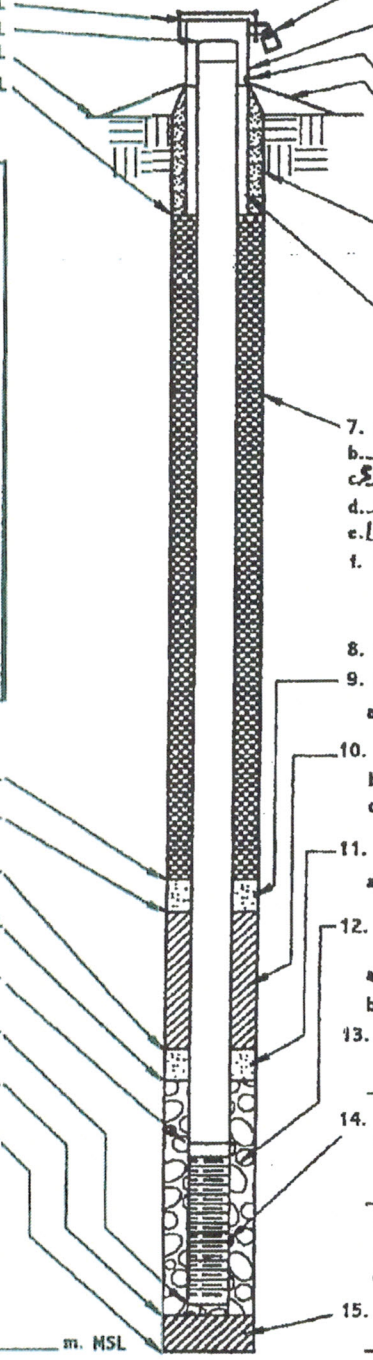
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☑ ____ Other ☐

19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☑

20. Drilling additives used? ☐ Yes ☑ No
Describe ____

21. Source of water (attach analysis):
MAIN TREATMENT PLANT

E. Secondary filter, top ____ m. TOC or ____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or ____ m. MSL
G. Secondary filter, top 70 ft bgs m. TOC or ____ m. MSL
H. Primary filter, top 73 ft bgs m. TOC or ____ m. MSL
I. Screen joint, top 75.0 ft bgs m. TOC or ____ m. MSL
J. Well bottom 85.0 ft bgs m. TOC or ____ m. MSL
K. Filter pack, bottom 85 ft bgs m. TOC or ____ m. MSL
L. Borehole, bottom 85 ft bgs m. TOC or ____ m. MSL
M. Borehole, diameter 7¼ in. mm.
N. O.D. well casing 2.375 in. mm.
O. I.D. well casing 2.047 in. mm.
P. 24-hr water level after completion ____ m. TOC or ____ m. MSL



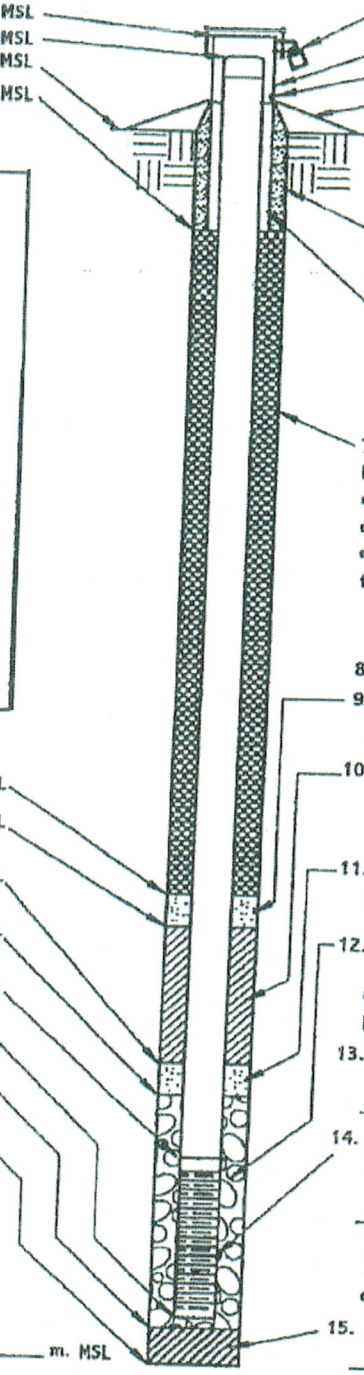
1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4" mm.
   b. Length: 18" m.
4. Drainage port(s) ☒ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ ____ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ ____ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Soil Other ☒
7. Annular space seal: a. Granular Bentonite ☐
   b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 50/14 Lbs/gal mud weight ..... Bentonite slurry ☑
   d. ____ x Bentonite ..... Bentonite-cement grout ☐
   e. 10 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☑ Gravity ☐
8. Centralizers ☐ Yes ☑ No
9. Secondary Filter ☐ Yes ☑ No
   a. Volume added ____ m³ ____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
   b. ☐ ¼in. ☐ ⅜in. ☐ ½in. Bentonite pellets ☐
   c. ____ Other ☐
11. Secondary Filter ☑ Yes ☐ No
   a. Volume added 1 BAG m³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
   a. ~~[illegible]~~ J.M. NATURAL SAND
   b. Volume added ____ m³ ____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☑ Flush threaded PVC schedule 80 ☐ ____ Other ☐
14. Screen material: SCH 40 PVC
   a. Screen type: Factory cut ☑ Continuous slot ☐ ____ Other ☐
   b. Manufacturer PREMIUM PERM FLOW
   c. Slot size: 0.020 in.
   d. Slotted length: 10.00 ft m.
15. Backfill material (below filter pack): None ☑ Sand Other ☐

Facility/Project Name: MEAD FNOP	Local Grid Location of Well: ☐ N. ☐ S. _____ m. ☐ E. ☐ W. _____ m.	Well Number: MW-179B
Facility License, Permit or Monitoring Number:	Grid Origin Location: Lat. 41 03 58.14 Long. 96 28 18.88 or St. Plane — m. N. — m. E.	Date Well Installed (Start): 11-16-12
Type of Protective Cover: Above-Ground ☒ Flush-To-Ground ☐	Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 36 T. 14 N.R. 8 ☒ E. ☐ W.	Date Well Installed (Completed): 11-16-12
Well Distance From Waste/Source Boundary: Mile +	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name & Firm) Jay Kolb (BMCD) Sam Wolf (Peterson)
Maximum Depth of Frost Penetration (estimated): 36"		

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation 1108.04 m. MSL
B. Well casing, top elevation 1107.64 m. MSL
C. Land surface elevation 1105.19 m. MSL
D. Surface seal, bottom 1103.69 m. TOC or _____ m. MSL

Fl



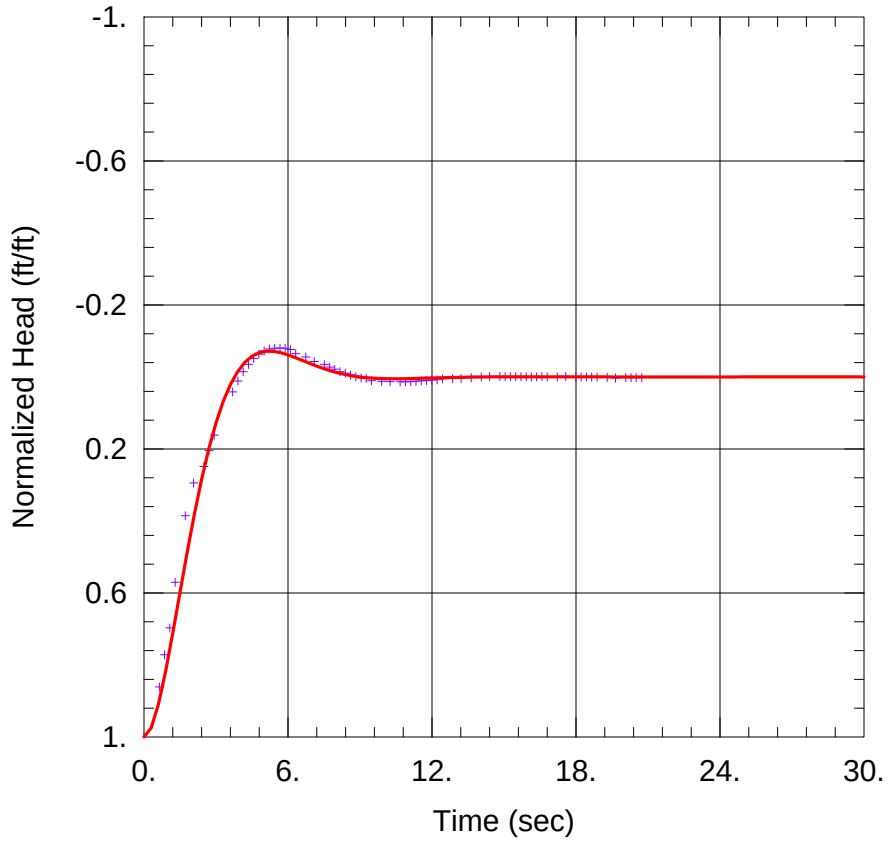
1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☒ Yes ☐ No
3. Protective casing:
   a. Inside diameter: 4" mm.
   b. Length: 18" m.
4. Drainage port(s) ☒ Yes ☐ No
5. Surface seal:
   a. Cap: Gravel blanket ☐ Bentonite ☐ Concrete ☒ Other ☐
   b. Annular space seal: Bentonite ☐ Cement ☒ Other ☐
6. Material between well casing and protective casing: Bentonite ☐ Cement ☐ Other ☒ Soil
7. Annular space seal: a. Granular Bentonite ☐
   b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐
   c. 80/14 Lbs/gal mud weight ..... Bentonite slurry ☒
   d. _____ x Bentonite ..... Bentonite-cement grout ☐
   e. 4.5 BAGS m.³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
   a. Volume added _____ m³ _____ Bags/Size
10. Bentonite seal: NA a. Bentonite granules ☐
    b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐
    c. _____ Other ☐
11. Secondary Filter ☒ Yes ☐ No
    a. Volume added 1.5 BAGS m³ 30/70 Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size
    a. NATURAL SAND
    b. Volume added _____ m³ _____ Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ _____ Other ☐
14. Screen material: PREMIUM PERM FLOW SCH 40 PVC
    a. Screen type: Factory cut ☒ Continuous slot ☐ _____ Other ☐
    b. Manufacturer PREMIUM PERM FLOW
    c. Slot size: 0.010 in.
    d. Slotted length: 10.00 ft m.
15. Backfill material (below filter pack): None ☒ Sand Other ☐

16. USCS classification of soil near screen:
    GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
    SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
    Bedrock ☐
17. Sieve analysis attached? ☐ Yes ☒ No
18. Drilling method used: Rotary ☐ Hollow Stem Auger ☒ _____ Other ☐
19. Drilling fluid used: Water ☐ Air ☐ Drilling Mud ☐ None ☒
20. Drilling additives used? ☐ Yes ☒ No
    Describe _____
21. Source of water (attach analysis):
    MAIN TREATMENT PLANT

E. Secondary filter, top _____ m. TOC or _____ m. MSL
F. Bentonite seal, top 5 ft bgs m. TOC or _____ m. MSL
G. Secondary filter, top 29 ft bgs m. TOC or _____ m. MSL
H. Primary filter, top 32 ft bgs m. TOC or _____ m. MSL
I. Screen joint, top 34.9 ft bgs m. TOC or _____ m. MSL
J. Well bottom 44.9 ft bgs m. TOC or _____ m. MSL
K. Filter pack, bottom 45 ft bgs m. TOC or _____ m. MSL
L. Borehole, bottom 45 ft bgs m. TOC or _____ m. MSL
M. Borehole, diameter 7 1/4 in mm.
N. O.D. well casing 2.375 in mm.
O. I.D. well casing 2.047 in mm.
P. 24-hr water level after completion _____ m. TOC or _____ m. MSL

