STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER

DISTRICT I

TOM BLAINE, P.E.
New Mexico State Engineer

5550 San Antonio Drive, NE
Albuquerque, NM 87109
(505) 383-4000

May 15, 2015

File: None

Fort Wingate Depot Activity, Building 1
Fort Wingate, New Mexico 87316

Office pick-up:
National EWP
Bryan Nydoske, Manager
3621 Hwy 47
Peralta, NM 87042

RE: **Well Plugging Plan of Operations for monitoring well "CMW21"**

Greetings,

The Office of the State Engineer is in receipt of your plugging plan. The plan has been reviewed and is hereby approved, subject to the attached Conditions of Approval.

If you wish for this plugging to be witnessed by authorized OSE personnel, arrangements for appointments during normal work hours may be made with a minimum 48-hour notice by contacting Jess L. Ward, District 1 Supervisor at (505) 383-4000

Please deliver a copy of this plugging plan with attached conditions to the well driller contracted to provide plugging services.

If discussion is needed, please call us (505) 383-4000.

Sincerely,

Joey Fields
NMOSE, District 1

JF:jf,
Enclosure as stated

WELL PLUGGING PLAN OF OPERATIONS

NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: CMW21

Name of well owner: Fort Wingate Depot Activity

Mailing address: Building 1, 7 miles east of Gallup

City: Fort Wingate State: NM Zip code: 87316

Phone number: 505-905-6190 E-mail: richard.cruz2@us.army.mil

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: National EWP

New Mexico Well Driller License No.: WD-1210 Expiration Date: 10/31/15

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

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1) GPS Well Location: Latitude: 35 deg, 26 min, 49.118 N sec
Longitude: 108 deg, 37 min, 9.493 W sec, NAD 83

2) Reason(s) for plugging well: Environmental remediation of surface soils via excavation

3) Was well used for any type of monitoring program? Yes If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.

4) Does the well tap brackish, saline, or otherwise poor quality water? _____ If yes, provide additional detail, including analytical results and/or laboratory report(s): _____

5) Static water level: 21.5 feet (below land surface) / feet above land surface (circle one)

6) Depth of the well: 67.5 feet

7) Inside diameter of innermost casing: 2 inches.

8) Casing material: PVC

9) The well was constructed with:

☐ an open-hole production interval, state the open interval: _____

☑ a well screen or perforated pipe, state the screened interval(s): 10' screen with 0.01" slot

10) What annular interval surrounding the artesian casing of this well is cement-grouted? 3 inches

11) Was the well built with surface casing? Yes If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? Yes If yes, please describe: 49' Bentonite-cement slurry

12) Has all pumping equipment and associated piping been removed from the well? _____ If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well: The well will be overdrilled and the boring will be grouted from bottom to top with cement bentonite grout

2) Will well head be cut-off below land surface after plugging? 1'

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VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

1) For plugging intervals that employ cement grout, complete and attach Table A.

2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.

3) Theoretical volume of grout required to plug the well to land surface: 194.6 gallons

4) Type of Cement proposed: Portland Type II

5) Proposed cement grout mix: ~~5~~ 5.2 gallons of water per 94 pound sack of Portland cement.

6) Will the grout be:

☐ batch-mixed and delivered to the site

☑ mixed on site

7) Grout additives requested, and percent by dry weight relative to cement: 3% to 5% Bentonite pre-mixed with .65 gallons water per 1%

8) Additional notes and calculations: 8.25" OD HSA with 4.25" ID will be used to overdrill the wells. Air & Drag Bit will be used to Drill out or install Tremie & Grout from Bottom to surface with Cement Grout & 3% to 5% Bentonite. 5.8 gallons Water & .65 Gallons water for Bentonite per 1% premixed

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

The monitoring well was installed to monitor/investigate groundwater for potential metals, explosives, and other contamination associated with the hazardous waste management unit.

