Haley Griffith (adpce.ad)

Subject: RE: Work Plan for Piezometer Abandonments & Out-of-Waste Extraction Well Relocations, Eco-Vista Class 1 Landfill, Solid Waste Permit No. 0290-S1-R3, AFIN 72-00144

From: Steve Jett <steve.jett@jettenviro.com>
Sent: Monday, June 19, 2023 12:35 PM
To: gwreports <gwreports@adeq.state.ar.us>
Cc: Conrad, David <dconrad@wm.com>; Reynolds, Jodi <jreyno10@wm.com>; Michael Caldwell <mcaldwell@wm.com>; Small, Blake <bsmall@wm.com>; Travis Doll <travis.doll@jettenviro.com>; Travis Atwood (adpce.ad) <travis.atwood@adeq.state.ar.us>
Subject: Work Plan for Piezometer Abandonments & Out-of-Waste Extraction Well Relocations, Eco-Vista Class 1 Landfill, Solid Waste Permit No. 0290-S1-R3, AFIN 72-00144

On behalf of Eco-Vista, LLC, Jett Environmental Consulting is submitting the attached Work Plan for Piezometer Abandonments & Out-of-Waste Extraction Well Relocations for the Eco-Vista Class 1 Landfill.

If you have any questions or comments regarding this submittal, please do not hesitate to contact us.

Sincerely,

Steve Jett, P.G.
Owner
Jett Environmental Consulting
18 Lexington Oaks Court
Foristell, MO 63348
314-496-4654
steve.jett@jettenviro.com
www.jettenviro.com

June 19, 2023 ***Submitted via Electronic Mail***

Mr. Travis Atwood, Geologist
Arkansas Department of Energy and Environment
Division of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118

Re: Work Plan for Piezometer Abandonments & Out-of-Waste Extraction Well Relocations
Eco-Vista, LLC, Class 1 Landfill (Permit No. 0290-S1-R3)
AFIN: 72-00144

Dear Mr. Atwood:

On behalf of Eco Vista, LLC, Jett Environmental Consulting is pleased to submit this Work Plan to the Arkansas Department of Energy and Environment, Division of Environmental Quality (ADEQ) for work to be conducted at the Eco-Vista Class 1 Landfill.

The site intends to abandon four piezometers (PZ-1D, PZ-2D, PZ-3S, and PZ-3D) and nine out-of-waste (OW) extraction wells (OW-5 through OW-10, and OW-19 through OW-21) that are in the footprint of the future Class 1 Landfill expansion area (see **Figure 1**).

In addition, the site plans to install up to five new OW wells (OW-204 through OW-208) just northwest of the future Class 1 Landfill expansion area (see **Figure 1**).

ABANDONMENT

The abandonment of the four piezometers and nine OW wells will be performed by an Arkansas-licensed driller. The piezometers will be abandoned in general conformance with American Society for Testing and Materials (ASTM) D5299-99, US Environmental Protection Agency (EPA) (160014-891034), and Arkansas Water Well Construction Commission (AWWCC) guidance documents.

The equipment to be used for abandonment will be cleaned and decontaminated prior to the first piezometer/OW and between decommissioning locations. The protective outer casing, pipe bollards, and concrete pad will be removed. An attempt will be made to remove the inner-casing. The associated annular materials and any remaining inner-casing will attempt to be removed by overdrilling. Each piezometer will be overdrilled to its total installed depth using sonic core barrels, air rotary, or hollow-stem augers fitted with a guide pipe. Once each piezometer has been overdrilled to its total depth, the borehole will be tremie grouted to the ground surface. It is recommended to use bentonite grout to backfill the boreholes due to their location in the future Class 1 cell, where a portion of the backfilled material may have to be removed. Construction logs for each point proposed for abandonment are included in **Attachment 1**.

INSTALLATION

Based on boring logs of the piezometers, existing OW wells, and nearby monitoring wells MW-1N, MW-19 and NE-4, we suspect that the target zone for the screened interval of the new OW wells may be within the epikarst zone, approximately 20 feet above the top of the bedrock. It is estimated that the 20-foot length screened interval will be located at an approximate depth of 40 to 60 feet below ground surface (ft bgs). Actual depths may vary depending on topography and local variations in depth to the target stratum encountered in the field.

The following is a summary of the decision process on where, and how many, new OW wells will be installed. The exact number and locations are to be determined in the field based on subsurface conditions encountered during the pilot borings. The final number of OW wells is contingent on if/where the epikarst zone is encountered. The epikarst zone is the optimal flow zone for potential landfill gas migration and extraction.

The purpose of the existing OW wells (OW-5 through OW-10, and OW-19 through OW-21) was for landfill gas control. According to the site, OW-10, OW-19, OW-20, and OW-21 have consistently exhibited significant amounts of landfill gas, and OW-5 through OW-9 have not had significant amounts of landfill gas. Past investigations have identified possible NW-SE trending lineaments/fractures just west and east of these OW wells. Therefore, extending the NW-SE lineament to the northwest (outside of the Class 1 waste area and the proposed Class 1 waste expansion area) would optimally place additional (i.e., replacement) OW wells in the lineament path towards MW-1N. It is proposed to drill the first OW pilot boring at OW-204, as shown on **Figure 1**.

The target zone for the screened interval of an OW well is the epikarst zone, which generally has consisted of silty/sandy gravel and weathered chert/limestone above competent bedrock. The epikarst zone would be the ideal pathway for landfill gas to migrate, if present.

Step 1: The initial pilot boring (i.e., PB-204) would be drilled in an attempt to encounter the epikarst zone. If encountered, then an OW-well (i.e., OW-204) would be installed within the pilot boring.

Step 2: If the epikarst zone is encountered (Step 1), then the next OW-well would be drilled approximately 100 feet north of OW-204, continuing on 100-foot spacings (i.e., OW-205, OW-206, and OW-207) until OW-208 is reached (see **Figure 1**).

Step 3: If no epikarst zone is encountered (i.e., no silty/sandy/gravelly/cherty weathered zone between the silty/cherty clay and overlying bedrock), then the pilot boring would be terminated, backfilled with grout, and the next pilot boring would be attempted approximately 50 feet north of PB-204 (or any subsequent boring).

Step 4: Upon conclusion of PB-208/OW-208, then the drilling of the pilot borings/wells would be considered complete. The maximum number of OW-wells anticipated is five (OW-204 through OW-208), as shown on **Figure 1**.

Drilling and well installation will be performed by an Arkansas-licensed driller. To install the wells, the driller will advance borings and install the wells using sonic (rotary vibratory), air rotary, or hollow-stem auger drilling methods. Each boring will be logged by either observation of the cuttings or by a continuous sampler. Soils will be logged and classified according to the Unified Soil Classification System by a qualified geologist contracted separately by the facility. The wells will be constructed and developed in general conformance with ASTM D5092 construction protocols and in accordance with EPA 160014-891034 and AWWCC guidance documents.

The equipment to be used for well installation will be cleaned and decontaminated prior to the first boring and between drilling locations.

Each OW well will have the following design components:

- The well borings will be advanced using sonic core barrels, hollow stem augers, or air rotary utilizing a sufficient diameter to maintain a minimum of 2 inches of annular space between the well casing and borehole wall.
- The polyvinyl chloride (PVC) well casing at each well will have a locking cap, which is vented to allow equilibration of water levels with atmospheric pressure.
- The top of casing at each well will be permanently marked, or notched, for future use as a reference point for water-level measurements.
- Each well will be secured at the surface with a locking, protective steel or aluminum casing; concrete pad; and protective pipe bollards. A weep hole will be drilled in the protective casing approximately 6 inches above ground surface to allow for drainage.
- The well identifications will be clearly marked on the outside protective casings.
- Well casings and screens will be constructed of 4-inch-diameter, Schedule 80 PVC with flush-threaded casing; a minimum 20-ft long, 10-slot (i.e., 0.010-inch) well screen; and a bottom end cap.
- A filter pack consisting of well-rounded, 3/8-inch washed pea gravel will be placed in the annular space to a minimum distance of 3 ft above the top of the screen.
- The bentonite seal will be followed by a well-mixed bentonite cement grout filled to the ground surface and installed using a tremie pipe.

Slight adjustments to well construction may be required in the field based on the observed lithology at each well location. Any deviations from well design will conform to recommendations in the above-referenced guidance documents.

WELL SURVEY

An Arkansas-licensed surveyor will survey the horizontal and vertical location of each new monitoring point. The vertical locations of the top of PVC casing will be surveyed to the nearest 0.01 ft, with the horizontal locations surveyed to the nearest 0.1 ft. The vertical locations of the top of concrete and nearest ground surface will be surveyed to the nearest 0.1 ft.

The survey report will include horizontal and vertical coordinates based on the landfill's site-referenced coordinate system, which is based on established site-specific benchmarks.

INSTALLATION & ABANDONMENT REPORT

Within 60 calendar days of completion of the proposed field work, a report will be submitted documenting field activities. The report will be certified by the supervising professional per Regulation 22.1103(f) and will include the following:

- A site map that includes the locations of the abandoned points and surveyed locations of the newly installed monitoring points,
- Boring logs and construction diagrams for the new monitoring points,
- Completed Abandonment Forms for each point,
- Summary of work quality and methods, and
- The certified survey report from an Arkansas-licensed surveyor containing vertical and horizontal location coordinates for the newly installed monitoring points.