Appendix D

Slug Test Summary Pages



PNEUMATIC SLUG TEST

Data Set: K:\...\MW09A_1uncon_dd1_jb.aqt
Date: 01/30/13 Time: 08:27:09

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

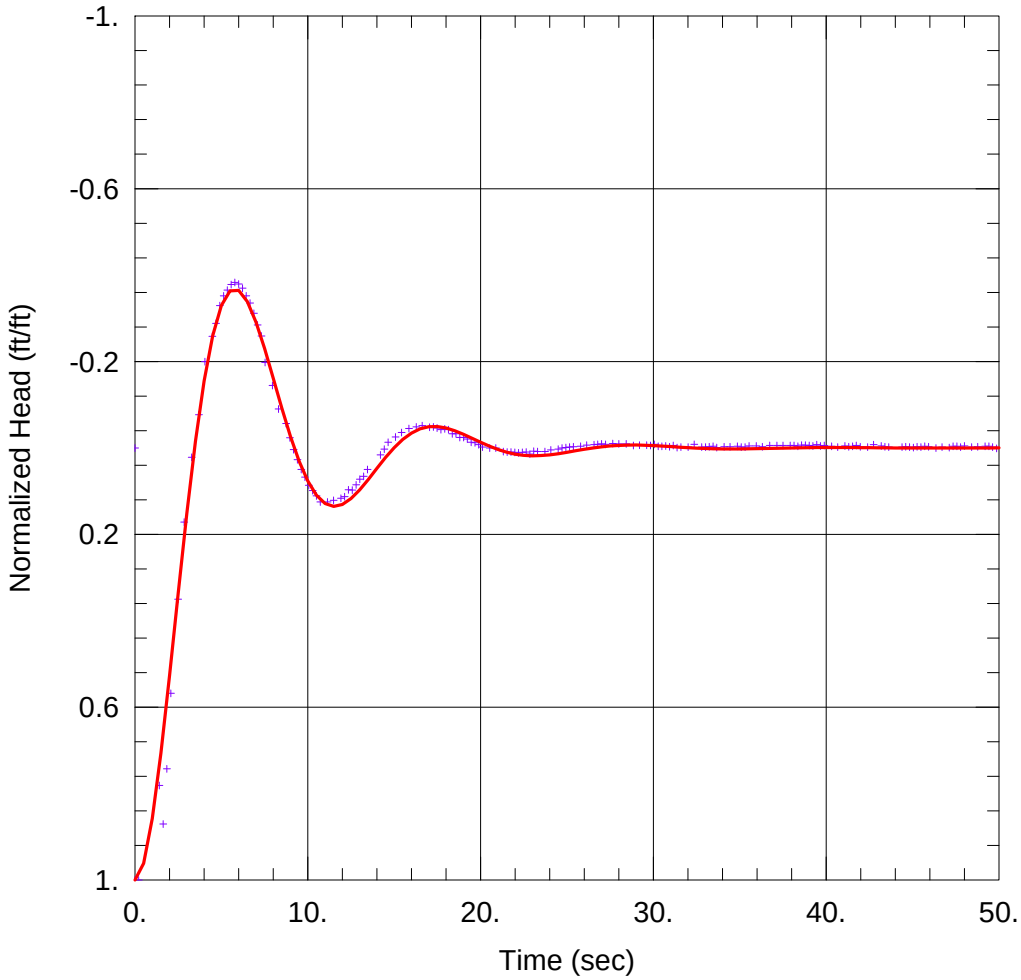
K = 26.98 ft/day
Le = 52. ft

AQUIFER DATA

Saturated Thickness: 76.9 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW09A_)

Initial Displacement: 2.6 ft
Total Well Penetration Depth: 105.6 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 76.6 ft
Screen Length: 39. ft
Well Radius: 0.25 ft



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wze436\MW21A_uncon_dd1.aqt
Date: 01/09/13 Time: 09:03:30

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

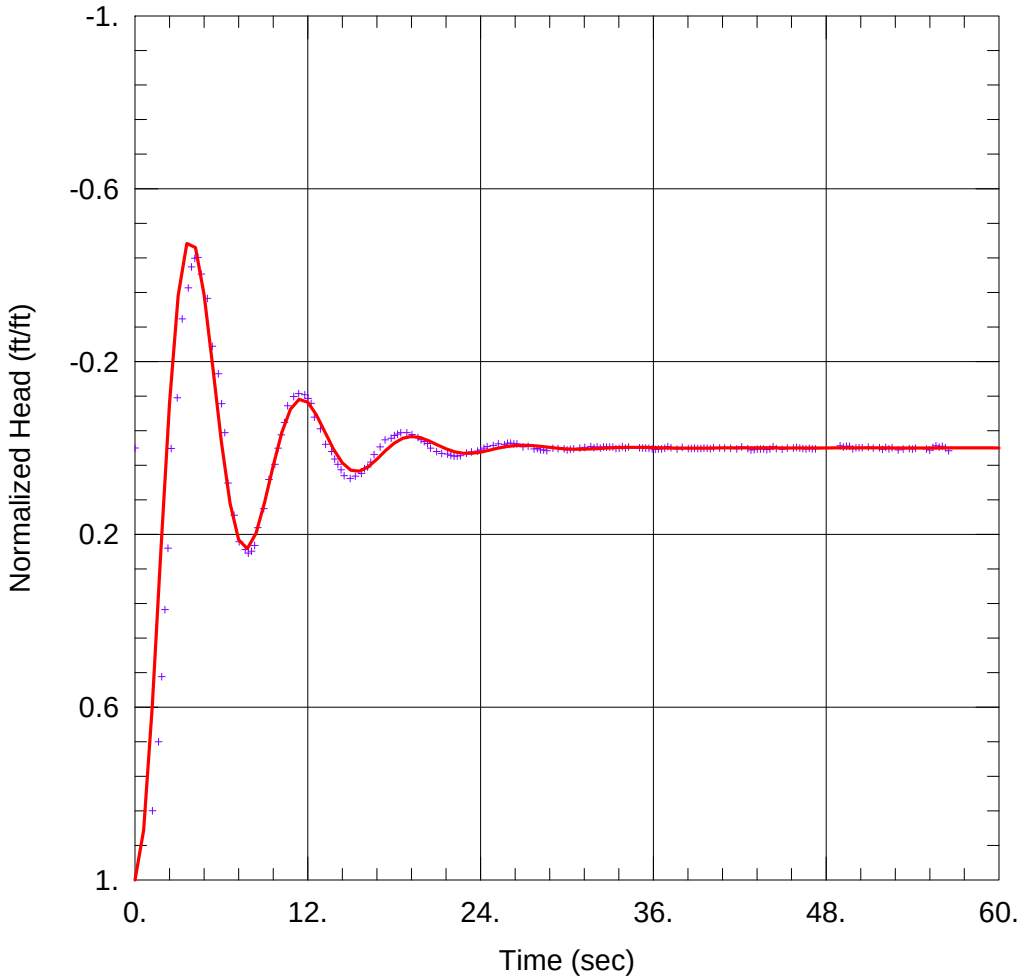
Saturated Thickness: 93.3 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW21A_)

Initial Displacement: 1.065 ft
Total Well Penetration Depth: 92. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 92. ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar
K = 132.2 ft/day
Le = 98.39 ft



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wz1e87\MW42A_uncon_dd1.aqt
Date: 01/09/13 Time: 09:03:47

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

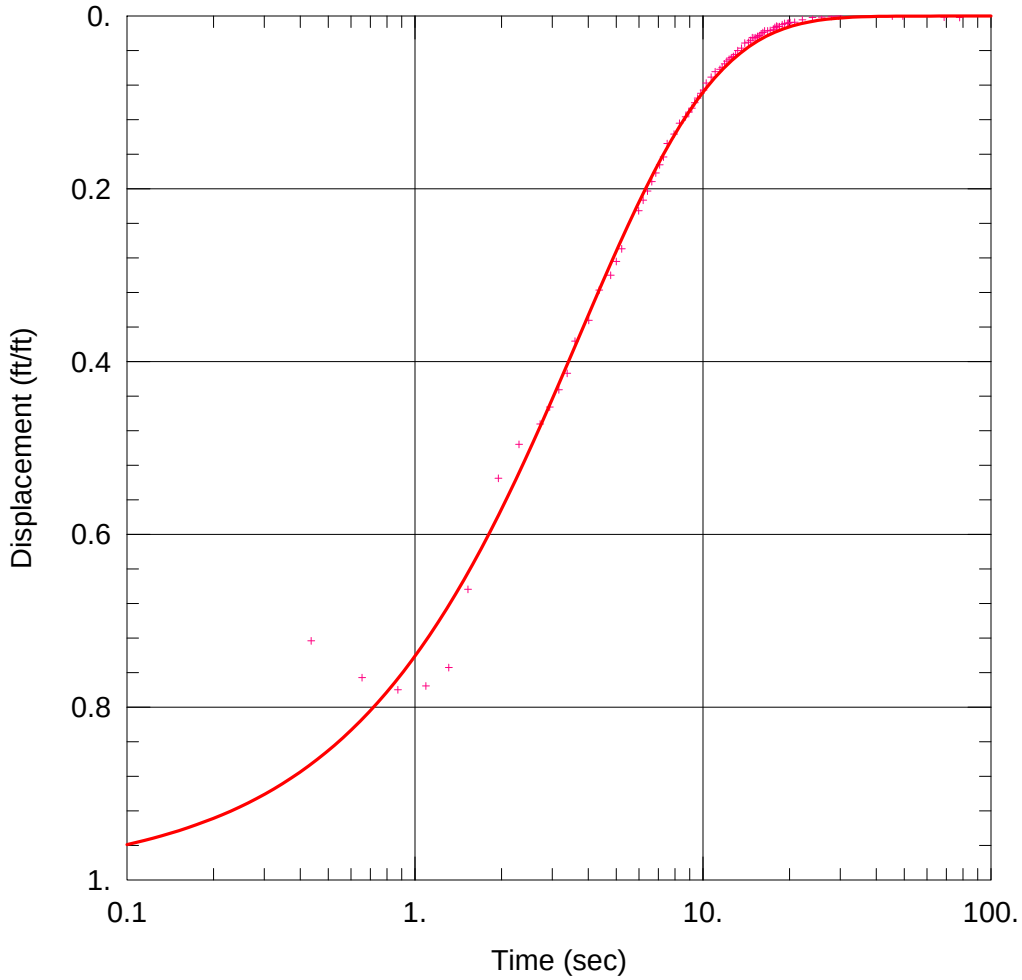
Saturated Thickness: 46.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW42A_)

Initial Displacement: 1.56 ft
Total Well Penetration Depth: 44.1 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 44.1 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar
K = 237.7 ft/day
Le = 45.82 ft



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wz7158\MW42D_uncon_dd1.aqt
Date: 01/09/13 Time: 09:04:07

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

Saturated Thickness: 56.5 ft

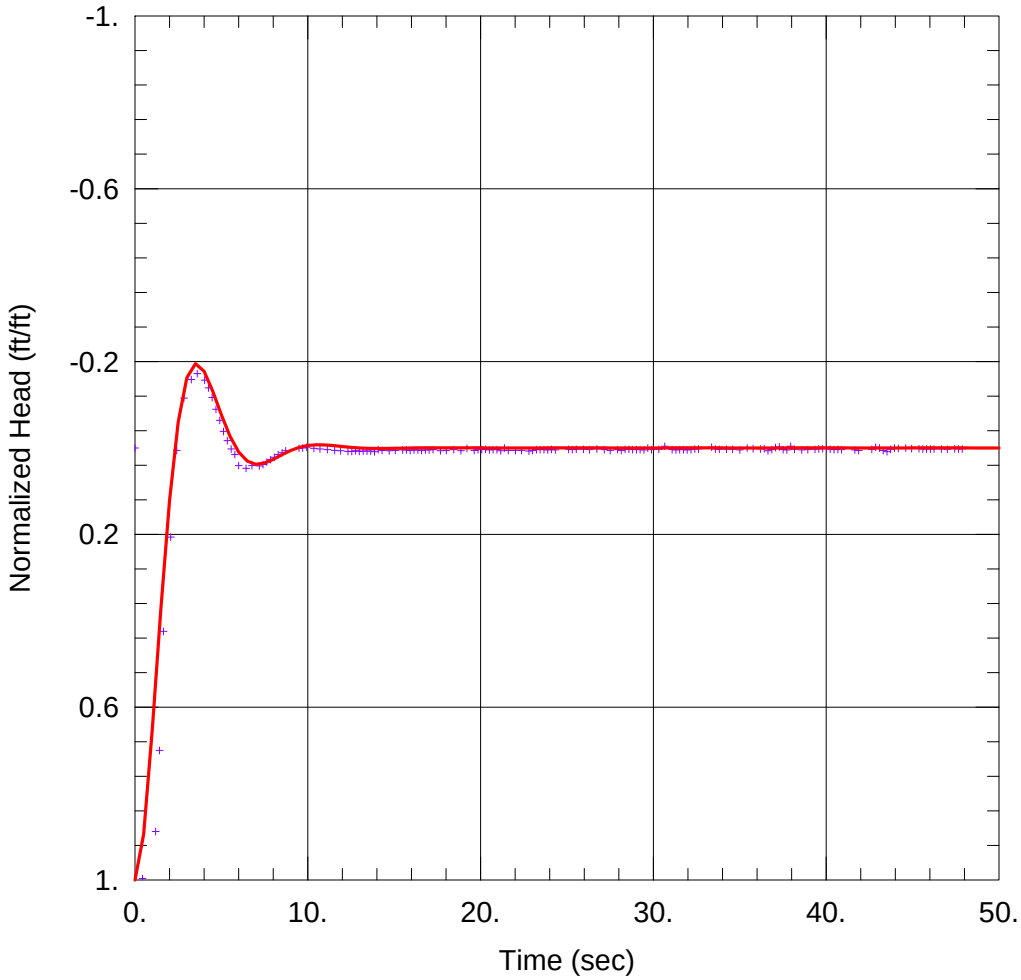
WELL DATA (MW42D_)

