National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
White Sands Test Facility
P.O. Box 20
Las Cruces, NM 88004-0020

May 8, 2025

Reply to Attn of: RE-25-072

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

Subject: Abandonment Report for NASA Well PFI-1

NASA completed installation and development of WSTF well PFI-1 in September 2000. The well was designed and installed to inject groundwater treated at the Plume Front Treatment System and was operational between 2005 and 2019. In March 2019, the well began producing excessive sediment along with what appeared to be filter pack sand and demonstrated a reduction in specific capacity, indicated a potential problem with the wells screen. NASA removed the well from service in December 2019 and performed an evaluation that resulted in the determination that the well was no longer suitable for long-term use as an injection well. In the *Remediation System Monitoring Plan Annual Update for 2024*, submitted on July 23, 2024, NASA notified NMED of the intent to abandon well PFI-1. In response, NMED directed NASA to submit a well abandonment report that comprehensively documents related field activities and includes a copy of the final well plugging record within 120 days of well abandonment. NASA's drilling subcontractor completed well abandonment activities on April 7, 2025 and this submittal provides the required well abandonment report. This reporting format includes a paper copy of the report as Enclosure 1, and a CD-ROM with the report in PDF as Enclosure 2.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or comments concerning this submittal, please contact Michael Zigmond of my staff at 575-524-5484.

Timothy Davis

Digitally signed by Timothy Davis
Date: 2025.05.08 10:50:18 -06'00'

Timothy J. Davis
Chief, Environmental Office

2 Enclosures

cc: (w/enclosures)
Ms. Naomi Davidson
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New Mexico Environment Department
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Santa Fe, NM 87502
Submittal via Box

National Aeronautics and Space Administration



Abandonment Report for Well PFI-1

May 2025

NM8800019434

NASA Johnson Space Center White Sands Test Facility

Abandonment Report for Well PFI-1

May 2025

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Timothy Davis Digitally signed by Timothy Davis
Date: 2025.05.08 10:50:00 -06'00'

Timothy J. Davis
Chief, NASA Environmental Office

See Electronic Signature
Date

National Aeronautics and Space Administration

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www.nasa.gov

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List of Acronyms

bgs	below ground surface
ft	Feet/Foot
gal	Gallon(s)
GWQB	Groundwater Quality Bureau
in.	Inch(es)
NASA	National Aeronautics and Space Administration
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
PFI-1	Plume Front Injection well #1
PFTS	Plume Front Treatment System
PVC	Polyvinyl Chloride
RCRA	Resource and Recovery Act
WSTF	White Sands Test Facility

1.0 Introduction

This Well Abandonment Report summarizes activities associated with the plugging and abandonment of National Aeronautics and Space Administration (NASA) Plume Front Injection well #1 (PFI-1) at the NASA White Sands Test Facility (WSTF). The plugging and abandonment of well PFI-1 was completed between March 31 and April 5, 2025. Cascade Drilling, LLC was contracted to perform abandonment activities. Cascade is a licensed driller in the State of New Mexico (NMWD-1664) that is qualified to perform well abandonment activities in the state.

2.0 Facility Location and Description

WSTF is located approximately 16 miles northeast of Las Cruces in southern New Mexico (Figure 2.1). WSTF's primary activities in support of the United States space program are:

1. Development, qualification, refurbishment, and testing of spacecraft propulsion systems, subsystems, and ground support equipment.
2. Investigation of flight hardware anomalies.
3. Testing of materials and components.
4. Performance of hazard and failure analyses.

Following the completion of construction of WSTF in 1964, many wastes were historically managed in hazardous waste management units, including surface impoundments, within the WSTF industrial area. These hazardous waste management units contributed to groundwater contamination. As a result of the groundwater contamination, NASA operates a network of groundwater monitoring and remediation wells throughout the site.

Well PFI-1 is located within the southern Jornada del Muerto Basin alluvial aquifer southwest of the Plume Front Treatment System (PFTS).

3.0 Well PFI-1 Summary

NASA well PFI-1 was an injection well drilled in early 2000 and registered with the New Mexico Office of the State Engineer (NMOSE) as LRG-10819 (Figure 3.1). The well was completed with nominal 20-inch (in.) carbon steel surface casing to a depth of 111 feet (ft) below ground surface (bgs) and 7.85-in. inner diameter, 9.05-in. outer diameter CertainTeed polyvinyl chloride (PVC) casing to 996.58 ft bgs (Figure 3.2). The injection well's screened interval extends from 418.2 ft bgs to 977.6 ft bgs. After final development, the well was fitted with nominal 4-in. drop pipe, a pump assembly, and associated hardware to a depth of 672 ft bgs for injection of treated groundwater from the PFTS into the local aquifer. The well's boring is installed entirely within Santa Fe Group alluvium, which is generally characterized as an unconsolidated to semi-consolidated poorly to moderately sorted pebbly polygenetic conglomerate. Bedrock was not encountered during drilling at this location to a depth of 1,020 ft bgs.

NASA completed installation and development of well PFI-1 (LRG-10819) in September 2000. The well was designed and installed to inject groundwater treated at the PFTS (Figure 3.1). PFI-1 was an operational part of the PFTS between 2005 and 2019. In March 2019, the well began producing excessive sediment along with what appeared to be filter pack sand and demonstrated a reduction in specific capacity, indicating a potential problem with or failure of the well screen. NASA removed the well from service in December 2019 and determined that the downhole equipment would be removed from the well to evaluate the condition of the well screen and casing (NASA, 2020, p6).

