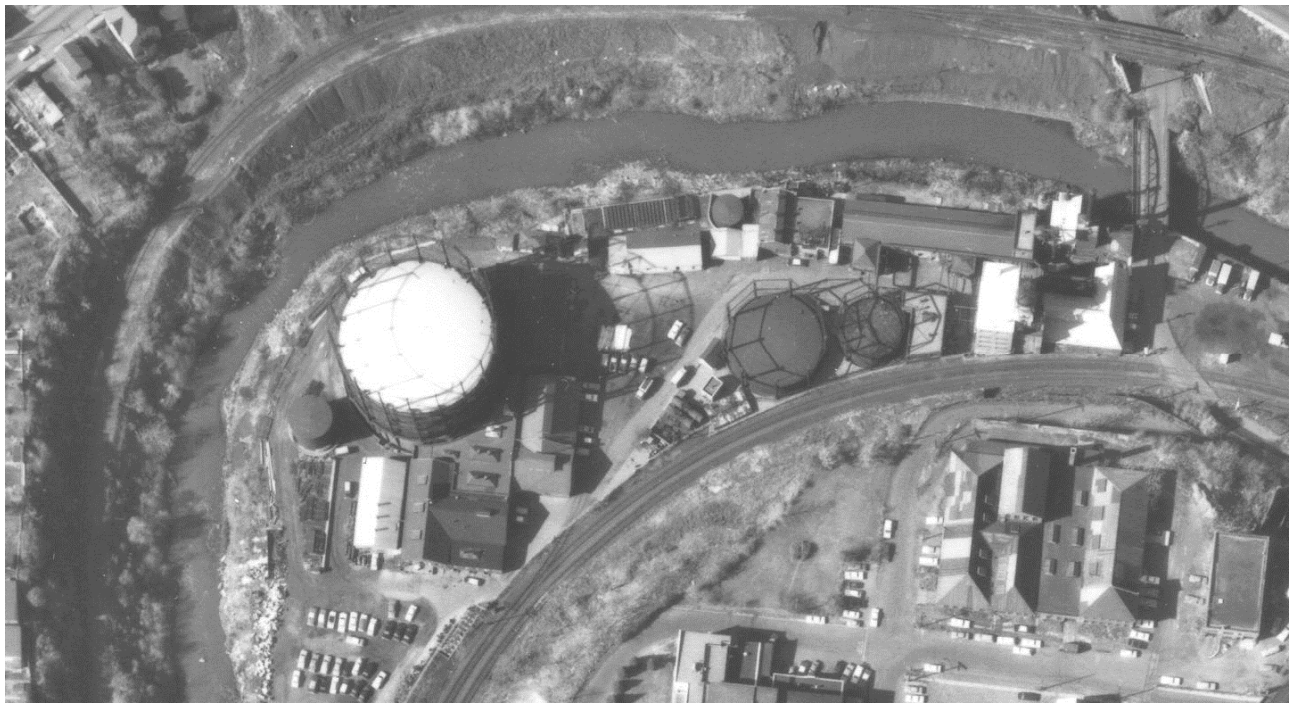
DEEP TROUBLE

When Design-Phase Simplicity Meets Construction-Phase Reality



John Roberts / Gordon Araujo

Stantec

Energy to do more®

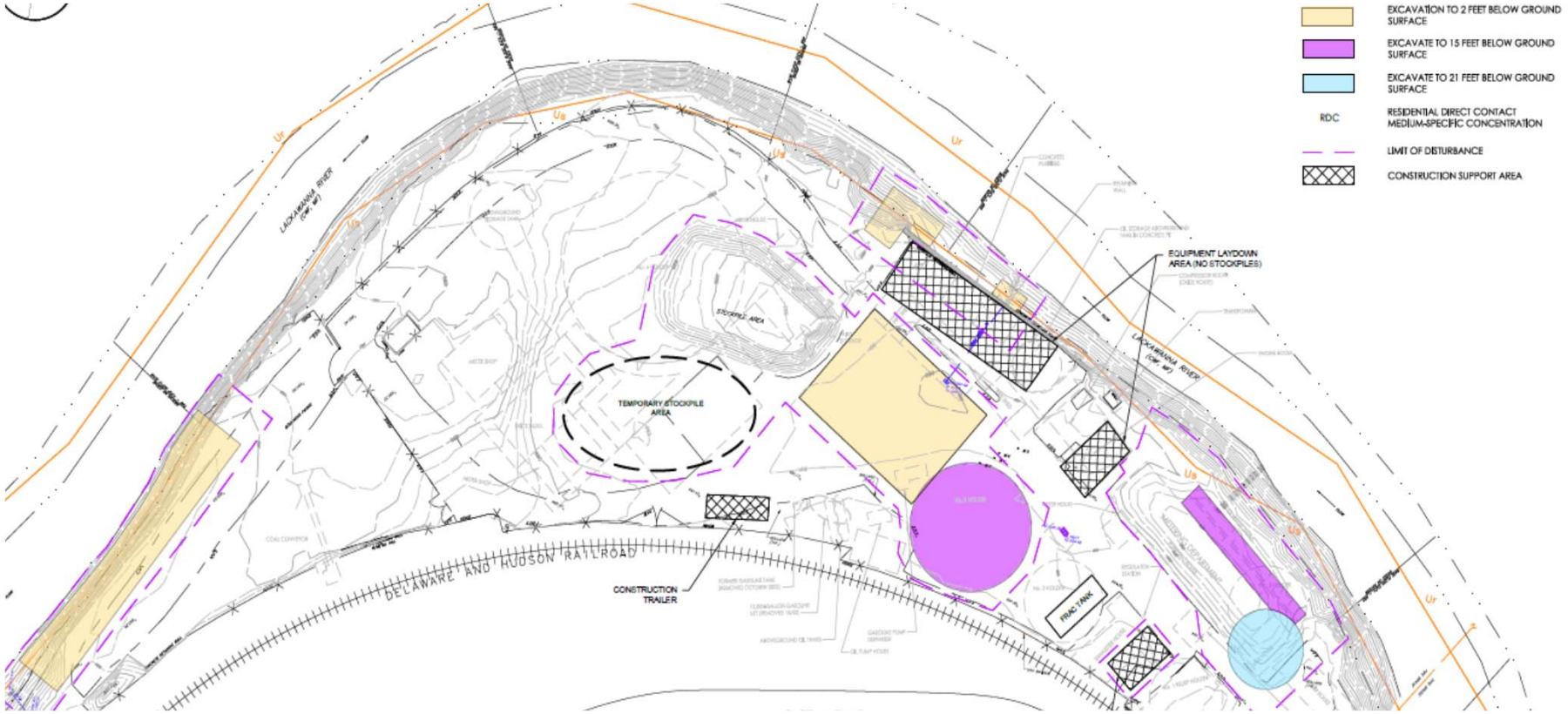
2020 EXCAVATION PLAN

Gas Holder #3
100 foot Diameter
15 foot Deep

Gas Holder #5
60 foot Diameter
21 foot Deep

SCRANTON MGP SITE
2020

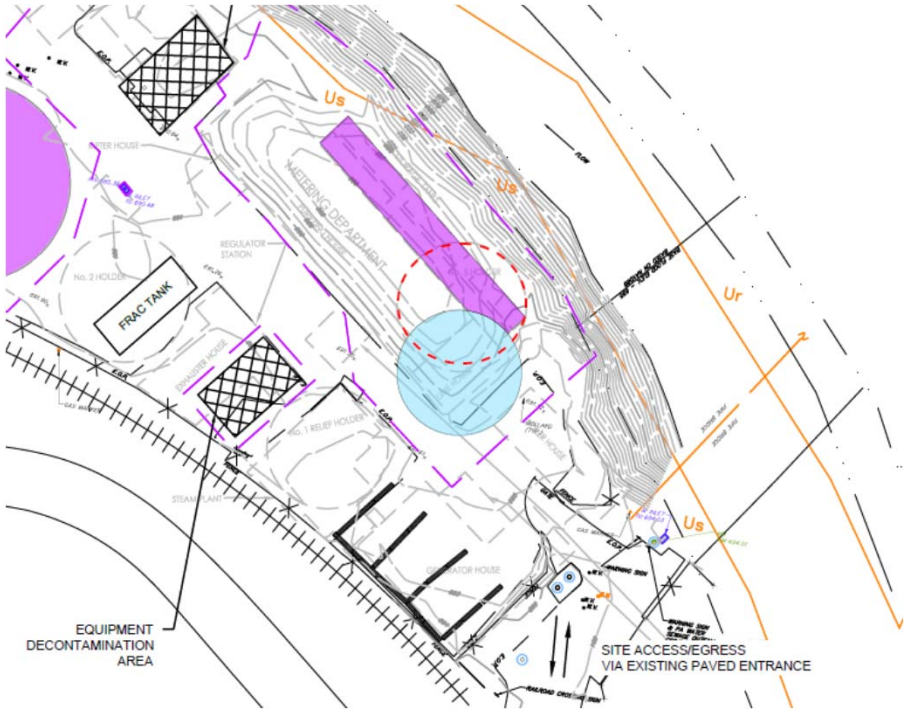
2020 EXCAVATION PLAN



GAS HOLDER NO. 5

DESIGN DIAMETER:

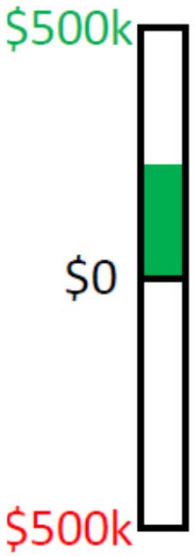
- 60 Feet



GAS HOLDER NO. 5

ACTUAL DIAMETER:

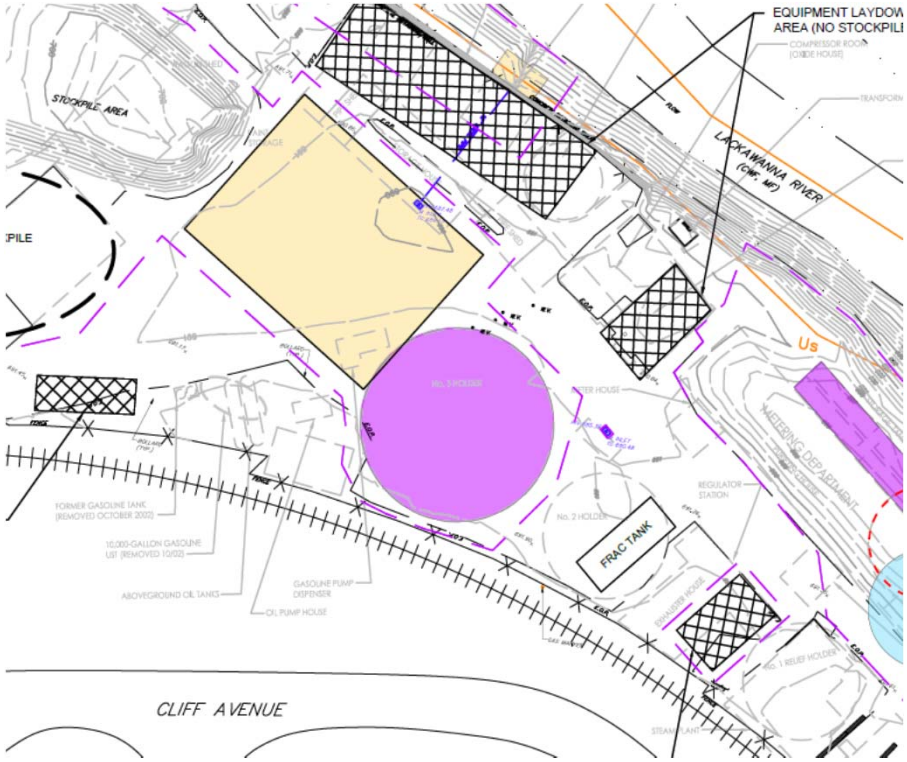
- 40 Feet
- $220,000 Saving



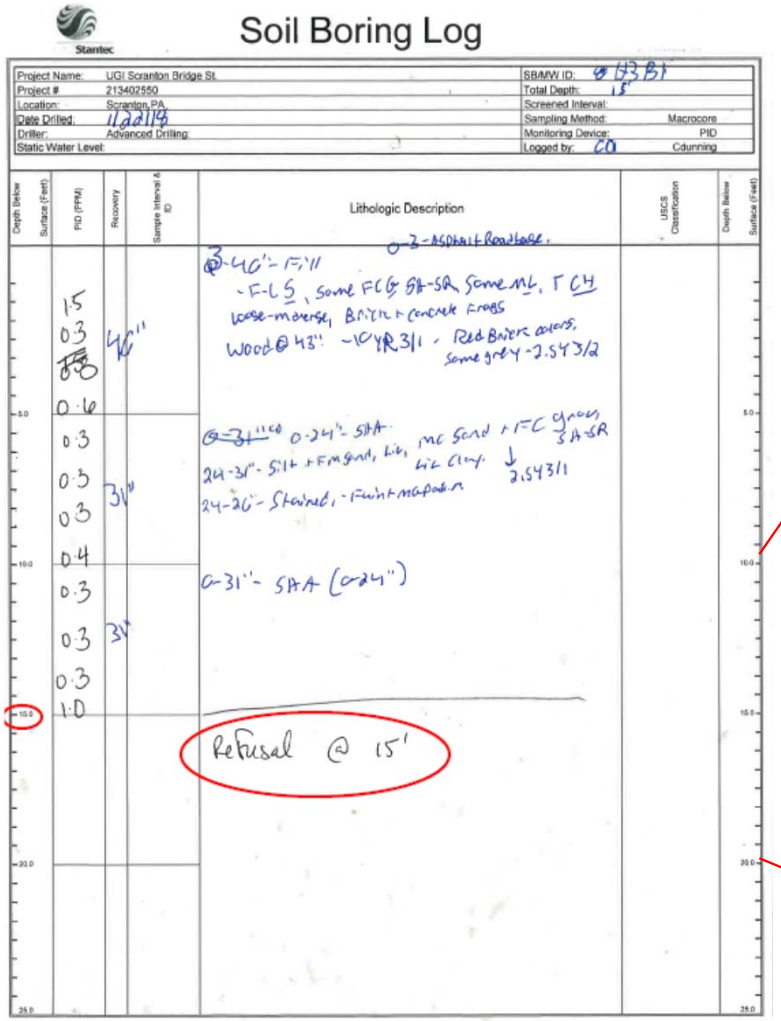
GAS HOLDER NO. 3

DESIGN DEPTH:

- 15 Feet



BORING H3-B1

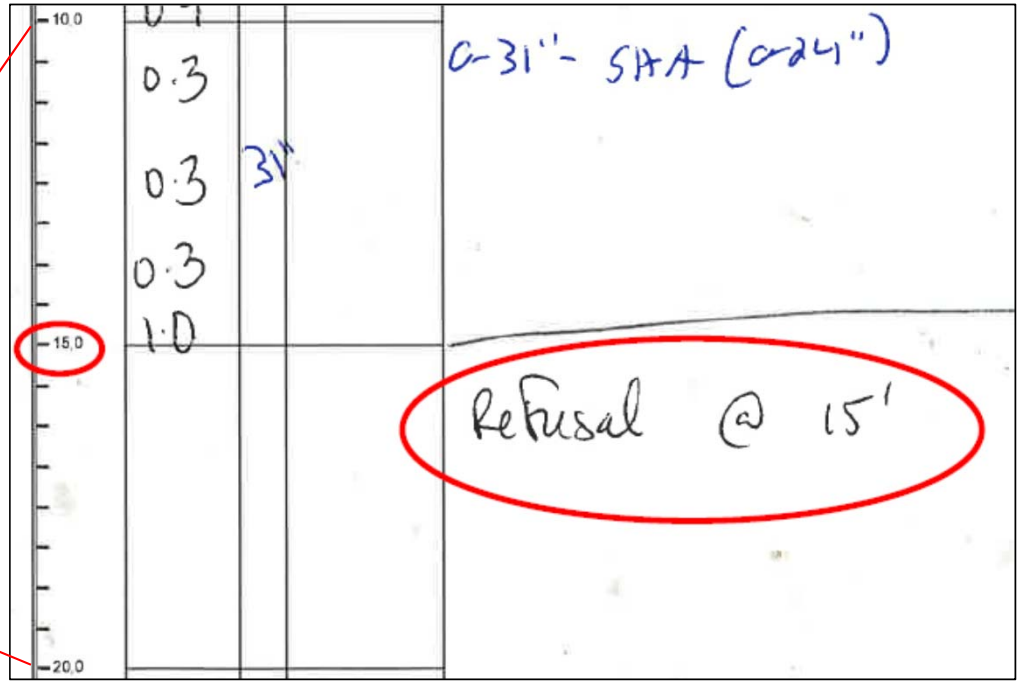


Soil Boring Log

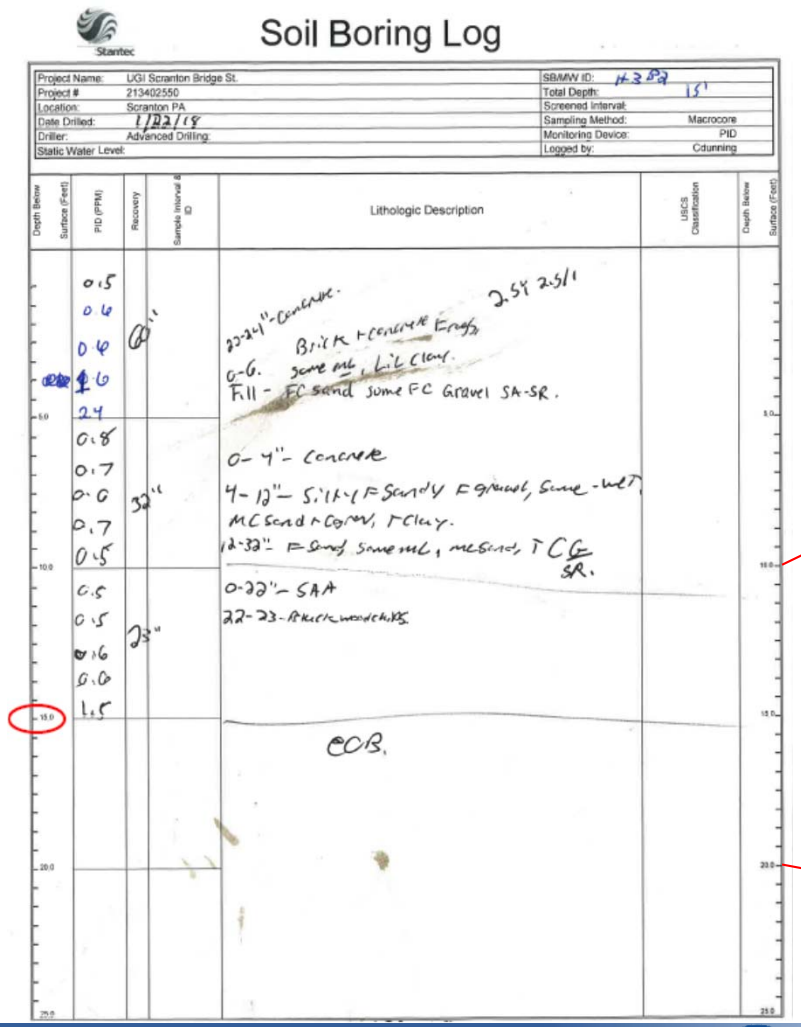
Stantec

Project Name:	UGI Scranton Bridge St.	SB/MW ID:	H3-B1
Project #:	213402550	Total Depth:	15'
Location:	Scranton, PA	Screened Interval:	
Date Drilled:	11/20/19	Sampling Method:	Macrocore
Driller:	Advanced Drilling	Monitoring Device:	PID
Static Water Level:		Logged by:	CD Cdunning

Depth Below Surface (Feet)	PID (PPM)	Recovery	Sample Interval & ID	Lithologic Description	USCS Classification	Depth Below Surface (Feet)
				0-2 - Asphalt + Roadbase.		
	1.5	46"		@ 2'-4.0' - 1.11 - F-L S, some FCG SA-SR, some ML, T CH loose-moderse, Brick + concrete frags Wood @ 4.3' - 10YR 3/1 - Red Brick chips, some grey - 2.5Y 3/2		
	0.3					
	0.6					
	0.3	31"		@ 3'-4.0' 0-24" - SHA 24-31" - Silt + F sand, Lit, mc Sand + FC gravel, SA-SR Lit Clay. ↓ 2.5Y 3/1 24-26" - Stained, + Fuel + Naptha		
	0.3					
	0.3					
	0.4					
	0.3	31"		@ 5'-4.0' - 31" - SHA (@ 24")		
	0.3					
	0.3					
	1.0			Refusal @ 15'		



BORING H3-B2

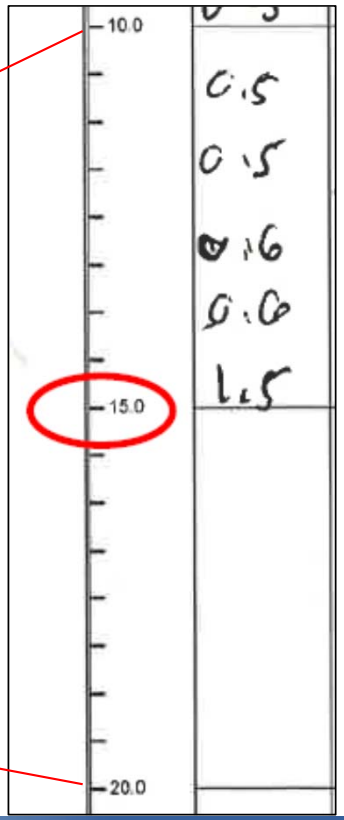


Soil Boring Log

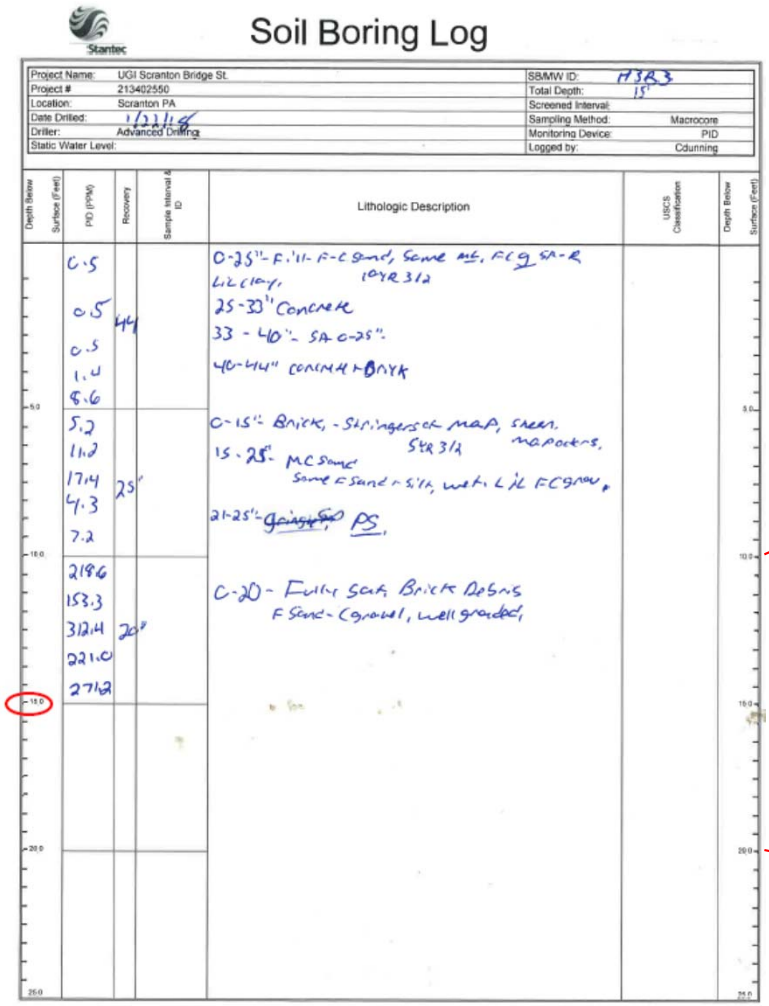
Stantec

Project Name:	UGI Scranton Bridge St.	SBMW ID:	H3-B2
Project #:	213402550	Total Depth:	15'
Location:	Scranton PA	Screened Interval:	
Date Drilled:	1/22/18	Sampling Method:	Macrocore
Driller:	Advanced Drilling	Monitoring Device:	PID
Static Water Level:		Logged by:	Cdunning

Depth Below Surface (Feet)	PID (PPM)	Recovery	Sample Interval & ID	Lithologic Description	USCS Classification	Depth Below Surface (Feet)
	0.5			22-24"- Concrete. 2.5Y 2.5/1		
	0.6			Brick + Concrete Frags		
	0.4	60%		0-6. some ML, Lil Clay.		
	1.6			Fill - FC Sand some FC Gravel SA-SR.		
	24					
	0.8			0-4"- Concrete		
	0.7			4-12"- Silty F Sandy F Gravel, Some-wet		
	0.6	32"		MC Sand + Coarse, Trace Clay.		
	0.7			12-32"- F Sand some ML, mc Sand, Trace		
	0.5			SR.		
	0.5			0-22"- SAA		
	0.5			22-23- Rock/wood chips		
	1.6	32"				
	0.6					
	1.5					
				EOB.		



