



DEPARTMENT OF THE ARMY  
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WASHINGTON, DC 20310-0600

June 25, 2024

Army Environmental Division - BRAC Operations Branch

Mr. JohnDavid Nance  
Chief, Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, New Mexico 87505-6303

RE: Disapproval, Groundwater Periodic Monitoring Report, July through December 2022, Fort Wingate Depot Activity, McKinley County, New Mexico. EPA# NM6213820974, HWB-FWDA-23-008

Dear Mr. Nance:

This letter provides responses to the comments issued in the Notice of Disapproval (NOD) letter from the New Mexico Environment Department (NMED) dated April 4, 2024, for the Groundwater Periodic Monitoring Report, July through December 2022, dated November 2023. In addition to the comment responses provided in this letter, two (2) hard copies and two (2) electronic (CD) copies of the above-mentioned document are enclosed for your review and consideration. The electronic transmittal includes a redline-strikeout version of the above-mentioned report showing where all revisions were made.

**General Comments:**

**1. Inaccuracies/Discrepancies**

**NMED Comment:** Although the quality of the report content has notably improved compared to the previous ones, some inaccuracies/discrepancies were still identified in the Report. Examples are listed as follows:

- a) **Figure 5-1, Northern Area Nitrate and Nitrite in Alluvial Groundwater - October 2022:** The nitrate concentration in the groundwater sample collected from well MW37 is depicted as <0.040 J mg/L in the figure, while it is reported as 0.040 J mg/L in Table 5-2, *Summary of Inorganic Anions Analytical Results*. Correct the typographical error in the revised Report.
- b) **Figure 5-7, Northern Area Fluoride and Phosphate in Alluvial Groundwater-October 2022:** The phosphate concentration in the groundwater sample collected from well SMW01 is depicted as <1.2 mg/L in the figure, while it is reported as <1.25 mg/L in Table 5-2. Resolve the discrepancy in the revised Report.
- c) **Figure 5-7, Northern Area Fluoride and Phosphate in Alluvial Groundwater-October 2022:** The phosphate concentration in the groundwater sample collected from well TMW08 is depicted as <1.2 mg/L in the future, while it is reported as

<1.25 mg/L in Table 5-2. Resolve the discrepancy in the revised Report.

- d) **Figure 5-9, Northern Area Explosives in Alluvial Groundwater-October 2022:** The 4-amino-4,6-dinitrotoluene concentration in the groundwater sample collected from well RMW03 is depicted as <0.2 J ug/L in the figure, while it is reported as 0.92 J ug/L in Table 5-3, Summary of Explosives Analytical Results. Resolve the discrepancy in the revised Report.

Revise the Report to address the inaccuracies and discrepancies.

**Permittee Response:**

- a) Concur. Figure 5-1 was revised to depict well MW37 with a nitrate concentration of 0.040 J mg/L.
- b) Concur. Figure 5-7 was revised to depict well SMW01 with a phosphate concentration of <1.25 mg/L.
- c) Concur. Figure 5-7 was revised to depict well TMW08 with a phosphate concentration of <1.25 mg/L.
- d) Concur. Figure 5-9 was revised to depict well TMW03 with a 4-amino-2,6-dinitrotoluene concentration of 0.92 J ug/L.

**2. Missing References**

**NMED Comment:** Some references are not listed in Section 7.0, *References*. For example, although Section 1.0 states, "[b]ased on the information described in the Interim Northern Area Groundwater Monitoring Plan, Version 10, Revision 1, Request for Work Plan Deviations letter dated November 12, 2020 (Army, 2020)," the referenced document (i.e., Army, 2020) is not listed in Section 7.0. Include all cited references in the revised Report.

**Permittee Response:** Comment acknowledged. The referenced document (i.e., Army, 2020) is the third listed reference in Section 7.0 (listed as Department of the Army (Army)).

The document was not changed as a result of this comment.

**SPECIFIC COMMENTS:**

**3. Section 1.1, Site Description and Activities, lines 32-33, page 1-1**

**Permittee Statement:** "[T]he Missile Defense Agency currently leases and uses portions of FWDA for missile testing."

**NMED Comment:** Describe the nature of missile testing and associated activities conducted by the Missile Defense Agency (MDA) at the leased portions of the site in

the revised Report. If the activities conducted by the MDA can cause potential adverse effects to human health/environment or contaminate the site with potential chemical releases, they must be reported to NMED, to which NMED will further provide directions to address the issue.

