GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS	:	Split Spoon - 1%" I.D., 2" O.D., unless otherwise noted Thin-Walled Tube - 2" O.D., Unless otherwise noted	PS : WS :	Piston Sample Wash Sample
PA	;	Power Auger	FT :	Fish Tail Bit
HA	:	Hand Auger	RB :	Rock Bit
DB	:	Diamond Bit - 4", N, B	BS :	Bulk Sample
AS	:	Auger Sample	PM :	
HS	:	Hollow Stem Auger	DC :	Dutch Cone
			WR .	Wash Bore

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL		water Level		ws	:	While Sampling
WCI	:	Wet Cave In	•			While Drilling
DCI	:	Dry Cave In				Before Casing Removal
AB	:	Dry Cave In After Boring				After Casing Removal
\$20.00		_		7.01.	•	oacing Helliotal

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of ground water levels is not possible with only short term observations.

DESCRIPTIVE SOIL CLASSIFICATION:

Soil Classification is based on the Unified Soil Classification System and ASTM Designations D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL): silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE GRAINED SOILS:

RELATIVE DENSITY OF COARSE-GRAINED SOILS:

			COMMOE GUMINED
Inconfined Compressive		N-Blows/ft.	Relative Density
Strength, Qu, psf	Consistency	0-3	Very Loose
< 500	Very Soft	4-9	Loose
500 - 1.000	Soft	10-29	Medium Dense
1.001 - 2.000	Medium	30-49	Dense
2.001 - 4,000	Stiff	50-80	Very Dense
4,001 - 2,000	Very Stiff	- 08	Extremely Dense
8.001 -16.000	Hard		
> -16.000	Very Hard		

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) (of Components Also Present in Sample)	Percent of Dry Weight
Trace	< 15
With	15 · 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s)
(of Components Also Percent of Present in Sample)

Trace < 5
Y/ith 5 12
Modifier > 12

GRAIN SIZE TERMINOLOGY

Size Range
Over 12 in. (300mm)
12 in. to 3 in. (300mm to 75mm)
3 in. to #4 sieve (75mm to 4.75mm)
#4 to #200 sieve (4.75mm to 0.075mm
Passing #200 sieve (0.075mm)



GENERAL NOTES

Sedimentary Rock Classification

DESCRIPTIVE ROCK CLASSIFICATION:

Sedimentary rocks are composed of cemented clay, silt and sand sized particles. The most common minerals are clay, quartz and calcite. Rock composed primarily of calcite is called limestone; rock of sand size grains is called sandstone, and rock of clay and silt size grains is called mudstone or claystone, siltstone, or shale. Modifiers such as shaly, sandy, dolomitic, calcareous, carbonaceous, etc. are used to describe various constituents. Examples: sandy shale; calcareous sandstone.

LIMESTONE

Light to dark colored, crystalline to fine-grained texture, composed of CaCo₃, reacts

readily with HCl.

DOLOMITE

Light to dark colored, crystalline to fine-grained texture, composed of CaMg(CO₃)₂,

harder than limestone, reacts with HCI when powdered,

CHERT

Light to dark colored, very fine-grained texture, composed of micro-crystalline quartz

(SiO₂), brittle, breaks into angular fragments, will scratch glass.

SHALE

Very fine-grained texture, composed of consolidated silt or clay, bedded in thin layers. The unlaminated equivalent is frequently referred to as siltstone, claystone or

mudstone.

SANDSTONE

Usually light colored, coarse to fine texture, composed of cemented sand size grains of quartz, feldspar, etc. Cement usually is silica but may be such minerals as calcite.

iron-oxide, or some other carbonate.

CONGLOMERATE

Rounded rock fragments of variable mineralogy varying in size from near sand to boulder size but usually pebble to sobble size (½ inch to 6 inches). Cemented together with various cementing agents. Breccia is similar but composed of angular,

fractured rock particles cemented together.

DEGREE OF WEATHERING:

SLIGHT

Slight decomposition of parent material on joints. May be color change.

MODERATE

Some decomposition and color change throughout.

HIGH

Rock highly decomposed, may be extremely broken.

Classification of rock materials has been estimated from disturbed samples.

Core samples and petrographic analysis may reveal other rock types.