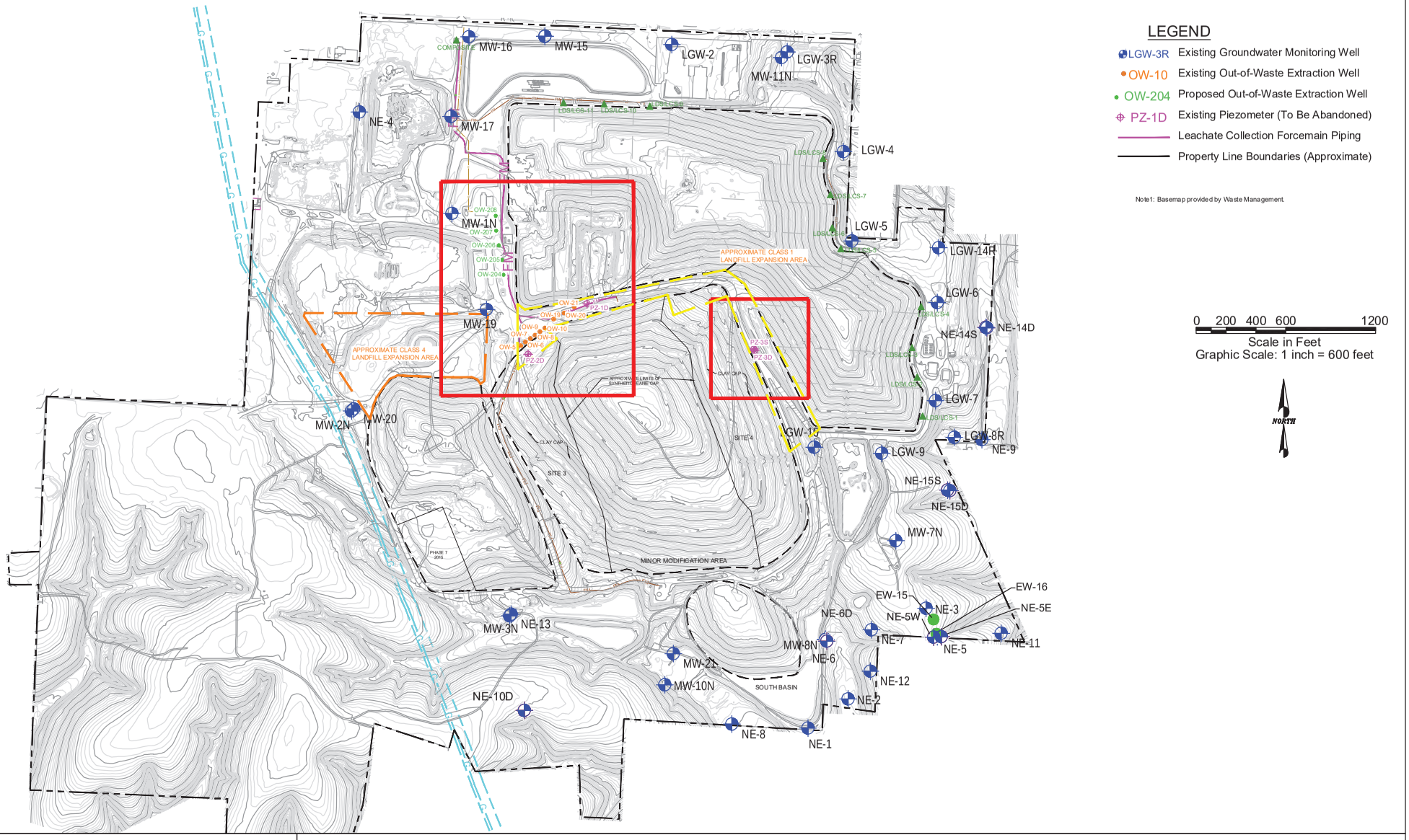
If you have any questions or comments, please contact me at steve.jett@jettenviro.com or 314-496-4654.

Sincerely,

Steve Jett, P.G. No. 1826
Owner

Attachments: *Figure 1 – Site Layout & Piezometer/Extraction Well Locations*
Attachment 1 – Boring Logs & As-Builts

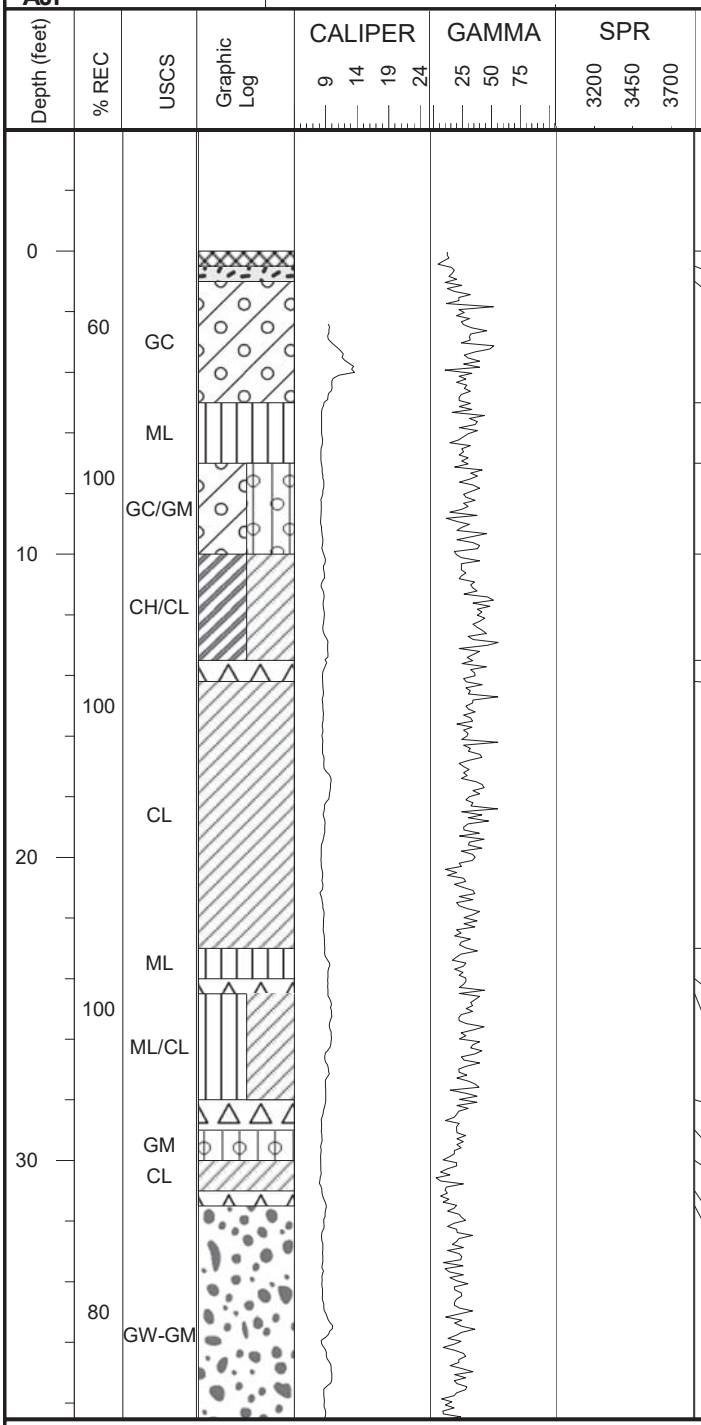
cc: *Jodi Reynolds – WM (PDF via Email)*
Dave Conrad – WM (PDF via Email)
Michael Caldwell – WM (PDF via Email)



JETT ENVIRONMENTAL CONSULTING
18 Lexington Oaks Court
Foristell, MO 63348
314-496-4654
www.jettenviro.com

Figure 1
Site Layout & Drilling Locations
Eco-Vista Landfill, Springdale, Arkansas

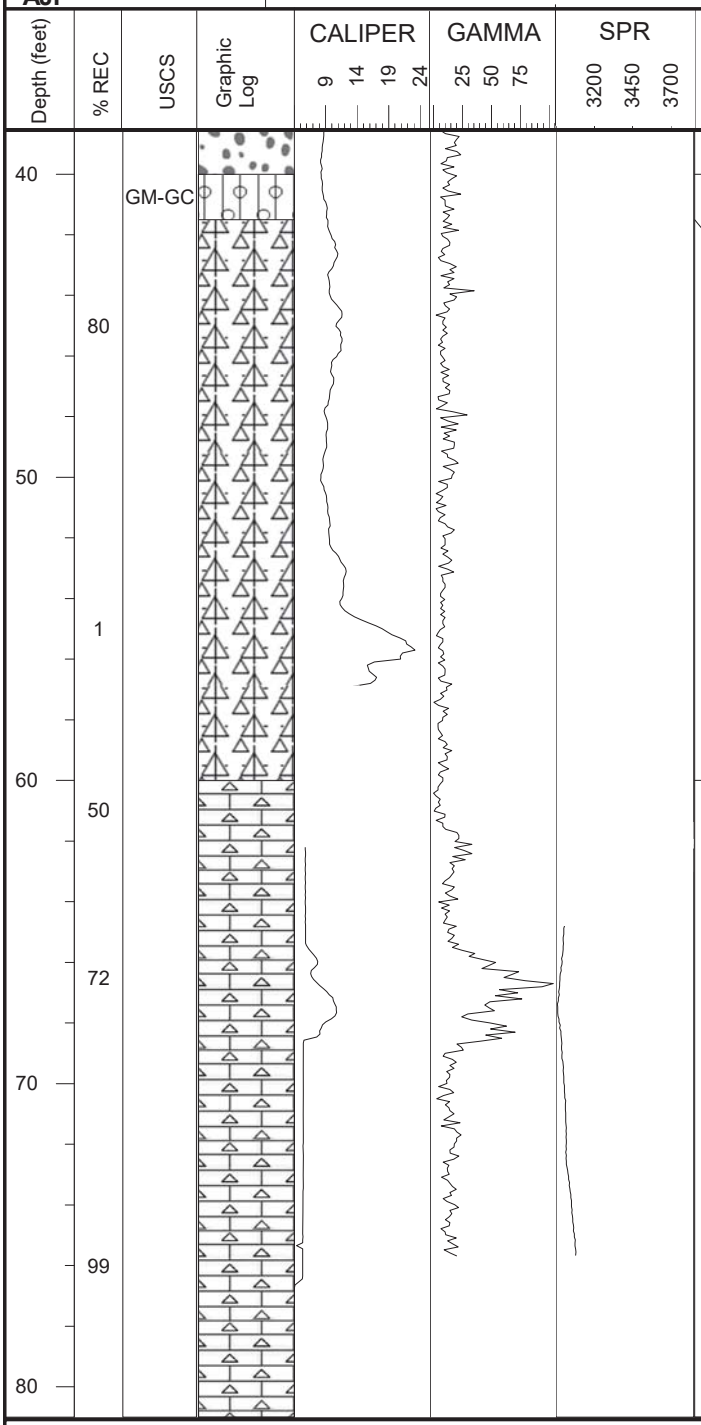
	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-1D**	PIEZOMETER ID: **PZ-1D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664908.0**	EASTING, FT SRC: **645833.0**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1296.5**	TOC MP, FT SRE: **1299.39**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **80.3**	INSTALLATION DATES: **6/29-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



