DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF, G-9
600 ARMY PENTAGON
WASHINGTON, DC 20310-0600

December 28, 2022

Army Environmental Division – BRAC Operations Branch

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

RE: Letter Work Plan for Downhole Video Inspection for Well BGMW08, Fort Wingate Depot Activity, McKinley County, New Mexico. EPA# NM6213820974, HWB-FWDA-22-003

Dear Mr. Shean:

This letter describes the proposed work plan for the investigation of the integrity of well BGMW08 as required in the Approval with Modifications Letter, Final Groundwater Periodic Monitoring Report, July through December 2020, Revision 2, from the New Mexico Environment Department (NMED), dated July 25, 2022, HWB-FWDA-21-003.

Background

Well BGMW08 was installed and developed in March of 2018 (see Attachment I), and redeveloped in May of 2018. Based on historical data, well BGMW08 has had consistently low yield, and lack of recharge following purging, causing difficulty in obtaining groundwater samples during semi-annual monitoring events. Therefore, the Army is planning an investigation of the integrity of the casing and screen interval of well BGMW08.

Purpose

The purpose for the downhole video inspection of well BGMW08 is to investigate the integrity of the well to reduce uncertainty regarding historical low yield in the well. The Army is submitting this Letter Workplan to describe the procedure for assessing the integrity of the well casing and screen by downhole video logging, using equipment specifically designed for inspecting and assessing groundwater wells. In general, video logging will be used to assess the internal condition of the well casing and screen for potential plugging or blockage, biological fouling, or broken or leaky casing, as well as verifying construction of the well.

Video logging will be done by a licensed drilling company or company experienced in downhole video logging in a prescribed and consistent manner to ensure reliable data. Well video logging involves accurately documenting the construction of the well and identifying concerns (e.g., leaking casing seams). A well video log will be produced from high-resolution video and imagery of the well casing in axial or radial view using a downhole digital color camera and light source. Data will be oriented to magnetic north by use of an internal magnetometer. Oriented images of the length of the well will be presented as an unwrapped core as if viewing the well casing outward from the center. Data will be collected in fluid filled and non-fluid filled portions of the well. The optical televiewer will be oriented with compass direction and depth.

Proposed field work will be directed by a field geologist. In preparation for the video survey, the well completion report and well construction details for well BGMW08 will be reviewed to identify any potential problem areas that will bear closer inspection during the survey, as well as to identify depths of interest for closer inspection.

The line speed, the rate at which the camera is moved up and down the well, will be maintained at a consistent and relatively slow speed. Excessive line speed will be avoided, which can prevent a thorough evaluation. The movement of the camera will be stopped at various depths to visually inspect relevant well features, such as each casing joint and the screen interval of the well.

Air-filled or clear fluid-filled well casing conditions typically provide the best results for downhole video logging, and the camera will be centralized in the well casing. Camera runs may be repeated as necessary, as determined by the field geologist. The camera will be allowed to equilibrate with downhole temperature and humidity conditions to ensure that the camera lens does not fog up. Image clarity will be improved with adjustment of brightness, contrast, and other controls as needed. Groundwater should be of low enough turbidity to ensure clear video data is recorded. If high turbidity impedes effective video inspection of the well, then the well may be purged dry to allow inspection of the well with no water present.

Reporting

The reporting deliverable for the video logging will consist of a real-time video, photographic log of selected images of the well, and a description and interpretation of observations made during the logging with respect to the integrity of well BGMW08.

If you have questions or require further information, please contact me at George.h.cushman.civ@army.mil, 703-455-3234 (Temporary Home Office, preferred) or 703-608-2245 (Mobile).