VIII. SIGNATURE:

I, Bryan Nydoske, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Signature of Applicant

5/7/15
Date

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IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

☒ Approved subject to the attached conditions.
☐ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 15TH day of MAY, 2015

Tom Blaine, State Engineer

By:

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			1'
Bottom of proposed interval of grout placement (ft bgl)			70'
Theoretical volume of grout required per interval (gallons)			194.6
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5.8
Mixed on-site or batch-mixed and delivered?			on site
Grout additive 1 requested			bentonite
Additive 1 percent by dry weight relative to cement			3% to 5%
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

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TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

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DISTRICT 1
TOM BLAINE, P.E.
NEW MEXICO STATE ENGINEER

NMED is in agreement with the Army's plan to plug and abandon the well per Ben Wear, Hazardous Waste Bureau, NMED
Well Owner: Fort Wingate Depot Activity, Building 1
Well No. CMW21
Well Location: Latitude = 35d 26m 49.118, N, and Longitude = 108d 37m 9.493, W, NAD83
Well Driller: National EWP, WD-1210, expires 10/31/15

Specific Plugging Conditions of Approval

1. Water well drilling and well drilling activities, including well plugging, are regulated under 19.27.4 NMAC, which requires any person engaged in the business of well drilling within New Mexico to obtain a Well Driller License issued by the New Mexico Office of the State Engineer (NMOSE). Therefore, the firm of a New Mexico licensed Well Driller shall perform the well plugging.

2. Theoretical volume of sealant of the borehole required for abandonment is as shown on the plugging plan. Total minimum volume of necessary sealant shall be calculated upon sounding the actual pluggable depth of the well.

3. The Well Plugging Plan of Operations submitted requests the use of 3% to 5% bentonite-enriched cement. When supplementing a cement slurry with bentonite as requested, water demand for the mix increases at a rate of approximately **0.65 gallons of water for each 1% increment** of bentonite bdwc (by dry weight cement) above **fundamental water demand of 5.2 gallons water per 94-lb. sack of cement**. A 5% bentonite/cement slurry may therefore contain up to **8.45 gallons** of water total per 94-lb. sack of cement / approximate 5-lb. bentonite increment when appropriately mixed.

   The bentonite should be hydrated separately with its required increment of water before being mixed into the cement slurry. If water is otherwise added to the combination of dry ingredients or the dry bentonite blended into wet cement, the alkalinity of the cement will restrict yield of the bentonite powder, resulting in excess free water in the slurry and enhanced cement shrinkage upon curing.

4. Placement of the sealant within the wells shall be by pumping through a tremie pipe extended to near well bottom, and kept below top of the slurry column as the well is plugged from bottom-upwards in a manner that displaces the standing water column.

5. Should the NMED, or another regulatory agency sharing jurisdiction of the project authorize, or by regulation require a more stringent well plugging procedure than herein acknowledged, the more-stringent procedure should be followed. This, in part, includes provisions regarding pre-authorization to proceed, contaminant remediation, inspection, pulling/perforating of casing, or prohibition of free discharge of any fluid from the borehole during or related to the plugging process.

6. NMOSE witnessing of the plugging will not be required, but shall be facilitated if a NMOSE observer is onsite. NMOSE witnessing may be requested during normal work hours by calling the District 1 NMOSE Office at 505-383-4000, at least 48-hours in advance. NMOSE inspection will occur dependant on personnel availability.

7. A Well Plugging Report itemizing actual abandonment process and materials used shall be filed with the State Engineer (NMOSE, 5550 San Antonio Dr. N.E., Albuquerque, NM 87109), within 20 days after completion of well plugging. Please attach a copy of these plugging conditions.

The NMOSE Well Plugging Plan of Operations plan, as annotated, is hereby approved with the aforesaid conditions applied.

Witness my hand and seal this 15th day of May, 2015.