Description	Well Construction
FILL ASPHALT CLAYEY GRAVEL, reddish orange, gravel (<3" dia), stiff, moist.	Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
GRAVELLY SILT, light gray, gravel (<2" dia), moist.	
SILTY GRAVEL to CLAYEY GRAVEL, reddish brown to tan, stiff, moist to almost dry.	70.1 ft of 2 in dia., Sch. 40 PVC solid riser, including 2.9 ft of stickup
GRAVELLY LEAN CLAY to FAT CLAY, reddish brown, gravel (<2" dia), moist.	
CHERT, some clay, 13.5-14.2 ft bgs.	Cement/bentonite grout from 0 ft bgs to 20.0 ft bgs
GRAVELLY LEAN CLAY, orangish brown, decreasing clay with depth, soft, moist.	
@ 20-23 ft bgs increasing silt content with depth.	
SILT with gravel, orange with some clay, medium stiff, moist.	
CHERT, white with oxidation along fractures Gas odor, 24.24.5 ft bgs.	
GRAVELLY SILT to GRAVELLY LEAN CLAY, orangish brown with lenses of red clay and tan silt, medium stiff, moist.	
CHERT, white with weathering along fractures 28-29 ft bgs.	
GRAVELLY SILT, orangish brown, moist.	
LEAN CLAY, tannish orange with black nodules (<3/4" dia), soft, moist.	
CHERT, 31-31.5 ft bgs.	
WELL GRADED GRAVEL with silt, reddish brown with some clay, chert heavily weathered, moist.	
@ 38-40 ft bgs color changes to tan.	

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-1D**	PIEZOMETER ID: **PZ-1D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664908.0**	EASTING, FT SRC: **645833.0**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1296.5**	TOC MP, FT SRE: **1299.39**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **80.3**	INSTALLATION DATES: **6/29-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



Description

SILTY GRAVEL with clay, reddish brown, medium stiff, moist. @ 41.3-41.5 ft bgs white silt, moist to wet.

WEATHERED CHERT/EPIKARST, chert is weathered into a well-graded gravel, white. @ 44.5 ft bgs with silt and sand, white to tan, gravel (<4" dia), moist.

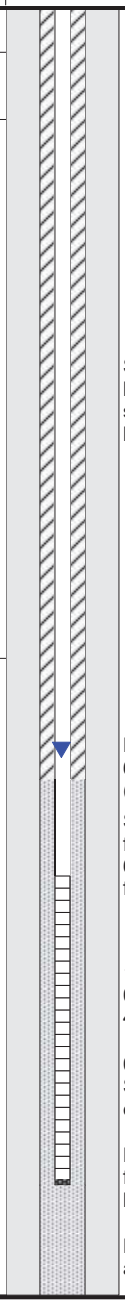
After bedrock was encountered, the six-inch barrels were raised and the borehole was left open for 14 hours (overnight). The following morning the borehole was dry.

LIMESTONE AND CHERT, interbedded., competent, limestone is white and gray, chert is white.

@ 62-71 ft bgs, no loss of air from 62-66 ft bgs, air loss and bit drop from 66-68.5 ft bgs, RQD 44%, fractures 0-51° off horizontal, some infilled with gray sparry calcite or brown clay. After completing run from 62-71 ft bgs water level was measured at 62.7 ft bgs in boring.

@ 71-81 ft bgs little to no air recovery, RQD 88%, fractures 0-47° off horizontal, some infilled with gray sparry calcite or brown clay.

Well Construction



Slow-release bentonite pellet seal from 20.0 ft bgs to 64.0 ft bgs

Depth to water: 65.94 ft below MP (7/29/2019)