Initial Displacement: 2.2 ft
Total Well Penetration Depth: 56.5 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 56.5 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 50.59 ft/day
Kz/Kr = 1.
Ss = 1.351E-5 ft^{-1}



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wzc438\MW44A_uncon_dd1.aqt
Date: 01/09/13 Time: 09:04:39

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

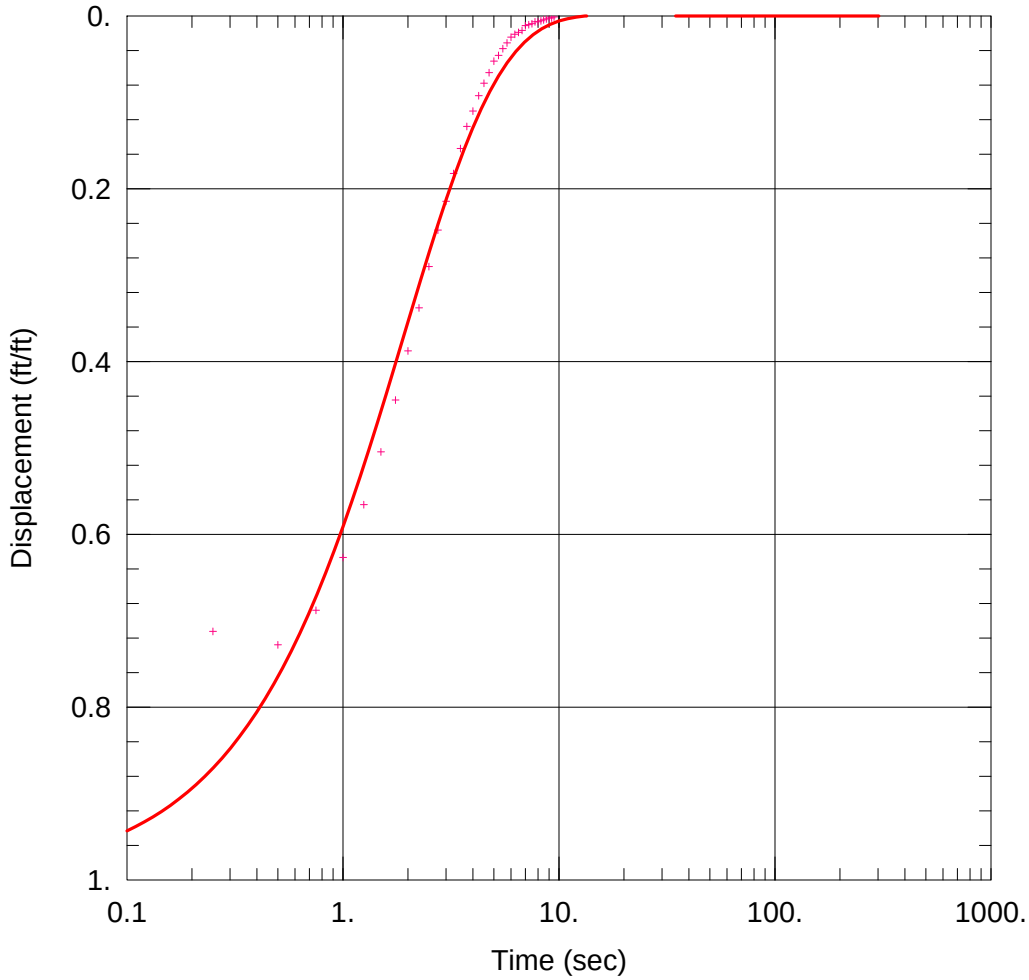
Saturated Thickness: 34.5 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW44A_)

Initial Displacement: 1.25 ft
Total Well Penetration Depth: 30.4 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 30.4 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar
K = 129.9 ft/day
Le = 32.1 ft



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wz5705\MW86A_1uncon_dd1.aqt
Date: 01/09/13 Time: 09:05:17

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

Saturated Thickness: 31.9 ft

WELL DATA (MW86A_)

Initial Displacement: 0.9 ft
Total Well Penetration Depth: 30.1 ft
Casing Radius: 0.0833 ft

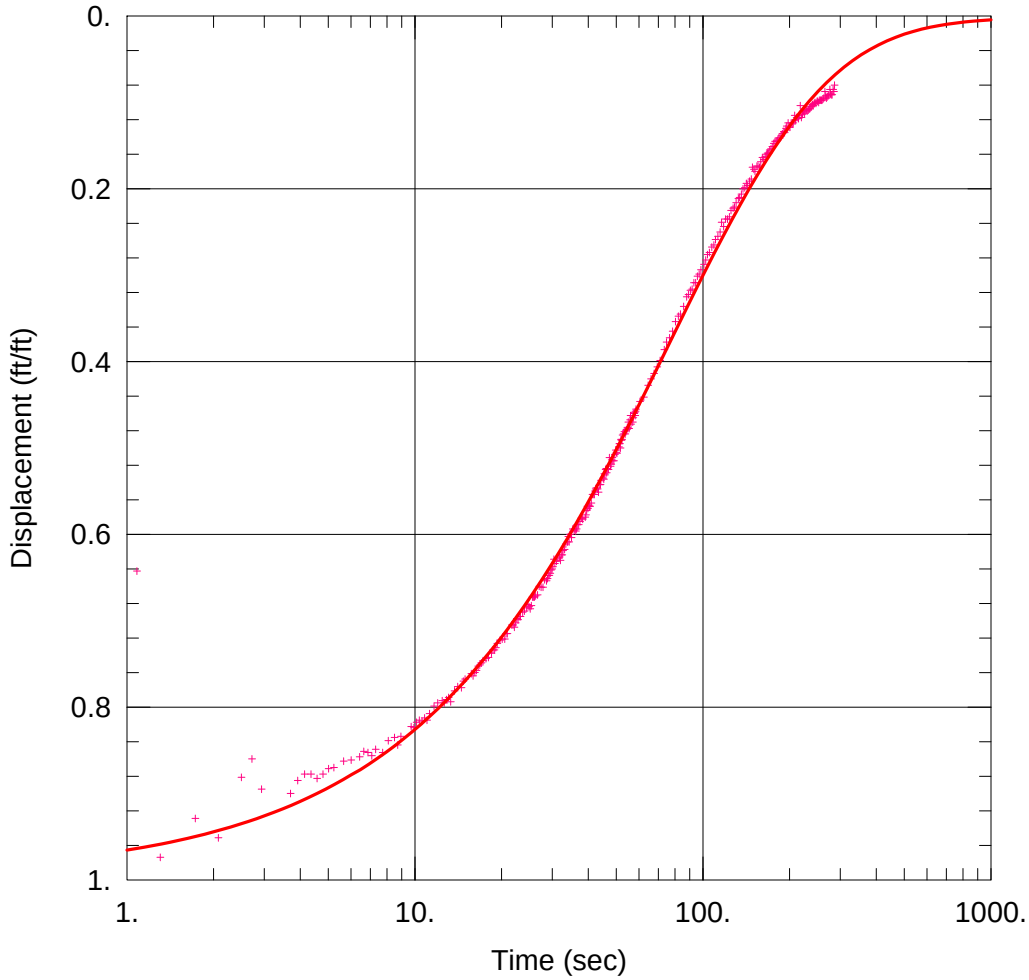
Static Water Column Height: 31.1 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 73.45 ft/day
Kz/Kr = 0.1

Ss = 7.983E-8 ft^{-1}



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wzb3e3\MW90D_1uncon_dd4.aqt
Date: 01/09/13 Time: 09:05:31

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

Saturated Thickness: 84.9 ft

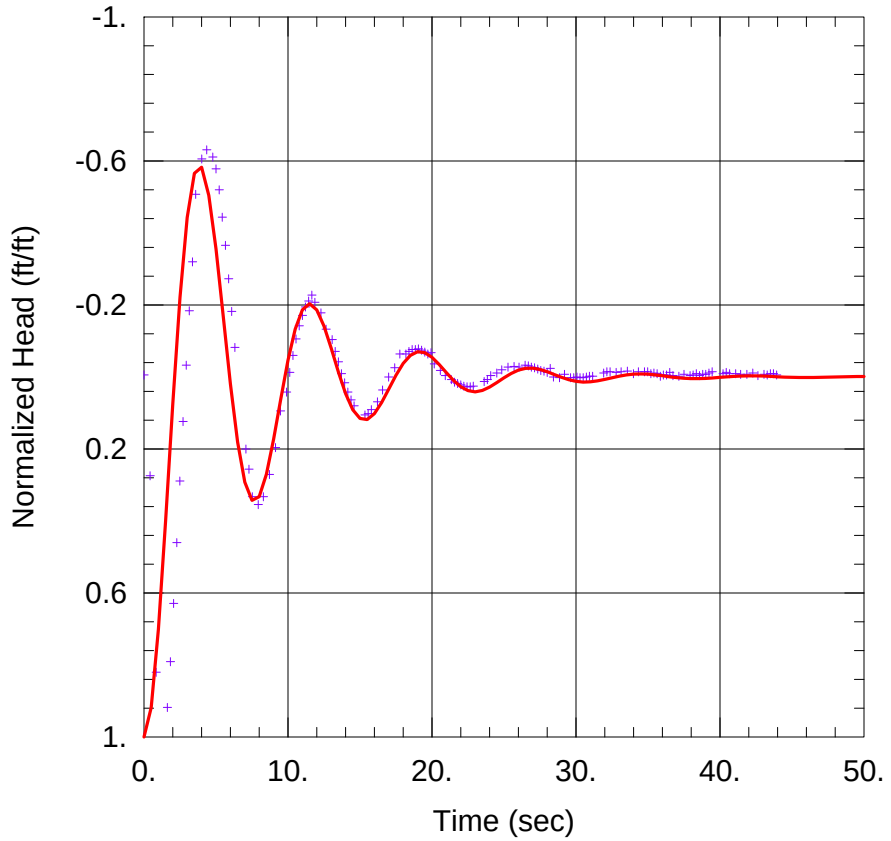
WELL DATA (MW90D_)

Initial Displacement: 0.8 ft
Total Well Penetration Depth: 84.9 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 84.9 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.289 ft/day
Kz/Kr = 0.3409
Ss = 8.259E-5 ft^{-1}