By:

Joey Fields
Water Resource Specialist
NMOSE District 1

WELL CONSTRUCTION DIAGRAM

Project#: 00805.22	Project Name: FWDA-OB/OD	Well#: CMW 21	
Geologist: KEN S. EDEN		Driller/Company: SHANE WHITE/STEWART BROS	
Drilling Equip. FAILING F-10	Date Start:: 7/13/98	Date Completed: 8/12/98	
Surface Elev.: ~7085	Top of Casing Elev.: 7086.9'	Total Depth: 74.5'	Well Depth: 67.5'

QUANTITY	MATERIALS USED:
3	50lb BAGS 20/40 SAND
1	50lb BAGS 30/70 SAND
3/4	SEAL BUCKET BENTONITE PELLETS
11	50lb BAGS OF PORTLAND CEMENT
45	GALLONS WATER FOR GROUT
1	50lb BAGS OF BENTONITE GEL
3	CENTRALIZERS
5	Gallons for Bentonite

CENTRALIZERS	
BTOC	BGS
	47.5
	66.5

DEPTH TO JOINTS	
BTOC	BGS

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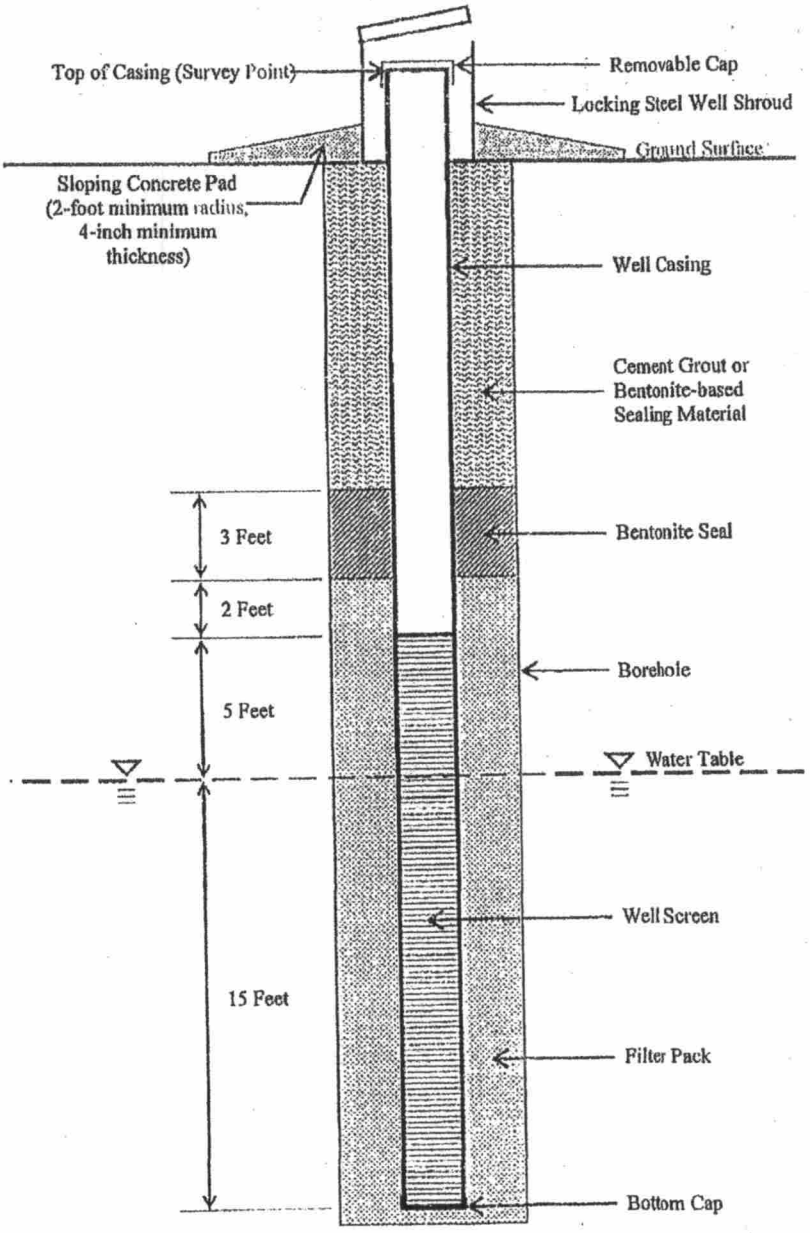
Deviation from Monitoring Well Construction and Abandonment Requirements: Requests to construct water table monitoring wells or other types of monitoring wells for ground water monitoring under ground water Discharge Permits or Abatement Plans in a manner that deviates from the specified requirements must be submitted in writing to the GWQB. Each request must state the rationale for the proposed deviation from these requirements and provide detailed evidence supporting the request. The GWQB will approve or deny requests to deviate from these requirements in writing.