Silica size 20/40 filter pack from 64.0 ft bgs to 77.4 ft bgs

10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

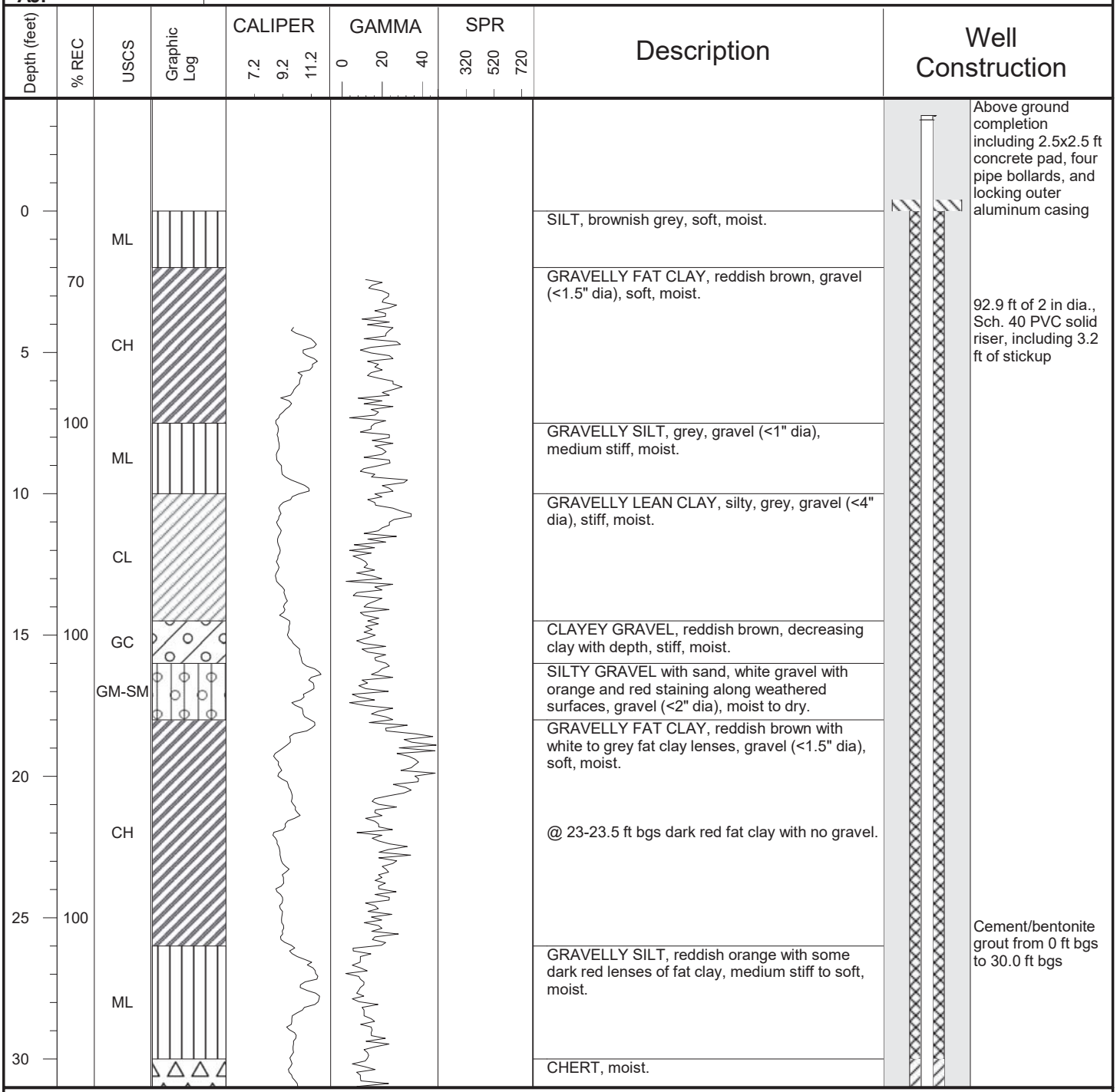
0.19 ft, 2 in dia., Sch. 40 PVC end cap

Native materials from 77.4 to 81.0 ft bgs

Drilling terminated at 81 ft bgs

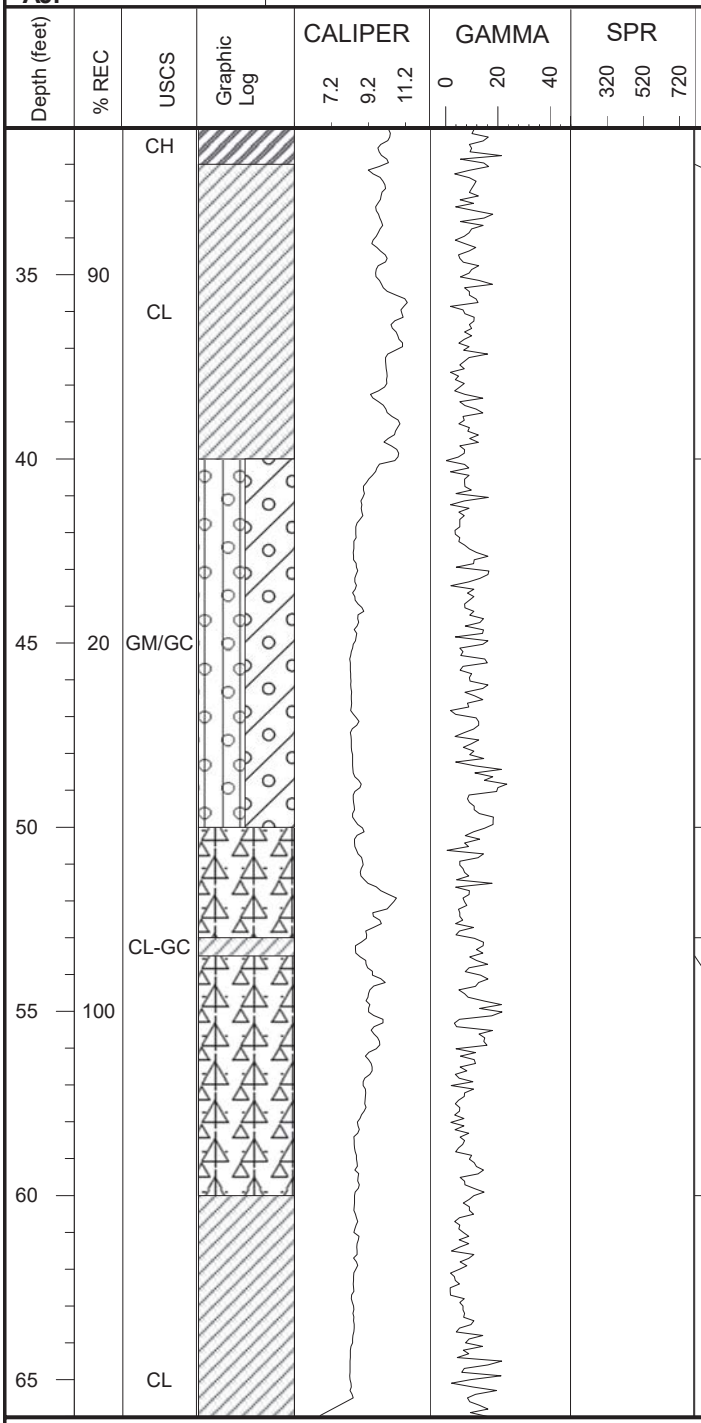
NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-2D**	PIEZOMETER ID: **PZ-2D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664568.4**	EASTING, FT SRC: **645439.1**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1295.5**	TOC MP, FT SRE: **1294.74**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **103.1**	INSTALLATION DATES: **7/10-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-2D**	PIEZOMETER ID: **PZ-2D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664568.4**	EASTING, FT SRC: **645439.1**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1295.5**	TOC MP, FT SRE: **1294.74**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **103.1**	INSTALLATION DATES: **7/10-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



Description

FAT CLAY, dark reddish brown, blocky, stiff, moist.

LEAN CLAY, with interbedded gravel and layers of fat blocky clay, medium stiff, moist.

SILTY GRAVEL to CLAYEY GRAVEL, gravel (<4" dia).

WEATHERED CHERT/EPIKARST, chert is weathered into a well-graded gravel with silt, tan, gravel (<3" dia), loose, moist.

LEAN CLAY with gravel, dark reddish brown, medium stiff to soft, moist.

WEATHERED CHERT/EPIKARST, chert is weathered into a well-graded gravel with silt, tan, gravel (<3" dia) moist to dry. @ 54.5 color change to white with reddish brown staining.

@ 58-60 ft bgs color change to white and tan.

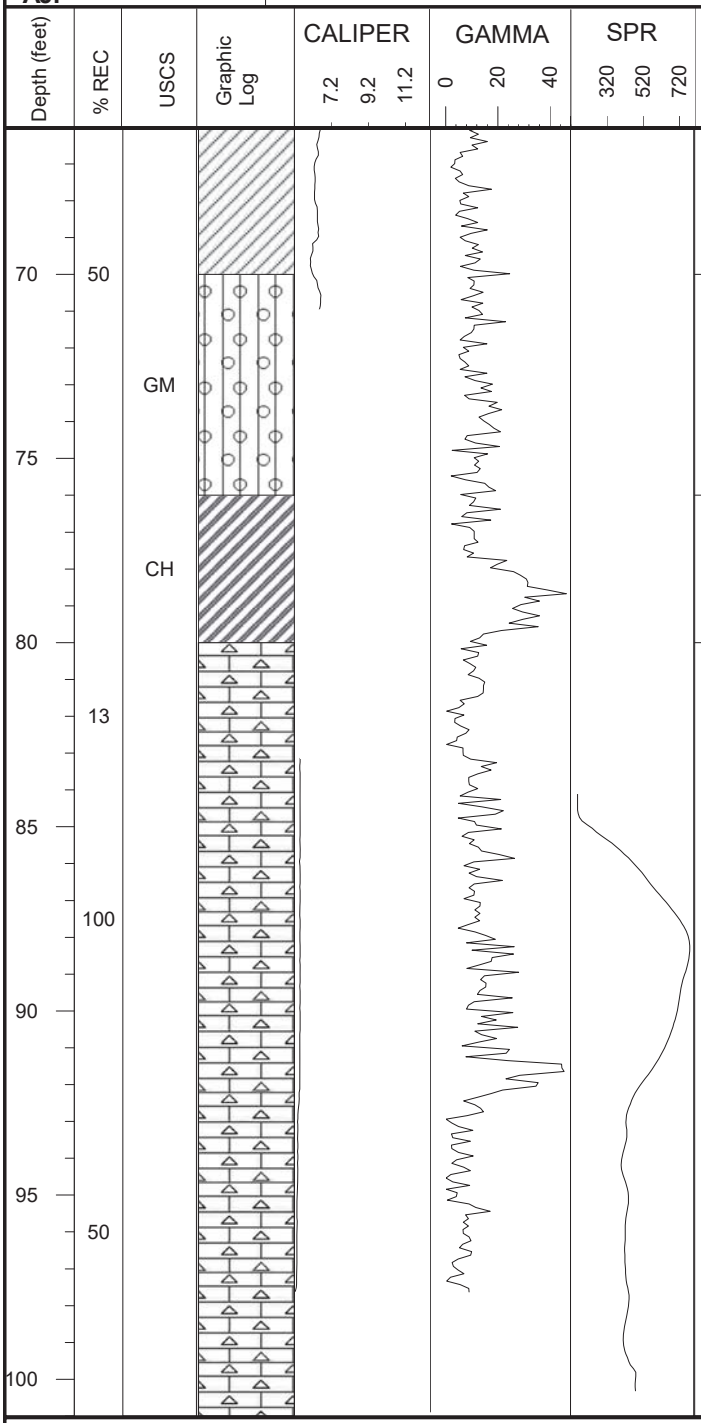
LEAN CLAY with gravel, dark reddish brown, medium stiff to soft, moist.

Well Construction

Bentonite chip seal from 30.0 ft bgs to 67.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-2D**	PIEZOMETER ID: **PZ-2D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664568.4**	EASTING, FT SRC: **645439.1**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1295.5**	TOC MP, FT SRE: **1294.74**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **103.1**	INSTALLATION DATES: **7/10-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



Description

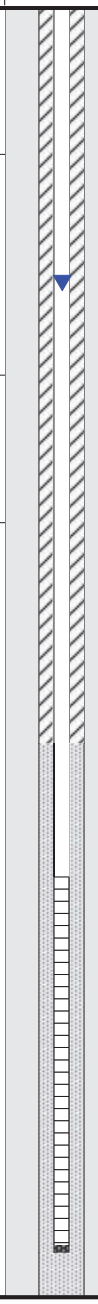
SILTY GRAVEL, brownish tan, gravel (<1" dia), medium dense to loose, moist.

GRAVELLY FAT CLAY, dark reddish brown, gravel (<2" dia), soft, moist.

LIMESTONE AND CHERT, interbedded, weathered, limestone is white and gray, chert is white.
@ 80-84 ft bgs no air loss.

@ 84-91 ft bgs no air loss, RQD 60%, fractures 76-78° off horizontal. Limestone is primarily light gray microcrystalline, some is dark grey and fossiliferous, chert is white.

@ 91-101 ft bgs no air loss, unable to record RQD due to core sample being lodged in sample barrel, fractures 83-87° off horizontal. Downhole camera used to confirm water-bearing fractures at 96-98 ft bgs.



