

DEMYSTIFYING
& MAINSTREAMING
**Ground Source
GEOTHERMAL
DRILLING**

**A candid conversation with Geothermal
drilling professional, Brock Yordy**

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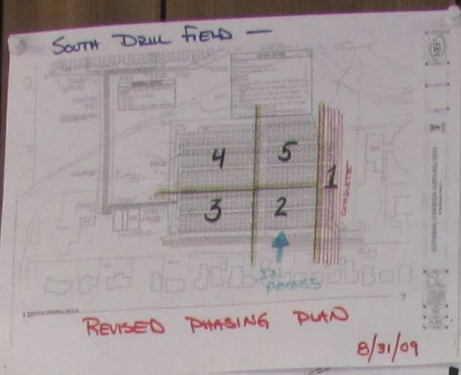
*Drilling SME: Geothermal, Water, Construction
US Military-Department of Labor SME & Trainer
Safety Professional & Authorized OSHA 1926 Trainer
Municipal Water & Wastewater EHS&S Veolia NA
Director of Wells & Drilling SUEZ North American
Drilling Fluids – Solids Control: Barrick, BHP, Kinross
Halliburton Drilling & Fluids Engineer
Industry Advocate NYSERDA, HEET, IGSHPA, NGWA
Journalist, Host, & Teacher at TheDriller.com*



Brock Yordy

LOOP WELL COUNTS BY PHASE

| | North Drill Field | South Drill Field |
|---|-------------------|-------------------|
| 1 | 195 | 48 |
| 2 | 210 | 96 |
| 3 | 390 | 120 |
| 4 | 210 | 165 |
| 5 | 225 | 144 |
| | 1230 | 573 |



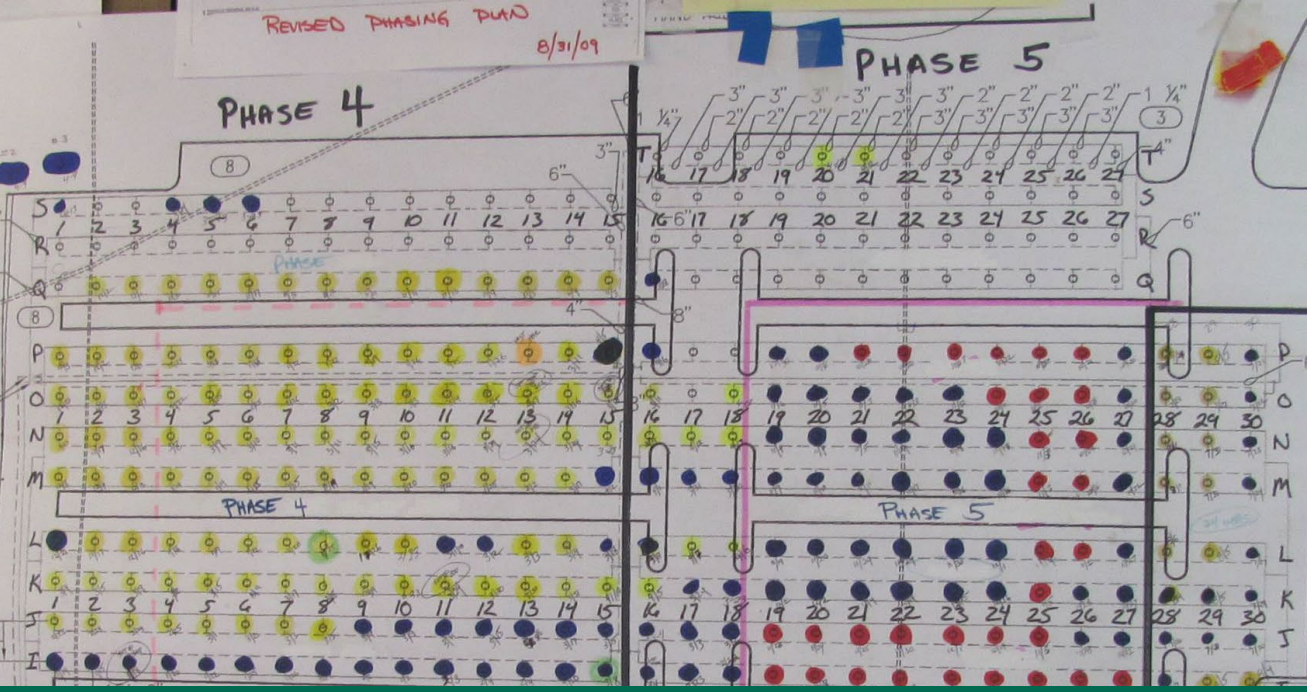
501 COMPLETE

72 TO GO!

Well Count by Phase

SEE DETAIL M004 #3 FOR PURGING

15'-0" (TYP.)