	LOG OF BO	RIN	3 N	o.	B -2	2				Pag	e 1 of 2
own	ER City of Tulsa	ARCHITECT/ENGINEER Montgomery Watson									
SITE	Lake Spavinaw	PROJECT Proposed Water Treatment Plant									
	Spavinaw, Oklahoma			Pro		ed W		reatm	ent Pla	ant TESTS	
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907 :	DESCRIPTION	(FT.	SYMBOL			₹,1	Z L	Ж	DENSITY		
HIC	DESCRIPTION		S	낊	1,1	RECOVERY,		MOISTURE,		<u>E</u> E	
GRAPHIC	Surface Elev.: 92.1 ft.	DEPTH	nscs	NUMBER	TYPE	REC	SPT - BLOWS	N C	쮼	UNCONFINED STRENGTH PSF	
	1 0 6" Topsoil				PA						
	2.0 SILT WITH CLAY 2.0 Dark Brown 90.1] :	ML CL	1	SS	8	15	12.4			
72	GRAVELLY LEAN TO FAT] -	СН	2	SS	4	8	14.0			
	CLAY Reddish-Brown		GC		PA			<u> </u>			
7/7	CLAYEY CHERT GRAVEL	5-	<u> </u>								_
72	White, Reddish-Brown, and Gray, Loose to Medium Dense]	JGC	3	SS	9	5/6" 14/6"	17.0			S-3 P200=
		.	 	<u> </u>	PA		1770				30.4%
44	8.5	-	 								
	CLAYEY CHERT GRAVEL	<u> </u>	GC	4	SS	12	56	22.8			
	White, Yellowish-Brown, and Gray, Very Dense	10 -	-		TO A						
	, , , , , , , , , , , , , , , , , , , ,	•	-		PA		,				
			-	! ! !							
///	13.5 78.6	-	:	<u>:</u>							
70 A	WEATHERED SHALE+	-		5	SS PA	5	50/5"	19.8		!	
	Black. Soft to Moderately Hard	. 15 -	_	1	PA			ļ			
AVIL		٠.	_	;							
100 mm		_	_								L 1 1 1 2
A Company						-	50 (5)				<u>!</u>
Andrew Control			<u>-</u>		SS PA	2	50/2"	15.4		1	<u>:</u>
	21.0	20 -	<u>-</u>				 				
	SHALE+		<u>-</u>	?	ļ .						:
	Black, Hard	_	_ 	2	:				<u> </u>	<u> </u>	<u>.</u>
	23.5 68.6	_	-	7	SS ·	0	50/0"			i	<u>!</u> !
7	BOTTOM OF BORING										
	+Classification estimated from		i						-		
Tue	Continued Next Page TRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY 1	INES		V- 100		Cal	l. .ibrate	l d Ha~d	Penet	rometer	† •
35.745	EN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE	RADUAI	L.						. GITC		
	WATER LEVEL OBSERVATIONS			, " ·			G STAR	<u> </u>		7-15	The second second
WL AL	= 2.5' WD ¥ 3.0' AB	7		1		ORIN UG	G COM	PLETEI E-75		7-1: DREMAN	5-96 KS
^ _ 71_					2	PPRO		DLE		<u> </u>	4965190
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ow:	City of Tulsa	ARCI	ПТЕС	T/EN	GINE	ER Mon	tgomer	v Wa	tson		
SITE	Lake Spavinaw Spavinaw, Oklahoma	РКОЛ	ECT	Pr			- "		ent Plai	nt	
			T	Τ		PLES				ESTS	
GRAPHIC LOG	DESCRIPTION	DEPTH (FT.)	SYMBOL	ER.	1	RECOVERY, IN.	N / FT.	MOISTURE, %		UNCONFINED STRENGTH PSF	
GRA		DEP1	SUSI	NUMBER	TYPE	RECC	SPT - BLOWS	MOIS	PCF PCF	STRE	
	disturbed samples. Core samples and petrographic analysis may reveal other rock types.										
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			** a						Manage designation of the second seco		
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WATER LEVEL OBSERVATIONS