PNEUMATIC SLUG TEST

Data Set: K:\...\MW99A_1uncon_dd1_jb.aqt
Date: 01/30/13 Time: 08:27:34

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

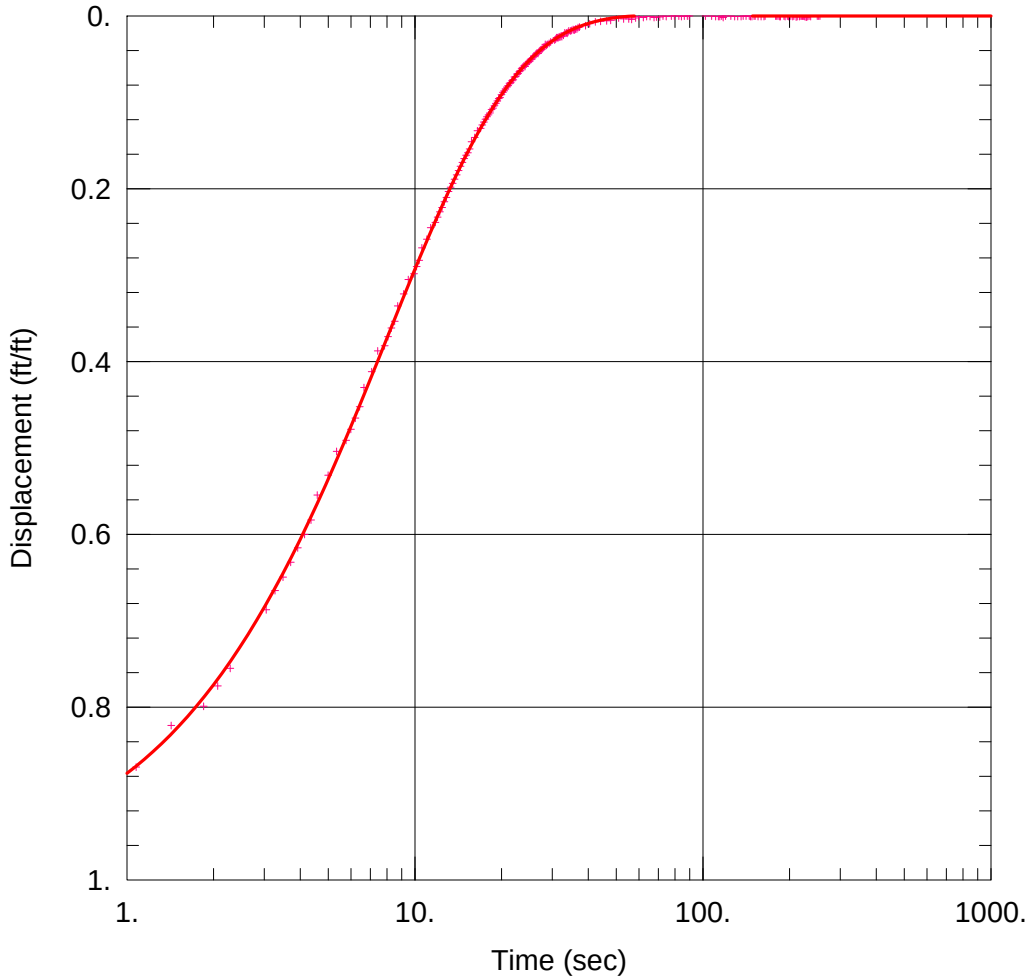
K = 349.4 ft/day
Le = 46.43 ft

AQUIFER DATA

Saturated Thickness: 43.8 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW99A_)

Initial Displacement: 0.55 ft
Total Well Penetration Depth: 44.2 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 44.2 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wz55cd\MW104D_1uncon_dd1.aqt
Date: 01/09/13 Time: 09:00:47

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

Saturated Thickness: 47.6 ft

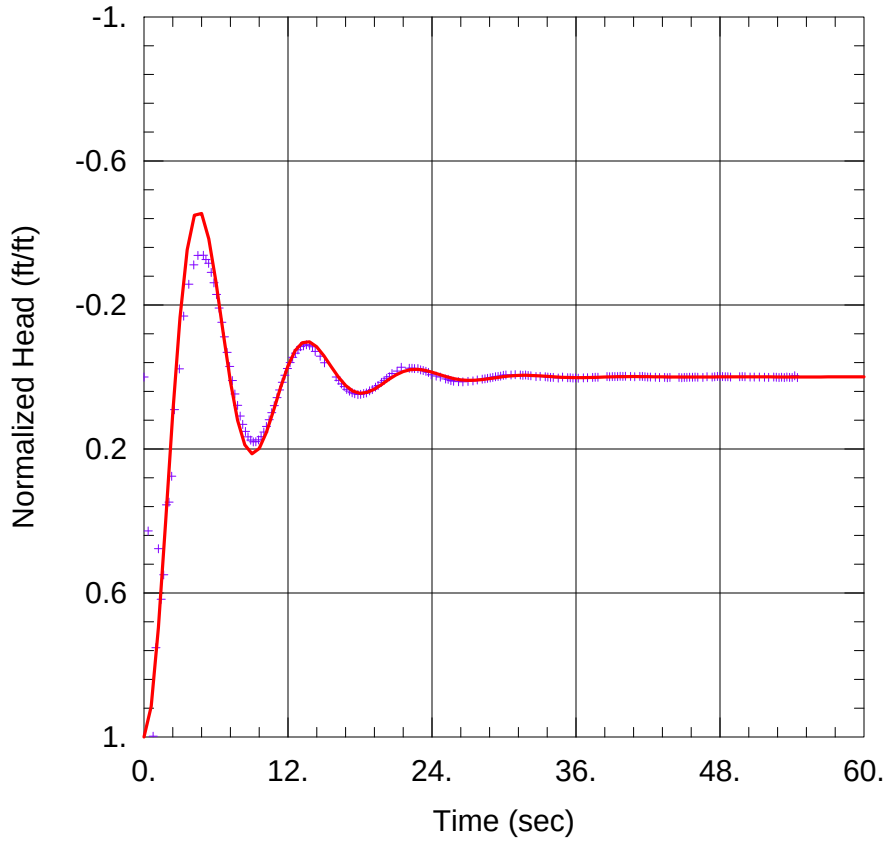
WELL DATA (MW104D_)

Initial Displacement: 1.8 ft
Total Well Penetration Depth: 47.6 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 47.6 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 32.79 ft/day
Kz/Kr = 0.1
Ss = 2.538E-7 ft^{-1}



PNEUMATIC SLUG TEST

Data Set: K:\...\MW124A_uncon_dd1_jb.aqt
Date: 01/30/13 Time: 08:27:52

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

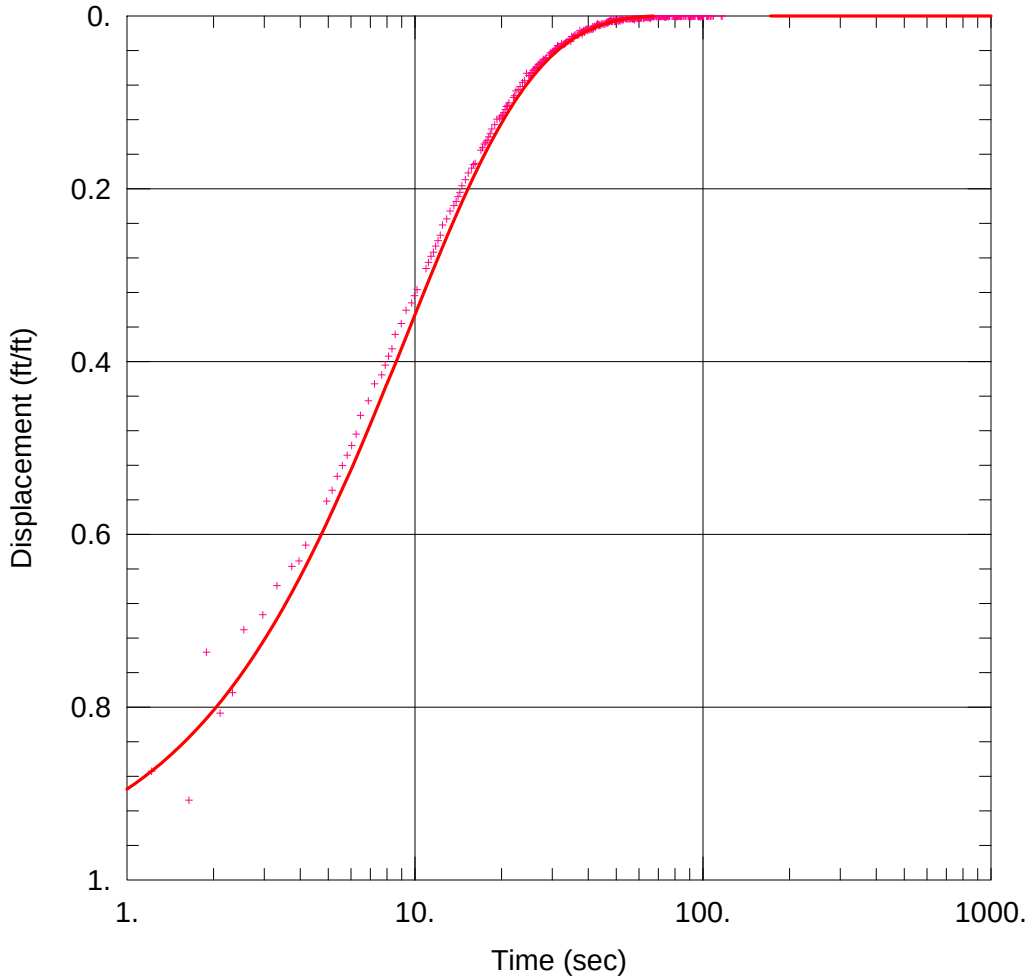
K = 195.2 ft/day
Le = 63. ft

AQUIFER DATA

Saturated Thickness: 73.2 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW124A_)

Initial Displacement: 2.11 ft
Total Well Penetration Depth: 67.9 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 67.9 ft
Screen Length: 10. ft
Well Radius: 0.25 ft



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wz7718\MW124D_uncon_dd1.aqt
Date: 01/11/13 Time: 08:52:43

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

Saturated Thickness: 83.4 ft

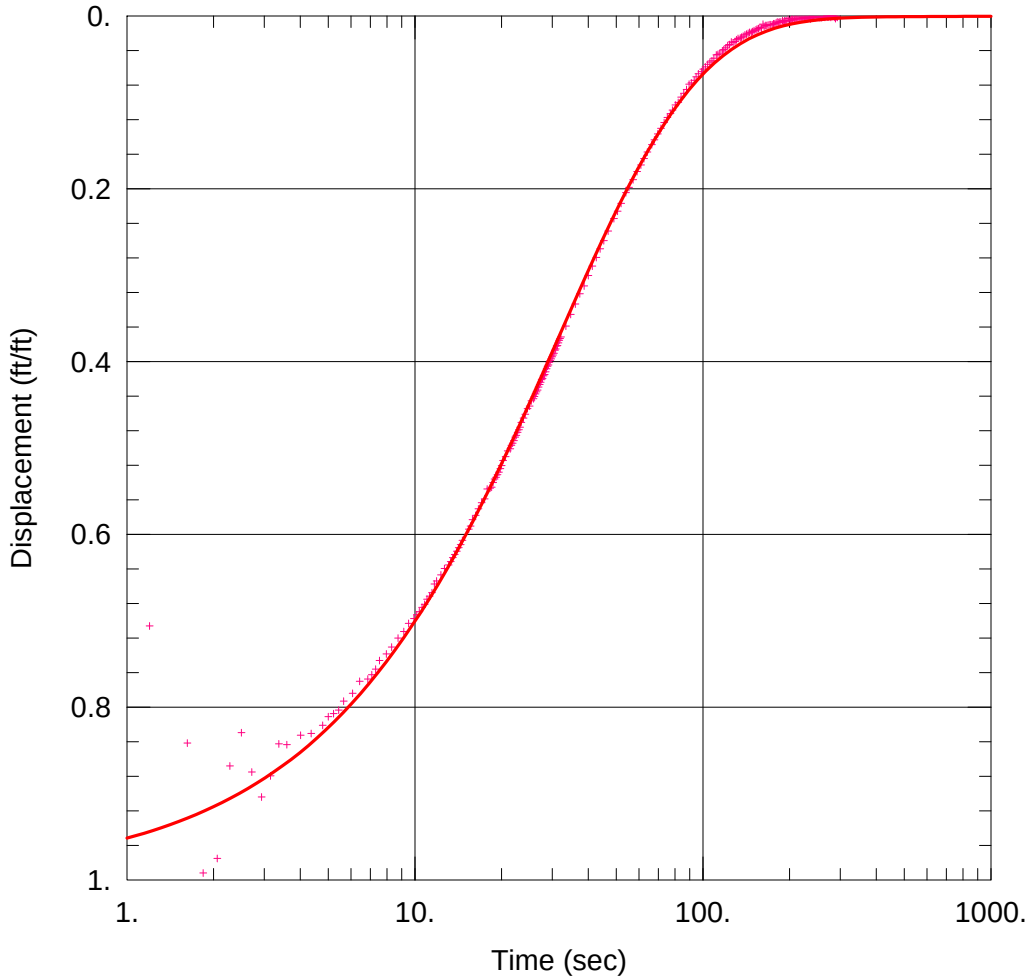
WELL DATA (MW124D_)

