

Drillers Notes
(4/24/2019 to 10/24/2019)

Well Name
USGS 149

Rig
CS 1500

Special Equipment
Mud pumps, grouting pump

Drilling System

Diameter	Bit Type	Method	Rig	Depth
8-inch	Crackerjack	Air rotary, water	CS 1500	0-3 feet
6-inch	Tricone	Air rotary, water	CS 1500	0-6 feet
4.8-inch	PCD, PQ3 core	Water/mud	CS 1500	6.5-973.7 feet

Borehole Diameters

Diameter	Top Depth	Bottom Depth
8-inch	0 feet	3 feet
6-inch	3 feet	6 feet
4.9-inch	6 feet	973.7 feet

Casing

Diameter	Top Depth	Bottom Depth	Slotted	Thickness
8-inch	+1 foot	3 feet	No	.250-inch
5-inch	+1 foot	6 feet	No	.288-inch
Westbay 55 system	+2.8 feet	958 feet		

Grout Seal

Material	Top Depth	Bottom Depth	Amount	Placement Method
Cement with 2.5% bentonite	0 feet	403 feet	51.3 yards	Tremie

Date **Depth** **Driller Notes**
(mm/dd/yyyy) (feet) (Note of daily activity)

4/24/2019	0	Start moving equipment onto drill site and setting up.
4/25/2019	0	Setup equipment, haul three loads of water with the water truck.
4/29/2019	0	Pre-job briefings, standup rig.
4/30/2019	38	Drill 8-inch to 3 feet, push 8-inch casing to 3 feet. Drill 6-inch to 6 feet, set 5-inch casing to 6 feet. Setup core PQ3 core barrel and core from 6 to 38 feet. Encountered sediment at 34 to 41 feet.
5/1/2019	97	Picked up Lexan liners at CFA, replace started on CS 1500, core through the sediment at 41 feet without using the Lexan liners, core to 97 feet, mostly fractured basalt.
5/2/2019	203	Pumps and hoses frozen in morning, cored to 105 feet, used 21,000 gallons of drilling fluid with no returns.

Date (mm/dd/yyyy)	Depth (feet)	Driller Notes (Note of daily activity)
5/3/2019	233	Cored into loose rubble at 207 feet, hole caved constantly, poor recovery. Decided to grout up hole, mixed and pumped in 26 bags (94 lbs. each) with 2.5% bentonite at 8 gallons water per bag, set tremie at 215 feet.
5/6/2019	215	Pulled PQ core rods, set 1.5-inch tremie to 215 feet, mixed and pumped 82 bags grout mixture.
5/7/2019	215	Pumped 175 bags of grout mixture using approximately 7 gallons of water per bag, still no grout found in hole.
5/8/2019		Pumped 8 yards of very thick cement slurry into hole (4 gallons of water per 94 lbs. bag).
5/9/2019		Pumped 4 yards of thick cement slurry into hole (5 gallons of water per 94 lbs. bag).
5/10/2019		Pumped 10 yards of cement slurry down hole, finally filled up.
5/13/2019	197	Setup 4.75-inch tricone drilled cement to 197 feet using water at about 35 gpm, returns look like all cement.
5/14/2019	308	Drilled cement to 215 feet, then drilled through a rock bridge and lost returns. Tricone bit followed the corehole with no resistance to 222 feet then drilled to 232 feet. Tripped out changed to 4.8-inch PCD bit and cored to 309 feet. Encountered a cement seam at about 240 feet, coring okay.
5/15/2019	403	Cored okay until 380 feet then had caving fractured area, made decision to grout hole.
5/16/2019	234	Set 1.5-inch tremie to 403 feet, pulled PQ core rods, lifted tremie to 390 feet. Pumped in 15 yards of grout, had some problems with grout pump working.
5/17/2019	397	Used 4.8-inch tricone to drill out grout from 234 to 397 feet. Had no returns, tripped back out.
5/20/2019	463	Cored basalt from 403 to 463 feet, seems to be in good shape. Rained and muddy all day.
5/21/2019	523	Hole cored fine, had some problems with core barrel sticking when trying to retrieve core. Rained on and off all day.
5/22/2019	573	Coring slow, lots of dense basalt. Rained and muddy at drill site.
5/23/2019	633	Coring slow, rain all day.
5/24/2019	688	Coring okay, dense flows, some fractured zones.
5/28/2019	733	Measured water level at 653 feet (below ground level) before drilling, hole cored fine all day.
5/29/2019	758	Cored to depth, flushed hole with extra 1,000 gallons at bottom of hole.
5/30/2019	758	Set bit back on bottom, ran gyroscope log and source logs through PQ core rods and then tripped out the rods.
6/4/2019	758	Ran video of hole, showed large fractures/voids at 215 to 234 feet and several smaller ones at various flow tops deeper in the hole. Some discussion concerning condition of hole with all involved.

Date (mm/dd/yyyy)	Depth (feet)	Driller Notes (Note of daily activity)
6/5/2019	758	Geo Vision logged hole with caliper tool and suspension tools.
6/6/2019	758	Geo Vision logged hole with optic televiewer and acoustic televiewer.
6/7/2019	758	Started moving equipment off of drill site.
8/12/2019	758	Hole logged by Geo Vision through FLUTE liner.
8/13/2019	758	Hole logged by Geo Vision through FLUTE liner.
8/14/2019	758	Hole logged by Geo Vision through FLUTE liner.
8/21/2019	758	FLUTE pulled liner out of well.
8/26/2019	793	Cored PQ 4.9-inch hole using only water to move cuttings, drilling okay.
8/27/2019	858	Coring okay, used about 9,000 gallons of water.
8/28/2019	903	Coring okay, several large fractured zones.
9/3/2019	973	Coring okay, small sediment zone near 960 feet.
9/4/2019	973	Core rods locked up almost immediately upon getting to bottom, lost circulation, no fluid going out bottom of bit and no rod movement
9/5/2019 9/20/2019	973	Spent 10 days trying many options to free bit, ended up using an inside cutter to cut rods at 956 feet and borrowing 100,000 lbs. casing jacks to pull partially cut rods apart. About 400 feet of the CPWL core rods were bad from over torque and stress when we got them out of the hole. Broke the SD 300 head during these struggles.
9/20/2019	973	Ran video, acoustic and electric logs. Set PQ rods to 830 feet.
9/23/2019 – 9/26/2019	958	Videoed well, installed Westbay multi-depth sampling system.
10/24/2019		Poured concrete pad around well with a brass cap and reference point, moved equipment off of well site.