**Permittee Response:** Comment acknowledged. The nature of missile testing and associated activities at Fort Wingate are described in the 2007 Environmental Assessment prepared by MDA: [https://www.mda.mil/global/documents/pdf/env\\_target\\_fff\\_ea.pdf](https://www.mda.mil/global/documents/pdf/env_target_fff_ea.pdf). Please refer to this document for information on MDA's activities at Fort Wingate. Per email correspondence with Michiya Suzuki on June 20, 2024, the Army will gather additional information on previous launch activities at Fort Wingate and will submit to NMED under separate cover.

The document was not changed as a result of this comment.

#### **4. Section 2.2, Groundwater Purging and Sampling, lines 2-7, page 2-2**

**Permittee Statement:** "For purposes of sampling, eight monitoring wells were considered dry during the October 2022 groundwater sampling event: FW35 (dry since 2015), MW18S (dry since installation in 1994), MW22S (dry since fall 2016), and TMW11, TMW40S, TMW54, TMW56, and TMW60 (dry since 2021). Well TMW56 was measured with over 6 inches of water during groundwater gauging but did not recharge with 6 inches of water after purging dry."

**NMED Comment:** The directions regarding dry wells FW35, MW18S, MW22S and TMW54 were previously provided in separate covers as follows:

- a) Comment 15 of the NMED's May 23, 2023 Disapproval Groundwater Periodic Monitoring Report January through June 2021, and Groundwater Periodic Monitoring Report July through December 2021 states, "[p]ropose to submit a work plan to abandon wells FW35, MW18S and MW22S in the revised Reports."
- b) Comment 36 of the NMED's January 25, 2022 Disapproval Final Northern Area Groundwater RCRA Facility Investigation Report states, "[s]ubmit a work plan to replace well TMW54 with a well that is constructed with a more appropriate screened interval no later than June 30, 2022."

Since these comments will be addressed in separate covers, no response is required. This part of the comment serves as a reminder. In addition, address the following directions for wells TMW11, TMW40S, TMW56, and TMW60:

- I. Alluvial well TMW11 is not located to delineate the boundaries of contaminant plumes. Well TMW11 must continue to be monitored and sampled, as groundwater is available; however, a replacement well for well TMW11 is not warranted at this time.
- II. The RDX concentrations in the groundwater samples collected from alluvial well TMW40S with a screened interval of 50 to 60 feet below ground surface (bgs) were consistently the highest among those of the alluvial wells when groundwater was available. Although the groundwater elevations at well TMW40S has decreased in recent years, RDX is likely to be detected in the vicinity of the well. Therefore, a replacement well for well TMW40S must be installed, as practicable. Bedrock well TMW40D (screened interval of 135 to 155 feet bgs), which is located adjacent to TMW40S, has

not been impacted by the overlying RDX plume. Seventy-five (75) feet of soil column is present from the bottom of the screened interval of well TMW40S (i.e., 60 feet bgs) to the top of screened interval of well TMW40D (i.e., 135 feet bgs). The alluvial aquifer in the vicinity of the well may extend deeper than 60 feet bgs. Evaluate whether a replacement well with a deeper screened interval that targets the same hydrogeologic unit (i.e., alluvium) can be advanced adjacent to well TMW40S. Review the boring logs and provide a discussion in the response letter. In addition, provide the boring logs for wells TMW40S and TMW40D with the response letter.

- III. Alluvial well TMW56 is critically located to delineate the boundary of the perchlorate plume. It is essential to retain a groundwater sample for perchlorate analysis from well TMW56. If the groundwater in well TMW56 is limited after purging, collect a perchlorate sample first or extend the time for groundwater recharge, as necessary, and document the deviation associated with sampling procedures in future groundwater periodic monitoring reports.
- IV. Alluvial well TMW60 is critically located to delineate the boundaries of the nitrate and RDX plumes; however, wells TMW21 and TMW43 also define the plume boundaries of nitrate and RDX in the vicinity of well TMW60. In addition, the screened intervals of wells TMW21 and TMW43 are comparable to that of well TMW60. Thus, the alluvial well TMW60 must continue to be monitored and sampled, as groundwater is available; however, a replacement well for well TMW60 is not warranted at this time.