MONITORING WELL SCHEMATIC
(Not to Scale)



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GEOLOGIC BORING / WELL LOG

Project#: 00805.22	Project Name: FWDA 03/00	Boring/Well#: CMW-21
Geologist: Ken S. Eden	Driller/Company: Shane White / Stewart Bros.	
Drilling Equip. Failing F-10	Date Start:: 07/13/98	Date Completed: 8/12/98
Surface Elev.: ~7085'	Top of Casing Elev.:	Total Depth: 74.5' Well Depth: 67.5'

Method of Drilling
- [x] Hollow Stem [ ] Direct Rotary
- [x] Air Rotary [ ] Bucket Auger
- [ ] MUD Rotary [x] Flight Auger ESE
- Hole Diameter: ~~8 3/4"~~ ESE and 5 1/2"

Casing/Riser Type
- [ ] Steel [x] Threaded Height (above) below surface 1.56'
- [ ] Galv [ ] Welded
- [x] PVC [ ] Solvent
- [ ] SS [ ] Welded
- Drive Shoe? Yes (No)

Screen Portion of Well
- Material Sch 40 PVC
- Diameter 2" Length 10'
- Set between 57 ft and 67 ft
- Slot size 0.010"

Filter Pack
- Size 20/40
- Meth of Install. Tremie
- Composition Silica Sand
- Volume Used 35 lb. Bags
- Depth to top of f.p. 55 ft. BGS

Annulus Seal
- [x] Bentonite Pellets X Chips
- [ ] 1/4"
- Volume Used? 3/4 5gal. Bucket
- Method of Instal. Tremie
- Depth : from 49 ft. to 52 ft. BGS ft.

Grout
- Used? X Yes No Volume 11-50lb Bags
- [ ] Neat Cement [x] Bentonite
- [ ] 5% Bentonite
- Method of Instal. Tremie
- Depth : from 0 ft. to 49 ft.

Well Head Completion
- [ ] Flushmount [x] Stand Up
- Cap Type 2" Churnie Plug
- Lock # 31 American
- Volume Used 4'x4" Protective Steel Casing

Developement
- Method
- Gallons Evacuated
- Date
- Odor

Static Water Level
- Initial 21.5 ft. 07/14/98 1535
- Developement ft.
- 24 hr. ft. 2nd. water 8/11/98 30.0'
- 2nd day 66.1 ft 07/31/98 0800

DRILLING		SAMPLE							GEOLOGIC LOG		
Depth (ft)	PID Reading (ppm)	Sample Type	Sample ID	Blow Count 0-6"	6-12"	12-18"	18-24"	Recovery-(ft)	USCS Class	Contact-Depth	Description and Comments (Core Interval)
1	0	Cuttings						2/2.5	SM		(0-2.5) 0-0.5 Silty fine sand, Sand 70%, Silt 20%, clay 10%, 5YR 3/2 (Dark Reddish Brown), moist, Sub angular to Subrounded, firm. 0.5-2.0 Silty fine sand Sand 90%, Silt 10%, 2.5YR 5/6 (Red), moist, Subangular to subrounded; firm
2	0							3/2.5	SM		(2.5-5.0) 2.5-4.0 Silty fine Sand, 80% Sand, 20% Silt, 2.5YR 4/6 (Red), moist-dry, firm w/ some roots and red sandstone fragments.
3											
4											
5	0							2/2.5	SM		(5.0-7.5) 5-7 Silty fine Sand, 80% Sand 20% Silt, 2.5YR 4/3 (Reddish Brown), moist to dry, firm
6											