BORING H3-B3

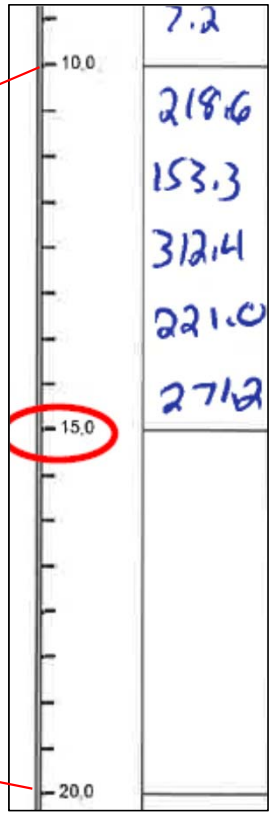


Soil Boring Log

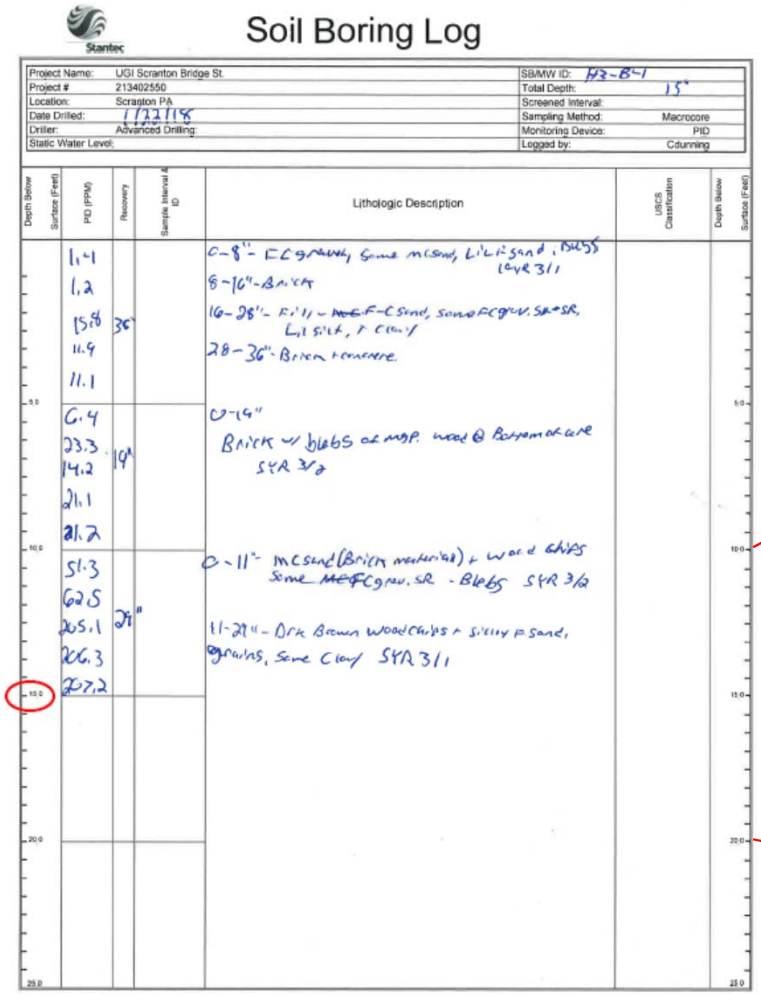
Stantec

Project Name:	UGI Scranton Bridge St.	SB/MW ID:	H3B3
Project #	213402550	Total Depth:	15'
Location:	Scranton PA	Screened Interval:	
Date Drilled:	1/21/18	Sampling Method:	Macrocore
Driller:	Advanced Drilling	Monitoring Device:	PID
Static Water Level:		Logged by:	Cdunning

Depth Below Surface (Feet)	PID (PPM)	Recovery	Sample Interval & ID	Lithologic Description	USCS Classification	Depth Below Surface (Feet)
	0.5 0.5 0.5 1.4 8.6	44"		0-25"- F-M-F-C Sand, some Mt, FCg SA-R Lt Clay, 10YR 3/2 25-33" Concrete 33-40"- SA C-25". 40-44" continue Brick		
	5.2 11.2 17.4 4.3 7.2	25"		C-15"- Brick, - Stringer of MAP, sheen, mapdots, 5YR 3/2 15-25"- MC Sand some F Sand - SIA, wet, Lt FCgravel,		
	2186 153.3 312.4 221.0 2712	20"		21-25"- ~~Grading~~ PS, C-20- Fully Sat, Brick Debris F Sand - Coarse, well graded,		



BORING H3-B4

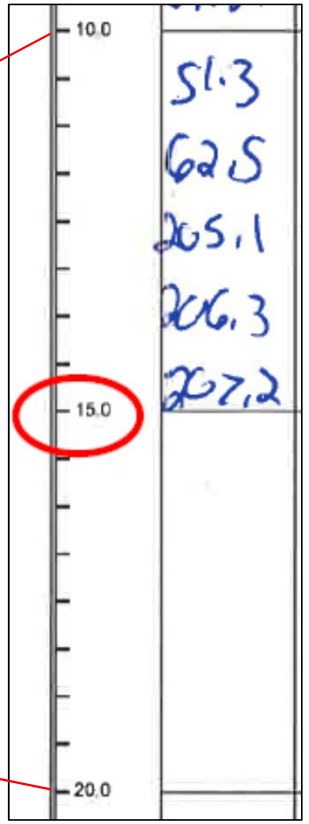


Soil Boring Log

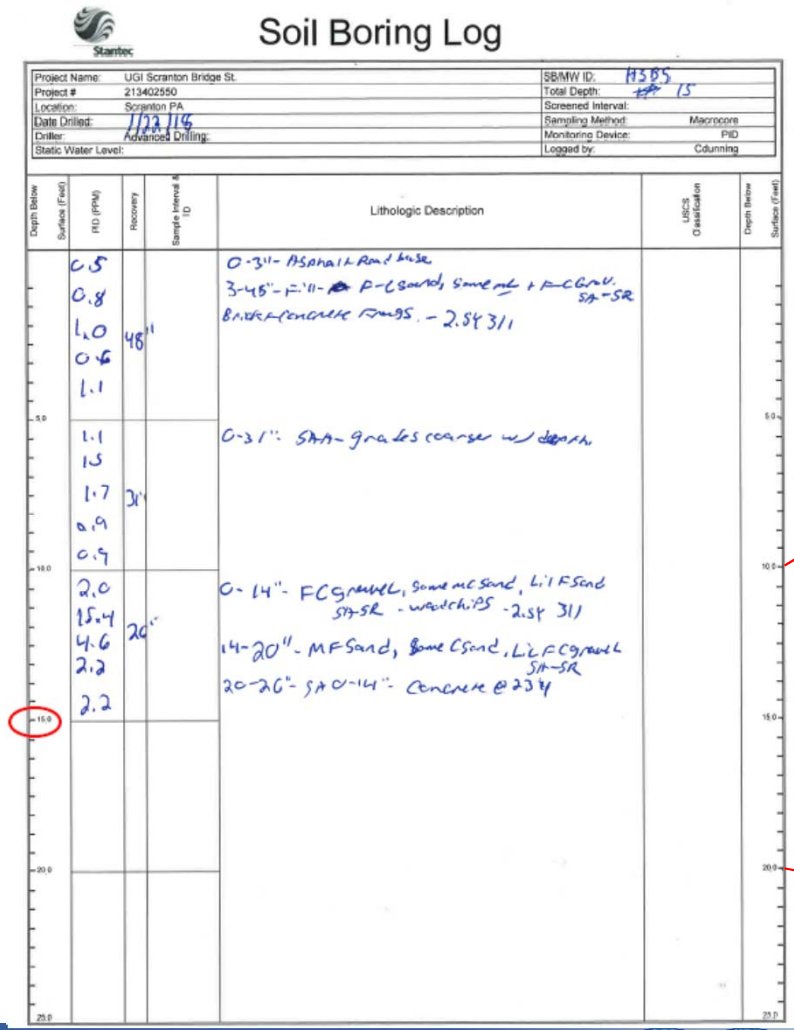
Stantec

Project Name:	UGI Scranton Bridge St.	SB/MW ID:	H3-B4
Project #	213402550	Total Depth:	15'
Location:	Scranton PA	Screened Interval:	
Date Drilled:	11/22/18	Sampling Method:	Macrocore
Driller:	Advanced Drilling	Monitoring Device:	PID
Static Water Level:		Logged by:	Cdunning

Depth Below Surface (Feet)	PID (PPM)	Recovery	Sample Interval & ID	Lithologic Description	USCS Classification	Depth Below Surface (Feet)
0	1.4	36"		0-8"- FC gravel, some m-c sand, Lil silt sand, BRICK 10YR 3/1		0
	1.2			8-16"- BRICK		
	15.8			16-28"- Fill - ~~M-F~~-C sand, some FC grav. SR-SR, Lil silt, T clay		
	11.9			28-36"- Brick + concrete		
	11.1					
5	6.4	19"		0-14" Brick w/ blebs of MGP wood @ bottom of core 5YR 3/2		5
	23.3					
	14.2					
	21.1					
	21.2					
10	51.3	29"		0-11"- m-c sand (Brick material) + wood chips some ~~M-F~~ C gray, SR - blebs 5YR 3/2		10
	62.5					
	205.1			11-29"- Dark Brown Wood Chips + silty m sand, grains, some clay 5YR 3/1		
	206.3					
15	207.2					15
20						20
25						25