WL = 2.5' WD ¥ 3.0' AB

WL

WL



BORIN	G STA	RTED	7-	15-96	
BORIN	G СОМ	PLETED	7-	15-96	
RIG	СМ	E-75	FOREMA	N K	;
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	LOG OF BOI	UN	G	N	J.	В-	3				Pag	e 1 of 2
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SITE	Lake Spavinaw	PRC	JEC	T			78.3		:	<u> </u>		
	Spavinaw, Oklahoma		- 1		Pro		ed W	ater T	reatm	ent Pla		
	· ·	_				SHIT		<u> </u>		Γ.	TESTS	<u> </u>
1.06		(FT.)		SYMBOL			NI,	Ε.	× .	DENSITY	8	
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GRAPHIC	Surface Elev.: 100.2 ft.	DEPTH		SSSN	NUMBER	TYPE	RECOVERY	SPT - BLOWS	MOISTURE,	PCF	UNCONFINED STRENGTH PSF	
H	1 0 6" Topsoil		士			PA			<u> </u>			
	Possible Fill: SILT WITH CLAY		\int		1	SS	14	9	21.7			
	Dark Brown		+	-	2	SS	15	10	17.2		*3000	
	Possible Fill: LEAN CLAY WITH CHERT GRAVEL AND SAND.					33	1.7	10	17.2		3000	·
	AND SILT SEAMS		\pm	-		PA		···	<u> </u>		<u> </u>	
	5.0 Reddish-Brown and Dark Brown 95.2	_	4									
///	BROKEN CHERT WITH CLAY	5	70	GP	3	SS	8	21	7.5			
	White, Medium Dense		1						<u> </u>			
			_	1		PA	1				<u> </u>	
11/	8.5 91.7		4	į			ļ				*	
	LEAN TO FAT CLAY, TRACE			L	4	SS	18	13	21.9		*8000	
	CHERT GRAVEL Mottled Reddish-Brown and	10	<u> </u>	H					1			
	Gray-Brown, Very Stiff	10	\exists	-		PA						
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	13.5 86.7		=	:		: i						
////:	LEAN TO FAT CLAY WITH		_(L	5	SS	18	9	16.5		*8000	
	CHERT GRAVEL, TRACE SILT SEAMS	15	-(-H		PA			:			LL=45 PL=17
	Mottled Gray and		-	:		FA.					•	PI=28
	Yellowish-Brown, Very Stiff		_									P200=
												69.5%
11111	18.5 81.7		_	- :		55		E0/1"				
	SHALE+ Black, Hard		<u> </u>			SS .		50/1"	6.8			
		20	_	1		PA			i İ		•	
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	WATER LEVEL OBSERVATIONS				-Charles	Е	ORIN	G STAR	TED	No. 2000 Sugar	7-15	-96
ット	= 30.0' WD ₹ 32.0' AB	، حس			D. (1888	В	ORIN	G СОМІ	PLETEI)	7-15	-96
77.	±30.0' WD ≥32.0' AB C		L	L		R	ug	CMI	E-75	FC	REMAN	KS
77.							PPRS	VED	DLB	10	B # 0	4965190
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City of Tulsa SITE Lake Spavinaw Spavinaw, Oklahoma PROJECT Proposed Water Treatment Plant SAMPLES TESTS OESCRIPTION DESCRIPTION SHALE- Black, Hard SHALE- Black, Hard SHALE- Black apples of the state of from disturbed samples and petrographic analysis may reveal other rock types.
STE Spavinaw, Oklahoma DESCRIPTION DESCRIPTION DESCRIPTION SHALE+ Black, Hard SAMPLES TESTS T
DESCRIPTION
DESCRIPTION Total File
SHALE+ Black, Hard
33.5 BOTTOM OF BORING +Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.
BOTTOM OF BORING +-Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.
BOTTOM OF BORING +Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.
+Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE ROUNDARY LINES Calibrated Hand Penetrometer*
BETWEEN SUIL AND ROCK TYPES: 18-5110, THE TRANSITION MAY BE GRADUAL.
WL ₹30.0' WD ₹32.0' AB WL BORING COMPLETED 7-15-96 RIG CME-75 FOREMAN KS
WL APPROVED DLB JOB # 04965190