On April 10, 2021, a drilling subcontractor attempted to the remove the drop pipe, submersible pump, and other downhole equipment from well PFI-1 to support an evaluation of the well condition. Attempts to remove the downhole equipment were ultimately unsuccessful. The subcontractor tagged what was believed to be solid material at 475.4 ft bgs between the drop pipe and well casing. Prior to abandonment activities, the drop pipe was found to be accessible down to approximately 654 ft bgs, just below the well's flow control (Baski) valve. Based on an evaluation of the available information, NASA concluded the well screen in well PFI-1 had likely been breached, allowing annular material to intrude into the casing and lock the downhole equipment in place. NASA believed this blockage extended from 475.4 ft to possibly the total depth of the well casing at 996.58 ft. As a result of the infiltration, the well could no longer be backwashed or accept treated groundwater as designed; therefore, it was no longer suitable for long-term use as an injection well.

On November 14, 2024, NASA submitted the *Well Plugging Plan of Operations for NASA Well LRG-10819* to NMOSE (NASA 2024a). On November 20, 2024, NASA provided the *Plugging and Abandonment of NASA Well PFI-1* to the New Mexico Environment Department (NMED) Hazardous Waste Bureau and the *Notice of Intent to Discharge Groundwater at NASA White Sands Test Facility (WSTF) During Abandonment of Well PFI-1* to the NMED Groundwater Quality Bureau (GWQB) (NASA 2024b, NASA 2024c). The NMOSE approved the plugging plan for well PFI-1 on November 22, 2024 (NMOSE, 2024). NASA submitted the *Pre-closure Notification of WSTF Plume Front Treatment System Well PFI-1* to the GWQB on December 20, 2024 (NASA 2024d). The GWQB approved the Notice of Intent on January 13, 2025 (NMED, 2025).

This well abandonment report was developed to meet the requirements of Sections 5.3 and 6.2 of the NASA WSTF Resource Conservation and Recovery Act (RCRA) Permit (NMED, 2023a) and Conditions 27 through 29 of Discharge Permit (DP)-1255 (NMED, 2023b).

4.0 Pre-Plugging Activities

4.1 Site Preparation

Prior to the subcontract drilling company's arrival at WSTF, NASA performed well site maintenance at PFI-1 to remove potential hazards and provide a safe work environment. The sub-grade concrete well vault was not removed as part of well abandonment. However, prior to abandonment work, NASA ensured that the pipeline leading to the well was empty and capped at both ends so future discharges cannot occur, as required by Condition 29 of DP-1255 (NMED, 2023b). All electrical connections into and out of the vault itself were removed or severed. The vault's external plumbing and electrical connections all remain intact however, in the event another injection well or infiltration basin is constructed in the area in the future.

4.2 Equipment Remaining Downhole

Equipment that remains downhole at well PFI-1 includes: one flow control valve; one check valve; one submersible pump and motor; submersible power cable; approximately 634 ft of nominal 4-in. drop pipe, and 1/4-in. stainless steel tubing; two water level transducers and cable; and one 1-in. downhole camera and its cable. NASA was unable to remove this equipment prior to abandoning the well.

5.0 Plugging and Abandonment

A 4-ft riser pipe was lowered in the well vault and attached to the surface casing to extend this casing to a working height above ground. Grating was placed over the well vault opening to ensure a safe platform for abandonment activities and to preclude direct access the confined space of the well vault. Cement

grout used for plugging was hand mixed on-site using Martin Marietta Materials Portland Type II cement, mixed with 5% by weight Haliburton Quick-Gel bentonite with approximately 3.5 gallons (gal) of water per 50-pound bag of cement. The bentonite was hydrated with water prior to the cement being added. A tremie was run down the drop pipe to the Baski control valve at 475 feet. Approximately 770.5 gal of grout was emplaced through the Baski valve into the screened zone. Approximately 268 gal of grout was also emplaced through the sounder tube into the screened zone. Grout was then emplaced in the annulus between the drop pipe and the well casing, from 475 feet bgs to the surface. Approximately 2,147 gal of cement grout were emplaced during the abandonment of PFI-1. Grout in excess of the theoretical calculated volume of 1,309 gal likely filled voids where the annular material entered the well through the suspected screen breach. Grout was tagged at approximately 1-ft deep in the 4-ft riser upon completion, representing a +1-ft plug above the top of PFI-1 well casing, but still below ground level.

After allowing the grout to cure, the riser was removed leaving the cement plug and the well's remaining casing stickup. The protective grating was removed and the vault doors replaced to secure the location until final site leveling and vault removal is performed. Final brass cap emplacement will be performed after final site grading and restoration.

Cascade submitted the Well Plugging Record for well PFI-1 to the NMOSE on April 17, 2025; a copy is included as Appendix A.

6.0 Waste Management

Waste characterization was conducted in accordance with Section 4.3.10 of the Permit (NMED, 2023a). Only personal protective equipment, plastic sheeting, and general refuse were generated during well abandonment activities. Because there was no exposure to contaminated groundwater, these wastes were characterized as non-hazardous solid waste and disposed of in accordance with NASA procedures and applicable state and federal regulations.

No groundwater was generated from well PFI-1 during the abandonment activities. All downhole equipment (tremie pipe) was wiped down and rinsed using potable, non-chlorinated groundwater sourced from an on-site supply well as it was removed from the drop pipe and well casing. All rinse water was contained in the uppermost portion of the well surface casing.

7.0 References

NASA Johnson Space Center White Sands Test Facility. (2020, May 26). *NASA WSTF Periodic Monitoring Report – First Quarter 2020*. Las Cruces, NM.

NASA Johnson Space Center White Sands Test Facility. (2024a, November 14). *Well Plugging Plan of Operations for NASA Well LRG-10819*. Las Cruces, NM.