**Permittee Response:**

- a) Concur. The referenced work plan will be submitted to NMED by 28 June 2024. The document was not changed as a result of this comment.
- b) Comment acknowledged. Replacement of well TMW54 is proposed in the Phase 2 Northern Area Groundwater RFI Work Plan. The document was not changed as a result of this comment.
- I. Concur. The document was not changed as a result of this comment.
- II. Comment acknowledged. Well TMW02 is less than 30 feet away from well TMW40S, targets the alluvial groundwater unit, and has a deeper screened interval than TMW40S. The Army therefore requests that NMED consider well TMW02 as satisfying the need for a deeper alluvial well in the vicinity of TMW40S, as described in the comment.

As requested, boring logs for wells TMW40S and TMW40D are provided in Attachment I.

The document was not changed as a result of this comment.

- III. Concur. In future monitoring events, if the groundwater in well TMW56 is limited after purging, the bottle for perchlorate analysis will be filled first, or the time for groundwater recharge will be extended as necessary to collect a sample for perchlorate analysis.

The document was not changed as a result of this comment.

IV. Concur. Well TMW60 will continue to be monitored in future sampling events. The document was not changed as a result of this comment.

#### **5. Section 2.2, Groundwater Purging and Sampling, pages 2-2 and 2-3**

**NMED Comment:** Section 2.2 states that wells were purged with dedicated low-flow pneumatic, Bennet, BESST, portable stainless-steel electronic submersible pumps or bailers. However, the Report does not include a table that presents the purging method utilized for each well. Include a table that identifies the purging method for each well in the revised Report. In addition, it is unclear how and why wells were purged with various purging methods. It would be appropriate to utilize a low-flow sampling method for every well, where applicable. Provide a justification for wells where sampling was conducted by methods other than low-flow sampling method in the revised Report.

**Permittee Response:** Concur. Table 2-1 was revised to include the purging method utilized for each well.

Methods other than low-flow sampling methods were used because of lack of sufficient water in these wells to allow for low-flow sampling. In the 2024 Interim Groundwater Monitoring Plan, the Army proposed to evaluate active monitoring wells for the feasibility of utilizing low-flow sampling methods and will include the results of the evaluation in the 2024 Periodic Monitoring Report.

#### **6. Section 4.1.1, Northern Area Alluvial Groundwater System, lines 27-28, page 4-1**

**Permittee Statement:** "The flattest gradients were found in the central portion of the Northern Area, and the steepest gradients in the southeast portions of the monitoring area."

**NMED Comment:** Section 4.1.2, Northern Area Bedrock Groundwater System, provides a more detailed discussion with the calculated values of hydraulic gradients for the bedrock aquifer. Provide the same level of detail for the discussion regarding hydraulic gradients of the alluvial aquifer as in Section 4.1.2 in the revised Report.

**Permittee Response:** Concur. Section 4.1.1 was revised to provide a similar level of detail as Section 4.1.2.

The following was added to Section 4.1.1:

"Hydraulic gradients in the alluvial unit range from approximately 0.004 ft/ft across the Administration Area (between wells TMW61 and MW33) to 0.0016 ft/ft across the Workshop Area (between wells TMW01 and TMW29)."

#### **7. Section 4.1.2, Northern Area Bedrock Groundwater System, lines 37-39 and 42-43, page 4-1**

**Permittee Statement:** "A third water-bearing sandstone unit is assumed since groundwater from well BGMW08 was measured at over 100-feet lower than the DTW of other bedrock wells." and,

"Bedrock groundwater elevations in July 2022 ranged from 6,674.81 ft. (TMW30) to 6,516.18 ft. (BGMW08) and in September 2022 ranged from 6,674.80 ft. (TMW30) to 6,541.61 ft. (BGMW08)."

**NMED Comment:** According to Figure 4-3, Northern Area Bedrock Groundwater Contour Map-July 2022, the groundwater elevation recorded for well BGMW08 (6,516 feet) was not used to generate contours because it was too low relative to the neighboring wells (e.g., 6,674 feet for well BGMW07 and 6,643 feet for well BGMW09). The Permittee's December 22, 2023 Final Groundwater Periodic Monitoring Report, January through June 2022 states, "Appendix G in the July to December 2020 PMR shows the well [BGMW08] is still recharging (water elevation increasing) in the six months between sampling events." The statement indicates that the groundwater elevation reported for well BGMW08 has not reached equilibrium. It is necessary to evaluate the equilibrated groundwater elevation in well BGMW08. In the response letter, propose to investigate the equilibrated groundwater elevation in well BGMW08; continue gauging groundwater elevations in well BGMW08, and halt purging/sampling until the investigation is complete.