Initial Displacement: 1.43 ft
Total Well Penetration Depth: 82.8 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 83.4 ft
Screen Length: 4.4 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 46.02 ft/day
Kz/Kr = 0.001
Ss = 2.875E-9 ft^{-1}



PNEUMATIC SLUG TEST

Data Set: C:\TEMP\wz4c3b\MW125D_1uncon_dd1.aqt
Date: 01/09/13 Time: 09:03:00

PROJECT INFORMATION

Company: ECC/B&McD
Client: USACE-KCD
Project: 5447.001
Location: Mead NOP

AQUIFER DATA

Saturated Thickness: 93.3 ft

WELL DATA (MW125D_)

Initial Displacement: 2. ft
Total Well Penetration Depth: 93.3 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 93.3 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 7.576 ft/day
Kz/Kr = 0.1
Ss = 7.028E-6 ft^{-1}

Attachment 1

Quality Control Summary Report

FINAL
QUALITY CONTROL SUMMARY REPORT
MONITORING WELL NETWORK OPTIMIZATION
SAMPLING EVENT

OPERABLE UNIT No. 2 (GROUNDWATER)

FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Prepared for

United States Army Corps of Engineers
Kansas City District

March 2013

1.0 INTRODUCTION

Groundwater sampling was conducted between October 15, 2012 and October 16, 2012 and soil sampling was conducted on October 31, 2012 at the former Nebraska Ordnance Plant, near Mead, Nebraska. All sampling activities were performed in accordance with the *Monitoring Well Network Optimization Analysis and Work Plan, Phase II, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2012). This Quality Control Summary Report presents a summary of the chemical data quality review for the soil and groundwater sampling for the Monitoring Well Network Optimization sampling event.

TestAmerica, South Burlington, Vermont performed the analyses. Groundwater samples were analyzed for trichloroethene (TCE) by Environmental Protection Agency (EPA) Method 8260B, or hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) by EPA Method 8330, and soil samples were analyzed for Total Organic Carbon (TOC) by Lloyd Kahn Method.

Table 1-1 and Table 1-2 present a complete list of the sampling locations, the corresponding sample identifications (IDs), and the requested analyses.

The chain-of-custody (COC) and field notes are included as Appendices A and B, respectively. Appendix C presents an explanation of data validation qualifiers. Appendix D contains all analytical data.

2.0 FIELD SAMPLING ACTIVITIES

During the Monitoring Well Network Optimization sampling event, groundwater samples from four direct-push locations at various depths were collected and analyzed. Fifteen soil samples were collected and analyzed for TOC.

Two field duplicates for each analysis, two matrix spike/matrix spike duplicate (MS/MSD) field sample pairs (one pair analyzed for RDX and one pair analyzed for TCE), one trip blank and two rinsate blanks were collected and analyzed.

Tables 2-1 and 2-2 provide the following sample collection information:

- A cross-reference between laboratory sample IDs and field sample IDs;
- MS/MSD sample information;
- Quality Control (QC) sample information (field duplicates);
- Dates of sample collection and sample receipt by the laboratory;
- Sample delivery group (SDG) numbers; and
- Requested analyses.

3.0 DATA QUALITY EVALUATION PROCEDURES

The following subsections present results of the data quality evaluation. This evaluation was performed in accordance with the *Mead Validation Guidelines*, (ECC, 2007, approved by United States Army Corps of Engineers [USACE] 2007). Qualifiers were assigned based on laboratory QC criteria. Data quality evaluation results are presented in Table 3-1 and QC outliers resulting in qualifications are presented in Tables 3-2 and 3-3.

3.1 Sample Receipt at the Laboratory

The samples were properly preserved and in good condition, and the sample coolers were received within the recommended temperature range of 4 ± 2 °C or just below 2 °C, but not frozen. Several volatile organic compound (VOC) sample vials arrived at the laboratory with head-space in the sample vials. The sample results were qualified as estimated (J/UJ) when all sample vials were noted to contain head-space. When at least one of the vials arrived in good condition, no qualifications were applied because an alternate vial was used for analysis. Refer to Table 3-1 for data quality evaluation results and Table 3-2 QC outliers.

3.2 Holding Times

All samples were prepared and analyzed within the required holding times.

3.3 Tuning and Calibration

According to the *Mead Validation Guidelines* (ECC, 2007), assessment of tune and calibration information is assessed using the laboratory case-narrative or summary forms. No deviations for the calibration and tuning of pertinent instrumentation were reported by the laboratory in the case narratives and evaluation of the calibration summary forms indicated that all project criteria were met.

3.4 Laboratory Method Blanks

A laboratory method blank is an analyte-free matrix that is carried through the entire preparation and analysis sequence for the purpose of identifying potential contamination introduced during preparation and analysis. Method blanks were analyzed for each sample batch for all analyses. In accordance with the *Mead Validation Guidelines* (ECC, 2007), detections are qualified as non-detect (U) if the concentration in the sample is less than 5 times the concentration in the associated blank. For common laboratory contaminants, detections are qualified as non-detect (U) if the concentration in the sample is less than 10 times the concentration in the associated blank. Sample results that are either non-detect (U), or greater than 5 or 10 times the blank result do not require qualification.

TCE was detected in one laboratory method blank. A TCE result in one sample was qualified as a non-detect (U) due to a laboratory method blank. Refer to Table 3-1 for data quality evaluation results and Table 3-2 QC outliers.

3.5 Trip Blanks

A trip blank is an analyte-free matrix that accompanies samples through the sample collection and transportation process to identify potential VOC contamination. In accordance with the *Mead Validation Guidelines* (ECC, 2007), detections are qualified as non-detect (U) if the concentration in the sample is less than 5 times the concentration in the associated blank (10 times for common laboratory contaminants). Sample results that are either non-detect (U), or greater than 5 or 10 times the blank result do not require qualification.

There were no detections of target analytes in the trip blanks resulting in qualifications.

3.6 Rinsate Blanks

A rinsate blank is a sample of analyte-free rinse water that is poured over decontaminated field sampling equipment prior to further sample collection. Rinsate blanks identify potential contamination introduced during the sample collection process. In accordance with the *Mead Validation Guidelines* (ECC, 2007), detections are qualified as non-detect (U) if the concentration in the sample is less than 5 times the concentration in the associated blank (10 times for common laboratory contaminants). Sample results that are either non-detect (U), or greater than 5 or 10 times the blank result do not require qualification.

There were no detections of target analytes in the rinsate blanks resulting in the qualification.

3.7 Surrogates

Surrogates are compounds not normally found in the environment that are added (spiked) into samples prior to extraction (for extractable methods) or prior to analysis (for non-extractable methods). The percent recovery (% REC) of each surrogate is used to assess the success of the sample preparation process for an individual sample.

In accordance with the *Mead Validation Guidelines* (ECC, 2007), results for associated analytes in the affected samples are J-coded for detects and UJ-coded for non-detects if the surrogate % RECs are below the laboratory QC limits, but greater than 10%. Non-detects are R-coded if % RECs are less than 10%. Also in accordance with the *Mead Validation Guidelines* (ECC, 2007), results for associated analytes in the affected samples are J-coded for detects if the % RECs are greater than the QC limits. No action is required for non-detects.

All surrogate %RECs were within QC limits.

3.8 Laboratory Control Sample / Laboratory Control Sample Duplicate

A laboratory control sample (LCS) consists of a matrix, similar to that of the field sample, which is spiked with known concentrations of analytes. The LCS % REC is a measure of the accuracy of the preparation and analytical methods. The laboratory control sample duplicate (LCSD) is a duplicate preparation and analysis of the LCS. The differences between the LCS and LCSD recoveries are used to calculate the relative percent differences (RPD), which is a measure of the

precision of the preparation and analytical methods. LCS samples were analyzed for each sample batch for all analyses.

In accordance with the *Mead Validation Guidelines* (ECC, 2007), results for the affected analyte in the associated samples are J-coded for detects and UJ-coded for non-detects if the LCS % RECs are below the laboratory QC limits, but greater than 10%. Non-detects are R-coded if the % RECs are less than 10%. Also in accordance with the *Mead Validation Guidelines* (ECC, 2007), results for the affected analyte in the associated samples are J-coded for detects if the % RECs are greater than the QC limits. No action is required for non-detects. Additionally, results for the affected analyte in the associated samples are J-coded for detects and UJ-coded for non-detects if the RPD exceeds 30%.

All % RECs and RPDs were within QC limits.

3.9 Matrix Spike / Matrix Spike Duplicate

MS and MSD samples were analyzed for both VOC analyses and explosives. A field sample is split into three portions (original, MS, and MSD) and known amounts of analytes are added (spiked) into the MS and MSD portions of the sample. The analytical results of these two portions are compared to each other for reproducibility using the RPD. These results are also compared against the un-spiked portion of the sample for % REC of the spiked analytes. MS/MSD analyses were performed on the appropriate samples; see Table 2-1.

In accordance with the *Mead Validation Guidelines* (ECC, 2007), results for the affected analyte in the parent sample are J-coded for detects and UJ-coded for non-detects if the MS/MSD % RECs are below the laboratory QC limits, but greater than 10%. Non-detects are R-coded if % RECs are less than 10%. Also in accordance with the *Mead Validation Guidelines* (ECC, 2007), results for the affected analyte in the parent sample are J-coded for detects if the MS/MSD % RECs are greater than the QC limits. No action is required for non-detects. Additionally, results for the affected analyte in the associated parent samples are J-coded for detects and UJ-coded for non-detects if the RPD exceeds QC limits.

All MS/MSD % RECs and RPDs were within QC limits.

3.10 Field Duplicates

Field duplicates provide information regarding the reproducibility of analytical results and account for error introduced from handling, shipping, preparing, and analyzing field samples.

Field duplicate pairs collected during the Monitoring Well Network Optimization sampling event are summarized in Table 2-1.

The following field duplicate pairs were collected during the Monitoring Well Network Optimization sampling event:

- GP-MW0179A-55 / GP-MW2179A-55 (VOCs)

- GP-MW0179A-35 / GP-MW2179A-35 (VOCs);
- GP-MW0171A-67 / GP-MW2171A-67 (Explosives);
- GP-MW0163B-69 / GP-MW2163B-69 (Explosives);
- MW-161A-102-102.5 / MW-161A-102-102.5 (TOC); and
- MW-171A-87-88 / MW-2171A-87-88 (TOC).

The field duplicate precision criterion (RPD of < 50%) was met in the all duplicate pairs with the exception of RDX in duplicate pair GP-MW0171A-67 / GP-MW2171A-67 with an RPD of 113%. Field duplicate results are considered acceptable when one result is not detected and the other result is detected below the limit of quantitation (LOQ) or if both results are less than the LOQ. In accordance with the *Mead Validation Guidelines* (ECC, 2007), data were not qualified based on field duplicate sample results.

3.11 Dilutions and Re-analyses

Qualifiers assigned as a result of calibration range exceedance are not used in the calculation of analytical data completeness percentages if there are acceptable results from diluted sample analyses.

Sample results were flagged "E" by the laboratory as exceeding the calibration range are considered estimated values. According to the *Mead Validation Guidelines* (ECC, 2007), results exceeding the calibrations range are not used for reporting or project decisions when acceptable results from dilutions are available. Therefore, the secondary diluted concentrations should be used for these compounds and the initial least dilute analysis should be used for all other results for these samples.

One sample for RDX analysis and nine samples for TCE analysis were analyzed at a dilution. The results from the dilution analyses were reported for these samples.

Three samples for explosives analysis was re-extracted outside the holding time. No explanation for the re-extraction was provided. The results from the original extraction were used for this report.

3.12 Laboratory Qualifiers

Analytes detected below the LOQ, but above the detection limit were quantified and results were assigned an estimated (J) qualifier by the laboratory. These qualifiers were carried over by the validator and were not used to determine analytical completeness or project completeness (Section 4.0).