NASA Johnson Space Center White Sands Test Facility. (2024b, November 20). *Plugging and Abandonment of NASA Well PFI-1.* Las Cruces, NM.

NASA Johnson Space Center White Sands Test Facility. (2024c, November 20). *Notice of Intent to Discharge Groundwater at NASA White Sands Test Facility (WSTF) During Abandonment of Well PFI-1.* Las Cruces, NM.

NASA Johnson Space Center White Sands Test Facility. (2024d, December 20). *Pre-closure Notification of WSTF Plume Front Treatment System Well PFI-1*. Las Cruces, NM.

NMED Hazardous Waste Bureau. (2023a, March 28). RCRA Permit EPA ID # NM8800019434. Santa Fe, NM.

NMED Ground Water Quality Bureau. (2023b, May 17). *Discharge Permit Renewal and Invoice, DP-1255, NASA White Sands Test Facility, Plume Front Treatment System (PFTS) and Mid-plume Interception and Treatment System (MPITS).* Santa Fe, NM.

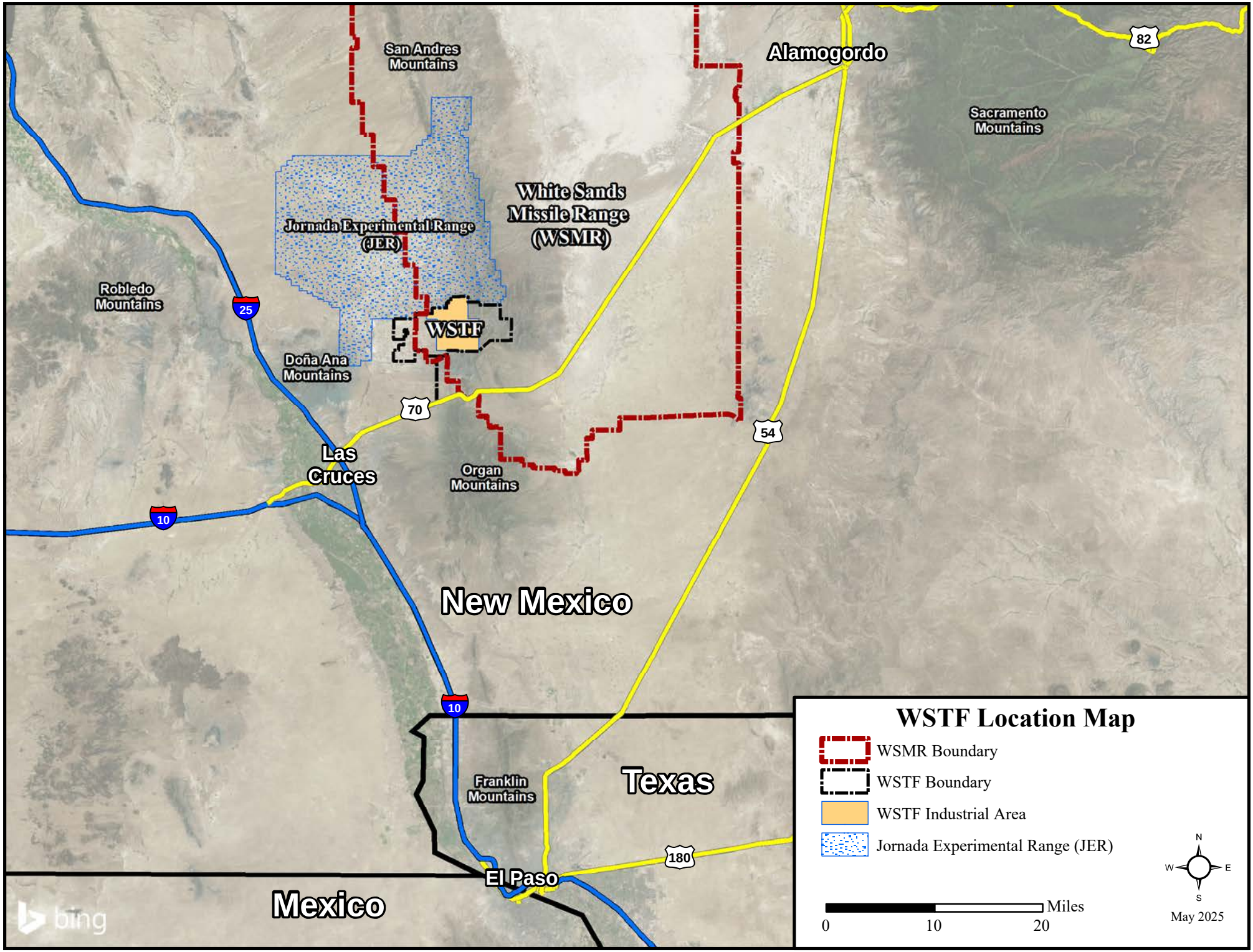
NMED Ground Water Quality Bureau. (2025, January 13). *Response to Notice of Intent to Discharge; Discharge Permit Not Required for NASA White Sands Test Facility PFI-1 Abandonment, AI-124.* Santa Fe, NM.

NM Office of the State Engineer. (2024, November 22). *Plugging Plan Approval for LRG-10819*. Las Cruces, NM.