Well Construction

Slow-release bentonite pellet seal from 67.0 ft bgs to 86.0 ft bgs

Depth to water: 76.71 ft below MP (7/29/2019)

Silica size 20/40 filter pack from 86.0 ft bgs to 101.0 ft bgs

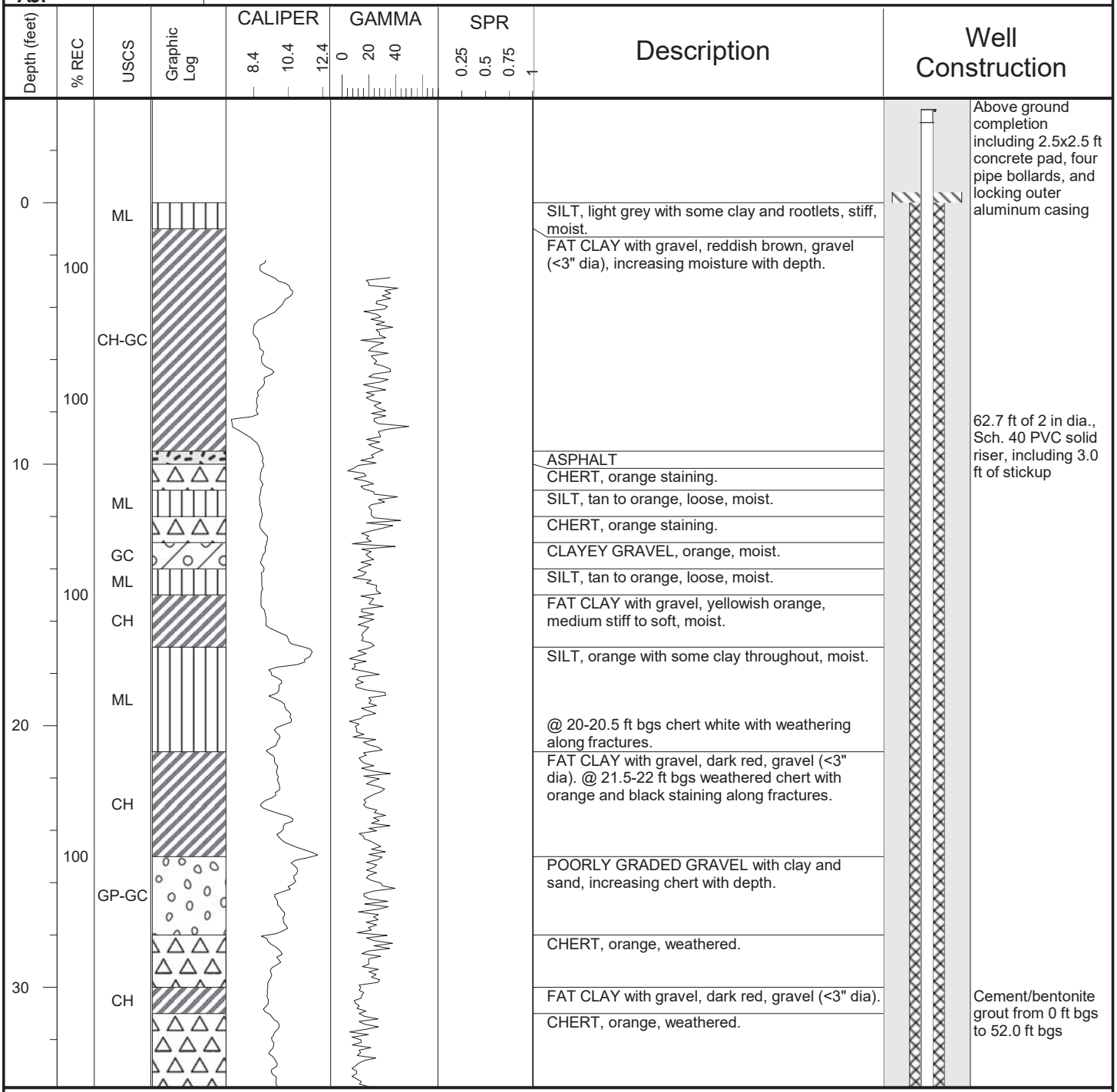
10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

0.19 ft, 2 in dia., Sch. 40 PVC end cap

Drilling terminated at 101.0 ft bgs

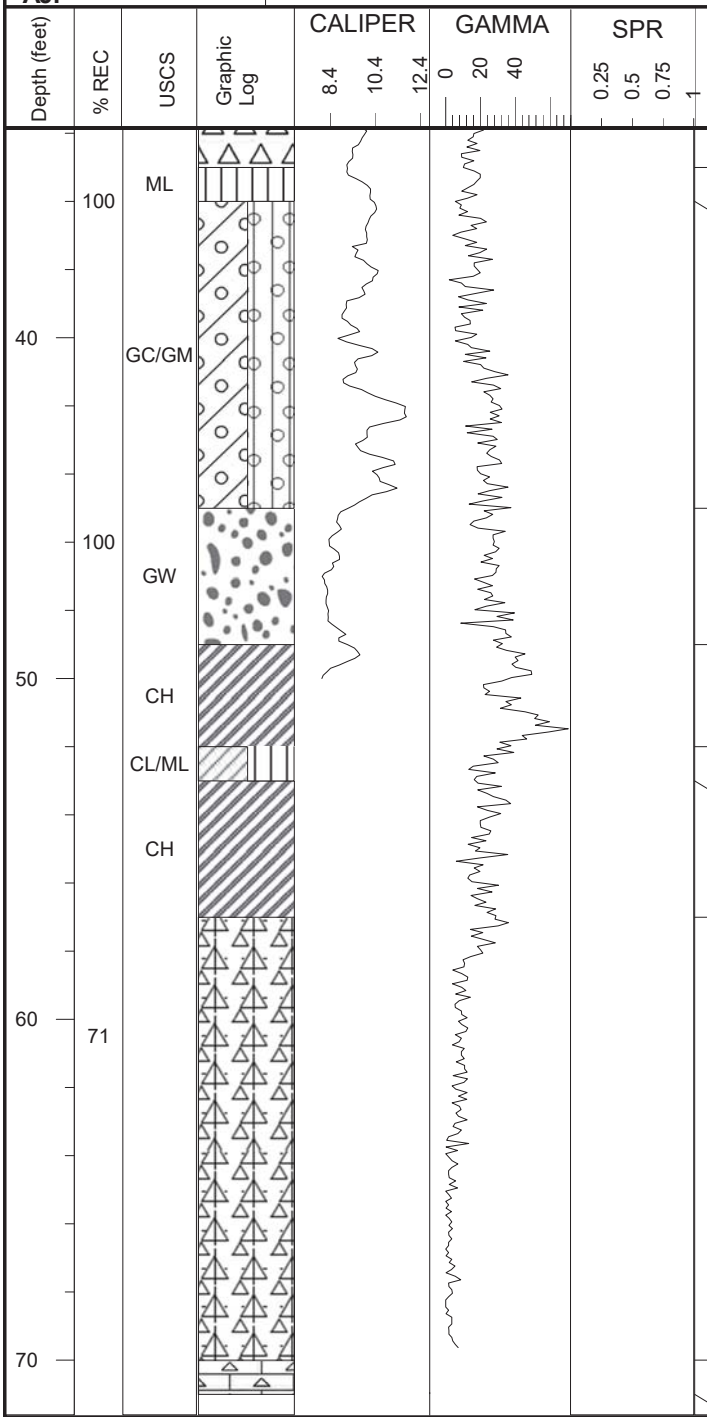
NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-3S**	PIEZOMETER ID: **PZ-3S**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664604.5**	EASTING, FT SRC: **646951.1**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1262.7**	TOC MP, FT SRE: **1265.71**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **72.9**	INSTALLATION DATES: **6/27-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**		



NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-3S**	PIEZOMETER ID: **PZ-3S**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664604.5**	EASTING, FT SRC: **646951.1**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1262.7**	TOC MP, FT SRE: **1265.71**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **72.9**	INSTALLATION DATES: **6/27-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**		



Description

SILT, with sand, tan to white with some very thin red lenses of clay, moist.

CLAYEY GRAVEL to SILTY GRAVEL, tan to orange, gravel (<4" dia).

@ 38-38.8 ft bgs tan silt layer with lenses of dark red fat clay.
@ 40.5-41 ft bgs tan silt layer with lenses of dark red fat clay.

WELL GRADED GRAVEL, black and red staining along fractures. @ 45.5-46 ft bgs grey unweathered chert.

FAT CLAY, dark red with some chert, soft, moist.

LEAN CLAY to SILT, tan silt with dark red lenses of clay, soft, moist.

FAT CLAY, dark red with some chert, soft, moist. @ 53.5-54 ft bgs with reddish brown silt and sand, loose, moist.

WEATHERED CHERT/EPIKARST, chert is weathered into a well-graded gravel, tan, gravel (<4" dia), moist.

@ 60-70 ft bgs color changes to white, chert is loosely cemented.

LIMESTONE AND CHERT, interbedded, competent, limestone is light gray, chert is white.