4.0 OVERALL ASSESSMENT

The following subsections present the completeness determinations for the Monitoring Well Network Optimization sampling event.

4.2 Field Completeness

Field completeness for sample collection is assessed by comparing the number of samples collected to the number of samples planned for collection. For the Monitoring Well Network Optimization sampling event, a goal for total number of samples was not established since sample quantity requirements were refined as the plume was defined. The field completeness was therefore considered to be 100%. The field completeness is summarized in Tables 4-1 and 4-2.

4.3 Analytical Completeness

Analytical completeness is calculated as both acceptable data completeness and quality data completeness.

Acceptable data is a measure of laboratory contract compliance. Acceptable data includes data that have not been rejected or qualified as estimated (J). Qualified data are considered acceptable if appropriate corrective actions were taken by the laboratory or did not require corrective actions. Therefore, the sample results qualified due to sample handling issues such as headspace are not counted against the acceptable data. Acceptable data completeness percentages met the acceptable data completeness goals for each analytical method of 90% for the Monitoring Well Network Optimization sampling event.

Quality data is a measure of the percentage of usable data points. Usable data points include all non-rejected data. Rejected data points with replacement data do not count against the quality data completeness. There were no rejected data points for this sampling event; therefore, the quality data completeness met the quality data completeness goals for each analytical method of 80% for the Monitoring Well Network Optimization sampling event. Overall quality data completeness met the quality data completeness goal of 80%. Tables 4-3 and 4-4 present analytical data completeness summary.

4.4 Project Completeness

Project completeness combines sampling and analytical protocols to assess the project as a whole. Project completeness is assessed by comparing the percentage of samples/measurements that are determined to be usable to the total number of samples/measurements planned. Project completeness is calculated using field completeness and analytical completeness (quality data) percentages. Since field completeness was considered 100% for this sampling event, the project completeness is the same as quality analytical completeness.

5.0 CONCLUSIONS

Data are valid for use, as qualified. The overall project completeness was 100% for the Monitoring Well Network Optimization sampling event.

6.0 REFERENCES

ECC, 2012, *Monitoring Well Network Optimization Analysis and Work Plan, Phase II, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. September.

ECC, 2007, *Mead Validation Guidelines*， (approved by USACE 2007).

Tables

List of Acronyms for Tables

Term	Definition
µg/L	micrograms per liter
BLK	blank
GC/MS	gas chromatography–mass spectrometry
HPLC	high-performance liquid chromatography
ID	identification/identifier
IS	internal standard
J	estimated
Lab	laboratory
LCL	lower control limit
LCS	laboratory control sample
MDL	minimum detection limit
MS/MSD	matrix spike/matrix spike duplicate
MS	mass-spectrometry
QC	quality control
%REC	percent recovery
RPD	relative percent difference
SDG	sample delivery group
SURR	surrogate
U	not detected at laboratory limit of detection
UCL	upper control limit
UJ	qualified as estimated and not detected at laboratory limit of detection

Table 1-1

Sample Locations, Sample IDs, and Analyses

2012 Monitoring Well Network Optimization Sampling Event

Former Nebraska Ordnance Plant, Mead, Nebraska

Diret Push Sample Locations	Sample IDs	Analyses
GP-MW-160	GP-MW0160-103	Volatiles
GP-MW-160	GP-MW0160-113	Volatiles
GP-MW-160	GP-MW0160-123	Volatiles
GP-MW-160	GP-MW0160-133	Volatiles
GP-MW-160	GP-MW0160-53	Volatiles
GP-MW-160	GP-MW0160-63	Volatiles
GP-MW-160	GP-MW0160-73	Volatiles
GP-MW-160	GP-MW0160-83	Volatiles
GP-MW-160	GP-MW0160-93	Volatiles
GP-MW-163B	GP-MW0163B-109	Explosives
GP-MW-163B	GP-MW0163B-49	Explosives
GP-MW-163B	GP-MW0163B-59	Explosives
GP-MW-163B	GP-MW0163B-69	Explosives
GP-MW-163B	GP-MW0163B-79	Explosives
GP-MW-163B	GP-MW0163B-89	Explosives
GP-MW-163B	GP-MW0163B-99	Explosives
GP-MW-171A	GP-MW0171A-47	Explosives
GP-MW-171A	GP-MW0171A-57	Explosives
GP-MW-171A	GP-MW0171A-67	Explosives
GP-MW-171A	GP-MW0171A-77	Explosives
GP-MW-171A	GP-MW0171A-87	Explosives
GP-MW-171A	GP-MW0171A-97	Explosives
GP-MW-179A	GP-MW0179A-15	Volatiles
GP-MW-179A	GP-MW0179A-25	Volatiles
GP-MW-179A	GP-MW0179A-35	Volatiles
GP-MW-179A	GP-MW0179A-45	Volatiles
GP-MW-179A	GP-MW0179A-55	Volatiles
GP-MW-179A	GP-MW0179A-65	Volatiles
GP-MW-179A	GP-MW0179A-75	Volatiles
GP-MW-179A	GP-MW0179A-85	Volatiles

Notes:

Volatiles	SW8260B	Volatile Organic Compounds by Capillary GC/MS
Explosives	SW8330	Nitroaromatics and Nitramines by HPLC

Table 1-2
Sample Locations, Sample IDs, and Analyses
2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Soil Boring Sample Locations	Sample IDs	Analyses
MW-148A	MW-148A-102-102.5	TOC
MW-160A	MW-160A-116	TOC
MW-161A	MW-161A-106-108	TOC
MW-162A	MW-162A-80-81	TOC
MW-164A	MW-164A-92	TOC
MW-166A	MW-166A-96.5-97.5	TOC
MW-167A	MW-167A-87-88	TOC
MW-168A	MW-168A-95	TOC
MW-169A	MW-169A-94-95	TOC
MW-170A	MW-170A-80-81	TOC
MW-171A	MW-171A-87-88	TOC
MW-172A	MW-172A-93-94	TOC
MW-173A	MW-173A-85-86	TOC
MW-174A	MW-174A-85-86	TOC
MW-175A	MW-175A-89	TOC

Notes:

TOC LYDKHN Lloyd Kahn Method for the Determination of Total Organic Carbon in Sediment, USEPA

Table 2-1
Sample Collection Summary
Direct Push Samples 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Field Samples	MS/MSD Samples	Field Duplicate Samples	Date Sampled	Date Received by Lab	Lab ID	SDG	Explosives	Volatiles
Equipment Blanks								
RIN-GP-MW0179A			10/16/2012	10/17/2012	200-13262-21	13262		•
RIN-GP-MW0171A			10/16/2012	10/17/2012	200-13262-29	13262	•	
Field Samples								
GP-MW0160-133			10/15/2012	10/17/2012	200-13262-2	13262		•
GP-MW0160-123			10/15/2012	10/17/2012	200-13262-3	13262		•
GP-MW0160-113			10/15/2012	10/17/2012	200-13262-4	13262		•
GP-MW0160-103			10/15/2012	10/17/2012	200-13262-5	13262		•
GP-MW0160-93			10/15/2012	10/17/2012	200-13262-6	13262		•
GP-MW0160-83			10/15/2012	10/17/2012	200-13262-7	13262		•
GP-MW0160-73			10/15/2012	10/17/2012	200-13262-8	13262		•
GP-MW0160-63			10/15/2012	10/17/2012	200-13262-9	13262		•
GP-MW0160-53			10/15/2012	10/17/2012	200-13262-10	13262		•
GP-MW0179A-85			10/15/2012	10/17/2012	200-13262-11	13262		•
GP-MW0179A-75			10/15/2012	10/17/2012	200-13262-12	13262		•
GP-MW0179A-65			10/15/2012	10/17/2012	200-13262-13	13262		•
GP-MW0179A-55	GP-MW0179A-55		10/15/2012	10/17/2012	200-13262-14	13262		•
		GP-MW2179A-55	10/15/2012	10/17/2012	200-13262-15	13262		•
GP-MW0179A-45			10/15/2012	10/17/2012	200-13262-16	13262		•
GP-MW0179A-35			10/15/2012	10/17/2012	200-13262-17	13262		•
		GP-MW2179A-35	10/15/2012	10/17/2012	200-13262-18	13262		•
GP-MW0179A-25			10/15/2012	10/17/2012	200-13262-19	13262		•
GP-MW0179A-15			10/15/2012	10/17/2012	200-13262-20	13262		•
GP-MW0171A-97			10/16/2012	10/17/2012	200-13262-22	13262	•	
GP-MW0171A-87			10/16/2012	10/17/2012	200-13262-23	13262	•	
GP-MW0171A-77			10/16/2012	10/17/2012	200-13262-24	13262	•	
GP-MW0171A-67			10/16/2012	10/17/2012	200-13262-25	13262	•	
		GP-MW2171A-67	10/16/2012	10/17/2012	200-13262-26	13262	•	
GP-MW0171A-57			10/16/2012	10/17/2012	200-13262-27	13262	•	
GP-MW0171A-47			10/16/2012	10/17/2012	200-13262-28	13262	•	
GP-MW0163B-109			10/16/2012	10/17/2012	200-13262-30	13262	•	
GP-MW0163B-99			10/16/2012	10/17/2012	200-13262-31	13262	•	

Table 2-1
Sample Collection Summary
Direct Push Samples 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Field Samples	MS/MSD Samples	Field Duplicate Samples	Date Sampled	Date Received by Lab	Lab ID	SDG	Explosives	Volatiles
GP-MW0163B-89			10/16/2012	10/17/2012	200-13262-32	13262	•	
GP-MW0163B-79			10/16/2012	10/17/2012	200-13262-33	13262	•	
GP-MW0163B-69	GP-MW0163B-69		10/16/2012	10/17/2012	200-13262-34	13262	•	
		GP-MW2163B-69	10/16/2012	10/17/2012	200-13262-35	13262	•	
GP-MW0163B-59			10/16/2012	10/17/2012	200-13262-36	13262	•	
GP-MW0163B-49			10/16/2012	10/17/2012	200-13262-37	13262	•	
Trip Blank								
TRB-GP-MW2160			10/15/2012	10/17/2012	200-13262-1	13262		•

Notes:

Volatiles	SW8260B	Volatile Organic Compounds by Capillary GC/MS
Explosives	SW8330	Nitroaromatics and Nitramines by HPLC
	SW8330	Nitroaromatics and Nitramines by HPLC

• = Requested for the indicated analyses

Table 2-2
Sample Collection Summary
Soil Boring 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Field Samples	Field Duplicate Samples	Date Sampled	Date Received by Lab	Lab ID	SDG	TOC
Field Samples						
MW-164A-92		10/23/2012	10/31/2012	200-13525-6	13525	•
MW-162A-80-81		10/23/2012	10/31/2012	200-13525-7	13525	•
MW-160A-116		10/24/2012	10/31/2012	200-13525-2	13525	•
MW-148A-102-102.5		10/24/2012	10/31/2012	200-13525-8	13525	•
MW-161A-106-108		10/24/2012	10/31/2012	200-13525-3	13525	•
	MW-261A-106-108	10/24/2012	10/31/2012	200-13525-4	13525	•
MW-172A-93-94		10/25/2012	10/31/2012	200-13525-11	13525	•
MW-173A-85-86		10/25/2012	10/31/2012	200-13525-1	13525	•
MW-171A-87-88		10/25/2012	10/31/2012	200-13525-9	13525	•
	MW-271A-87-88	10/25/2012	10/31/2012	200-13525-10	13525	•
MW-168A-95		10/25/2012	10/31/2012	200-13525-5	13525	•
MW-175A-89		10/26/2012	10/31/2012	200-13525-15	13525	•
MW-170A-80-81		10/26/2012	10/31/2012	200-13525-13	13525	•
MW-167A-87-88		10/27/2012	10/31/2012	200-13525-16	13525	•
MW-166A-96.5-97.5		10/27/2012	10/31/2012	200-13525-17	13525	•
MW-174A-85-86		10/27/2012	10/31/2012	200-13525-14	13525	•
MW-169A-94-95		10/27/2012	10/31/2012	200-13525-12	13525	•

Notes:

TOC LYDKHN Lloyd Kahn Method for the Determination of Total Organic Carbon in Sediment, USEPA Region II Method