● = GRAB SAMPLE

— = BURNED

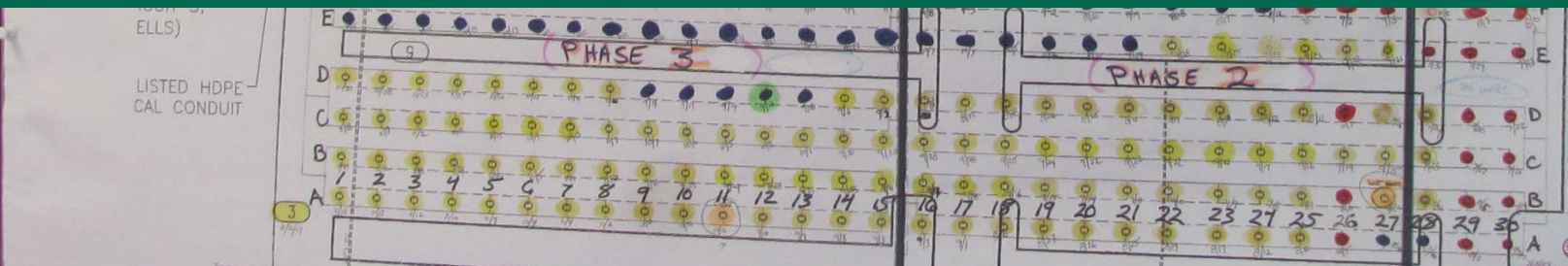
— = WELLS

○ = LOST HOLE

PHASE 1-B

Completed 8/1/09

Phase 1 Ball State Geothermal Project 2008



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FEDERAL MINIMUM WAGE

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Ball State University - Muncie Indiana

George Lucas Narrative Arts Museum 2018



University of Michigan – November 2023



Residential Geothermal



A green portable drilling rig is positioned in a narrow, cluttered basement. The walls are made of brick and have various pipes and electrical conduits running along them. A window in the background shows a glimpse of the outside world. The rig is mounted on a small cart with a single visible tire. The overall scene is one of a confined space where a specialized piece of equipment is being used for a task.

LIMITED ACCESS BASEMENT DRILLING

Geothermal Project Flow Chart – Client



Feasibility,
Budget, &
Stakes of Project.