BORING H3-B5

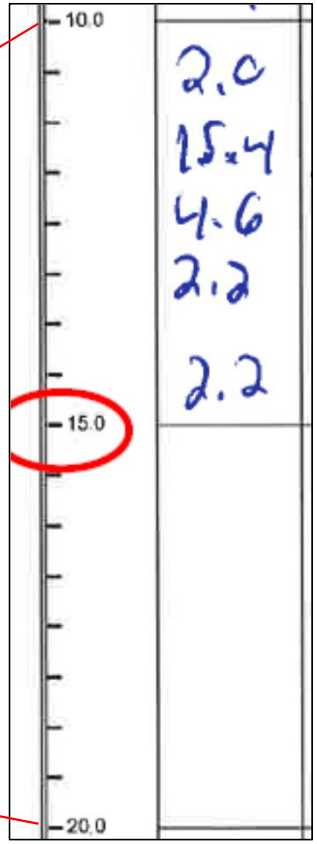


Soil Boring Log

Stantec

Project Name:	UGI Scranton Bridge St.	SB/MW ID:	H3B5
Project #	213402550	Total Depth:	~~15~~ 15
Location:	Scranton PA	Screened Interval:	
Date Drilled:	11/23 11/6	Sampling Method:	Macrocore
Driller:	Advanced Drilling	Monitoring Device:	PID
Static Water Level:		Logged by:	Cdunning

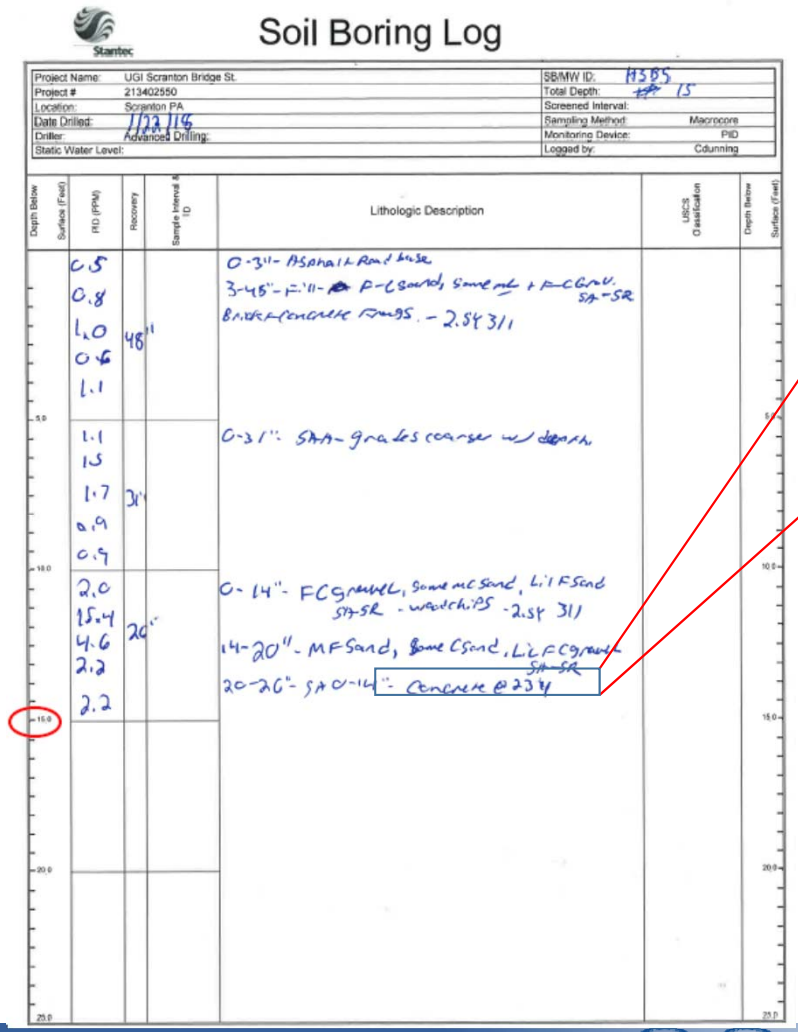
Depth Below Surface (Feet)	PID (PPM)	Recovery	Sample Interval & ID	Lithologic Description	USCS Classification	Depth Below Surface (Feet)
	0.5 0.8 1.0 0.6 1.1	48"		0-3"- Asphalt Road base 3-48"- F-M- P-C Sand, some ~~mf~~ + F-C Grv. SA-SR Brick+Concrete Rubble - 2.54 311		
5.0	1.1 1.5 1.7 0.9 0.9	31"		0-31": SAA- grades coarser w/ depth.		5.0
10.0	2.0 15.4 4.6 2.2 2.2	20"		0-14"- FC gravel, some mC Sand, Li'l FSand SA-SR - wood chips - 2.54 311 14-20"- MF Sand, some CSand, Li'l FC gravel SA-SR 20-26"- SAA 0-14"- Concrete @ 2334		10.0
15.0						15.0
20.0						20.0
25.0						25.0



GAS HOLDER DE-WATERING

"John, we have the pump set at 23 feet and have it de-watered down to 15 feet. Everything is going great."

BORING H3-B5



Soil Boring Log

Stantec

Project Name:	UGI Scranton Bridge St.	SB/MW ID:	H3B5
Project #	213402550	Total Depth:	~~20~~ 15
Location:	Scranton PA	Screened Interval:	
Date Drilled:	1/22 1/26	Sampling Method:	Macrocore
Driller:	Advanced Drilling	Monitoring Device:	PID
Static Water Level:		Logged by:	Cdunning

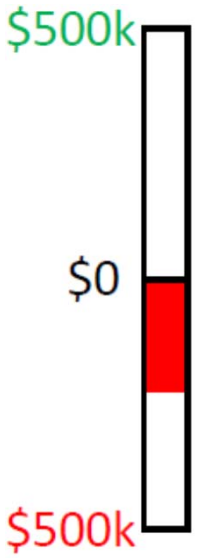
Depth Below Surface (Feet)	PID (PPM)	Recovery	Sample Interval & ID	Lithologic Description	USCS Classification	Depth Below Surface (Feet)
	0.5 0.8 1.0 0.6 1.1	48"		0-3"- Asphalt Road base 3-48"- F-M- P-C Sand, some mC + F-C Grv. SA-SR Brick+Concrete Rmgs. - 2.54 311		
5.0	1.1 1.5 1.7 0.9 0.9	31"		0-31": SAA- grades coarser w/ depth.		5.0
10.0	2.0 15.4 4.6 2.2 2.2	20"		0-14"- FC Gravel, some mC Sand, Li F Sand SA-SR - wood chips -2.54 311 14-20"- MF Sand, some CSand, Li F Gravel SA-SR 20-26"- SAA-14"- Concrete @ 23 ¼		10.0
15.0						15.0
20.0						20.0
25.0						25.0

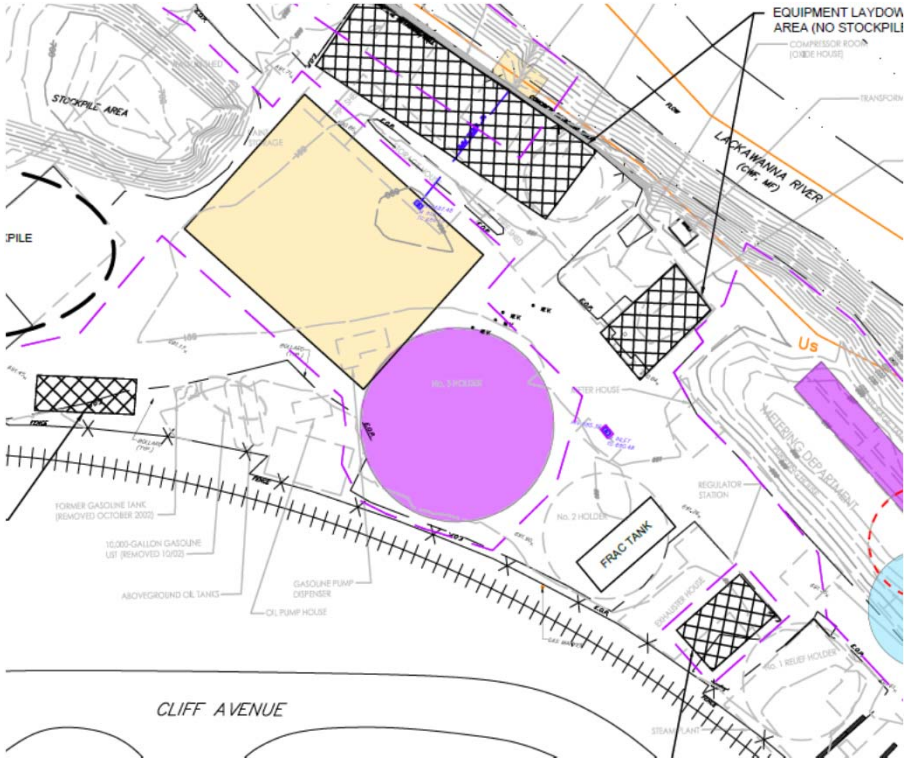
Concrete @ 23 ¼

GAS HOLDER NO. 3

ACTUAL DEPTH:

- 23 Feet
- $475,000 Cost





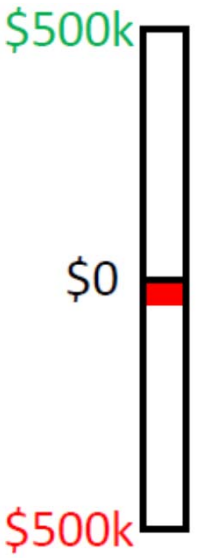
A “DUMPLING”

OUR “DUMPLING”

GAS HOLDER NO. 3

ACTUAL DEPTH:

- 15 - 23 Feet
- $210,000 Savings



The simple calculation for working out the volume of a cone can be used to roughly estimate its size. This calculation is the volume of a cone = $(^1/_3)$ x p x Radius^2 x height. This calculation does not take into account that the dumpling was often a wide short cone with a flat top (a lustrum of a cone), with the angles dependent on the strata. A more accurate approach would therefore be to work out the area of a frustum of a cone as below.

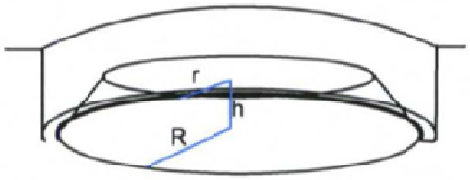
$$V = \frac{(p \times h)}{3}(R^2 + r^2 + Rr)$$

v= volume

h = height

R = radius of the base of cone,

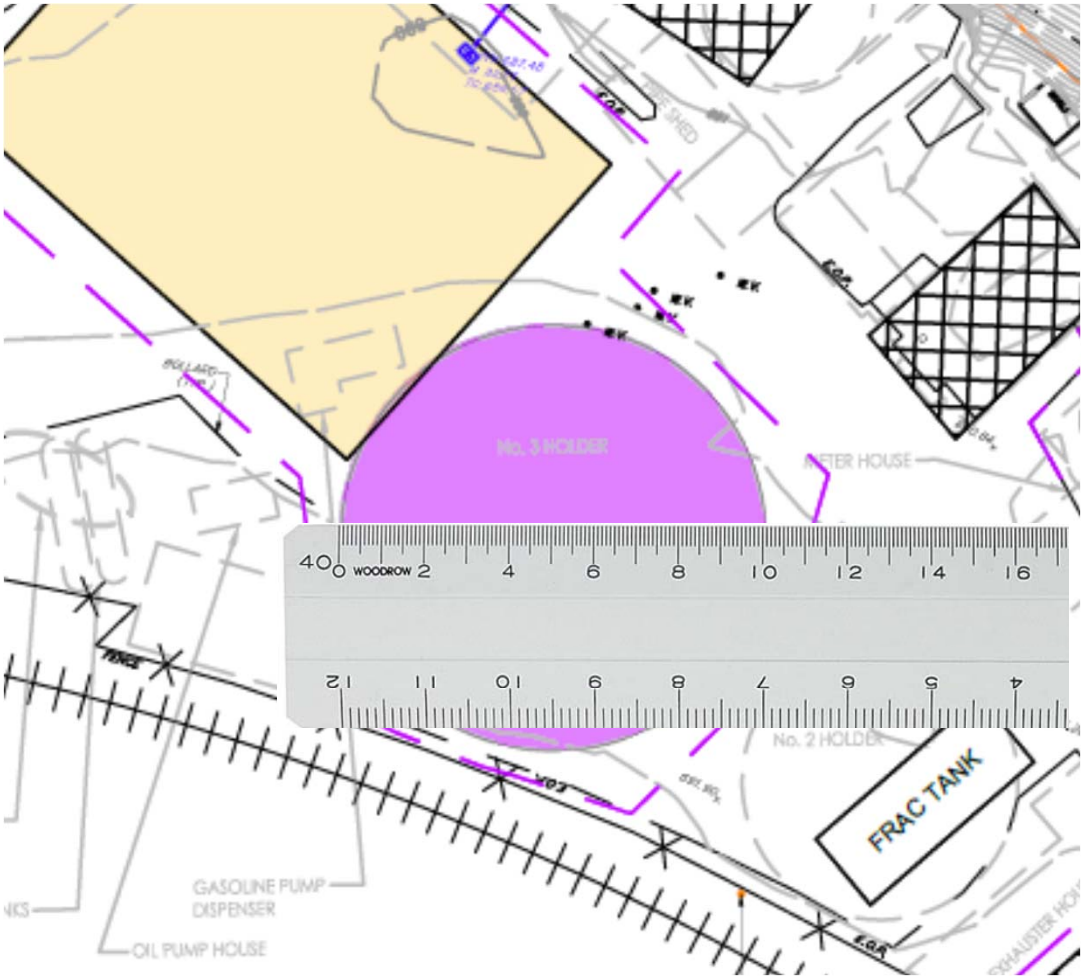
r = radius of the top of the cone

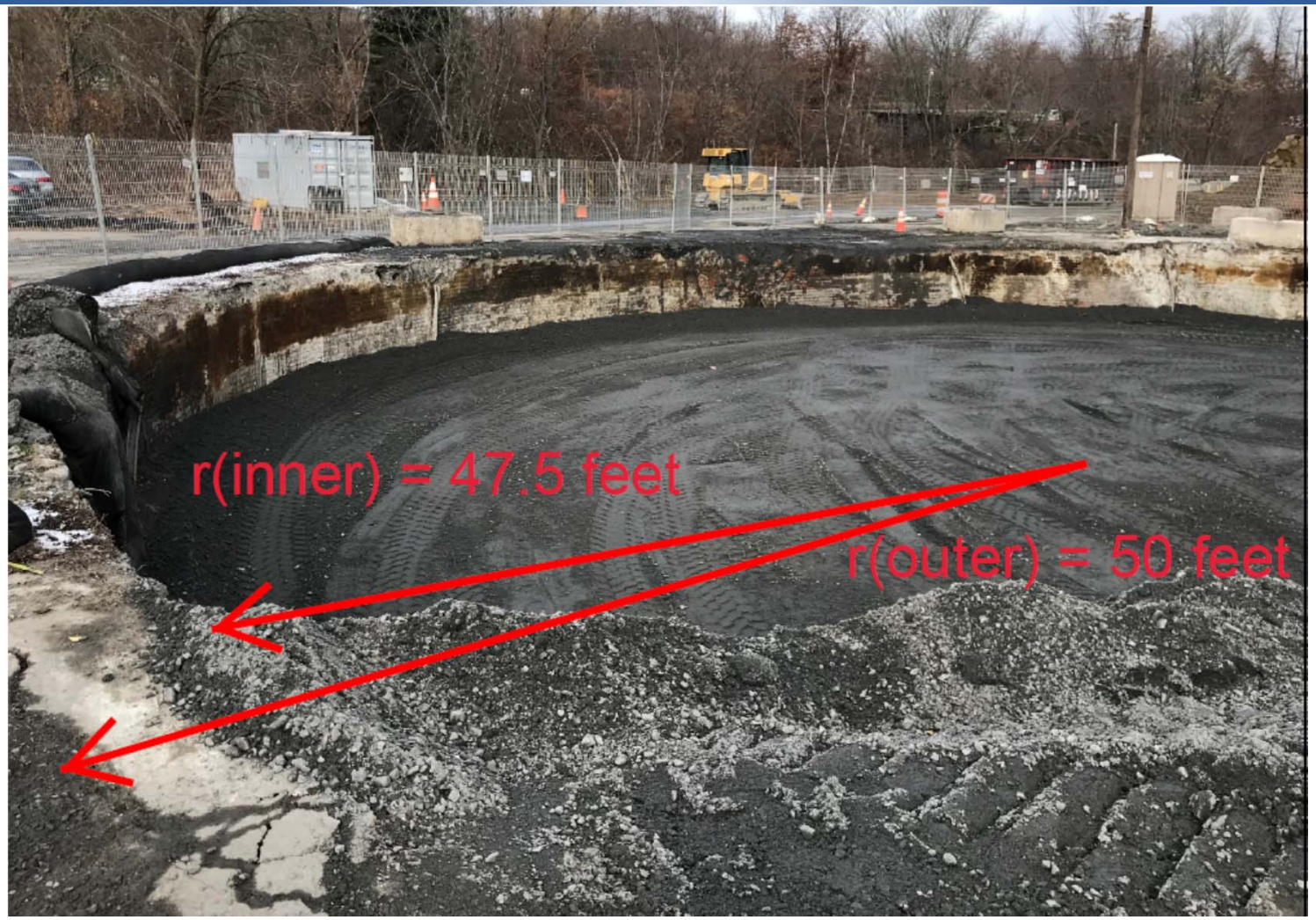


GAS HOLDER NO. 3

DESIGN DIAMETER:

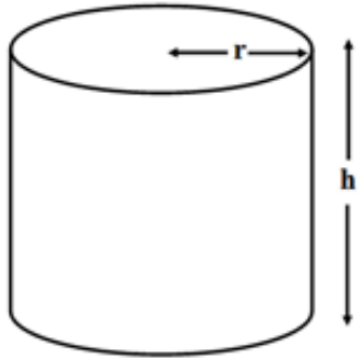
- 100 Feet




r(inner) = 47.5 feet
r(outer) = 50 feet

GAS HOLDER NO. 3

$$V = \pi r^2 h$$



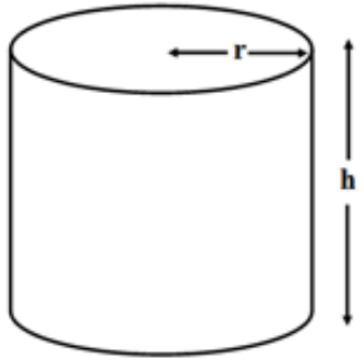
ACTUAL (INNER) DIAMETER:

- 95 Feet

$$\frac{\pi\,(47.5')^2 \times 23'}{\pi\,(50.0')^2 \times 23'} = ???$$

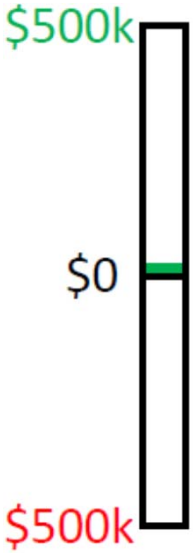
GAS HOLDER NO. 3

$$V = \pi r^2 h$$



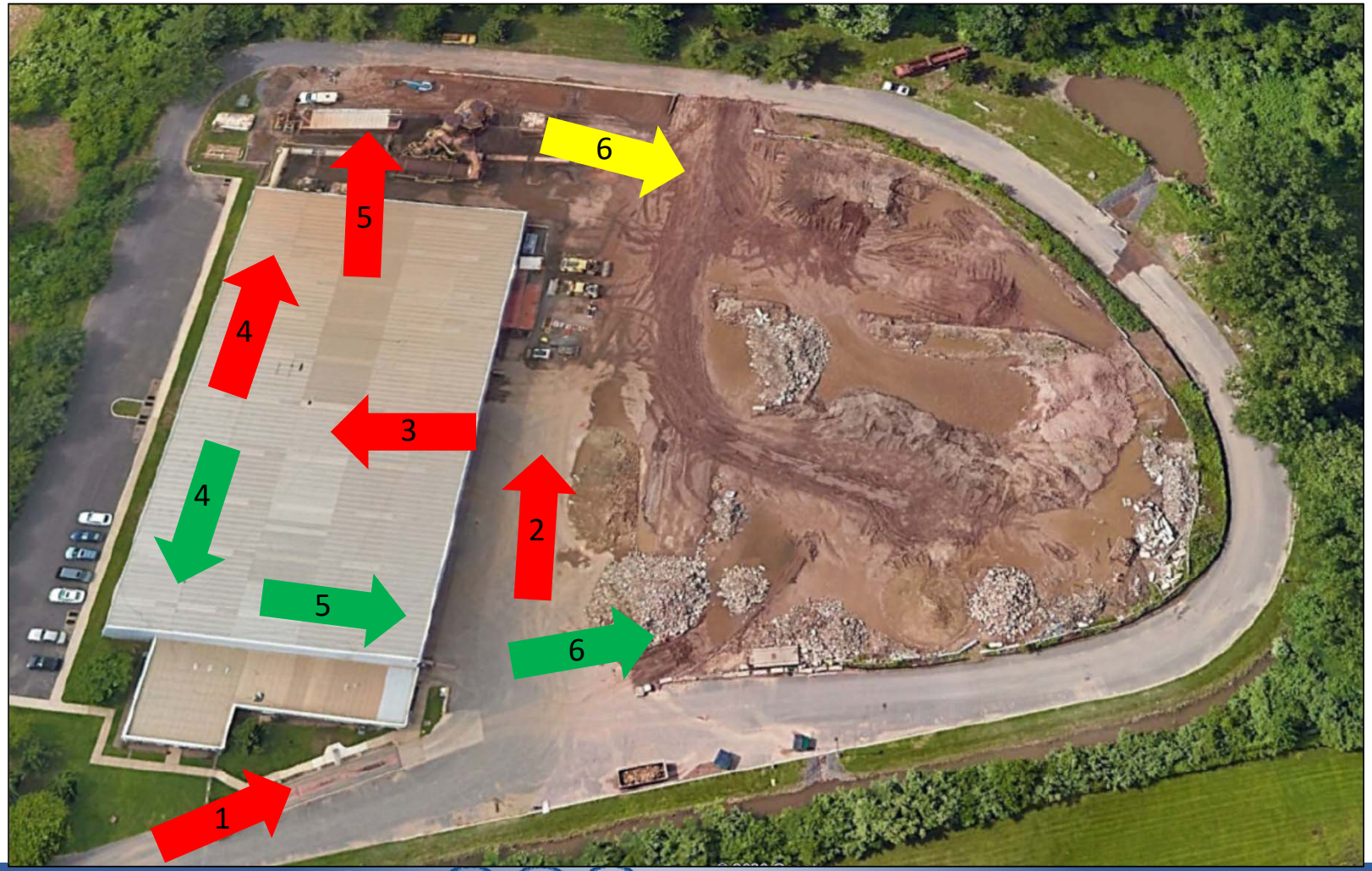
ACTUAL (INNER) DIAMETER:

- 95 Feet
- $75,000 Saving



$$\frac{\pi\,(47.5')^2 \times 23'}{\pi\,(50.0')^2 \times 23'} = 0.9$$

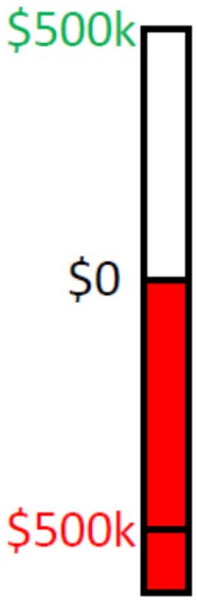
THERMAL TREATMENT FACILITY


6
5
4
3
4
2
5
6
1

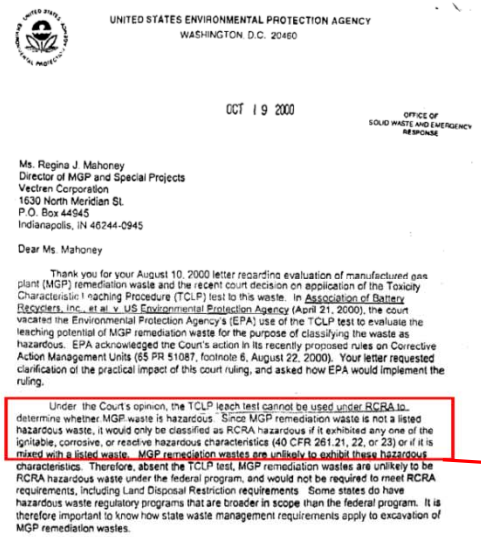
ASBESTOS TILE IN DEBRIS STOCKPILE

REJECTED SOIL ON-SITE (HAZARDOUS DISPOSAL???)