	LOG OF BOI	RING	N	Ο.	В-	4				Pag	e 1 of 2	
OWN	OWNER City of Tulsa ARCHITECT/ENGINEER Montgomery Watson											
SITE	Lake Spavinaw	PROJE	CT						. 101		., -	
	Spavinaw, Oklahoma	Proposed Water Treatment P								Plant TESTS		
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	DESCRIPTION	(FT.	SYMBOL			Υ, Ι	표	யி	DENSITY			
보	DESCRIPTION	F		Ë		VER	. N	H	EN	158 175		
GRAPHIC	G 6 71 1040 B	DEPTH	nscs	NUMBER	TYPE	RECOVERY,	SPT - BLOWS	MOISTURE,	FR	UNCONFINED STRENGTH PSF		
	Surface Elev.: 104.9 ft. 6" Topsoil			Z	PA	22	ഗമ	Σ	00	⊐ທ⊈		
	GRAVELLY SILTY LEAN CLAY	-	CL	1		12	13	9.2	<u> </u>		S-1	
	2.0 Brown 102.9	-	ML CL	2	SS	16	13	17.0		*6000	P200 = 53.4%	
	GRAVELLY LEAN CLAY Reddish-Brown, Very Stiff	_	CL	4	35	10	13	17.0		10000	S-2	
	4.0 100.9 CLAYEY CHERT GRAVEL	_			PA						P200=	
72	White and Reddish-Brown,	5-	-								40.6%	
	Medium Dense	_	GC	3	SS	16	15	12.2		*5000	e e	
12			<u> </u> 	,	PA							
	7.5 97.4 <u>LEAN TO FAT CLAY WITH</u>	. <u>-</u>	<u> </u>							<u> </u>	"	
	CHERT GRAVEL, TRACE	<u>-</u>	ICL.	4	SS	14	6/6"	18.0	· · · · · ·	*5000		
	SILTY CLAY SEAMS Mottled Reddish-Brown and	_	СН				18/6"	1 1				
	Yellowish-Brown, Very Stiff	10 —			PA							
		_										
	∓	! <u>-</u>										
	13.5 91.4	<u> </u>										
	LEAN TO FAT CLAY, TRACE CHERT GRAVEL, TRACE	<u> </u>	CL CH	5	SS	6	13	22.3		*8000		
	SILT SEAMS	15 —			PA			1		<u> </u> 		
	Mottled Brown and Gray-Brown,	_	•								, a	
	Very Stiff	: -	•			į					:	
	18.0 86.9 CLAYEY CHERT GRAVEL.	. –										
	TRACE SHALE FRAGMENTS	: -	GC	6	SS	18	50	14.5				
	White, Gray, Brown, and	20 —										
	Reddish-Brown, Very Dense		•		PA							
44		-		j¹								
			-	j.								
	24.0 80.9	_	-	7	SS	7	24/6"	11.9		<u> </u>		
	SHALE+	25 —			PA		50/1"	***	<u> </u>	<u> </u> 		
	Black, Hard		,			·						
	Continued Next Page		-				155			Z N. W. C	. 22.7 33.22(5	
THE S	TRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LI EN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE D	NES RADUAL	<u>. </u>			Cal	ibrated	d Hand	Penet	rometer*		
	WATER LEVEL OBSERVATIONS				Е	ORIN	G STAR	TED	,	7-15	-96	
WL	₹20.0' WD ₹12.0' AB	e e	.	سر ج			G COMI	PLETEI)	7-15	-96	
WL	= 20.0' WD ≥ 12.0' AB TELL	۵L			B	UG	СМП	E-75	FC	DREMAN	KS	
WL				-	A	PPRO	VED	DLB	10	в# 0	4965190	

	LOG OF BO	RING	N	o.	В-	4		. >		Page	e 2 of 2
OWN	ER City of Tulsa	ARCHITECT/ENGINEER Montgomery Watson									
SITE	Lake Spavinaw Spavinaw, Oklahoma	PROJE	CT	D			ater T				
	Sparmarr, Oktahoma	 	T	FR		PLES		reatm	ent Pla	TESTS	
GRAPHIC LOG	DESCRIPTION	ОЕРТН (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT.	MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF	
	SHALE+ Black, Hard	-		8	SS	1	<i>5</i> 0/1"	15.9			
					PA						
		30					·				
	33.6 71.3	-		9	SS	1	50/1"	20.1			•
	 BOTTOM OF BORING +Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types. 										
And the second s						:			-		
										9.	
	TRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LI EN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE					Cal	crated	Hand	Penetr	ometer*	reactive programme and consequently
25 85	WATER LEVEL OBSERVATIONS	ANDUAL.			В	ORIN	STAR	ΓED		7-15-	.06
7.7	and the control of th	<u> </u>		<u>.</u> . <u></u> ,			G COMP			7-15-	VS
7.7:	± 20.0' WD ¥ 12.0' AB	ar			R	IG	СМЕ	<u> </u>	- <u> </u>	REMAN	KS
17.					" \	PPRO		DLB		3# 04	
Acres (September 1987)	s some on the community of the community	بجدون وساد	يتلاوينو			-					