**Permittee Response:** Concur. The 2024 Interim Groundwater Monitoring Plan proposed to halt purging and sampling of well BGMW08 in order to investigate the equilibrated groundwater elevation in well BGMW08. Purging and sampling of well BGMW08 has been halted beginning with the April 2024 sampling event.

The document has not been changed as a result of this comment.

#### **8. Section 4.1.2, Northern Area Bedrock Groundwater System, lines 5-6, page 4-2**

**Permittee Statement:** "Hydraulic gradients in the bedrock unit beneath the Workshop Area range from approximately 0.006 ft/ft across the Administration Area to 0.027 ft/ft across the Workshop Area."

**NMED Comment:** The groundwater elevation data of specific wells that were used to calculate the hydraulic gradients are not identified in the Report. Identify the wells used to calculate the hydraulic gradients in the revised Report. In addition, NMED is not aware of any bedrock wells advanced within the Administration Area. Provide clarification in the response letter and revise the statement as appropriate. Furthermore, hydraulic gradients would significantly vary depending on the selected wells across the Workshop Area. For example, according to Figure 4-3, the groundwater elevations of bedrock wells TMW52, TMW58, and TMW64 are recorded as 6,645 feet, 6,664 feet, and 6,668 feet, respectively. Well TMW64 is located at the eastern boundary of the Workshop area, while wells TMW52 and TMW58 are closely located at the northwestern boundary of the Workshop area. The distances between well TMW64 and wells TMW52/TMW58 are approximately 1,800 feet; therefore, hydraulic gradients between well TMW64 and wells TMW52/TMW58 are calculated as 0.012 and 0.002 feet/feet, respectively. The hydraulic gradients across the Workshop area must not be generalized because groundwater flow direction has not been fully characterized in the bedrock aquifer beneath the Workshop area. Revise the Report accordingly. As a reminder, Comment 6 of the May 23, 2023 Disapproval Groundwater Periodic Monitoring Report January through June 2021, and Groundwater Periodic Monitoring Report July through December 2021 provide directions to resolve this issue.

**Permittee Response:** Concur. The text was revised to cite specific well pairs when discussing the range of hydraulic gradients in the Workshop Area and to remove reference to the Administration Area. The referenced section was revised to read as follows:

“Hydraulic gradients in the bedrock unit beneath the Workshop Area range from approximately 0.008 ft/ft (between wells TMW30 and TMW18) to 0.009 ft/ft (between wells TMW40D and TMW58).”

**9. Section 5.1, Water-Quality Parameters, lines 30-33 and 35-40, page 5-1**

**Permittee Statement:** “: “Groundwater-specific conductance values measured during the reported sampling event in the alluvial aquifer ranged from 1.18 millisiemens per centimeter (mS/cm) in well BGMW13D to 19.2 mS/cm in well TMW08, and in the bedrock aquifer the range was 1.54 mS/cm in well TMW53 to 25.0 mS/cm in well BGWM07.”  
and,

“Specific conductance values can be converted to TDS by multiplying the conductivity by an empirically determined conversion factor. This conversion factor may vary from 0.55 to 0.9, depending on the soluble components of the water and on the temperature of measurement (American Public Health Association [APHA], 1992). Due to the range of the appropriate conversion factors at the Site, some wells may exceed the USEPA secondary MCL for TDS of 500 mg/L (USEPA, 2021).”While metals are consistently detected in groundwater samples at concentrations above the screening levels, background groundwater concentrations have not been accepted for FWDA and it cannot be demonstrated whether the detected concentrations are a result of natural conditions or anthropogenic sources.”

**NMED Comment:** While the highest groundwater-specific conductance (i.e., 25.0 mS/cm) is multiplied by the highest conversion factor (i.e., 0.9), the total dissolved solids (TDS) value will not exceed 500 mg/L; thus, none of the wells exceed the secondary MCL for TDS of 500 mg/L. Alternatively, while the lowest groundwater-specific conductance (i.e., 1.18 mS/cm) is converted to microsiemens per cm ( $\mu\text{S/cm}$ ) and the value (i.e., 1,180  $\mu\text{S/cm}$ ) is multiplied by the lowest conversion factor (i.e., 0.55), the TDS value will exceed 500 mg/L. Therefore, all wells exceed the secondary MCL for TDS of 500 mg/L. Provide a more detailed explanation to support the statement regarding the exceedance of the USEPA secondary MCL for TDS of 500 mg/L relative to the observed groundwater-specific conductance and/or revise the statement for accuracy in the revised Report.