- TCLP Benzene > 0.5 mg/L
- Estimated 2,000 Tons
- $640,000 Cost



BATTERY RECYCLERS vs USEPA (APRIL 21, 2000)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 19 2000

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Ms. Regina J. Mahoney
Director of MGP and Special Projects
Vectren Corporation
1630 North Meridian St.
P.O. Box 44945
Indianapolis, IN 46244-0945

Dear Ms. Mahoney

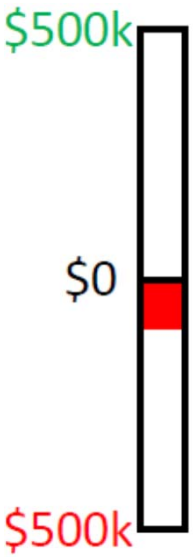
Thank you for your August 10, 2000 letter regarding evaluation of manufactured gas plant (MGP) remediation waste and the recent court decision on application of the Toxicity Characteristic Leaching Procedure (TCLP) test to this waste. In Association of Battery Recyclers, Inc., et al. v. US Environmental Protection Agency (April 21, 2000), the court vacated the Environmental Protection Agency's (EPA) use of the TCLP test to evaluate the leaching potential of MGP remediation waste for the purpose of classifying the waste as hazardous. EPA acknowledged the Court's action in its recently proposed rules on Corrective Action Management Units (65 FR 51087, footnote 6, August 22, 2000). Your letter requested clarification of the practical impact of this court ruling, and asked how EPA would implement the ruling.

Under the Court's opinion, the TCLP leach test cannot be used under RCRA to determine whether MGP waste is hazardous. Since MGP remediation waste is not a listed hazardous waste, it would only be classified as RCRA hazardous if it exhibited any one of the ignitable, corrosive, or reactive hazardous characteristics (40 CFR 261.21, 22, or 23) or if it is mixed with a listed waste. MGP remediation wastes are unlikely to exhibit these hazardous characteristics. Therefore, absent the TCLP test, MGP remediation wastes are unlikely to be RCRA hazardous waste under the federal program, and would not be required to meet RCRA requirements, including Land Disposal Restriction requirements. Some states do have hazardous waste regulatory programs that are broader in scope than the federal program. It is therefore important to know how state waste management requirements apply to excavation of MGP remediation wastes.

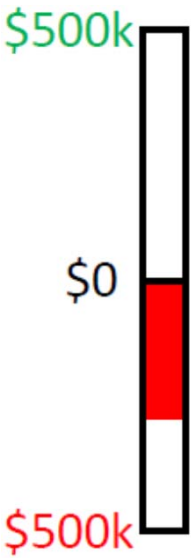
Under the Court's opinion, the TCLP leach test cannot be used under RCRA to determine whether MGP waste is hazardous. Since MGP remediation waste is not a listed hazardous waste, it would only be classified as RCRA hazardous if it exhibited any one of the ignitable, corrosive, or reactive hazardous characteristics (40 CFR 261.21, 22, or 23) or if it is mixed with a listed waste. MGP remediation wastes are unlikely to exhibit these hazardous

REJECTED SOIL ON-SITE (NON-HAZARDOUS WASTE)

- TCLP Benzene > 0.5 mg/L
- Estimated 2,000 Tons
- $505,000 Saving



REJECTED SOIL ON-SITE (NON-HAZARDOUS WASTE)



- Estimated 2,000 Tons
- Actual 3,200 Tons
- $170,000 Cost

JANUARY 13, 2021 @ 0615 HRS

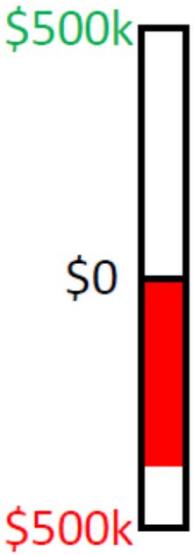
REJECTED MATERIAL OFF-SITE

Screened Soil

Unscreened Soil

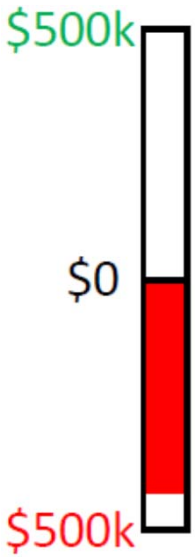
Co-Mingled Debris

SCREENED SOIL



- Gas Holder No. 3 Deep
- Est. 800 Tons
- TCLP Benzene > 0.5 mg/L
- Local Landfill Rejects
- $90,000 Cost

UNSCREENED SOIL



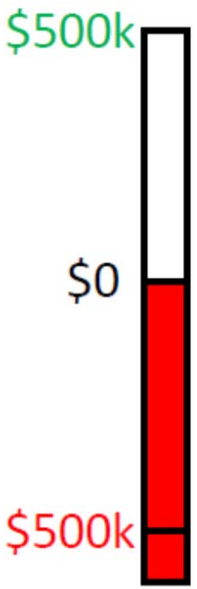
- Gas Holder No. 3 Shallow
- Est. 1,300 Tons
- TCLP Benzene < 0.5 mg/L
- Local Landfill Accepts
- $60,000 Cost

CO-MINGLED DEBRIS

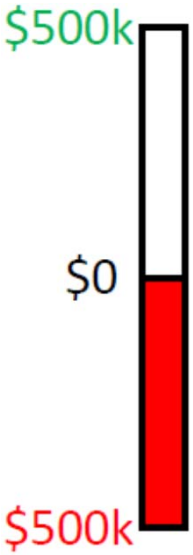
- Est. 2,000 Tons
  - 528 Tons UGI
  - 1,472 Tons Others
  - 5-6 Pounds Asbestos Tiles

CO-MINGLED DEBRIS

- Initial Offer
  - Local Landfill
  - $85/Ton
  - $170,000 Cost



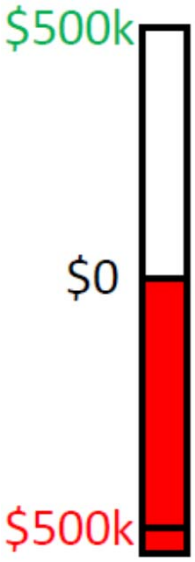
CO-MINGLED DEBRIS

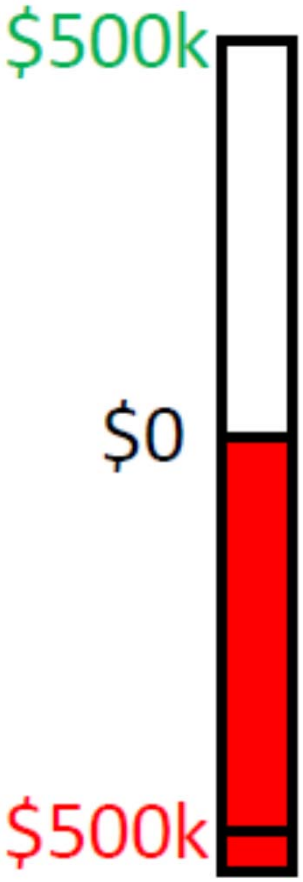


- Counter-Offer
  - $85,000 Lump Sum
  - Incentive to Segregate
  - Cost Cap
  - $85,000 Saving

CO-MINGLED DEBRIS

- Final Agreement
  - $115,000 Lump Sum
  - $30,000 Cost



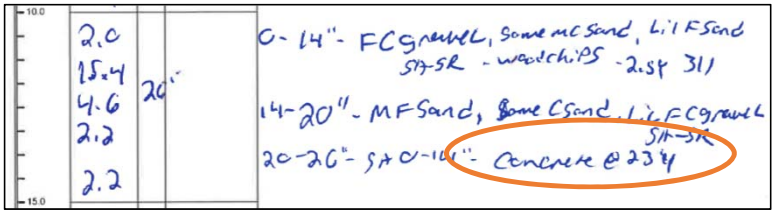


INCREMENTAL COSTS

GAS HOLDER NO.5 - 40' DIAMETER:	$220,000
GAS HOLDER NO.3 - 23' DEEP:	-$475,000
THE "DUMPLING"	$210,000
GAS HOLDER NO.3 - 95' DIAMETER:	$75,000
REJECTED SOIL - HAZARDOUS:	-$640,000
REJECTED SOIL - NON-HAZARDOUS:	$505,000
REJECTED SOIL - 1,200 TONS EXTRA:	-$170,000
SCREENED SOIL - TCLP BENZENE:	-$90,000
UNSCREENED SOIL - LOCAL LANDFILL:	-$60,000
DEBRIS - INITIAL OFFER:	-$170,000
DEBRIS - COUNTER-OFFER:	$85,000
DEBRIS - FINAL AGREEMENT:	-$30,000
	-$540,000

LESSONS LEARNED

- Be Careful With Assumptions



- Little Things (Can) Mean a Lot

$$\frac{\pi\,(47.5')^2\,23'}{\pi\,(50.0')^2\,23'} = 0.9$$

- Real-Time Cost Tracking/Forecasting
  - Budget for Contingencies: 15% Built In
  - But Black Swans Are Out There: 25% Over Budget

- Open, Clear Communication Between All Stakeholders

JANUARY 13, 2021 @ 0615 HRS