• = Requested for the indicated analyses

Table 3-1
Data Quality Evaluation Results
Direct Push Sample 2012Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant

Sample Identification	Date Sampled	SDG	Lab Number	Analysis	Parameter	Units	Lab Result	Data Review Qualifier	BLK	SAMP	Comments	Final Result
GP-MW0179A-65	10/15/2012	13262	200-13262-13	Volatiles	trichloroethene	µg/L	1.5	UJ		X	Sample Receipt Condition	1.5 UJ
GP-MW0179A-85	10/15/2012	13262	200-13262-11	Volatiles	trichloroethene	µg/L	0.16	U	X		Lab Blank	1.0 U

Reason for Qualification

BLK	Ambient Blank, Lab Blank, CCB, CCB - Neg, Trip Blank, Equipment Blank, Field Blank, Material Blank, Lab Blank - Neg
SAMP	Cooler temperature greater than 10 degreec C., Cooler temperature greater than 4 degrees C, but less than 10 degreec C., Encore sample holding time exceeded by less than 2X., Encore sample holding time exceeded by more than 2X., Holding time exceeded by less than 2X., Holding time exceeded by more than 2X., Receipt Temperature, Sample preservation/collection requirement not met., Sample Receipt Condition

Table 3-2
Volatile Organic Compounds Quality Control Outliers
Direct Push Samples 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Sample ID(s) Requiring Qualification	SDG	Compound(s)	QC Outlier	QC Parameter Control Limit	QC Result
Blank					
GP-MW0179A-85	13262	Trichloroethene	Lab Blank > MDL	< 0.14 µg/L	0.14 µg/L

Table 4-1
Field Completeness
Direct Push Sample 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Analysis	Number of Samples Planned	Number of Samples Collected	Field Completeness
Explosives	15	15	100%
Volatiles	19	19	100%
Totals =	34	34	100.0%
Goal =			95%

Notes:

Number of Samples Planned includes field samples and field duplicate samples.

Table 4-2
Field Completeness
Soil Borings 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Analysis	Number of Samples Planned	Number of Samples Collected	Field Completeness
TOC	17	17	100%
Totals =	17	17	100.0%
Goal =			95%

Notes:

Number of Samples Planned includes field samples and field duplicate samples.

Table 4-3
Analytical Completeness
Direct Push Sample 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant, Mead, Nebraska

Analysis	Total Number of Parameters	Acceptable Data	Acceptable Data Completeness	Acceptable Data Completeness Goals	Quality Data	Quality Data Completeness	Quality Data Completeness Goals
Explosives (Analyte Count - 1)	15	15	100%	90%	15	100%	80%
Volatiles (Analyte Count - 1)	19	18	94.7%	90%	19	100%	80%
Totals =	34	33	97.1%	90%	34	100.0%	80%

Notes:

Total number of parameters includes field samples (includes data points from dilutions and/or reanalyses to be used in place of original data) and field duplicates (does not include field blanks or trip blanks).
Acceptable data includes data that has not been rejected or qualified as estimated (J/UJ). Data points for which the required corrective actions were taken or do not require corrective action do not count against the acceptable data completeness goal calculation (i.e., results exceeding the calibration range that were reanalyzed at dilutions within the calibration range).
Quality data is defined as all non-rejected data.

Table 4-4
Analytical Completeness
Soil Borings 2012 Monitoring Well Network Optimization Sampling Event
Former Nebraska Ordnance Plant

Analysis	Total Number of Parameters	Acceptable Data	Acceptable Data Completeness	Acceptable Data Completeness Goals	Quality Data	Quality Data Completeness	Quality Data Completeness Goals
TOC (Analyte Count - 1)	17	17	100%	90%	17	100%	80%
Totals =			100.0%	90%		100.0%	80%

Notes:

Total number of parameters includes field samples (includes data points from dilutions and/or reanalyses to be used in place of original data) and field duplicates (does not include field blanks or trip blanks).
Acceptable data includes data that has not been rejected or qualified as estimated (J/UJ). Data points for which the required corrective actions were taken or do not require corrective action do not count against the acceptable data completeness goal calculation (i.e., results exceeding the calibration range that were reanalyzed at dilutions within the calibration range).
Quality data is defined as all non-rejected data.

Appendix A
Chain of Custody Records

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPO Phase 2 Geoprobe Samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10-15-2012	COC No: 101512
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	1 of 4 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W)			
(303) 298-7607 Phone	TAT if different from Below			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☒ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
T RB-GP-mw2160	10-15-12	0920	G	W	2	X		
GP-mw0160-133	10-15-12	1015	G	W	3	X		
GP-mw0160-123	10-15-12	1035	G	W	3	X		
GP-mw0160-113	10-15-12	1105	G	W	3	X		
GP-mw0160-103	10-15-12	1140	G	W	3	X		
GP-mw0160-93	10-15-12	1205	G	W	3	X		
GP-mw0160-83	10-15-12	1235	G	W	3	X		
GP-mw0160-73	10-15-12	1250	G	W	3	X		
GP-mw0160-63	10-15-12	1305	G	W	3	X		
GP-mw0160-53	10-15-12	1320	G	W	3	X		
GP-mw0179A-85	10-15-12	1500	G	W	3	X		
GP-mw-0179A-75	10-15-12	1525	G	W	3	X		

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☑ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby R H	ECC	10-16-12 1800	FCL-ex 7992	0838 9482	
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
				TABD	10/17/12 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMFO Phase 2 Geoprobe Samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10-15-2012	COC No: 101512
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	2 of 4 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W)			
(303) 298-7607 Phone	TAT if different from Below			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☒ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
GP-mw0179A-65	10-15-12	1550	G	W	3	X		
GP-mw0179A-55	10-15-12	1610	G	W	3	X		
GP-mw2179A-55	10-15-12	1610	G	W	3	X		
GP-mw0179A-55 MS	10-15-12	1610	G	W	3	X		
GP-mw0179A-55 MSD	10-15-12	1610	G	W	3	X		
GP-mw0179A-45	10-15-12	1625	G	W	3	X		
GP-mw0179A-35	10-15-12	1640	G	W	3	X		
GP-mw2179A-35	10-15-12	1640	G	W	3	X		
GP-mw0179A-25	10-15-12	1650	G	W	3	X		
GP-mw0179A-15	10-15-12	1700	G	W	3	X		
RIN-GP-mw0179A	10-16-12	0702	G	W	3	X		
			G	W				

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

1800

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby R Hinz	ECC	10-16-12	Fed-ex 7992	0838 9482	
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
			[illegible]	TABUR	10/17/12
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPO Geoprobe Samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10/16/2012	COC No: 101512
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	3 of 4 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W)			
(303) 298-7607 Phone	TAT if different from Below			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☒ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
GP-mw0171A-97	10-16-12	0915	G	W	2		X	
GP-mw0171A-87	10-16-12	0940	G	W	2		X	
GP-mw0171A-77	10-16-12	0955	G	W	2		X	
GP-mw0171A-67	10-16-12	1010	G	W	2		X	
GP-mw0171A-67	10-16-12	1010	G	W	2		X	
GP-mw0171A-57	10-16-12	1020	G	W	2		X	
GP-mw0171A-47	10-16-12	1040	G	W	2		X	
RIN-GP-mw0171A	10-16-12	1115	G	W	2		X	
GP-mw0163B-109	10-16-12	1255	G	W	2		X	
GP-mw0163B-99	10-16-12	1310	G	W	2		X	
GP-mw0163B-89	10-16-12	1350	G	W	2		X	
GP-mw0163B-79	10-16-12	1410	G	W	2		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☑ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

1800

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby D. Hinz	ECC	10-16-12	FedEx 7992	0838 9482	
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
				TABLR	10/17/12 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPO Geoprobe Samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10/16/2012	COC No: 101512
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	4 of 4 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W)			
(303) 298-7607 Phone	TAT if different from Below			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☒ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
GP-mw0163B-69	10-16-12	1420	G	W	2		X	
GP-mw2163B-69	10-16-12	1420	G	W	2		X	
GP-mw0163B-69 MS	10-16-12	1420	G	W	2		X	
GP-mw0163B-69 MSD	10-16-12	1420	G	W	2		X	
GP-mw0163B-59	10-16-12	1440	G	W	2		X	
GP-mw0163B-49	10-16-12	1500	G	W	1		X	
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

1800

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby D Hinz	ECC	10-16-12	Fed-ex 7992	0838	9482
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
				TAB	10/17/12 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
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South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPO Phase 2 Water Samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10-17-2012	COC No: 101712
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	1 of 3 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W) _____			
(303) 298-7607 Phone	TAT if different from Below _____			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☐ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
GP-MW0181A-95	10-17-12	0825	G	W	2		X	
GP-MW0181A-85	10-17-12	0840	G	W	2		X	
GP-MW0181A-75	10-17-12	0850	G	W	2		X	
GP-MW0181A-65	10-17-12	0905	G	W	2		X	
GP-MW2181A-65	10-17-12	0905	G	W	2		X	
GP-MW0181A-55	10-17-12	0925	G	W	2		X	
GP-MW0175-106	10-17-12	1135	G	W	2		X	
GP-MW0175-96	10-17-12	1155	G	W	2		X	
GP-MW0175-86	10-17-12	1215	G	W	2		X	
GP-MW2175-86	10-17-12	1215	G	W	2		X	
GP-MW0175-86 MS	10-17-12	1215	G	W	2		X	
GP-MW0175-86 MSD	10-17-12	1215	G	W	2		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

1600

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby D. Hinz	ECC	10-18-12	ECC - FX 7992	2469 3159	
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
			Atoh Pauu	TABUL	10/19/12 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPO Phase 2 Water Samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10-17-2012	COC No: 101712
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	2 of 3 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W) _____			
(303) 298-7607 Phone	TAT if different from Below _____			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☐ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
GP-MW0175-76	10-17-12	1235	G	W	2		X	
GP-MW0175-66	10-17-12	1245	G	W	2		X	
GP-MW0175-56	10-17-12	1310	G	W	2		X	
RIN-GP-MW0175	10-17-12	1345	G	W	2		X	
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☑ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

1600

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby D Hinz	ECC	10-18-12	Fed-ex 7992	2469 3159	
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
			Stan Brown	TABUL	10/19/12 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

Groundwater samples

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10-18-2012	COC No: 101812
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	3 of 3 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W) _____			
(303) 298-7607 Phone	TAT if different from Below _____			
(303) 298-7837 FAX	☐ 3 weeks			SDG No.
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☐ 1 week			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - VOCs	8330 - Explosives	Sample Specific Notes:
GP-mw0174B-105	10-18-12	0810	G	W	2		X	
GP-mw0174B-95	10-18-12	0820	G	W	2		X	
GP-mw0174B-85	10-18-12	0850	G	W	2		X	
GP-mw0174B-72	10-18-12	0900	G	W	2		X	
GP-mw0174B-62	10-18-12	0950	G	W	2		X	
RIN-GP-mw0174B	10-18-12	1130	G	W	2		X	
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				
			G	W				

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☑ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

1600

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Toby D. Hinz	ECC	10-18-12	Fed-ex 7992	2469 3159	
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
			Steph Fowler	TABUR	10/19/12 1000
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPOI SAMPLING EVENT 2012

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Ryder	Site Contact: Toby Hinz	Date: 10-23-12	COC No: 10231L
ECC	Tel/Fax: (720) 232-6425	Lab Contact: Jim Madison	Carrier: FedEx	1 of 2 COCs
1746 Cole Blvd Building 21, Suite 350	Analysis Turnaround Time			Job No. 5447.002
Lakewood, CO 80401	Calendar (C) or Work Days (W)			
(303) 298-7607 Phone	TAT if different from Below			SDG No.
(303) 298-7837 FAX	☐ 3 weeks			
Project Name: FNOP 5447.002	☐ 2 weeks			
Site: Former NOP	☐ 1 week			
PO#	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - TCE	8330 - RDX	TOC - Total organic Carbon	Sample Specific Notes:
MW-173A-85-86	10/25/12	1130	grab	S	2			X	
MW-160A-116	10/24/12	0919	grab	S	2			X	
MW-161A-106-108	10/24/12	1550	grab	S	1			X	
MW-261A-106-108	10/24/12	—	grab	S	1			X	
MW-168A-95	10/25/12	1800	grab	S	2			X	
MW-164A-92	10/23/12	1350	grab	S	2			X	
MW-162A-80-81	10/23/12	1420	grab	S	2			X	
MW-148A-102-102.5	10/24/12	1020	grab	S	2			X	
MW-171A-87-88	10/25/12	1625	grab	S	1			X	
MW-271A-87-88	10/25/12	—	grab	S	1			X	
MW-172A-~~87~~ 93-94	10/25/12	1045	grab	S	2			X	
MW-169A-94-95	10/27/12	1650	grab	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant Poison B ☐ Unknown ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Lewis Turner	BMD	10/30/12 1300	T. Hill	ECC	10/28/12 1300
Toby Hinz	ECC	10/30/12 1700	Fed-ex 7939 6470		4750
			Steph Boucher	TAB	10/31/12 0935

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 5403
phone 802.660.1990 fax 802.660.1919

GMPOI SAMPLING EVENT 2012

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact
ECC
1746 Cole Blvd Building 21, Suite 350
Lakewood, CO 80401
(303) 298-7607 Phone
(303) 298-7837 FAX
Project Name: FNOP 5447.002
Site: Former NOP
PO#

Project Manager: John Ryder
Tel/Fax: (720) 232-6425

Analysis Turnaround Time
Calendar (C) or Work Days (W) _____
TAT if different from Below _____
☐ 3 weeks
☐ 2 weeks
☐ 1 week
☐ 1 day

Site Contact: Toby Hinz
Lab Contact: Jim Madison

Date: 10-26-12
Carrier: FedEx

COC No: 102312
2 of 2 COCs
Job No. 5447.002
SDG No.