Figures

Figure 2.1 **WSTF Location Map**

(SEE NEXT PAGE)


San Andres Mountains
Alamogordo
82
Sacramento Mountains
White Sands Missile Range (WSMR)
Jornada Experimental Range (JER)
Robledo Mountains
25
WSTF
Doña Ana Mountains
70
54
Las Cruces
Organ Mountains
10
New Mexico
10
Franklin Mountains
Texas
180
El Paso
Mexico
bing
WSTF Location Map
WSMR Boundary
WSTF Boundary
WSTF Industrial Area
Jornada Experimental Range (JER)
N
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10
20
May 2025

Figure 3.1 **PFI-1 Well Location Map**

(SEE NEXT PAGE)



PFI-1 Well Location

NASA Johnson Space Center
White Sands Test Facility Las Cruces, New Mexico

Coordinate System:
NAD 1983 HARN StatePlane New Mexico Central FIPS 3002 Feet

G:\Projects\environmental\plume front\PFI-1\

Figure 3.2 **Well PFI-1 Construction Diagram**

(SEE NEXT PAGE)

WELL COMPLETION DIAGRAM

INJECTION WELL

Location ID: **PFI-1** Site ID: **NASA-WSTF, Doña Ana County, NM**

Township and Range: **NE 1/4 NE 1/4 SW 1/4 Sec 5, T21S, R3E**
NM State Plane Coordinates (NAD 83)(ft): **549277.735 N, 1514717.441 E**
Elevation (Brass Cap): **4484.86 ft.**
Elevation (Top of Casing): **4485.86 ft.**
Drilling Contractor: **Stewart Brothers Drilling Company**
Driller: **J. Aguilar**
Method of Drilling: **Mud Rotary**
Total Depth of Borehole (bgs): **1020 ft.**
Borehole Diameter: **17 1/2" 0-100 ft.; reamed 26" to 115 ft.; 17 1/2" 115-1,020 ft.**
Depth to Bedrock (bgs): **Not Reached**
Depth to Groundwater: **427.72 ft. (6/8/07)**
Diameter and Type Surface Casing: **19.5" ID; 20" OD**

Dates Borehole Drilled: **3/28 - 4/12/00**
Date(s) Well Installed: **4/26 - 4/29/00**
Date(s) Well Developed: **8/31 - 9/1/00 pumping**
Field Representative(s): **Marry Canavan, Geoff Giles, Lela Hunnicutt-Mack...**
Total Depth Well Casing (bgs): **996.58 ft.**
Type of Casing: **CertainTeed PVC**
Diameter Well Casing: **7.85" ID; 9.05" OD**
Screened Zone (bgs): **418.15-976.57 ft.**
Comments: **Field Reps. cont'd: John Pearson, Murry Stepro, Ron Weaver**

bgs = below ground surface TOC=Top of Casing
ags= above ground surface
ID = Inner Diameter OD= Outer Diameter

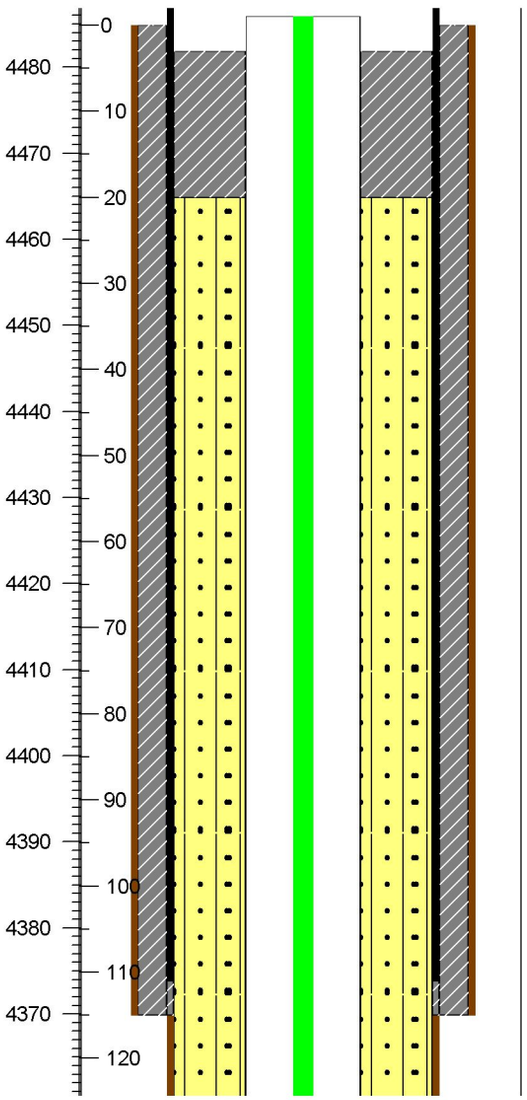
Casing Explanation

- Surface Casing — **20" OD Carbon Steel**
- Completion Casing — **7.85" ID; 9.05" OD** **CertainTeed PVC**
- Well Screen — **7.85" ID; 9.05" OD** **0.085"-Slot**
- Pump/Drop Pipe Assembly
- Steel Centralizer
- Steel End Cap
- Water Table

Annular Materials Explanation

- Neat Cement
- 4/8 Filter Pack Sand
- Bentonite Seal
- 8/12 Sand Bentonite Mix
- Slough

Elevation (ft amsl) / Depth (ft bgs)



Borehole/Well Casing Descriptions
All depths are below ground surface

Stick-Up = 1.0 ft. ags at installation.

Surface Casing Stick-Up = 2 ft. ags at installation

The well was completed as an Injection well below grade in a cement vault.

20" OD Carbon Steel Surface Casing Depth = 111.0 ft.

Annular Materials Descriptions
All depths are below ground surface

Top of Cement Grout (Portland II) = 3 ft.

Top of 8/12 Sand/Bentonite Mix = 20 ft.

Alluvium formation from surface is Santa Fe Group to 590.0 ft.

17 1/2" (reamed 26") borehole cemented to 115 ft.