	LOG OF	BOR	ING	N().	B-5	5				Page	1 of 2	
OWNER City of Tulsa					ARCHITECT/ENGINEER Montgomery Watson								
SITE	TE Lake Spavinaw Spavinaw, Oklahoma				PROJECT Proposed Water Treatment Plant								
	Dparman, Commona	1					PLES				TESTS		
G			$\overline{}$				z ſ	FT.	×	≥			
F00		Ì	(FT	SYMBOL			<u>`</u>		ıî.	SI	E E		
21	DESCRIPTION				띪		VER	Z \	Ę	DENSITY	NET	:	
GRAPHIC			DEPTH	SOSD	NUMBER	TYPE	RECOVERY, IN.	SPT - BLOWS	MOISTURE,	PCF	UNCONFINED STRENGTH PSF		
GR	Surface Elev.: 103.9 ft.		_ 💆	5		FA	₹	<u>ത</u> <u>അ</u>	Σ				
	6" Topsoil GRAVELLY SILTY LEAN CLAY	ļ	_	CL	1	SS	8	11	15.9		*4000		
	2.0 Brown, Very Stiff	101.9	_	ML				,					
	GRAVELLY LEAN CLAY		-	CL	2	SS	8	9	14.9		*5000	S-2 LL=41	
	Reddish-Brown, Very Stiff		_	-	<u> </u>	PA			<u> </u> 	<u> </u>	<u> </u>	PL=19	
			-			FA						PI=22	
			5 -	CL	3	SS	4	9	12.5				
	X		-										
			_	1		PA				,			
	8.5	95.4	_	-	,		-						
	LEAN TO FAT CLAY WITH		-	CL	4	SS	18	9	22.8		*4000	S-4 LL=40	
	SILTY CLAY SEAMS, TRACE CHERT GRAVEL		10 -	СН		TD A			<u> </u>		<u> </u>	PL=18	
////.	Mottled Reddish-Brown and		-			PA				ļ		PI=22	
	Brown, Very Stiff		-	1		ľ						P200= 99.0%	
			_	-								99.076	
			-	CL	5	SS	6	9	23.3	1	*3000	<u> </u>	
	14.5	89.4] :	CH		33	0)	22.2		3000		
	LEAN TO FAT CLAY, TRACE CHERT GRAVEL AND SILT		15 -	+	<u>' </u>	PA		1	1	1		Ì	
	SEAMS			_			ļ		;		1		
	Mottled Gray and		ļ . <u>-</u>	_					ĺ		:		
	Yellowish-Brown, Stiff 18.5	85.4						:	:		:		
	CLAYEY CHERT GRAVEL.			GC	6	SS	16	64	15.6				
	TRACE SHALE FRAGMENTS	· <u>*</u>	20 -	<u> </u>	<u> </u>	1		<u> </u>	1	<u> </u>	:		
72	White, Gray, and Brown, Very Dense					PA					:		
				<u> </u>	1			į					
	· · · · · · · · · · · · · · · · · · ·	ÿ ROA	-	-; ·					İ		!		
72	23.5 <u> </u>	= 80.4	-		<u> </u>	<u>!</u> ⊤SS	1	i ⊹50/4"	1126	 	<u>:</u>	<u>-</u>	
	WEATHERED SHALE— Black, Soft to Moderately Hard					PA		i	112.0	<u>' </u>			
	Diack, John to Intoleracy Comme		25	<u> </u>	Ì			1					
	Continued Next Page					!		1					
7.HE	STRATIFICATION LINES REPRESENT THE APPROXIMATE BO EEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION	DUNDARY L	INES GRADUA				Ca	librat	ed Han	d Rene	trometer	*	
557	WATER LEVEL OBSERVATIONS						BORI	NG STA	RTED	a yan seba g	7-1	5-96	
-2.7				-			BORI	NG COM	APLETI	ED	7-1	5-96	
271		277					RIG	CM	IE-75		FOREMA:	· KS	
Wit.	No.						APPR	CVED	DL	В	IOB#	04965190	
·	the state of the s			11 y.s.									