Contractor
Qualifications



Test Well
& Logs



Regulations



Hole
Specifications

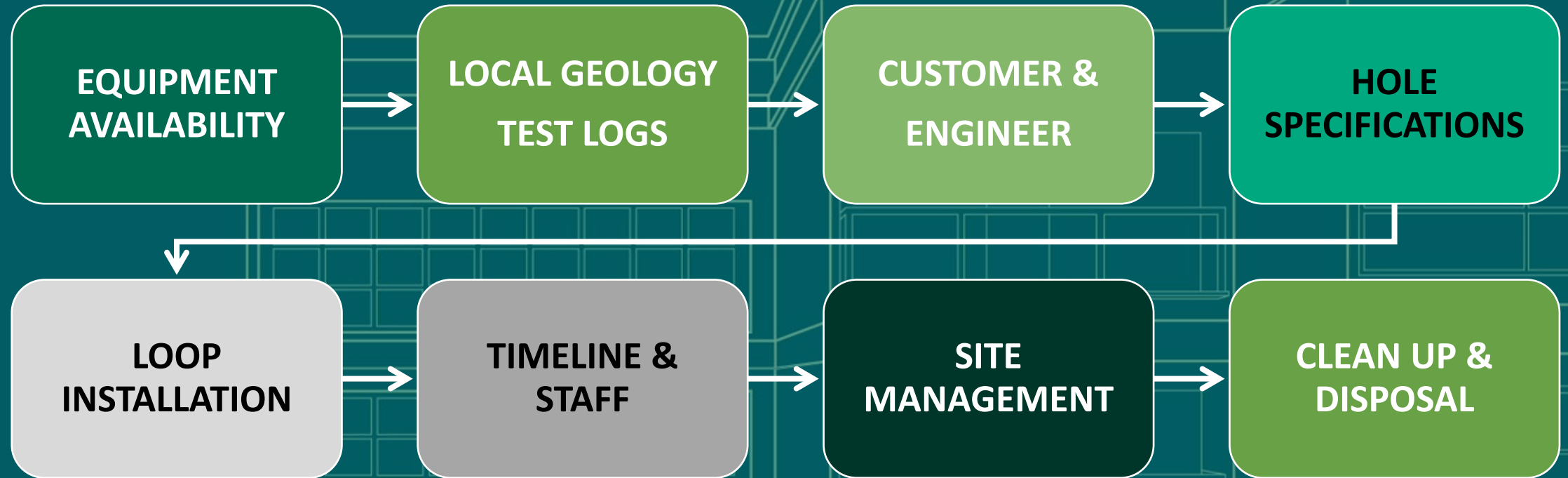


Construction
Timeline



Rig & Tooling
Specifications

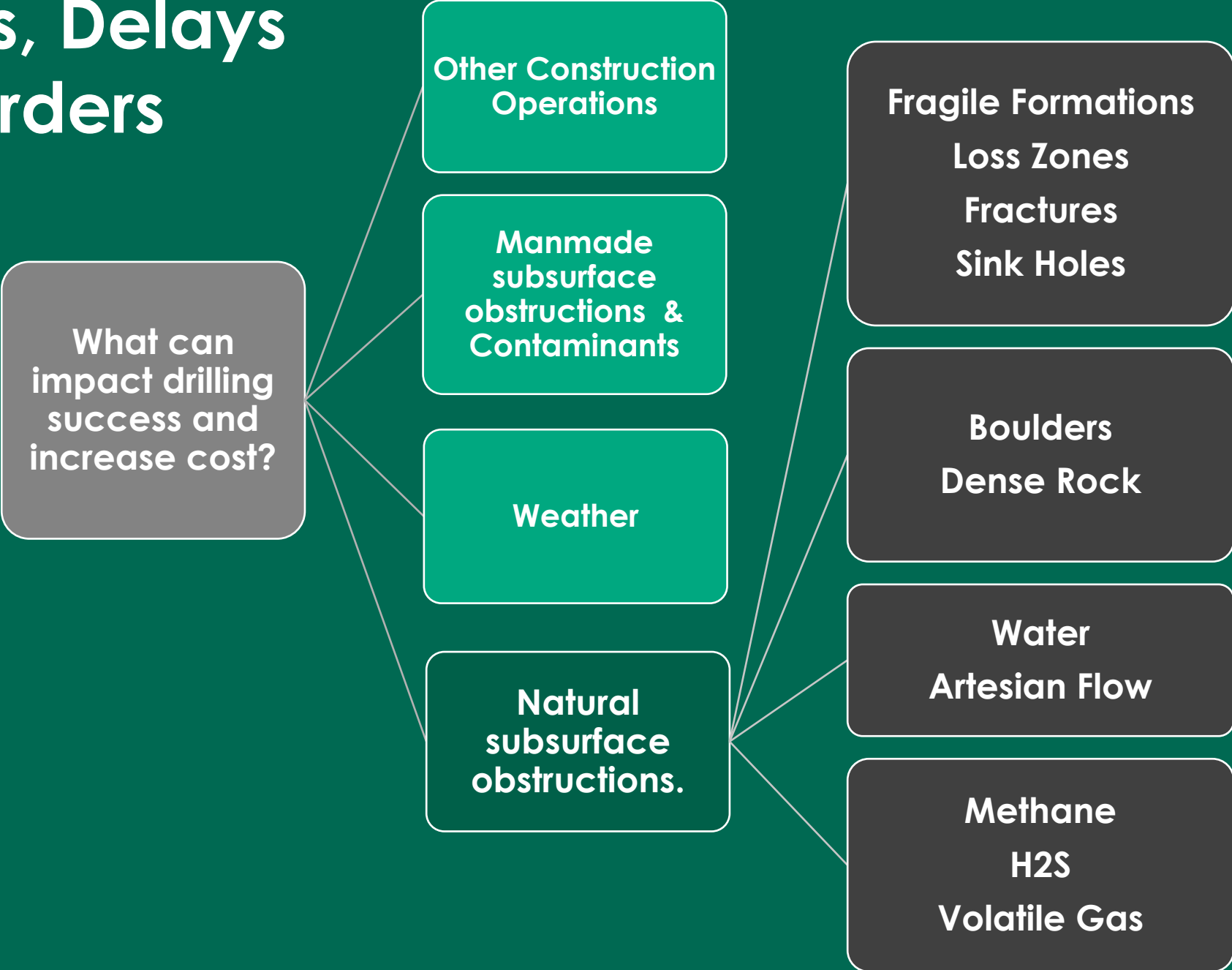
DRILLING CONTRACTOR BID PROCESS



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Project Impacts, Delays and Change Orders