Well Construction

Slow-release bentonite pellet seal from 52.0 ft bgs to 55.8 ft bgs

Silica size 20/40 filter pack from 55.8 ft bgs to 70 ft bgs

Depth to water: 64.21 ft below MP (7/29/2019)

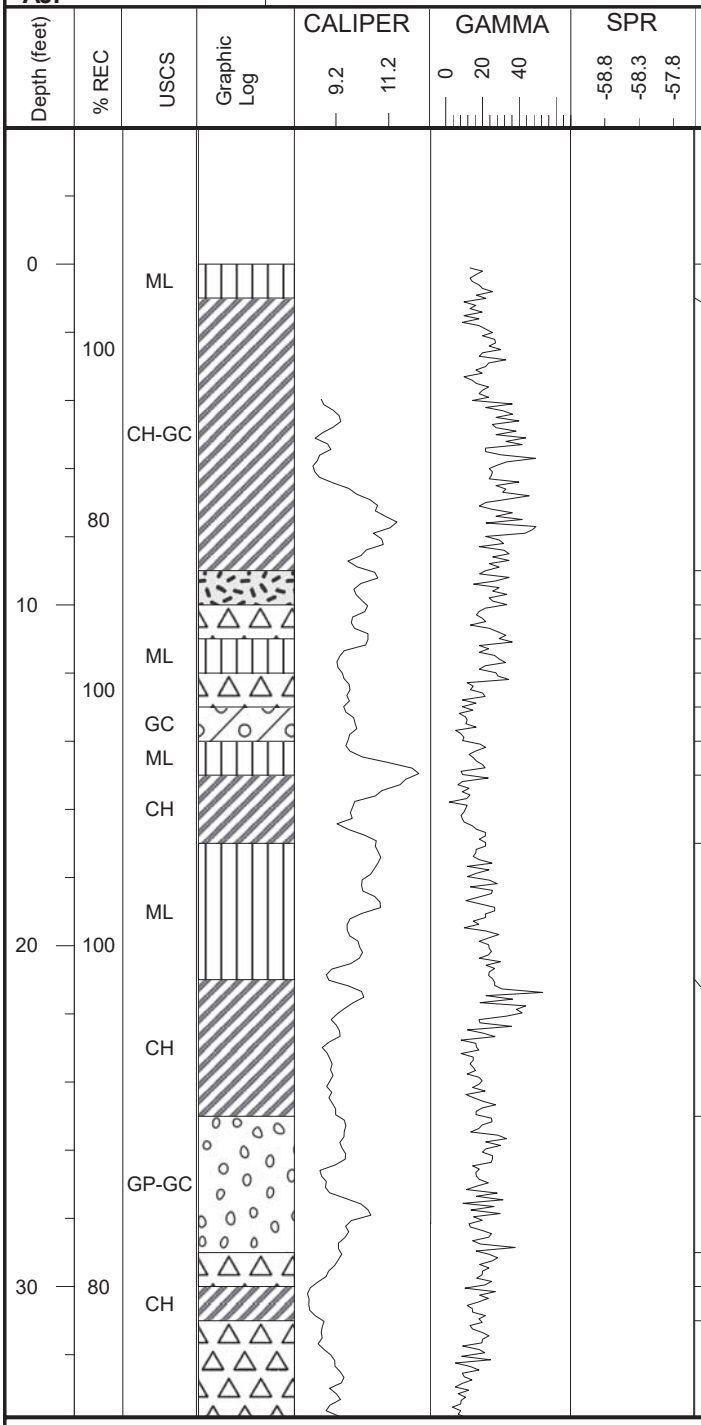
10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

0.19 ft, 2 in dia., Sch. 40 PVC end cap

Drilling terminated at 71.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

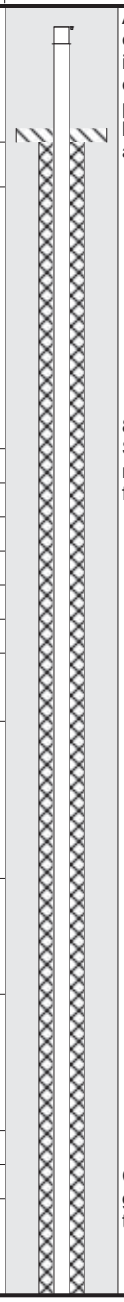
	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-3D**	PIEZOMETER ID: **PZ-3D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664592.8**	EASTING, FT SRC: **646955.6**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1262.9**	TOC MP, FT SRE: **1265.73**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **90.8**	INSTALLATION DATES: **6/25-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



Description

- SILT, light grey with some clay and rootlets, stiff, moist.
- FAT CLAY with gravel, reddish brown, gravel (<3" dia), increasing moisture with depth.
- ASPHALT
- CHERT, orange staining.
- SILT, tan to orange, loose, moist.
- CHERT, orange staining.
- CLAYEY GRAVEL, orange, moist.
- SILT, tan to orange, loose, moist.
- FAT CLAY with gravel, yellowish orange, medium stiff to soft, moist.
- SILT, orange with some clay throughout, moist.
- @ 20-20.5 ft bgs white chert with weathering along fractures.
- FAT CLAY with gravel, dark red, gravel (<3" dia). @ 21.5-22 ft bgs weathered chert with orange and black staining along fractures.
- POORLY GRADED GRAVEL with clay and sand, increasing chert with depth.
- CHERT, orange, weathered.
- FAT CLAY with gravel, dark red, gravel (<3" dia).
- CHERT, orange, weathered.

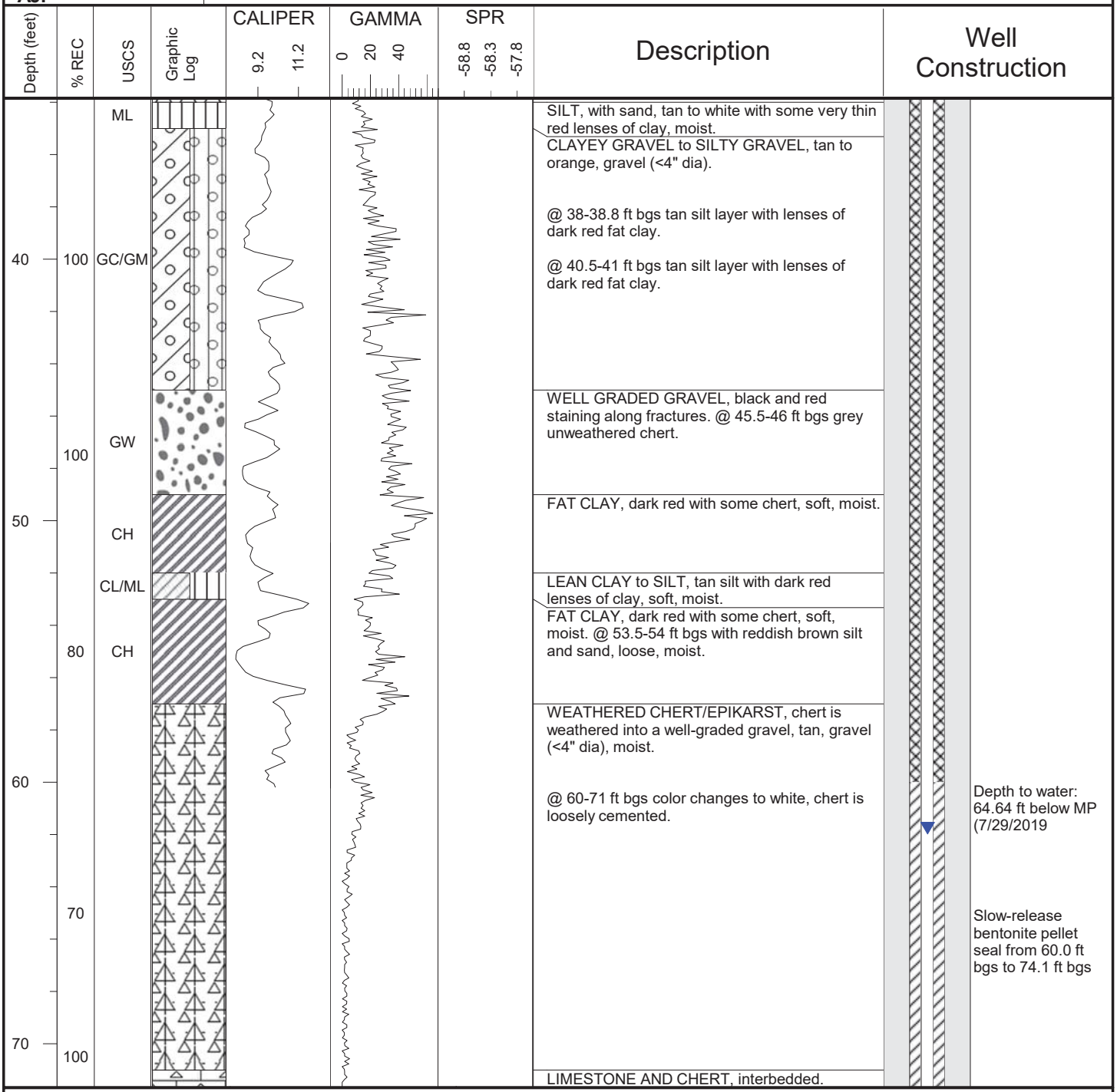
Well Construction



- Above ground completion including 2.5x2.5 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 80.6 ft of 2 in dia., Sch. 40 PVC solid riser, including 2.8 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 60.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

	PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-3D**	PIEZOMETER ID: **PZ-3D**
	LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664592.8**	EASTING, FT SRC: **646955.6**
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1262.9**	TOC MP, FT SRE: **1265.73**
	DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **90.8**	INSTALLATION DATES: **6/25-7/29/2019**
ftn Associates Ltd. water resources / environmental consultants FTN Project # R06820-0100-013	DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		