WELL COMPLETION DIAGRAM

INJECTION WELL

Location ID: **PFI-1** Site ID: **NASA-WSTF, Doña Ana County, NM**

Township and Range: **NE 1/4 NE 1/4 SW 1/4 Sec 5, T21S, R3E**
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Elevation (Brass Cap): **4484.86 ft.**
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Driller: **J. Aguilar**
Method of Drilling: **Mud Rotary**
Total Depth of Borehole (bgs): **1020 ft.**
Borehole Diameter: **17 1/2" 0-100 ft.; reamed 26" to 115 ft.; 17 1/2" 115-1,020 ft.**
Depth to Bedrock (bgs): **Not Reached**
Depth to Groundwater: **427.72 ft. (6/8/07)**
Diameter and Type Surface Casing: **19.5" ID; 20" OD**

Dates Borehole Drilled: **3/28 - 4/12/00**
Date(s) Well Installed: **4/26 - 4/29/00**
Date(s) Well Developed: **8/31 - 9/1/00 pumping**
Field Representative(s): **Marry Canavan, Geoff Giles, Lela Hunnicutt-Mack...**
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Screened Zone (bgs): **418.15-976.57 ft.**
Comments: **Field Reps. cont'd: John Pearson, Murry Stepro, Ron Weaver**

bgs = below ground surface TOC=Top of Casing
ags= above ground surface
ID = Inner Diameter OD= Outer Diameter

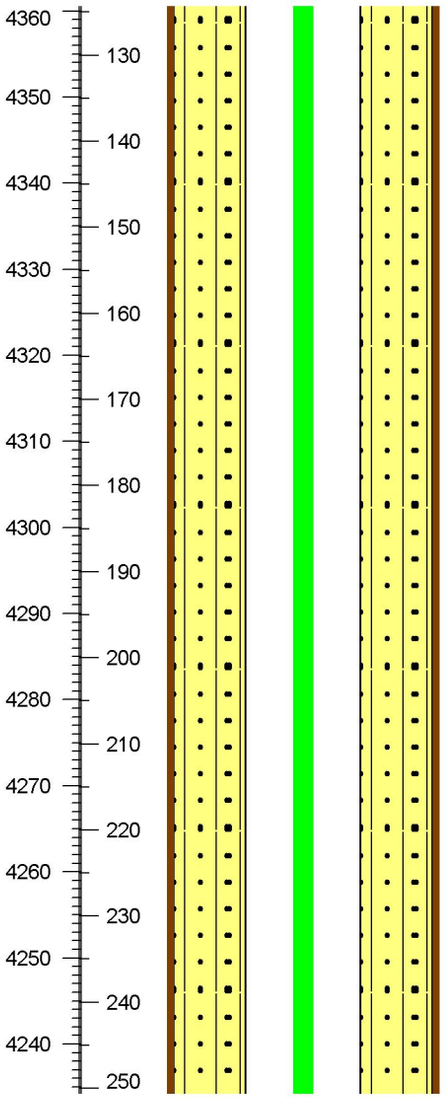
Casing Explanation

- Surface Casing — **20" OD Carbon Steel**
- Completion Casing — **7.85" ID; 9.05" OD CertainTeed PVC**
- Well Screen — **7.85" ID; 9.05" OD 0.085"-Slot**
- Pump/Drop Pipe Assembly
- Steel Centralizer
- Steel End Cap
- Water Table

Annular Materials Explanation

- Neat Cement
- 4/8 Filter Pack Sand
- Bentonite Seal
- 8/12 Sand Bentonite Mix
- Slough

Elevation (ft amsl) / Depth (ft bgs)	**Borehole/Well Casing Descriptions** All depths are below ground surface	**Annular Materials Descriptions** All depths are below ground surface



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Surface Casing
20" OD Carbon Steel
Completion Casing
7.85" ID; 9.05" OD
CertainTeed PVC
Well Screen
7.85" ID; 9.05" OD
0.085"-Slot

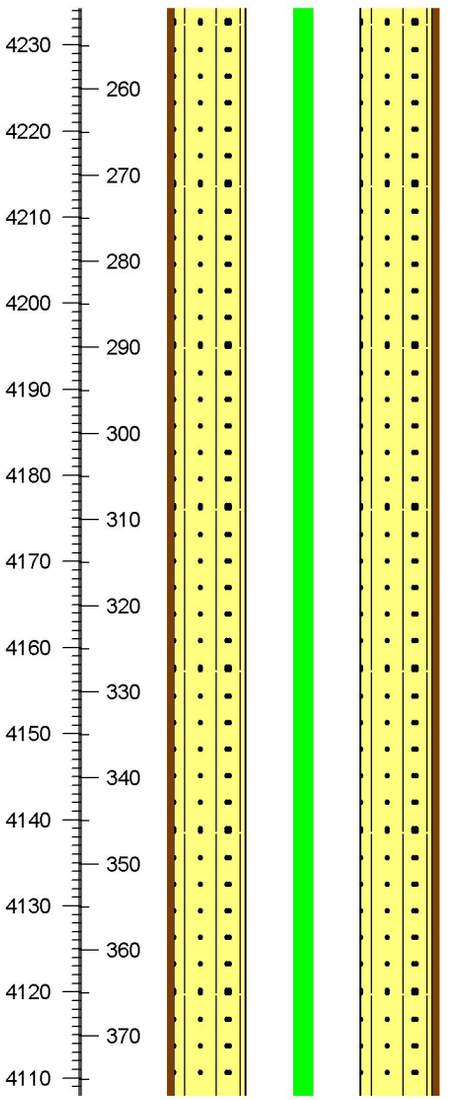
Casing Explanation
Pump/Drop Pipe Assembly
Steel Centralizer
Steel End Cap
Water Table