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	8260 - TCE	8330 - RDX	TOC - Total Organic Carbon	Sample Specific Notes:
MW-170A-80-81	10/26/12	1720	grab	S	1			X	
MW-174A-85-86	10/27/12	1350	grab	S	1			X	
MW-175A-89	10/26/12	1150	grab	S	1			X	
MW-167A-87-88	10/27/12	0820	grab	S	1			X	
MW-166A-96.5-97.5	10/27/12	1025	grab	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Lewis Turner	BMCD	1700 10/28/12	T. Hinz	ECC	10/22/12 1300
Toby Hinz	ECC	1800 10/30/12	Fed-ex 7939 6470		4750
			Steve Pouch	TABUK	10/31/12 0935

Appendix B
Field Forms

Location Mead FWDP Date 10-15-12

Project / Client GMPO Phase 2 / US ACE

Geoprobe

0800 TCK on site:
Daryl Bieve
Floyd Armstrong
Ronnie Fisher

0805 - 0825 Site Safety meeting.

0845 Setting up on MW-160

0855 Starting to push

0940 Hit Refusal at 135 ft.

0946 Starting to pull up 4'

0953 Screen opened full 4'
First sampling point will be 133'.

1000 water level BGS 50.96

1015 Taking Sample GP-MW0160-133

1022 Pulling up to 123' Sample.

1035 Took Sample GP-MW0160-123

1105 Pulled up Sampling GP-0160-0113

1140 Pulled up Sampling GP-0160-103

1205 Pulled up Sampling GP-0160-93

1235 Sampling 83 ft.

1250 Sampling 73 ft.

1305 Sampling 63 ft.

1320 Sampling 53 ft.

1330 No water at 43 ft.

good water well

Location

Date 10-15-12

Project / Client GMPO Phase 2

Continued

1335 Picking up.

1354 Setting up on MW-169

1405 location

1405 Starting to push down.

1440 Hit Refusal at 88'

1445 opening screen up 5'

1500 Sampling 85'

1525 Sampling 75'

1550 Sampling 65'

1610 Sampling 55' + QC, MS, MSD

1625 Sampling 45'

1640 Sampling 35'

1650 Sampling 25'

1700 Sampling 15'

good water

1710 no water at 5' lots of Sed.

1734 At plant Finishing up Paperwork and Scans.

1800 off site.

TK

Location Macad Nebraska, FAAP Date 10-16-12

Project / Client GMPO Phase 2 / USACE

Geoprobe Samples

0658 Toby Hisz and DCR crew on site. /RIG-for MW-60

ICR: Daryl Bierc, Ron Rasch and Floyd Armstrong Decoring

0725 Safety Meeting

0740 Setting up on GP-171A

0811 Starting to push Rods.

0847 Down to ~~top~~ 105'

Pulled back 4' /wl-83.22

First

0910 Setting up to Sample 103' Sample.

0915 Sampling GP-mw0171A-103 Now Sampling at 97' No water at 103

0940 Sampling GP-mw0171A-87

0955 Sampling GP-mw0171A-77

1010 Sampling GP-mw0171A-67 + QC

1020 Sampling GP-mw0171A-57

1040 Sampling GP-mw0171A-47

1048 Pulling Rods and moving on TO GP-mw-163B

lots of sed.

Location Date 10-16-12

Project / Client GMPO Geoprobe

Continued

MW-163B

RIG Taken for MW-171A At 1115

1124 Set up and starting to push

1204 Hit Refusal at 113'

Pulling back 4'

1220 Pulled 4' screen open

First Sample will be at 111' water Level = 64.75

1255 Had to pull up 2' water Hole wouldn't move.

Sampling at 109'

1310 Pulling up and Sampling 99' Depth

1350 Sampling 89' Depth

1410 Sampling 79' Depth

1420 Sampling 69' + QC, MS, MSD

1440 Sampling 59'

1500 Sampling 49' 2 Bottle / Little water

1515 Pulling up loading Machine

1535 Decoring Rods / screens

1605 Heading to MW-181A

1629 Setting up. / 1645 Starting to Push

1735 Hit at 97'

lots of sed.

Location Mead FNOP Date 10-17-12

Project / Client GMPO Phase 2 / USACE

Geoprobe water Sampling

0659 Tony D. Hire on site.

0730 ICRI Away on site

0735 Safety Meeting

0755 Waiting for Rain to stop

0805 Rain Has stopped. Heading to: GP-MW181A WL-49.02

0810 setting up. First Sample will be at 95'

0825 Sampling GP-MW0181A-95

0840 Sampling GP-MW0181A-85

0850 Sampling GP-MW0181A-75

0905 Sampling GP-MW0181A-65 + QC

0925 Sampling GP-MW0181A-55

0930 NO water at 45'

0940 Pulling Rods and loading

1000 Moving on To MW-175

1025 Setting up to push.

1105 Hit Refusal at 108'
First Sample at 106'

1115 opening Screen

1125 Putting down Sampling Hose

1135 Sampling GP-MW0175-106

Location Date 10-17-12

Project / Client GMPO Phase 2 / USACE

Continuing Geoprobe

MW-175 WL-52.70

1155 Sampling GP-MW0175-96

1215 Sampling GP-MW0175-86 + QC, MS, MSD

1235 Sampling GP-MW0175-76

1245 Sampling GP-MW0175-66

1310 Sampling GP-MW0175-56

1320 no water at 46'

1325 Loading machine

1345 Pulling off Site

1400 Deconning Equip.

1445 RIN-GP-MW0175

1455 Heading out to push down at MW-174B

1507 Setting up on hole.

1514 Starting to push.

1600 pushed to Refusal at 107'
First Sample will be at 105'

1615 Pulled back 4'

1630 Picking up for day off Site.

Location Mead FNDP Date 10-18-12

Project / Client GMPO Phase 2 / USACE
Groundwater Sampling

0658 Toby D. Kinz on site.
0715 Paper work
0730 ICR on site:
Ronnie Fischs
Floyd Armstrong
0740 Safety meeting
0745 Headed to MW-174B
0755 Setting up and starting to purge. WL-54.98
0810 Sampling GP-MW0174B-105
0820 Sampling GP-MW0174B-95
0850 Sampling GP-MW0174B-85
0900 Sampling GP-MW0174B-75
Pulled up 3' (no water) to 72'
0950 Sampling GP-MW0174B-62
1000 Only pulling up 7' water is only at 54.58, this will put us at the top of water table.
1030 Not enough water to sample.
1045 Picking up loading machine
1101 Heading back to plant
1119 Decoring ~~Equip~~ Equipment.
1201 Decon done / Packing Samples

Location Mead FNDP Date 11-19-12

Project / Client 4th Quarter Sampling - 2012

0700 ICR on-site: Ronnie Fischs & Michael Daugherty
Toby on site, site safety meeting & load up to deploy diffusion bags
0810 Left plant ~~stop~~ to deploy bags
0820 MW-133 A, B, & D
0840 MW-135 A, B, & D
0855 MW-134 A, B, & D
0915 MW-139B
0930 MW-138B
Low on diffusion bags
0945 To plant, no bags, can deploy one more
0955 MW-44 A, B, & D
1010 Return to treatment plant, spoke w/ Toby, will put flags on select wells
1030 Replaced flag @ MW-99
1040 Replaced flag @ MW-35
1105 Added flags to MWs 98, 97, 96, 82, & 20
1115 Return to treatment plant
1205 Added flags to MWs-128, ~~132~~ 131, 118, 129, & 130 (132 is abandoned)
Added flags to MWs-110, 109, 114, 111, 104, 105, 88, 115, & 116
1400 Return to treatment plant - Done for day

Appendix C
Reference Sheet
Data Validation Qualifiers
Drinking Water Standards

Data Qualifiers and Drinking Water Standards Reference Sheet
Former Nebraska Ordnance Plant, Mead, Nebraska

Any qualifiers (i.e., U, J, or R) listed after a result are assigned during the data validation process. Data validation is a procedure which involves the review of quality control data provided by the laboratory. This review is followed by the assignment of data qualifiers (if necessary) which indicate the reliability of a result to the reader. Data validation is performed by a chemist employed outside of the laboratory or associated government installations to ensure accuracy in data reporting. A description of qualifiers is provided below.

No qualifier

- If a result has no assigned qualifier, the contaminant was detected, and the reader can be confident that the concentration is exact.

"U"

- A result followed by a "U" qualifier means that the contaminant was undetected, or not detected by the instrument.

"UJ"

- A result followed by a "UJ" qualifier means that the contaminant was not detected, but the associated detection level is not certain (estimated). For example, if a value is followed by a "UJ", the contaminant was not detected, but the associated detection level is in question. The detection level is in question because one or more of the laboratory quality control indicators do not meet acceptance criteria. The amount that the indicator fell outside of the criteria may be used as a rough estimate of how much the actual detection level differs from the stated one. Typically, this is a 10-30% difference.

"UR"

- A result followed by a "UR" qualifier means that the contaminant was not detected, but there is strong doubt that the associated detection level is accurate. For example, if a value is followed by a "UR", the contaminant was not detected, but the associated detection level is in strong doubt. The detection level is in doubt because results are unacceptable for a quality control indicator. In this case, the detection level cannot be estimated.

"J"

- A result followed by only a "J" qualifier means that the contaminant was detected, but there is some question that the stated concentration is exact. For example, if a result is "0.5 J", the contaminant was detected, but there is some question that the concentration is exactly 0.5. A "J" qualifier may be applied for two reasons: (1) the contaminant was detected below the reporting limit; or (2) the contaminant was detected, but one or more quality control indicators did not meet acceptance criteria. The reporting limit is equal to the concentration of the lowest standard used by the laboratory to calibrate the instrument. The reporting limit is the minimum concentration that can be stated with complete confidence.

"R"

- A result followed by only an "R" qualifier means that the contaminant was detected, but there is strong doubt that the concentration is exact. For example, if a result is "0.5 R", the contaminant was detected, but there is strong doubt that the concentration is exactly 0.5. The concentration is in doubt because results are unacceptable for a quality control indicator. In this case, the detected concentration cannot be estimated. For comparison purposes, detected results are reported in the results letters with available Environmental Protection Agency drinking water standards. These standards include the maximum contaminant level (MCL) and various health advisories (HA). A description of the drinking water standards is provided below.

"MCL"

- The maximum contaminant level is the highest concentration of a contaminant that is allowed in drinking water. Maximum contaminant levels are enforceable Federal standards.

"HA"

- Health advisories provide estimates of acceptable drinking water concentrations for a chemical substance based on health effects information. Health advisories are not enforceable Federal standards, but serve as a technical guidance to assist Federal, State, and local officials.

Appendix D
Analytical Results on Compact Disc Summary Forms and Raw Data