Sincerely,

George H. Cushman IV

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

Enclosures

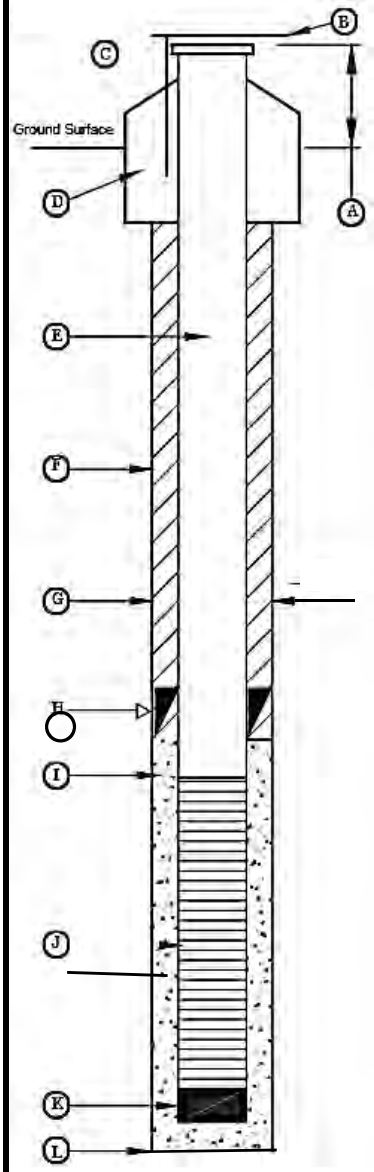
Attachment I – BGMW08 Boring Log and Well Completion Detail

CF:

Dave Cobrain, NMED, HWB
Ben Wear NMED, HWB
Michiya Suzuki, NMED, HWB
Lucas McKinney, U.S. EPA Region 6
Ian Thomas, BRAC OPS
George H. Cushman, BRAC OPS
George Padilla, BIA/NRO/DECSM
Alvin Whitehair, BIA SW
Val Panteah, Pueblo of Zuni
Carleton Bowekaty, Pueblo of Zuni
Eric Shepard, DOI
Sharlene Begay-Plater, Navajo Nation IDR
Alan Soicher, USACE
Saqib Khan, USACE
Admin Record, NM
Admin Record, Ohio

Project Name: FWDA US01027	Location: BGMW08	Logger: MB	Well ID: BGMW08
Driller: YellowJacket	Well Depth: 185	Water Level ATD: 178.60'	
Start Date: 3/10/2018	End Date: 3/12/2018	Elevation: 6685.02' TOC	

Screened Monitoring Well Completion Detail



A.	Stick up Length:	2'	Coordinate System:	NM State Plane West
B.	Key Number:	Master	Northing:	1643942.73
C.	Protective Casing:		Easting:	2500318.10
	Diameter:	8"	Method of Drilling:	Sonic
	Material:	Steel	Well Type:	Monitoring Well
	Length:	5'	Pump Information:	NA
	Depth to Bottom:	2'	Date Installed:	NA
D.	Surface Completion:		Manufacturer:	NA
	Dimensions:	4x4'	Type:	NA
	Depth:	6"	Model Number:	NA
	Material:	Concrete	Volts:	NA
E.	Well Casing Data:		Horse Power:	NA
	Diameter:	2"	Capacity:	NA
	Material:	PVC sch40	Depth of Pump Intake Setting:	NA
	Length:	187'	Number of Stages:	NA
	Depth to Bottom:	185'	Power Source:	NA
F.	Grout Type:	QUIK GROUT	Material of Drop Pipe:	NA
	Depth to Top:	0'	Other:	NA
	Depth to Bottom:	163'	Volumes:	
	Material:	sodium based bentonite	Bag of sand:	7.5
	Method of Installation:	Tremie pipe	Bag of grout:	3
	Depth to Cement in Casing:	158'	Comments:	
G.	Borehole Diameter:	6"		
H.	Type of Seal:	Bentonite chips		
	Quantity:	5'		
I.	Type of Filter Pack:	colorado silica sand		
	Quantity:	23'		
	Size:	10/20	1 foot of sand @ bottom, filter from 163-186	
J.	Screen:			
	Depth to Top:	165'	Well Location Sketch:	
	Depth to Bottom:	185'		
	Material:	PVC SCH40		
	Slot Size:	0.01		
	Method of Installation:	Machined		
K.	Bottom Cap:			
	Material:	PVC		
	Length:	4"		
L.	Boring Depth:	186'		

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Fort Wingate Depot Activity
Project US-01027