**Permittee Response:** Concur. The text was revised to read as follows:

“The specific conductance of groundwater is a general measure of water quality. Groundwater-specific conductance values measured during the reported sampling event in the alluvial aquifer ranged from 1.18 millisiemens per centimeter (mS/cm) in well BGMW13D to 19.2 mS/cm in well TMW08; and in the bedrock aquifer the range was 1.54 mS/cm in well TMW53 to 25.0 mS/cm in well BGWM07. Specific conductance values correspond to USEPA or NMED secondary water-quality standards for total dissolved solids (TDS) concentrations (40 CFR 143). Specific conductance values, as microsiemens per centimeter ( $\mu\text{S/cm}$ ), can be converted to TDS, as mg/L, by multiplying the conductivity by an empirically determined conversion factor. This conversion factor for natural water may vary from 0.55 to 0.75, depending on the soluble components of the water and on the temperature of measurement (Rusydi, 2018). However, the correlation between TDS and conductance is not linear and is strongly influenced by salinity and other factors. Direct analysis for TDS concentrations is for further precision. Based on the range of specific

conductance values measured, wells at the Site may exceed the USEPA secondary MCL for TDS of 500 mg/L (USEPA, 2021)."

#### **10. Section 5.2.1, Anions, lines 21-23, page 5-2**

**Permittee Statement:** "Nitrite concentrations in 1 out of the 66 monitoring wells analyzed in the alluvial aquifer exceeded the EPA MCL/NM WQCC screening level of 1.0 mg/L. The highest nitrite concentration in the alluvial groundwater was found in MW20 (61 mg/L)."

**NMED Comment:** The nitrite concentrations in groundwater samples collected from well MW20 were not previously detected. The sudden increase of nitrite concentration in well MW20 may or may not be representative of natural conditions of the aquifer. In the response letter, provide the analytical results of nitrite concentrations in groundwater samples collected from well MW20 during the April and October 2023 sampling events and provide a discussion regarding the nitrite concentrations in well MW20.

**Permittee Response:** Concur. The nitrite concentrations for well MW20 for the 2023 sampling events are provided below, as requested. The 2023 results indicate that the 2022 result was anomalous.

- April 2023: 0.47 J mg/L
- October 2023: not detected

#### **11. Section 5.3, Variances from the Work Plan, lines 24-25, page 5-5**

**Permittee Statement:** "Analytical and data quality methods and procedures used during this sampling event were performed in accordance with the QSM (DoD/DoE, 2021)."

**NMED Comment:** The 2019 Quality Systems Manual (QSM) was proposed to be evaluated for analytical data quality in the 2022 Interim Northern Area Groundwater Monitoring Plan. The reference suggests that the QSM was updated in 2021. State if the update occurred in 2021 in the response letter. Also, provide an additional detail of the variance associated with analytical data quality evaluation in the revised Report.

**Permittee Response:** Concur. The QSM was updated to Version 5.4 in 2021. However, the laboratory analyzed the October 2022 samples in accordance with QSM Version 5.3 (2019). The document was revised throughout to use the correct QSM version 5.3, and corresponded with the work plan, therefore no variance discussion is needed.

#### **12. Section 5.4, Data Quality Exceptions, lines 27-28, page 5-5**

**Permittee Statement:** "There are a total of 42 data quality exception compounds where the LOO, LOQ, or both, exceed the screening level as shown in Table 3-1."

**NMED Comment:** The limits of detection (LOD)/quantitation (LOQ) values of some analytes listed as data quality exception compounds in Section 5.4 (e.g., 2,4-dinitrotoluene, 2,6-dinitrotoluene, nitrobenzene, PETN, alpha-BHC) did not exceed the selected screening levels during the October 2022 sampling event. These compounds must not be listed as data quality exception compounds in the Report. Evaluate whether the LOD/LOQ values of 42 analytes listed as data quality exception compounds exceeded the selected screening



levels during the October 2022 sampling event. Remove the compounds from the list if the LOD/LOQ values did not exceed the screening levels. Revise the Report accordingly.