Annular Materials Explanation
Neat Cement
4/8 Filter Pack Sand
Bentonite Seal
8/12 Sand Bentonite Mix
Slough

Elevation (ft amsl) / Depth (ft bgs)

Borehole/Well Casing Descriptions
All depths are below ground surface

Annular Materials Descriptions
All depths are below ground surface



Top of Upper Bentonite Seal = 378 ft

WELL COMPLETION DIAGRAM

INJECTION WELL

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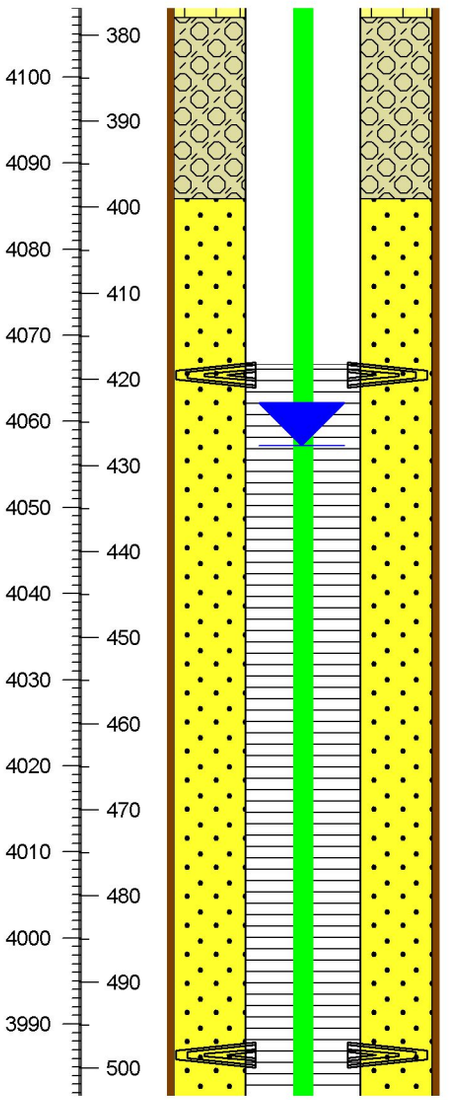
CertainTeed PVC
Well Screen
7.85" ID; 9.05" OD
0.085"-Slot

Casing Explanation
Pump/Drop Pipe Assembly
Steel Centralizer
Steel End Cap
Water Table

Annular Materials Explanation
Neat Cement
Bentonite Seal
4/8 Filter Pack Sand
8/12 Sand Bentonite Mix
Slough



Elevation (ft amsl) / Depth (ft bgs)

Borehole/Well Casing Descriptions
All depths are below ground surface

Steel cage centralizer bolted together around casing coupling at 418.2 ft.

Water Table Depth = 419.18 ft. (measured post development date unknown)

Top of Screen = 418.2 ft. (7.85" minimum ID/ 9.05" OD CertainTeed SDR 17 0.085" - Slot PVC)

Note: Location of blockage in annular space between drop pipe and wells screen tagged at 475 ft bgs.

Steel cage centralizer bolted together around casing coupling 497.9 ft.

Annular Materials Descriptions
All depths are below ground surface

Top of Upper Bentonite Seal = 378 ft.

Top of 4/8 Sand = 399 ft.

WELL COMPLETION DIAGRAM

INJECTION WELL

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Method of Drilling: **Mud Rotary**
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Borehole Diameter: **17 1/2" 0-100 ft.; reamed 26" to 115 ft.; 17 1/2" 115-1,020 ft.**
Depth to Bedrock (bgs): **Not Reached**
Depth to Groundwater: **427.72 ft. (6/8/07)**
Diameter and Type Surface Casing: **19.5" ID; 20" OD**

Dates Borehole Drilled: **3/28 - 4/12/00**
Date(s) Well Installed: **4/26 - 4/29/00**
Date(s) Well Developed: **8/31 - 9/1/00 pumping**
Field Representative(s): **Marry Canavan, Geoff Giles, Lela Hunnicutt-Mack...**
Total Depth Well Casing (bgs): **996.58 ft.**
Type of Casing: **CertainTeed PVC**
Diameter Well Casing: **7.85" ID; 9.05" OD**
Screened Zone (bgs): **418.15-976.57 ft.**
Comments: **Field Reps. cont'd: John Pearson, Murry Stepro, Ron Weaver**

bgs = below ground surface TOC=Top of Casing
ags= above ground surface
ID = Inner Diameter OD= Outer Diameter

Casing Explanation

- Surface Casing: **20" OD Carbon Steel**
- Completion Casing: **7.85" ID; 9.05" OD CertainTeed PVC**
- Well Screen: **7.85" ID; 9.05" OD 0.085"-Slot**
- Pump/Drop Pipe Assembly
- Steel Centralizer
- Steel End Cap
- Water Table

Annular Materials Explanation

- Neat Cement
- 4/8 Filter Pack Sand
- Bentonite Seal
- 8/12 Sand Bentonite Mix
- Slough

Elevation (ft amsl) / Depth (ft bgs)	**Borehole/Well Casing Descriptions** All depths are below ground surface	**Annular Materials Descriptions** All depths are below ground surface
3980 / 510 3970 / 520 3960 / 530 3950 / 540 3940 / 550 3930 / 560 3920 / 570 3910 / 580 3900 / 590 3890 / 600 3880 / 610 3870 / 620 3860	Steel cage centralizer bolted together around casing coupling 597.6 ft. **Drop Pipe**	Volcanic-Rich Alluvium Depth = 590 ft.