	LOG OF	BOI	T				<u> </u>		<u> </u>		Page 2 of	2	
OWN	ER City of Tulsa	ARCHITECT/ENGINEER Montgomery Watson											
SITE	Lake Spavinaw		PROJE	CT									
	Spavinaw, Oklahoma		<u> </u>		Pro		ed W	ater T	reatm	ent Pl	ant TESTS		
GRAPHIC LOG	DESCRIPTION		DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT.	MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF		
	WEATHERED SHALE+ Black, Soft to Moderately Hard		- - - - -		8			50/2"			30.1		
	31.0 SHALE+ Black, Hard	72.9	30 —										
	33.6	70.3			9	SS	1	50/1"	13.4				
	BOTTOM OF BORING -Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.												

		the Market											
THE S SET WE	CTRATIFICATION LINES REPRESENT THE APPROXIMATE BOUND SEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MA	ARY LII Y BE GI	NES RADUAL.	A	s		Cali	Ératec	Hand	Penetr	ometer#		
	WATER LEVEL OBSERVATIONS					В	BORING STARTED				7-15-96		
	± 23.0' WD ¥20.0' A3	-				В		COMP	<u> </u>		7-15-96		
WIL			ــا لــ		5 E .		IG	CME		 ;	 	KS_	
X',,						Α	PPPO	νED	DLB	101	B# 049651	90	

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	Results of Material	rassing #zoo Sieve Test - Percent Passing		69.5				0'66														
		#200	30,4		53.4	40.6	-		28.8													
	assing	#40	33.3		58.2	45.7			31.6													
ANT	Percent F	#10	42.7		67.1	57.4			40.6													
ESULTS	Results of Sieve Analysis · Percent Passing	Analysis -	Analysis -	Analysis -	Analysis -	Analysis •	Anafysis -	nafysis -	nafysis -	nafysis -	nafysis -	Anafysis -	Analysis •	#4	55.5		76.2	68.4			48.9	
SUMMARY OF LABORATORY TEST RESULTS PROPOSED LAKE SPAVINAW WATER TREATMENT PLANT SPAVINAW, OKLAHOMA JOB NO. 04965190		1/2"	74.3		95.1	86.6			77.4													
Y OF LABORATORY TEST SPAVINAW WATER TRE SPAVINAW, OKLAHOMA JOB NO. 04965190	Results	3/4"	100		100	100		* #	82.3													
OF LAB SPAVINA SPAVINA JOB N									100													
JMMARY ED LAKE	mits	Ē		28			22	22														
SI ROPOSI	Atterborg Limits	14					19	18														
	Atte	=		46			41	40														
	Sample Depth		5 to 6.5'	13.6 to 16'	0.5 to 2'	2 to 3.6'	2 to 3.5'	8.5 to 10'	18.5 to 20'	ĵ.												
	Sample No.		S:3	5 5	S-1	5.5	S-2	S.4	9-8													
	Boring No.		В.2	11.3	B-4	D.4	B-5	8-6	B-5													

BIROTHI OTAUR

Terracon

	Electrical Resistivity (ohm-cm)*	5,560	16,390	57 9,090 57 590		
LANT	Water Soluble Chloride (ppm) 57	57	57			
SUMMARY OF ANALYTICAL TEST RESULTS PROPOSED LAKE SPAVINAW WATER TREATMENT PLANT SPAVINAW, OKLAHOMA JOB NO. 04965190	Water Soluble Sulfate (ppm)	27	66	មិ	855	onductance test.
ARY OF ANALYTICAL TEST KE SPAVINAW WATER TRE SPAVINAW, OKLAHOMA JOB NO. 04965190	Н	6,48	6.40	6,15	6.60	*Based on specific conductance test.
SUMMA PROPOSED LA	Sample Depth(s)	8,5 to 10'	2 to 3.5' & 5 to 6.5'	13.5 to 15'	23.5 to 23.9' & 28.5 to 28.7'	*Ba
·	Sample No.	S-4	S 2 & S-3 (combined)	9.8	S-7 & S-8 (combined)	
	Boring No.	B-3	þ-{	B-6	13-5	