Date Started	: 3/10/2018
Date Completed	: 3/12/2018
Hole Diameter	: 6"
Drilling Method	: Sonic
Logged By	: McKenze Booth
Drilling Company	: Yellow Jacket
Northing Coord.	: 1643942.73
Easting Coord.	: 2500318.10
Elevation (amsl)	: 6685.02
Total Depth	: 186ft btoc

BORING LOG: BGMW08

Monitoring Well Details:

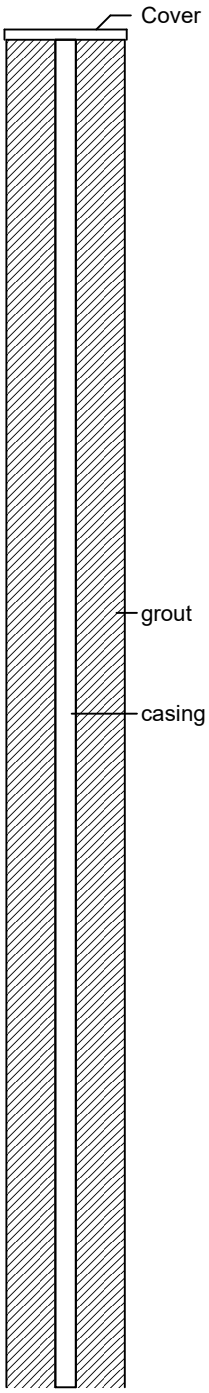
Casing Type	: PVC schedule-40
Screen Size	: 0.01"
Seal Type	: bentonite chips
Sand Pack Type	: Colorado silica 10/20

Sample Legend: Sample; Submitted to Lab

Water Levels: During Drilling; After Completion

Depth in Feet	USCS	DESCRIPTION	% Recovery
0	CL	SILTY CLAY, dry, very fine grained, 2.5 YR 4/8	
5	CL	SANDY CLAY, dry & crumbly, 2.5 YR 4/8	100
	SP	SAND, fine grained, traces of gravel, 2.5 YR 4/8	
10	CL	CLAY, dry & crumbly, friable 2.5 YR 4/8	100
15			
20	SC	CLAYEY SAND, dry, 2.5 YR 4/8	100
	CL	CLAYSTONE, slightly moist, some sand, 2.5 YR 4/8	
25	GP	SANDY GRAVEL, dry, 10 R 3/4	
	SC	CLAYEY SANDSTONE, with white streaks, dry, 10 R 3/4	
	SW	SAND, coarse grained, very moist, very loose, non plastic, 10 R 3/4	100
	SM	SAND, medium grained,very loose, some silt, dry, 10 R 3/4	
30	SW	SANDSTONE, dense, dry, 10 R 3/4	
	SC	CLAYEY SANDSTONE, moist, non cohesive, 10 R 3/4	
	SP	GRAVELY SAND, dry, with petrified wood, 10 R 3/4	100
	SC	CLAYEY SANDSTONE, dry, non cohesive, medium to coarse grained, 10 R 3/4	
35			

Well ID: BGMW08



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Water Levels: During Drilling; After Completion

Depth in Feet	USCS	DESCRIPTION	% Recovery
35	SC		100
	CL	CLAYSTONE, some sand, moist, dense, non plastic, 7.5 R 2.5/4	
	SP	GRAVELY SAND, dry, coarse grained, yellow/white nodules, 10 R 3/4	100
40	SC	CLAYEY SAND, moist, fine to medium grained, 10 R 3/4	
	SP	GRAVELY SAND, dry, very loose, 10R 4/6	100
45	SP	GRAVELY SAND, dry, very loose, 10 R 7/2	
		CLAYEY SANDSTONE, fine grained, dry, dense, non plastic, with white streaking, 7.5 R 3/4	100
50			
		CLAYEY SANDSTONE, fine grained, dry, dense, non plastic, with white streaking, green/white nodules, irregular shaped, damp at 57ft btoc, 7.5 R 3/4	100
55			
60			100
65			100
70			

Well ID: BGMW08

grout

casing

Depth in Feet

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BORING LOG: BGMW08

Monitoring Well Details:

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Screen Size	: 0.01"
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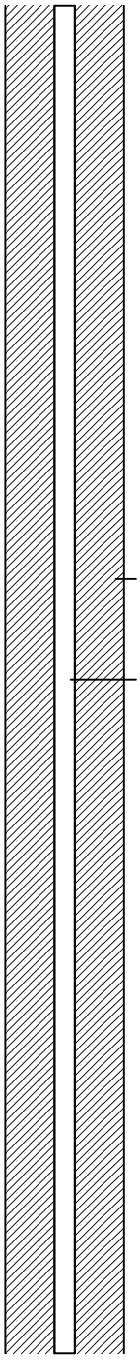
Sand Pack Type	: Colorado silica 10/20

Sample Legend
- Sample
- Submitted to Lab

Water Levels
- During Drilling
- After Completion

Depth in Feet	Water Level	USCS	GRAPHIC	DESCRIPTION	% Recovery
70					
75				CLAYSTONE, some very fine sand, green/white nodules 2-4mm, medium plastic when wet, dry, 7.5 R 3/4	100
80					100
85					
90					100
95					
100					100
105					

Well ID: BGMW08



Depth in Feet: 70, 75, 80, 85, 90, 95, 100, 105

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BORING LOG: BGMW08

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Sample Legend: Sample; Submitted to Lab

Water Levels: During Drilling; After Completion

Depth in Feet | Water Level | USCS | GRAPHIC | DESCRIPTION | % Recovery

Well ID: BGMW08

105 ft
SANDY CLAYSTONE, dense, dry, non plastic, green/gray nodules, 7.5 R 3/4 — 100
110 ft — 100
115 ft
120 ft — 100
125 ft
130 ft — 100
CLAYEY SANDSTONE, very fine grained, dry, dense, non plastic, with white streaking, green/white irregular shaped nodules, with very thin laminae of sandstone <1", 10 R 5/4
SANDY CLAYSTONE, hard, dry, green/white nodules, 10 R 5/4
135 ft — 100
140 ft

grout
casing

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BORING LOG: BGMW08

Monitoring Well Details:

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Screen Size	: 0.01"
Seal Type	: bentonite chips
Sand Pack Type	: Colorado silica 10/20

Sample Legend: Sample; Submitted to Lab

Water Levels: During Drilling; After Completion

Depth in Feet | Water Level | USCS | GRAPHIC | DESCRIPTION | % Recovery | Well ID: BGMW08 | Depth in Feet

140
145
150
155
160
165
170
175

SANDY CLAYSTONE, hard, dry, green/white nodules, cohesive, 10 R 5/4

CLAYEY SANDSTONE, fine grained, dry, green/gray irregular shaped nodules, 7.5 YR 5/4

CLAYSTONE, dry, cohesive, medium density, 7.5 YR 5/4

CLAYEY SANDSTONE, fine grained, dry, thin beds to laminations, green/gray nodules 7-8mm, 7.5 YR 5/4

SANDY CLAY, dense, wet, some coarse sand, fine gravel semi round to angular, very plastic, cohesive, 7.5 YR 2.5/3

% Recovery: 100; 100; 100; 100; 0

Well ID: BGMW08 — grout; casing; sand pack; screen

05-23-2018 C:\Users\cjennings\Desktop\Ft Wingate\Ft Wingate Boring Logs\FWDA_BGMW08.bor

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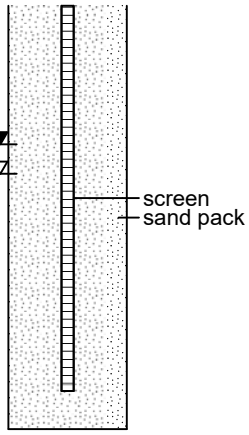
Seal Type	: bentonite chips
Sand Pack Type	: Colorado silica 10/20

Sample Legend
- Sample
- Submitted to Lab

Water Levels
- During Drilling
- After Completion

Well ID: BGMW08

Depth in Feet	Water Level	USCS	GRAPHIC	DESCRIPTION	% Recovery
175				CLAYEY SANDSTONE, fine grained, dry, thin beds to laminations, green/gray nodules, downward increase in clay content, 7.5 YR 5/3	0
180					100
185					100
				TD = 186ft btoc	



190 195 200 205 210