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STATE BOARD OF EQUALIZATION

GEOLOGIC BORING / WELL LOG

Project#: 00805.22	Project Name: FWDA 03/00	Boring/Well#: CMW-21
Geologist: Ken S. Eden	Driller/Company: Shane White/Stewart Bros.	
Drilling Equip. Failing F10	Date Start:: 07/13/98	Date Completed: 8/12/98
Surface Elev.: ~7085	Top of Casing Elev.:	Total Depth: 74.5' Well Depth: 67.5'

DRILLING		SAMPLE							GEOLOGIC LOG		
Depth (ft)	PID Reading (ppm)	Sample Type	Sample ID	Blow Count 0-6" / 6-12" / 12-18" / 18-24" (Sample interval)	Recovery-(ft)	USCS Class	Contact-Depth	Description and Comments (Core Interval)			
7	0	SS	CMW 2101 10		2/2.5	CL		(7.5-10) 7.5-9.0 Sandy Clay, 70% clay, 30% Sand, 2.5YR 3/2 (Dusky Red), Slightly plastic, stiff, dry. 9.0-9.5 Clayey Sand, 80% Sand, 20% clay, 2.5YR 4/3 (Reddish Brown), firm, dry, some sandstone fragments.			
10	0				1/2.5	SC		(10-12.5) 10-11 Same as above, but moist and soft			
	0				1/2.5	ML		(12.5-15.0) 12.5-13.5 Sandy silt, 90% silt, 10% Sand, 10R 5/2 (Weak Red), stiff, moist-dry.			
	0				2.5/2.5	ML		(15.0-17.5) 15-17.5 Same as above but dry			
15	0				2/2.5	ML		(17.5-20) 17.5-19.5 Same as above w/ some minor clay and sandstone lenses, Dry			
	0				2.5/2.5	ML		(20-22.5) 20-22.5 Same as above but harder, Dry			
20	0						▽	First SWL			
	0				0.5/2.5	ML		(22.5-25) 22.5-23 Same as above. Auger Refusal @ 23'			
		↓			switched to air rotary coring @ 1415 07/14/98			(23-30) 23-29 Fine Grained Sandstone 10R 3/2 (Dusky Red), well cemented, Fractured and slightly weathered @ fractures. Lighter laminations throughout core along bedding planes.			
25	0				6.0/7.0		▼	Highly fractured 29.5-29.0', Slightly fractured 29-23', Fractures horizontal to 20° and 70° from horizontal, wet and some cross bedding. Driller states			
							▽	Second zone that water was encountered @ approximately 28'			
30		air coring						End of Drilling on 07/14/98 1530			

▽ = Static Water Level

▼ = First Water Encountered.

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ALBUQUERQUE, NEW MEXICO
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GEOLOGIC BORING / WELL LOG

Project#: 00805.22	Project Name: FWDA OB/OD	Boring/Well#: CMW-21
Geologist: Ken S. Eden	Driller/Company: Shane Whitk/Stewart Bros.	
Drilling Equip.: Failing F-10	Date Start:: 07/13/98	Date Completed: 8/12/98
Surface Elev.: ~7085'	Top of Casing Elev.:	Total Depth: 74.5'FT / Well Depth: 67.5'