**Permittee Response:** Concur. The LOD/LOQ values of the 42 listed data quality exceptions were reviewed, and analytes, where LOD/LOQ values did not exceed the screening levels, were removed from the list of data quality exceptions in the Report. There are now 36 analytes on the list.

### **13. Section 5-5, Summary of VOC Analytical Results, page 1 of 7**

**NMED Comment:** Appendix 0-2, EMAX Electronic Data Deliverables and Figure 5-13, Northern Area VOCs in Alluvial Groundwater- October 2022, indicates that the naphthalene concentration in the groundwater sample collected from well MW20 was 0.59 J µg/L. However, the detection of naphthalene is not recorded in Table 5-5. All detections of constituents must be reported in Table 5-5. Revise Table 5-5 accordingly.

**Permittee Response:** Concur. Table 5-5 was revised to include naphthalene.

### **14. Section 5-5, Summary of VOC Analytical Results, page 5 of 7**

**NMED Comment:** Appendix 0-2, EMAX Electronic Data Deliverables and Figure 5-14, Northern Area VOCs in Bedrock Groundwater - October 2022, indicates that the bromodichloromethane concentration in the groundwater sample collected from well BGMW07 was 0.15 J µg/L. However, the detection of bromodichloromethane is not recorded in Table 5-5. All detections of constituents must be reported in Table 5-5. Revise Table 5-5 accordingly.

**Permittee Response:** Concur. Table 5-5 was revised to include bromodichloromethane.

If you have questions or require further information, please contact me at [George.h.cushman.civ@army.mil](mailto:George.h.cushman.civ@army.mil), 703-455-3234 (Temporary Home Office, preferred) or 703-608-2245 (Mobile) or [Cheryl.a.frischkorn.civ@army.mil](mailto:Cheryl.a.frischkorn.civ@army.mil), 703-624-6429 (Mobile).

Sincerely,

*George H. Cushman IV*

George H. Cushman IV  
BRAC Environmental Coordinator  
Fort Wingate Depot Activity  
BRAC Operations Branch  
Environmental Division

Enclosure

Attachment I: Boring Logs for TMW40S and TMW40D

CF:

Ricardo Maestas, NMED, HWB  
Neelam Dhawan, NMED, HWB  
Michiya Suzuki, NMED, HWB  
Dale Thrush, U.S. EPA Region 6  
Laurie King, U.S. EPA Region 6  
Ian Thomas, BRAC Ops  
Cheryl Frischkorn, BRAC Ops  
Alan Soicher, USACE  
Ben Moayyad, USACE  
Douglas Hickman, SW BIA  
George Padilla, BIA, NRO  
Darren Sanchez, The Zuni Tribe  
Sharlene Begay-Platero, Navajo Nation  
Admin Record, NM / Ohio