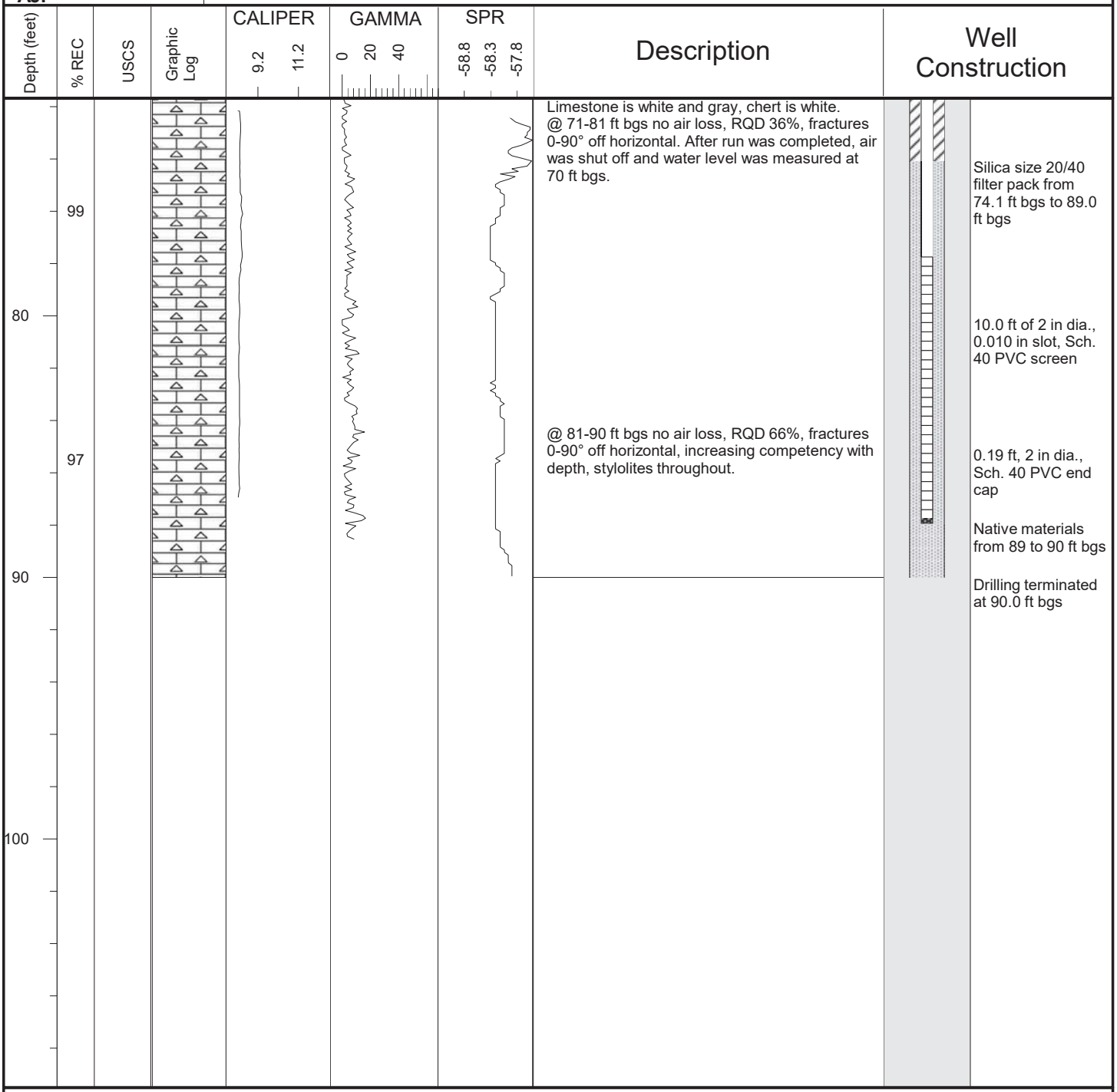
NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

PROJECT: **Eco-Vista, LLC Class 1 Landfill GHI**	BORING ID: **PZ-3D**	PIEZOMETER ID: **PZ-3D**
LOCATION: **Eco-Vista, LLC Landfill, Tontitown, AR**	NORTHING, FT SRC: **664592.8**	EASTING, FT SRC: **646955.6**
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	GROUND SURFACE, FT SRE: **1262.9**	TOC MP, FT SRE: **1265.73**
DRILLING EQUIPMENT: **Versa-Drill VersaSonic**	WELL DEPTH, FT BELOW MP: **90.8**	INSTALLATION DATES: **6/25-7/29/2019**
DRILLING METHOD: **Sonic with 4x6 in dia. core and case in soils and air rotary in bedrock**		
SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel in soil and 10 ft HQ core barrel in bedrock**		

ftn Associates Ltd.
water resources / environmental consultants

FTN Project # R06820-0100-013

LOGGED BY: **AJP**



Description

Limestone is white and gray, chert is white.
@ 71-81 ft bgs no air loss, RQD 36%, fractures 0-90° off horizontal. After run was completed, air was shut off and water level was measured at 70 ft bgs.

@ 81-90 ft bgs no air loss, RQD 66%, fractures 0-90° off horizontal, increasing competency with depth, stylolites throughout.

Well Construction

Silica size 20/40 filter pack from 74.1 ft bgs to 89.0 ft bgs

10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

0.19 ft, 2 in dia., Sch. 40 PVC end cap

Native materials from 89 to 90 ft bgs

Drilling terminated at 90.0 ft bgs

NOTES: Horizontal and vertical data are based on the Mason Surveying & Consulting, Inc., report dated August 9, 2019. SRE=site referenced elevation, SRC=site referenced coordinates, TOC=top of casing, MP=surveyed measuring point on TOC.

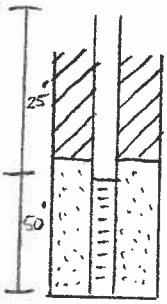
Drilling Log

Project Name: WM	Project Number: 0B201045.00		Boring Number: OW-5
Ground Elevation: 1294.4	Location:		Page: 1 of 1
Monitoring Equipment: —			Total Footage: 73'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
Air Rotary	10"	-44'	29'	—	—

Drilling Company: Flippin Bros		Driller (s): Marcus Flippin	
Drilling Rig: Schramm		Type of Sampler: —	
Date: 2/22/02	To:	Field Observer (s): Mark O--	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Clay, w/silt. Trace plasticity. Damp. Abundant chert fragments. Bright orangish-red.				1615					
2		CL								
3	0'-44'									
4	Limestone w/chert fragments	LS								
5	44'-73'									
6	TD = 73' @ 1700									
7										
8										
9										
10										
11										
12										
13										
14										



BZ=Breathing Zone BH=Bore Hole S=Sample

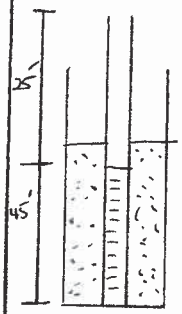
Drilling Log

Project Name: WM	Project Number: 08201045.00.	Boring Number: OW-6.
Ground Elevation: 1288.6	Location:	Page: 1 of 1
Monitoring Equipment: —		Total Footage: 67'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
Air Rotary	10"	39'	28'	—	—

Drilling Company: Eliggin Bros		Driller (s): Marcus Eliggin	
Drilling Rig: Schramm		Type of Sampler: —	
Date: 2/25/02	To:	Field Observer (s): Mark Orr	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Clay, w/silt. Trace plasticity. Damp. Abundant chert fragments. Bright orangish-red.				0915					
2		CL								
3	0'-39'									
4	Limestone w/chert fragments									
5	39'-67'	LS								
6	TD = 67' @ 1015									
7										
8										
9										
10										
11										
12										
13										
14										



BZ=Breathing Zone BH=Bore Hole S=Sample

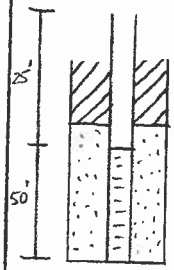
Drilling Log

Project Name: WM	Project Number: 08201045.002	Boring Number: OW-7
Ground Elevation: 1291.2	Location:	Page: 1 of 1
Monitoring Equipment: —		Total Footage: 72'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
Air Rotary	10"	28'	44'	—	—

Drilling Company: Flippin Bros		Driller (s): Marcus Flippin	
Drilling Rig: Schramm		Type of Sampler: —	
Date: 2/25/02	To:	Field Observer (s): Mark Orr	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Clay, w/silt. Trace plasticity. Damp. Abundant chert fragments. Bright orangish-red.				1100					
2		CL								
3	0'-28'									
4										
5		LS								
6	Limestone w/chert fragments									
7	28'-72'									
8	TD=72' @ 1255									
9										
10										
11										
12										
13										
14										



BZ=Breathing Zone BH=Bore Hole S=Sample

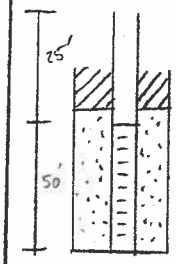
Drilling Log

Project Name: WM	Project Number: 08201045.00		Boring Number: OW-8
Ground Elevation: 1293.0	Location:		Page: 1 of 1
Monitoring Equipment: —			Total Footage: 74'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
Air Rotary	10"	50'	24'	—	—

Drilling Company: Flippin Bros		Driller (s): Marcus Flippin	
Drilling Rig: Schramm		Type of Sampler: —	
Date: 2/25/02	To:	Field Observer (s): Mark O--	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1–2	Clay, w/silt. Trace plasticity. Damp. Abundant chert fragments. Bright orangish-red.	CL			1350					
3	0'-50'									
4										
5	Limestone w/ chert fragments	LS								
6	50'-74'									
7	TD = 74' @ 1525									
8–14										



BZ=Breathing Zone BH=Bore Hole S=Sample

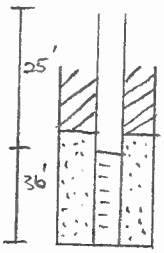
Drilling Log

Project Name: WM	Project Number: 08201045.00	Boring Number: OW-9	
Ground Elevation: 1293.9	Location:	Page: 1 of 1	
Monitoring Equipment: —		Total Footage: 62'	