DRILLING		SAMPLE							GEOLOGIC LOG		
Depth (ft)	PID Reading (ppm)	Sample Type	Sample ID	Blow Count 0-6"	6-12"	12-18"	18-24"	Recovery (ft)	USCS Class	Contact-Depth	Description and Comments
32											(Core Interval)
	0							3.0/4.0		07/18/98 0900	(30-34) 30-33 Interbedded Siltstone 10R3/2 (Dusky Red) and Fine Sandstone 10R5/1 (Reddish Gray), well cemeted, grain supported, some iron oxide staining. 33-34 Fine Sandstone 10R5/1 (Reddish Gray), well cemented, grain supported, hard. Fractures horizontal to 20° and 70° from horizontal, moist-dry, throughout core interval.
35	0							5.5/6.0			(34-40) 34-37 Fine Grained Sandstone 10R5/1 (Reddish Gray), well cemented, grain supported, hard, fractures horizontal + 70°. dry. 37-39.5 Siltstone 10yR4/2 (Weak Red) and claystone 5BG5/1 (Greenish Gray) with some clay filings, brittle Dry
40								1.5/2.0			(40-42) 40-41.5 Same as above w/some clay veins and filings, Dry
		4" roller Bit								End of Drilling 07/18/98	Using a 4" roller bit. Cuttings (42-50) will be used for Description
	6										Silty Sandstone 10R3/2 (Dusky Red) Fine-medium grained, Dry
45											
											Set PVC casing down to 50ft. BGS
50	0	9.1' coring						4.0/5.0			End of Drilling 7/20/98 @ 50ft. BGS (50-55) Interbedded Fine-Med. Sandstone 10R 7/1 (light Gray) and 10R5/1 (Reddish Gray), V. hard, no fractures, moist. well cemeted subrounded-subangular grains, some fines (silts)
55	0							5.0/5.0			(55-60) Same as above, a little more moist in small zones. More fine grained at 60ft. One fracture @ 58', wet-

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GEOLOGIC BORING / WELL LOG

Project#: 00805.22	Project Name: FWDA OB/OD	Boring/Well#: CMW-21
Geologist: Ken S. Eler	Driller/Company: Shane White/Stewart Bros.	
Drilling Equip. Failing F-10	Date Start:: 07/13/98	Date Completed: 8/12/98
Surface Elev.: ~7085	Top of Casing Elev.:	Total Depth: 74.5 FT / Well Depth: 67.5'

DRILLING		SAMPLE								GEOLOGIC LOG	
Depth (ft)	PID Reading (ppm)	Sample Type	Sample ID	Blow Count 0-6"	6-12"	12-18"	18-24"	Recovery (ft)	USCS Class	Contact-Depth	Description and Comments
56											(Core Interval)
60	0	air coring						1.5/2.5		▼	#Picture #3 was wrong interval it was 55-57.5 should have been 60-62.5 (60-62.5) 60-61.4 Fine grained Sandstone 10R 7/1 (light Gray), V. hard, NO fractures minimal matrix, wet. 61.4-61.5 Siltstone 10R 3/2 (Dusky Red), hard, fractured, wet.
65		4½" roller Bit	7/31/98 CMW21 @2.66								(62.5-67.5) No coring done between 62.5-67.5. ~~Cutting were, day, light gray Sandstone~~ KSE 7/31/98 Same day in core barrel @ 62 ft. BGS
	0	air coring						1.0/5.0		▽	(67.5-72.5) 67.5-68.0 Interbedded Siltstone 10R 3/2 (Dusky Red) and 5BG 7/1 (Light Greenish Gray), V. hard, no fractures, dry
70	0							2.0/2.0			(72.5-74.5) 72.5-74.5 Same as above
75											TD=74.5 ft BGS End of Drilling 07/30/98

▽ = Static Water Level

▼ = Second Water Encountered.