WELL COMPLETION DIAGRAM

INJECTION WELL

Location ID: **PFI-1** Site ID: **NASA-WSTF, Doña Ana County, NM**

Township and Range: **NE 1/4 NE 1/4 SW 1/4 Sec 5, T21S, R3E**
NM State Plane Coordinates (NAD 83)(ft): **549277.735 N, 1514717.441 E**
Elevation (Brass Cap): **4484.86 ft.**
Elevation (Top of Casing): **4485.86 ft.**
Drilling Contractor: **Stewart Brothers Drilling Company**
Driller: **J. Aguilar**
Method of Drilling: **Mud Rotary**
Total Depth of Borehole (bgs): **1020 ft.**
Borehole Diameter: **17 1/2" 0-100 ft.; reamed 26" to 115 ft.; 17 1/2" 115-1,020 ft.**
Depth to Bedrock (bgs): **Not Reached**
Depth to Groundwater: **427.72 ft. (6/8/07)**
Diameter and Type Surface Casing: **19.5" ID; 20" OD**

Dates Borehole Drilled: **3/28 - 4/12/00**
Date(s) Well Installed: **4/26 - 4/29/00**
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Field Representative(s): **Marry Canavan, Geoff Giles, Lela Hunnicutt-Mack...**
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Type of Casing: **CertainTeed PVC**
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Screened Zone (bgs): **418.15-976.57 ft.**
Comments: **Field Reps. cont'd: John Pearson, Murry Stepro, Ron Weaver**

bgs = below ground surface TOC=Top of Casing
ags= above ground surface
ID = Inner Diameter OD= Outer Diameter

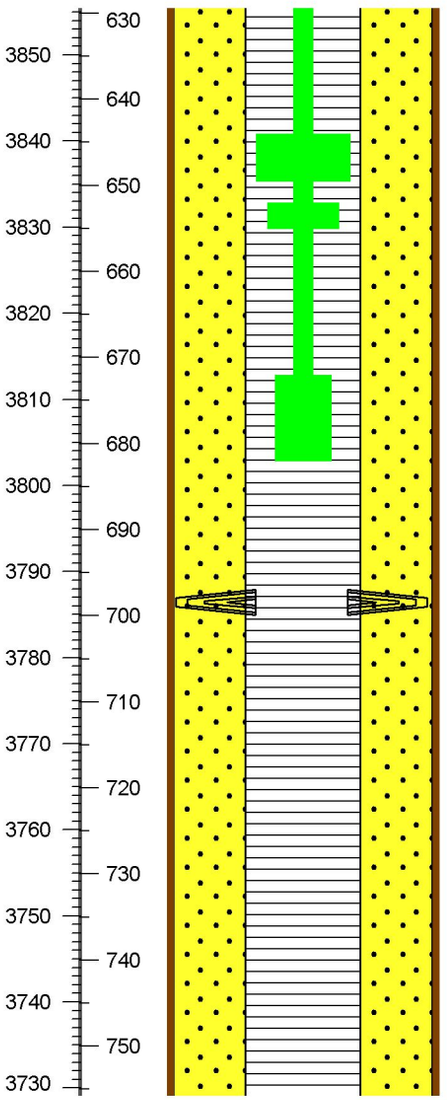
Casing Explanation

- Surface Casing — **20" OD Carbon Steel**
- Completion Casing — **7.85" ID; 9.05" OD CertainTeed PVC**
- Well Screen — **7.85" ID; 9.05" OD 0.085"-Slot**
- Pump/Drop Pipe Assembly
- Steel Centralizer
- Steel End Cap
- Water Table

Annular Materials Explanation

- Neat Cement
- 4/8 Filter Pack Sand
- Bentonite Seal
- 8/12 Sand Bentonite Mix
- Slough

Elevation (ft amsl) / Depth (ft bgs)	**Borehole/Well Casing Descriptions** All depths are below ground surface	**Annular Materials Descriptions** All depths are below ground surface



Baski flow control valve (644 ft bgs)

Check valve (652 ft bgs)

Submersible Pump / Motor Assembly (672 ft bgs)

Steel cage centralizer bolted together around casing coupling 697.3 ft.

WELL COMPLETION DIAGRAM

INJECTION WELL

Location ID: **PFI-1** Site ID: **NASA-WSTF, Doña Ana County, NM**

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ID = Inner Diameter OD= Outer Diameter

Casing Explanation

- Surface Casing: **20" OD Carbon Steel**
- Completion Casing: **7.85" ID; 9.05" OD CertainTeed PVC**
- Well Screen: **7.85" ID; 9.05" OD 0.085"-Slot**
- Pump/Drop Pipe Assembly
- Steel Centralizer
- Steel End Cap
- Water Table

Annular Materials Explanation

- Neat Cement
- 4/8 Filter Pack Sand
- Bentonite Seal
- 8/12 Sand Bentonite Mix
- Slough

Elevation (ft amsl) / Depth (ft bgs)	**Borehole/Well Casing Descriptions** All depths are below ground surface	**Annular Materials Descriptions** All depths are below ground surface
3720 / 760 3710 / 770 3700 / 780 3690 / 790 3680 / 800 3670 / 810 3660 / 820 3650 / 830 3640 / 840 3630 / 850 3620 / 860 3610 / 870 880	Steel cage centralizer bolted together around casing coupling 797.0 ft.	