Attachment I

Boring Logs for TMW40S and TMW40D

# Installation Report

Monitoring Well TMW-40D

Project FWDA Well Installation

Date 9/20/11

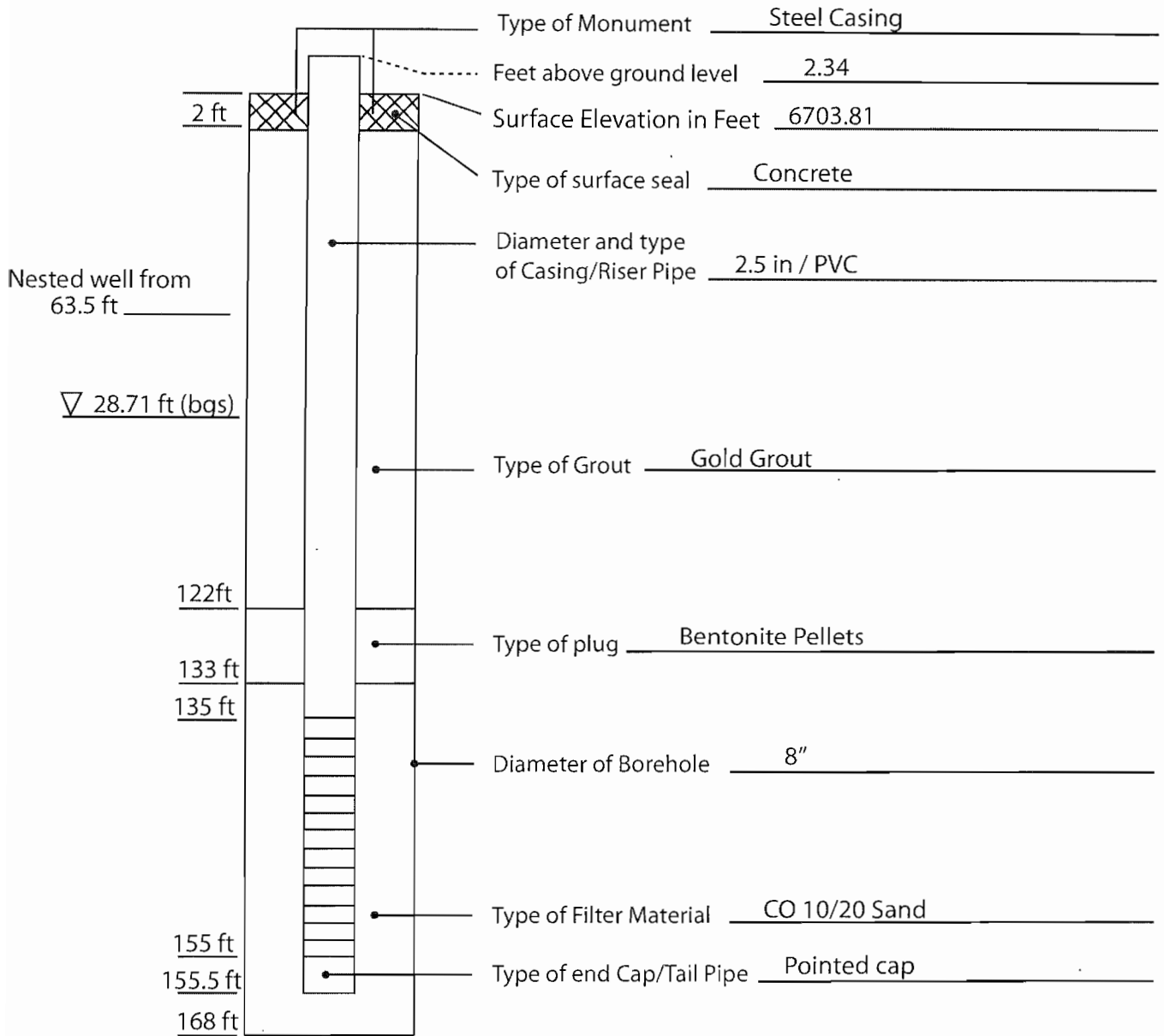
Location Ft Wingate, NM

Logger Gebhardt

Driller USGS/Huckaby

Northing 3932154.31

Easting 718665.12



Remarks: See geologic boring/ well log for a more detailed description of soil log.

Screen is 20 ft long.