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WELL CONSTRUCTION DIAGRAM

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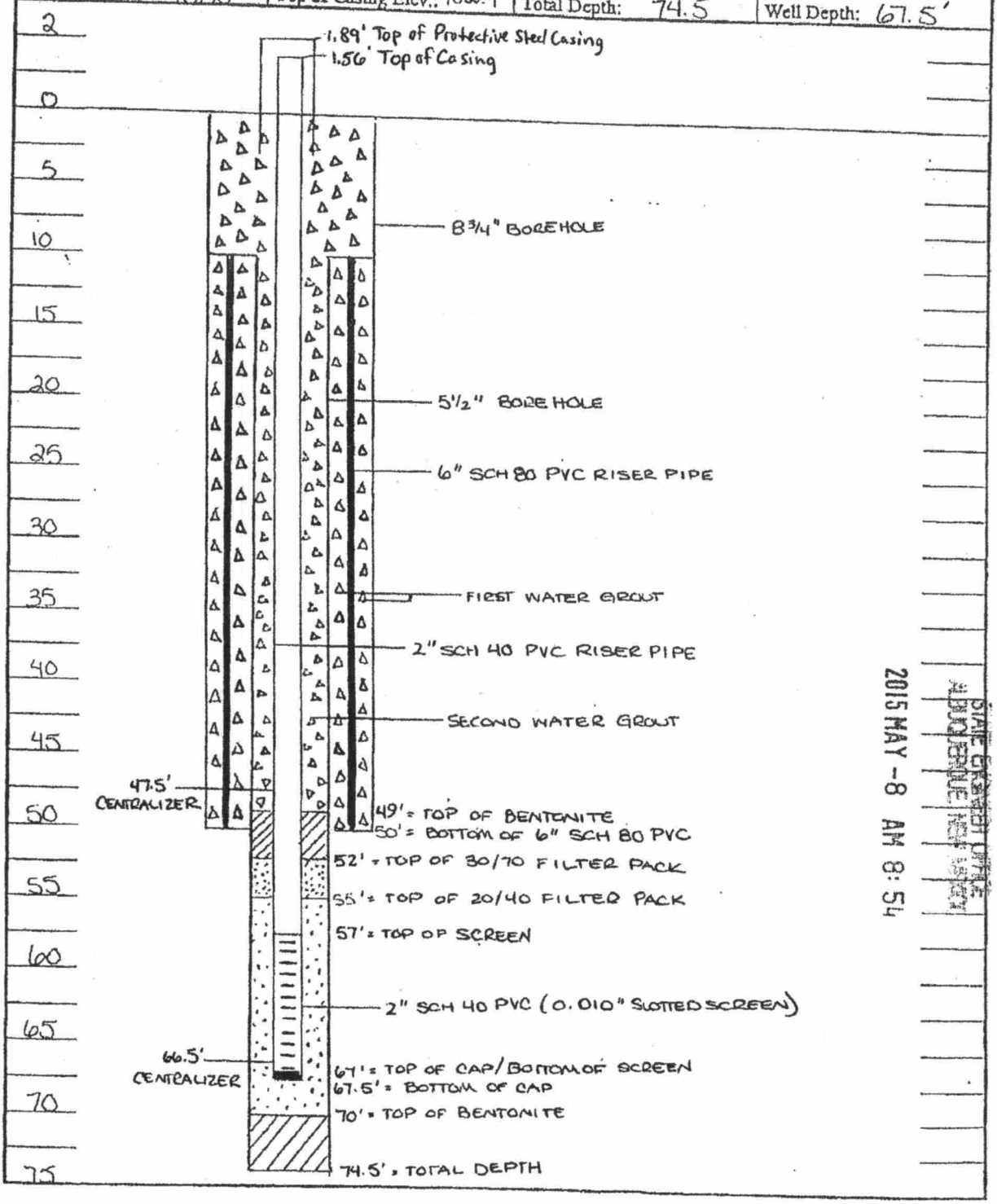
Project#: 00805.22	Project Name: FWDA-OB/OD	Well#: CMW 21	
Geologist: KENS. EDEN	Driller/Company: SHANE WHITE / STEWART BROS.		
Drilling Equip. FAILING F-10	Date Start:: 07/13/98	Date Completed: 8/12/98	
Surface Elev.: ≈ 7085'	Top of Casing Elev.: ~7086.9'	Total Depth: 74.5	Well Depth: 67.5'



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