Equipment & Methods

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RIG CAPABILITIES

- Rotation
- Pullback
- Pulldown

PUMPING CAPACITY

- Mud pumps
- Air compressor

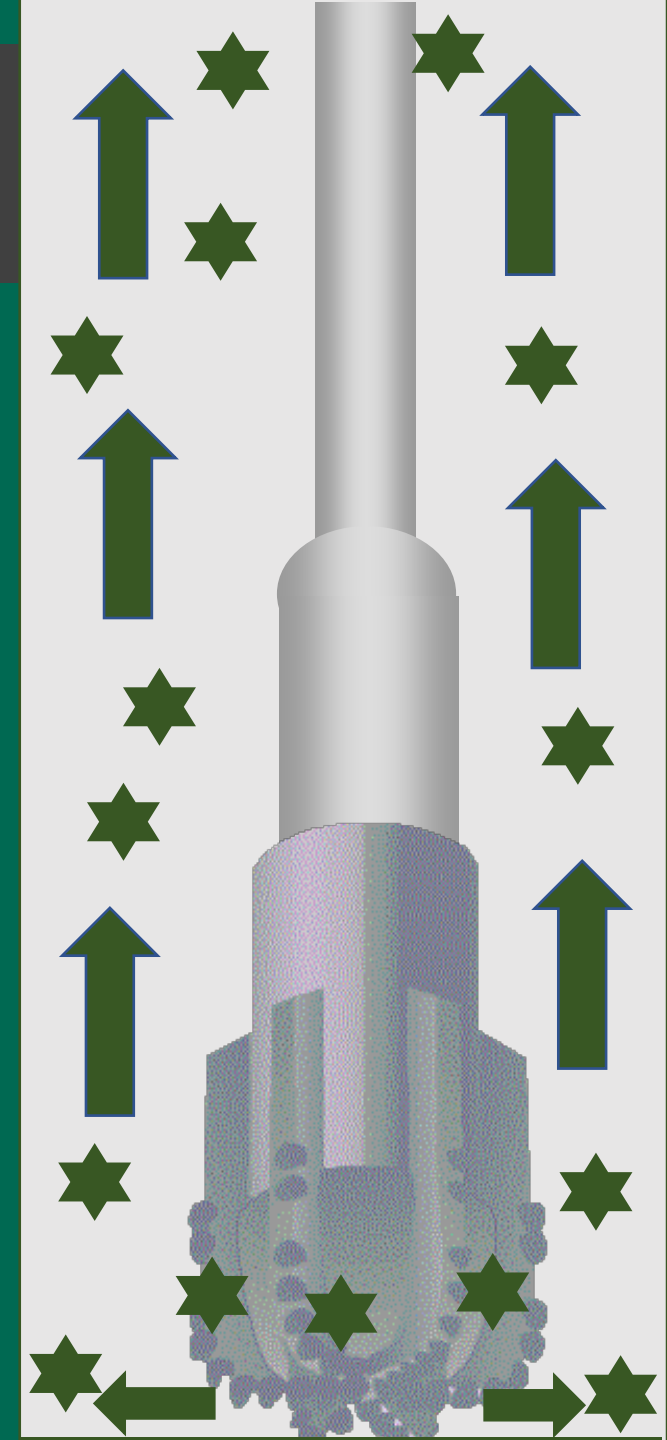
TOOLING

BIT SELECTION

- Type—cutting action
- Hydraulics
- Size - borehole diameter

DRILLING 101

- Rotation turns bit, creating cutting action
- Feed pressure exerted by the rig.
- Fluid is pumped down to move solids out of the hole.