# Installation Report

Monitoring Well TMW-40s

Project FWDA Well Installation

Date 9/20/11

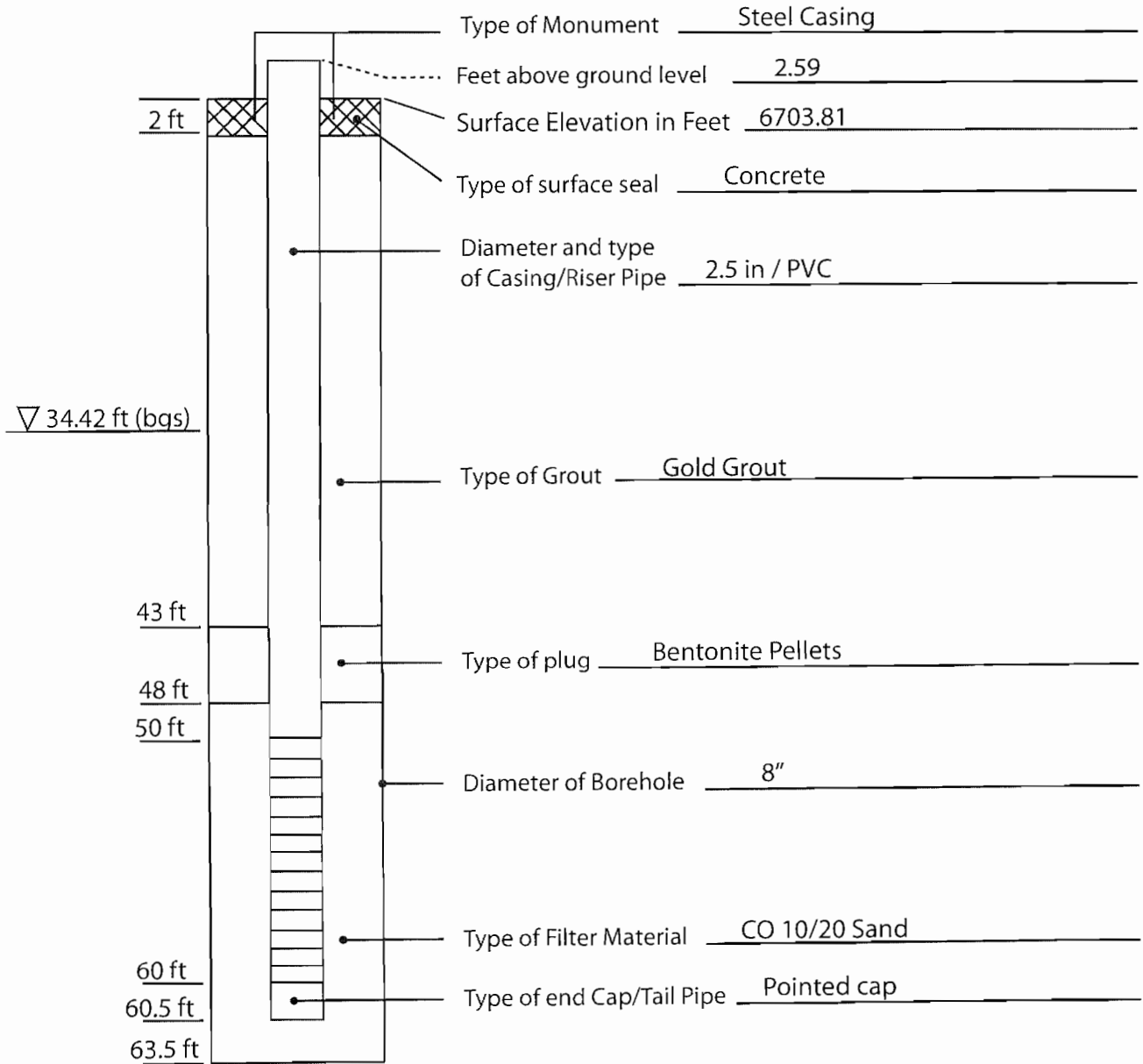
Location Ft Wingate, NM

Logger Gebhardt

Driller USGS/Huckaby

Northing 3932154.31

Easting 718665.12



Remarks: See geologic boring/ well log for a more detailed description of soil log.

Screen is 10 ft long.



# GEOLOGIC BORING/WELL LOG

Project #: DHBDR00		Project Name: Ft Wingate			Boring/Well #: TMW-40 D						
Geologist: BRL			Driller/Company: USGS								
Drilling Equip.: ODEX				Date Start: 9/18/11		Date Completed: 9/20/11					
Surface Elev.: 6703.81 ft		Top of Casing Elev.: 6706.15 ft		Total Depth: 168 ft		Well Depth: 155.5 ft					
DRILLING		SAMPLE				GEOLOGIC LOG					
Depth	PID Reading (ppm)	Sample Type	Sample ID	Blow Count				Recovery-(in)	USCS Class	Contact-Depth	Descriptions and Comments
				0-6"	6-12"	12-18"	18-24"				
58											Brown fine sandy silt slight moisture
60											Dry silt w/ claystone nodules
62.5								2.5'			62.5-63.5' silty sand compacted
											63.5-64.5' unconsolidated silt/clay/sandstone
65								4.5'			64.5-65' claystone
											65.5' gravel/wet
											66.5-67.7' gravel layers majority of this interval is compacted clay/silt
69.5								3.5'			compacted clay/silt
74											Hard coring, compacted clay/ silt
											75.5' siltstone
75.9								1.9'			75.9-78.5' very fractured siltstone
											78.5-84' competent siltstone
84								8'			Fractured sand & silt stone, very fractured, loss core. Upper foot of recovery/sandstone. water 89'. @ 91' another layer of fractures sandstone majority of core fractured siltstone
94								5'			Fractured reddish brown claystone
104								4'			Claystone
109								4'			Fractured claystone
											113-114' conglomerate sandstone gravel/clay/silt
114								4'			Upper 6' missing assume
											114-120' unconsolidated sandstone conglomerate
120								9'			120-128' fractured claystone
											128-131.5' siltstone
											131.5-132' fractured siltstone