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
Air Rotary	10"	62'	—	—	—

Drilling Company: Flippin Bros		Driller (s): Marcus Flippin	
Drilling Rig: Schramm		Type of Sampler: —	
Date: 2/25/02	To: 2/26/02	Field Observer (s): Mark Orr	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Clay, w/silt. Trace plasticity. Damp. Abundant chert fragments. Bright orangish-red.	CL			1600					Lost all circulation @ 62' bgs. Set well at borehole TD.
2										
3	0-62'									
4	TD = 62' @ 0825									
	No bedrock encountered									
6										
7										
8										
9										
10										
11										
12										
14										



BZ=Breathing Zone BH=Bore Hole S=Sample

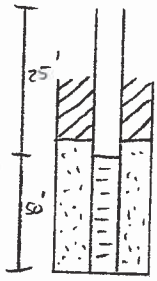
Drilling Log

Project Name: WM	Project Number: 0820104S.00	Boring Number: OW-10	
Ground Elevation: 1294.6	Location:	Page: 1 of 1	
Monitoring Equipment: —		Total Footage: 74'	

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
Air Rotary	10"	74'	—	—	—

Drilling Company: Flippin Bros		Driller (s): Marcus Flippin	
Drilling Rig: Schramm		Type of Sampler: —	
Date: 2/26/02	To: 2/27/02	Field Observer (s): Mark Orr	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
1	Clay, w/ silt. Trace plasticity. Damp. Abundant chert fragments. Bright orangish-red.				1105					
2										
3	0 - 74'	CL								
4	TD = 74' @ 1100									
	No bedrock encountered.									
6										
7										
8										
9										
10										
11										
12										
14										



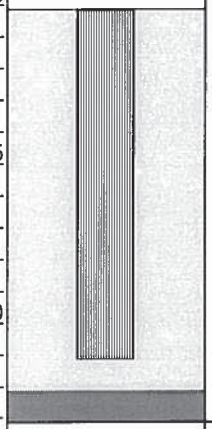
BZ=Breathing Zone BH=Bore Hole S=Sample

SCS ENGINEERS				DRILLING LOG
Boring/Monitoring Well Identification:		OW-19	1 of 2	Facility: Tontitown LF
Surface Elevation ~ 1294				Springdale
Date: 08/05/03	Time: 1300 - 1445			Project No.: 08203020.00
Sampling Method:	Grab from Cuttings			Driller: Flippin Bros.
Drilling Method:	Direct Air w/Downhole Hammer			Geologist: Jerrett Domling

Depth In Feet	Well Construction Detail	Well Construction Materials	Classification	Rock Formations, Soil, Color and Classifications Observations	
Bolt Elevation (MSL)	Boring: 10"	+/- 3' Stick-Up			Start drilling @ 1:00.
0	Casing: 4"	0		0' - 10'	Silty Clay with coarse / very coarse chert fragments, 2.5 YR 4/6.
TOC Elevation (MSL)		3/8-inch Chip Bentonite 0-16 feet			
5					
Ground Water Elevation (MSL)		4-inch Schad. 80 PVC Solid Riser 0-17 feet		10' - 14'	Increasing high plastic clay content 2.5 YR 3/6 decreasing chert fragments, decreasing particle size.
10					
15				14' - 27'	Silty clay with chert fragments 2.5 YR 6/8.
16					
17		3/8-inch Washed Pea Gravel 16-52 feet			
20					
25		4-inch Slotted Schad. 80 PVC Screen 17-51 feet		27' - 53'	Material fall-in, drill stem locking in hole.
				53'	Water introduced to bore hole.
30				27 - 53'	Weathered limestone and chert fragments, (very coarse), Fossiliforous, Light Brown/ Tan.
35					

OBSERVATIONS							
WATER (SWL from TOC)	Date:						
Static Water Level Symbol - v	Level:						

SCS ENGINEERS				DRILLING LOG
Boring/Monitoring Well Identification:		OW-19	2 of 2	Facility: Tontitown LF
Surface Elevation ~ 1294				Springdale
Date:	08/05/03	Time: 1300 - 1445		Project No.: 08203020.00
Sampling Method:	Grab from Cuttings			Driller: Flippin Bros.
Drilling Method:	Direct Air w/Downhole Hammer			Geologist: Jerrett Domling

Depth In Feet	Well Construction Detail	Well Construction Materials	Classification	Rock Formations, Soil, Color and Classifications Observations
Bolt Elevation (MSL) 40				
TOC Elevation (MSL) 45				42' Intermittent losses of circulation.
Ground Water Elevation (MSL) 50				
		51 Sloughed 52 Borehole 52-53 feet		53' No circulation, drilling suspended. BOH measured at 52' after removal of bit. 53' Total depth

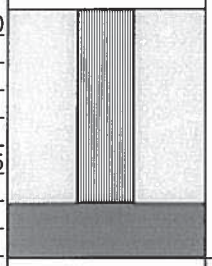
OBSERVATIONS							
WATER (SWL from TOC)	Date:						
Static Water Level Symbol - v	Level:						

SCS ENGINEERS				DRILLING LOG
Boring/Monitoring Well Identification:		OW-20	1 of 2	Facility: Tontitown LF
Surface Elevation ~ 1297				Springdale
Date: 08/05/03	Time: 0815 - 1245			Project No.: 08203020.00
Sampling Method:	Grab from Cuttings			Driller: Flippin Bros.
Drilling Method:	Direct Air Rotary with Downhole Hammer			Geologist: Jerrett Domling

Depth In Feet	Well Construction Detail	Well Construction Materials	Classification	Rock Formations, Soil, Color and Classifications Observations
Bolt Elevation (MSL)	Boring: 10"	+/- 3' Stick-Up		Start drilling @ 8:15.
0	Casing: 4"	0		0' - 12' Silty clay, moist, chert fragments, 2.5 YR 4/6.
TOC Elevation (MSL)		3/8-inch Chip Bentonite 0-20 feet		
5				
Ground Water Elevation (MSL)				
10		4-inch Schad. 80 PVC Solid Riser 0-21 feet		12' Increasing high plastic clay content.
15				
20		20		
		21		
25		3/8-inch Washed Pea Gravel 20-46 feet		
				28' Weathered chert limestone, 2.5 YR 7/4.
30		4-inch Slotted Schad. 80 PVC Screen 21-46 feet		30' Low cutting return, experiencing problems with fall-in.
35				34' Water added and circulation returns.

OBSERVATIONS							
WATER (SWL from TOC)	Date:						
Static Water Level Symbol - v	Level:						

SCS ENGINEERS				DRILLING LOG
Boring/Monitoring Well Identification:		OW-20	2 of 2	Facility: Tontitown LF
Surface Elevation ~1297				Springdale
Date: 08/05/03	Time: 0815 - 1245			Project No.: 08203020.00
Sampling Method:	Grab from Cuttings			Driller: Flippin Bros.
Drilling Method:	Direct Air Rotary with Downhole Hammer			Geologist: Jerrett Domling

Depth In Feet	Well Construction Detail	Well Construction Materials	Classification	Rock Formations, Soil, Color and Classifications Observations
Bolt Elevation (MSL) 40				44' Low water/cutting return, increased fracturing of bedrock formation.
TOC Elevation (MSL) 45				46' Foam added to increase circulation, drilling suspended at 10:45.
Ground Water Elevation (MSL)		46 Sloughed Borehole 46-48 feet		Rock pack and bentonite plug placed at 12:45.
				48' Total depth

OBSERVATIONS								
WATER (SWL from TOC)	Date:							
Static Water Level Symbol - v	Level:							

SCS ENGINEERS — **DRILLING LOG**

Boring/Monitoring Well Identification: OW-21 1 of 2	Facility: Tontitown LF
Surface Elevation ~1296	Springdale
Date: 07/30/03 Time: 0800	Project No.: 08203020.00
Sampling Method: Grab from Cuttings	Driller: Flippin Bros.
Drilling Method: Direct Air w/Downhole Hammer	Geologist: Brett Engard

Depth In Feet	Well Construction Detail	Well Construction Materials	Classification	Rock Formations, Soil, Color and Classifications Observations
Bolt Elevation (MSL)	Boring: 10"	+/- 3' Stick-Up		
TOC Elevation (MSL)	Casing: 4"	0		0'- 28' Silty clay, moist, medium, chert fragments, 2.5 YR 5/8.
Ground Water Elevation (MSL)	0	3/8-inch Chip Bentonite 0-17 feet		
	5			
	10	4-inch Schad. 80 PVC Solid Riser 0-23 feet		
	15			
		17		
	20	3/8-inch Washed Pea Gravel 17-43 feet		
		23		
	25	4-inch Slotted Schad. 80 PVC Screen 23-43 feet		28' Weathered cherty limestone, fossilifrous.
	30			
	35			

OBSERVATIONS	Date:						
WATER (SWL from TOC)	Level:						
Static Water Level Symbol - v							

SCS ENGINEERS				DRILLING LOG
Boring/Monitoring Well Identification:		OW-21	2 of 2	Facility: Tontitown LF
Surface Elevation ~1296				Springdale
Date: 07/30/03	Time: 8:00			Project No.: 08202035.00
Sampling Method:	Grab from Cuttings			Driller: Flippin Bros.
Drilling Method:	Direct Air w/Downhole Hammer			Geologist: Brett Engard

Depth In Feet	Well Construction Detail	Well Construction Materials	Classification	Rock Formations, Soil, Color and Classifications Observations
Bolt Elevation 40 (MSL)				Loss of return, added foam to increase circulation, rig down, well set 8/5/03.
TOC Elevation (MSL)				43' Total depth
Ground Water Elevation (MSL)				

OBSERVATIONS							
WATER (SWL from TOC)	Date:						
Static Water Level Symbol - v	Level:						