Drilling Methods & Impacts

Water-based drilling fluid = mud – Medium Impact

60 to 150 feet per minute



Air - High Impact

3,500 to 7,500 feet per minute



Air – Foam Combination – Low Impact

100 - 200 feet per minute



Special Capabilities – Sonic – RC – Dual Tube

5 to 75 feet per minute

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LOOP INSTALLATION – 1.25 to 1.5 HDPE U-Bends



LOOP INSTALLATION



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**HOLE DESIGN & LOOP
SPECIFICATIONS**



**METHOD OF
DRILLING**



**DRILLING FLUID
PACKAGE**



**INCORPORATION
OF DRILL SOLIDS**



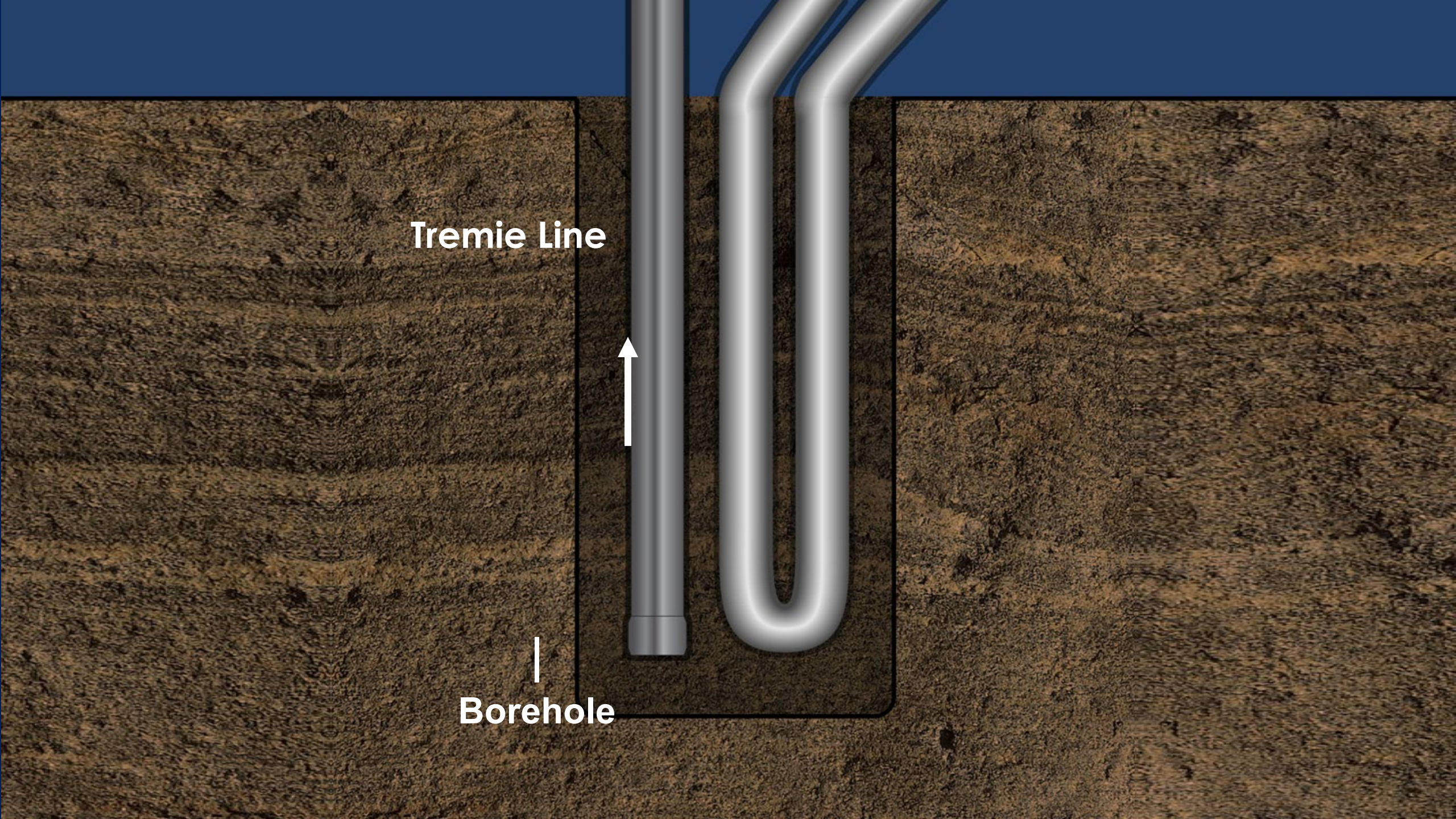
**LOOP
INSTALLATION**



**GROUTING &
WASTE DISPOSAL**



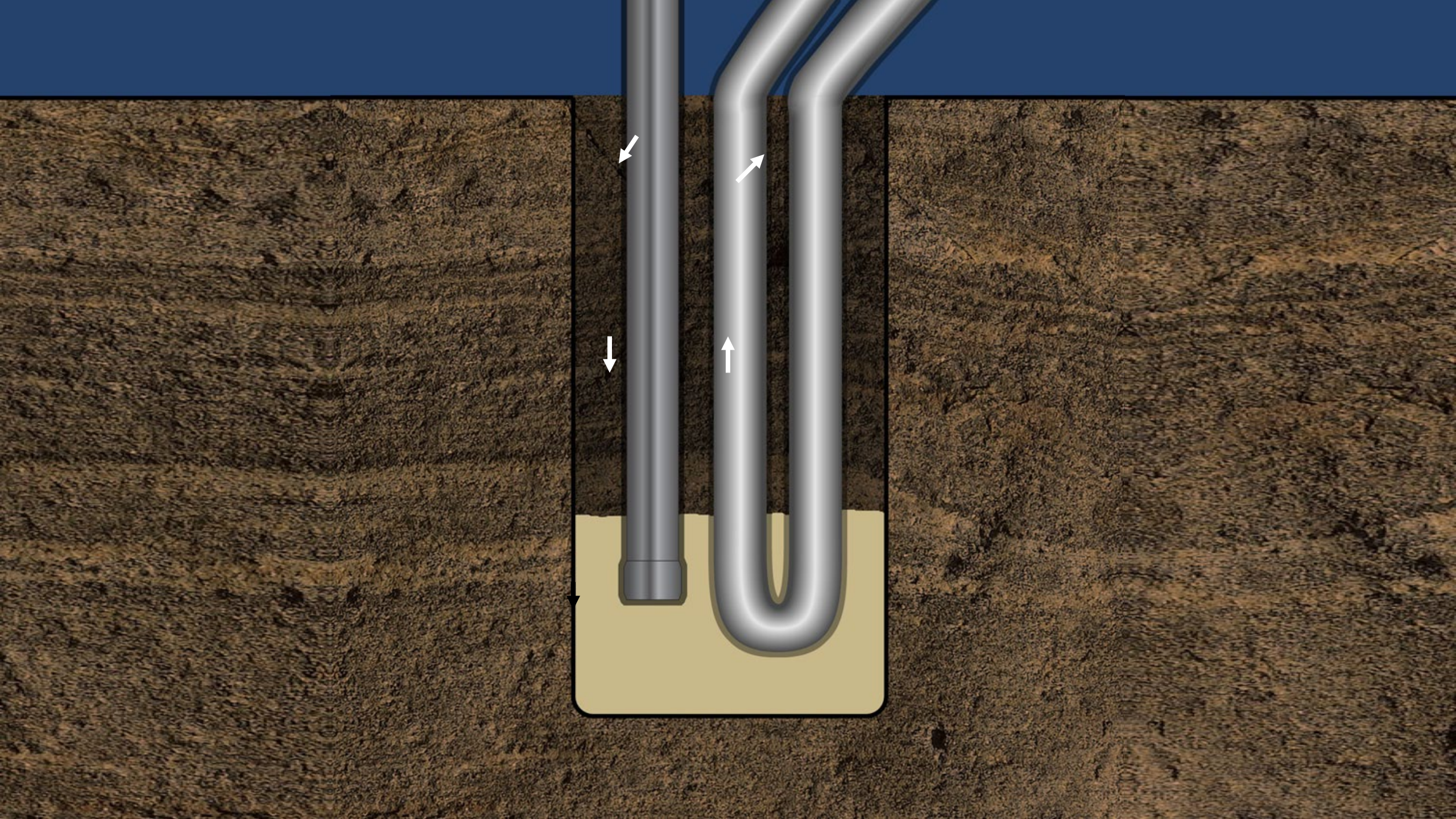
THE GROUTING PROCESS

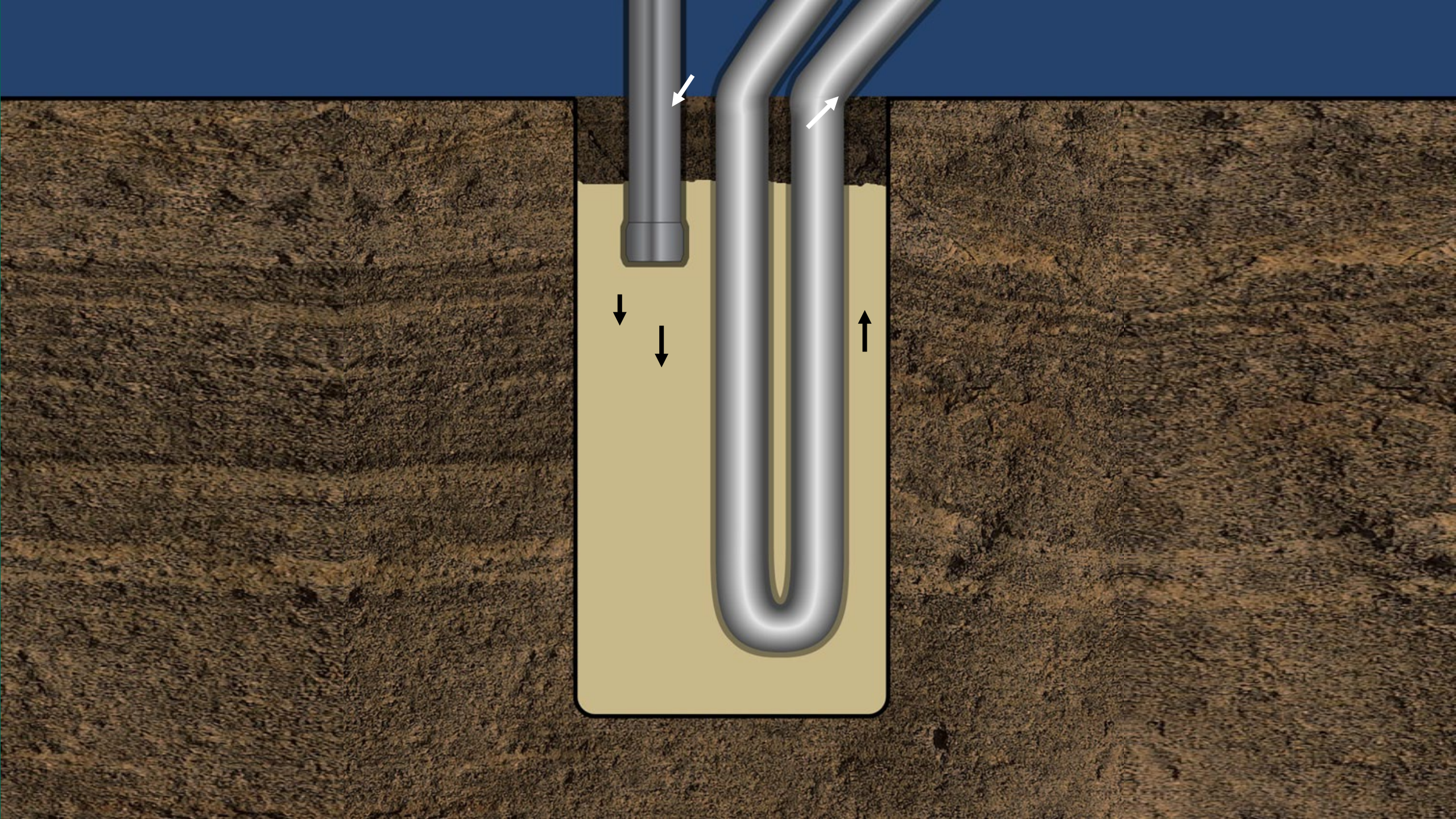


Tremie Line



Borehole







5" x 300' = 1.82 CYs

**Project Totals
25 Holes = 45.5 CYs**

All Drilling Generates Waste.

Kiawah Island South Carolina

GEOHERMAL PROJECT SOLIDS CREATION AND DISPOSAL

$5.5'' \times 400\text{ft} = 2.44 \text{ Cubic Yards}$

- Drilling 4 holes a day = **9.76 Cubic Yards**

$5.875 \times 800\text{ft} = 5.6 \text{ Cubic Yard Per Hole}$

- Drilling 2 holes a day = **11.12 Cubic Yards**



SUCCESSFUL EXECUTION



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QUESTIONS?

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“Ground Source Geothermal has the power to enhance economic growth, support energy independence, and improve the health and well-being of the American people.”



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