WELL COMPLETION DIAGRAM

INJECTION WELL

Location ID: **PFI-1** Site ID: **NASA-WSTF, Doña Ana County, NM**

Township and Range: **NE 1/4 NE 1/4 SW 1/4 Sec 5, T21S, R3E**
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Screened Zone (bgs): **418.15-976.57 ft.**
Comments: **Field Reps. cont'd: John Pearson, Murry Stepro, Ron Weaver**

bgs = below ground surface TOC=Top of Casing
ags= above ground surface
ID = Inner Diameter OD= Outer Diameter

Surface Casing
20" OD Carbon Steel
Completion Casing
7.85" ID; 9.05" OD
CertainTeed PVC
Well Screen
7.85" ID; 9.05" OD
0.085"-Slot

Casing Explanation
Pump/Drop Pipe Assembly
Steel Centralizer
Steel End Cap
Water Table

Annular Materials Explanation
Neat Cement
Bentonite Seal
4/8 Filter Pack Sand
8/12 Sand Bentonite Mix
Slough

Elevation (ft amsl) / Depth (ft bgs)	**Borehole/Well Casing Descriptions** All depths are below ground surface	**Annular Materials Descriptions** All depths are below ground surface
3600 / 890		
3590 / 900	Steel cage centralizer bolted together around casing coupling 896.7 ft.	
3580 / 910		
3570 / 920		
3560 / 930		
3550 / 940		
3540 / 950		
3530 / 960		
3520 / 970	Bottom of Screen = 977.6 ft. (7.85" minimum ID/ 9.05" OD CertainTeed SDR 17 0.085" - Slot PVC)	
3510 / 980	Steel cage centralizer bolted together around casing coupling at 976.6 ft.	
3500 / 990	Sump consists of 20' blank riser and end cap	
3490 / 1000	Casing TD = 996.58 ft.; 7.85" minimum ID; 9.05" OD CertainTeed SDR 17 PVC	Top of Lower Bentonite Seal = 1005 ft.
3480		

WELL COMPLETION DIAGRAM

INJECTION WELL

Location ID: **PFI-1** Site ID: **NASA-WSTF, Doña Ana County, NM**

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Depth to Groundwater: **427.72 ft. (6/8/07)**
Diameter and Type Surface Casing: **19.5" ID; 20" OD**

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- Well Screen: **7.85" ID; 9.05" OD 0.085"-Slot**
- Pump/Drop Pipe Assembly
- Steel Centralizer
- Steel End Cap
- Water Table

Annular Materials Explanation

- Neat Cement
- 4/8 Filter Pack Sand
- Bentonite Seal
- 8/12 Sand Bentonite Mix
- Slough

Elevation (ft amsl) / Depth (ft bgs)	**Borehole/Well Casing Descriptions** All depths are below ground surface	**Annular Materials Descriptions** All depths are below ground surface
1010 / 3470		Top of Slough = 1010 ft.
1020 / 3460		~~17 1/2" Borehole TD = 1020 ft.~~

Appendix A
New Mexico Office of the State Engineer Well Plugging Record

PLUGGING RECORD

NOTE: A Well Plugging Plan of Operations shall be approved by the State Engineer prior to plugging - 19.27.4 NMAC

I. GENERAL / WELL OWNERSHIP:

State Engineer Well Number: LGR-10819

Well owner: Nasa Johnson Space Center White Sands Test Facility Cc Phone No.: 575-524-5024

Mailing address: PO Box 20

City: Las Cruces State: NM Zip code: 88004

II. WELL PLUGGING INFORMATION:

1) Name of well drilling company that plugged well: Cascade Enviromental LLC

2) New Mexico Well Driller License No.: NMWD-1664 Expiration Date: 1/31/27

3) Well plugging activities were supervised by the following well driller(s)/rig supervisor(s): Mark Greene

4) Date well plugging began: 3/31/25 Date well plugging concluded: 4/5/25

5) GPS Well Location: Latitude: N32 deg, 30 min, 33.77 sec
Longitude: W106 deg, 39 min, 28.00 sec, WGS 84

6) Depth of well confirmed at initiation of plugging as: 475.4 ft below ground level (bgl), by the following manner: Tag Line

7) Static water level measured at initiation of plugging: 441.36 ft bgl

8) Date well plugging plan of operations was approved by the State Engineer: 11/22/24

9) Were all plugging activities consistent with an approved plugging plan? No If not, please describe differences between the approved plugging plan and the well as it was plugged (attach additional pages as needed):

The cement bentonite grout material used on this well was 2147-gallons. The plan calculation was 1309 gallons.

10) Log of Plugging Activities - Label vertical scale with depths, and indicate separate plugging intervals with horizontal lines as necessary to illustrate material or methodology changes. Attach additional pages if necessary.

For each interval plugged, describe within the following columns:

Depth (ft bgl)	Plugging Material Used (include any additives used)	Volume of Material Placed (gallons)	Theoretical Volume of Borehole/ Casing (gallons)	Placement Method (tremie pipe, other)	Comments ("casing perforated first", "open annular space also plugged", etc.)
	Cement bentonite grout from 0 to 475.4-feet bgl	2147-gallons	1309-gallons	Tremie pipe pumped	8-inch SDR17 PVC casings fillled with sand up to 475.4-feet. A 4-inch steel pumping system drop pipe extended past the sand at 475.5 down to a tag of 650-feet. The 4-inch drop pipe was also filled with cement bentonite grout.

MULTIPLY		BY		AND OBTAIN
cubic feet	x	7.4805	=	gallons
cubic yards	x	201.97	=	gallons

III. SIGNATURE:

I, Shawn Cain, say that I am familiar with the rules of the Office of the State Engineer pertaining to the plugging of wells and that each and all of the statements in this Plugging Record and attachments are true to the best of my knowledge and belief.

Signature of Well Driller

4-17-25

Date

Version: September 8, 2009
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