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UNIFIED SOIL CLASSIFICATION SYSTEM

			· · · · · · · · · · · · · · · · · · ·	Soi	I Classification
Criteria	a for Assigning Group Symbols	and Group Names Using	Laboratory lests	Group Symbol	Group Name ^B
Coarse-Grained Soils	Graveis	Clean Gravels	Cu ≥ 4 and 1 ≤ Cc ≤ 3 ^E	GW	Well-graded gravel ^F
More than 50% retained on No. 200 sieve	More than 50% of coarse fraction retained on	Less than 5% fines ^C	Cu < 4 and/or 1 > Cc > 3 ^E	GP	Poorly graded gravel ^F
NO. 200 Sieve	No. 4 sieve	Converte with Sings	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
		Gravels with Fines More than 12% fines ^c	Fines classify as CL or CH	GC	Clayey gravel ^{F, G, н}
	Sands	Clean Sands	Cu ≥ 6 and 1 ≤ Cc ≤ 3 ^E	sw	Well-graded sand
84. 24	50% or more of coarse fraction passes	Less than 5% fines ²	Cu < 6 and/or 1> Cc > 3 ^E	SP	Poorly graded sand
	No. 4 sieve	Sands with Fines	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}
ing the second s		More than 12% fines	Fines classify as CL or CH	sc	Clayev sand ^{G, H, I}
Fine-Grained Soils	Silts and Clays	inorganic	PI > 7 and plots on or above "A" line	CL	Lean clay ^{K. L. M}
50% or more passes the No. 200 sieve	Liquid limit less than 50	•	Pl < 4 or plots below "A" line ^J	ML	Silt ^{K, L, M}
10. NO. 230 Sieve		accomio	Liquid limit — oven dried		Organic clay ^{K, L, M, N}
P^{\prime}		organic	Liquid limit — not dried	OL	Organic silt ^{K, L, M, O}
	Siits and Clays	inorganic	Pliplots on or above "A" line	СН	Fat clay ^{K 'A}
na dia kacamatan di Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn	Liquid limit 50 or more	-	Pl plots below "A" line	МH	Elastic silt ^{K, L, M}
		organia -	Liquia limit — oven dried	ОН	Organic clay ^K - ^{M. P}
The state of the s		organic	Liquid limit — not dried	UH	Organic silt ^{K, L, M, O}
Hignly organic soils	P-marily or	rcanic matter, dark in color.	and organic odor	ΡΪ	Peat

Based on the material passing the 3-in. (75-mm) sieve.

Eff field sample contained cobbles or boulders, or both, add "with cobbles or bounders, or both" to group name.

Grave's with 5 to 12% fines require dual

symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

Sands with 5 to 12% fines require dual symbols:

SW-SM well-graced sand with silt SW-SC well-graced sand with diay SP-SM poorly graded sand with silt SP-SC poorly graded sand with diay $^{\Xi}$ Cu = D_{50}/D_{10} Cc = $\frac{(D_{50})^2}{D_{-1} \times D_{-2}}$

Fit soil contains ≥ 15% sand, and "with sand" to group name.

Significant classify as CL-ML, use dual symbol GC-GM, or SC-SM.

് fines are organic, add haith organic fines" to ൂലാഗ name.

If soil contains \geq 15% gravel, add "with grave!" to group name.

If Atterberg limits plot in shaded area, soil is a CL-M⊥ silty clay. If soil contains 15 to 29% plus No. 200, add with sand" or "with gravel", whichever is predominant.

Hf soil contains ≥ 30 % plus. No. 200 predominantly sand, add "sandy" to group name.

"If soil contains ≥ 30% plus No. 200. predominantly gravel, add "gravelly" to group name.

*P! ≥ 4 and picts on or above "A" line.

²PI < 4 or plots below "A" line.

Pliciots on or above "A" line.

²Pl clots below "A" line.

