MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS
USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	GEO PRO, INC.	PROJECT NUMBER:	02116310 .0007A
LOCATION:		DATE:	5/2/2011
SAMPLE ID:	GEOPRO'S THERMAL GROUT SELECT 1.00	PANEL IDENTIFICATION:	Lenexa Perm Board
	BENTONITE(Thermal Grout Select) - 11.11%	BURETTE AREA:	0.312 cm^2
	SAND (5010) - 55.56%	BURETTE INCREMENT LENGTH:	1.000 cm
	DEIONIZED WATER - 33.32%	VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g		WET WT, g	112.3		
D & T, g		DIA, in	2.428	6.17	cm
T, g		HT, in	0.995	2.53	cm
		AREA		29.88	cm^2
MOIST-		DENSITY:	92.9	PCF WET	
URE, %	**NA**	DENSITY:	**NA**	PCF DRY	

ADDITIONAL DATA

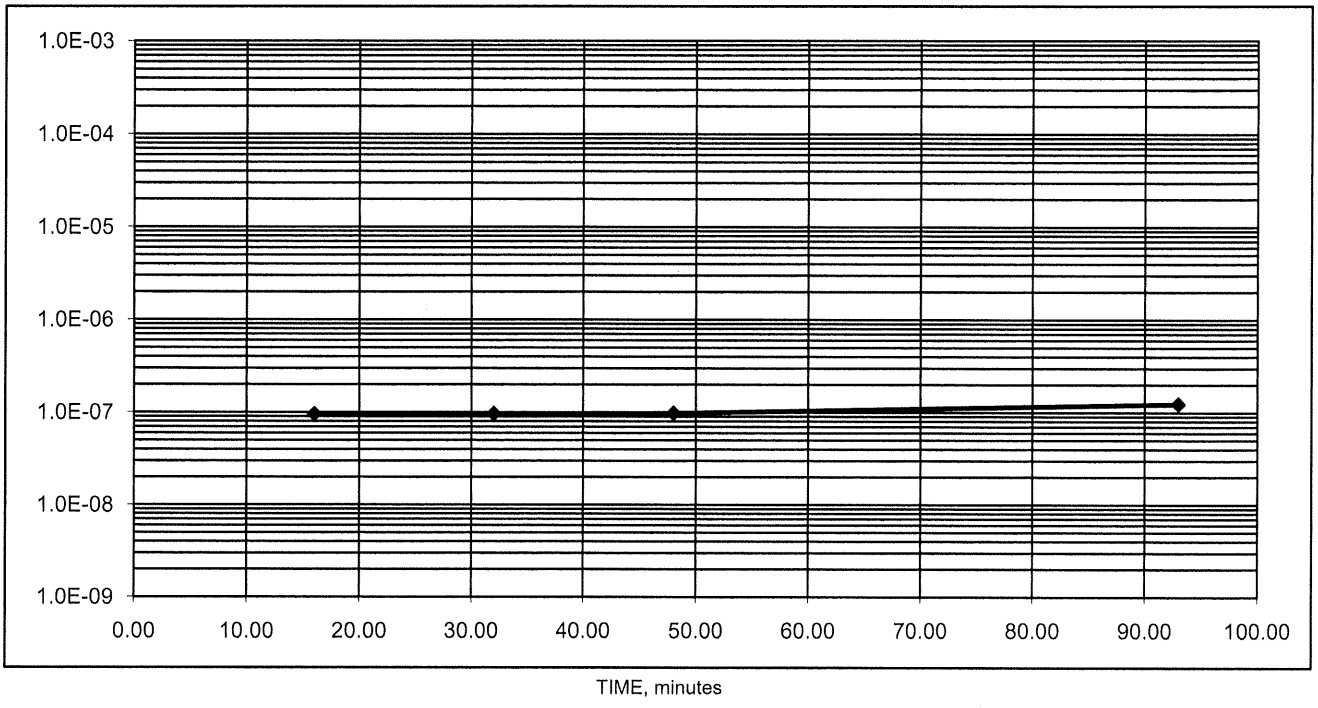
SPECIFIC GRAVITY:	2.60	RECOMPACTED?:	YES
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	NA	OPTIMUM, %:	NA
SATURATION, %:	NA	COMPACTION, %:	NA
VOID RATIO:	NA	OVER OPTIMUM, %:	NA

SATURATION:	LATERAL PRESS.:	104.0	psi	BACK PRESSURE (=UPPER=LOWER):	100.0	psi	
DURING TEST:	LATERAL PRESS.:	104.0	psi	H2: 100.0 psi	H1:	100.0	psi
				BIAS PRESSURE (=H1-H2)		0.0	psi

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
11.2	62.7	0.00	51.5									
11.4	62.5	16.00	51.1	0.007797	9.58E-08	0.06	0.06	1.00	20.2	7	24.8	0.893
11.6	62.3	32.00	50.7	0.007859	9.65E-08	0.06	0.06	1.00	20.1	7	24.8	0.893
11.8	62.1	48.00	50.3	0.007921	9.78E-08	0.06	0.06	1.00	19.9	5	24.6	0.897
12.5	61.4	93.00	48.9	0.028228	1.24E-07	0.22	0.22	1.00	19.4	19	24.7	0.895

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE 1.0E-07 cm/sec

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	20	% < 25 AT
HYDRAULIC	1.0E-04 TO 1.0E-05	5	RATIO	MAX	> 1.0E-8
GRADIENT	1.0E-05 TO 1.0E-06	10	<1.25	HYDRAULIC	OR
	1.0E-06 TO 1.0E-07	20		GRADIENT	% < 50 AT
	less than 1.0E-07	30		ALLOWED	< 1.0E-8



Terracon

MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER
ASTM D 5084 - 03 METHOD C TEST WITH INCREASING TAILWATER LEVEL
FLUID: DEAIRED TAP WATER WITH 0.005 N CaSO4

PROJECT NAME:	GEO PRO, INC.	PROJECT NUMBER:	02116310 .0008
LOCATION:		DATE:	4/22/2011
SAMPLE ID:	GEOPRO'S THERMAL GROUT SELECT 1.20	PANEL IDENTIFICATION:	Lenexa Perm Board
	BENTONITE(Thermal Grout Select) - 7.94%	BURETTE AREA:	0.312 cm^2
	SAND (5010) - 63.5%	BURETTE INCREMENT LENGTH:	1.000 cm
	DEIONIZED WATER - 28.56%	VOLUME PER INCREMENT:	0.312 cm^3

INITIAL

MOISTURE%		DENSITY			
W & T, g		WET WT, g	137.4		
D & T, g		DIA, in	2.433	6.18	cm
T, g		HT, in	0.993	2.52	cm
		AREA		30.00	cm^2
MOIST-		DENSITY:	113.4	PCF WET	
URE, %	NA	DENSITY:	NA	PCF DRY	

ADDITIONAL DATA

SPECIFIC GRAVITY:	2.60	RECOMPACTED?:	YES
SPECIFIC GRAVITY:	ASSUMED	PROCTOR, pcf:	NA
POROSITY, %:	NA	OPTIMUM, %:	NA
SATURATION, %:	NA	COMPACTION, %:	NA
VOID RATIO:	NA	OVER OPTIMUM, %:	NA

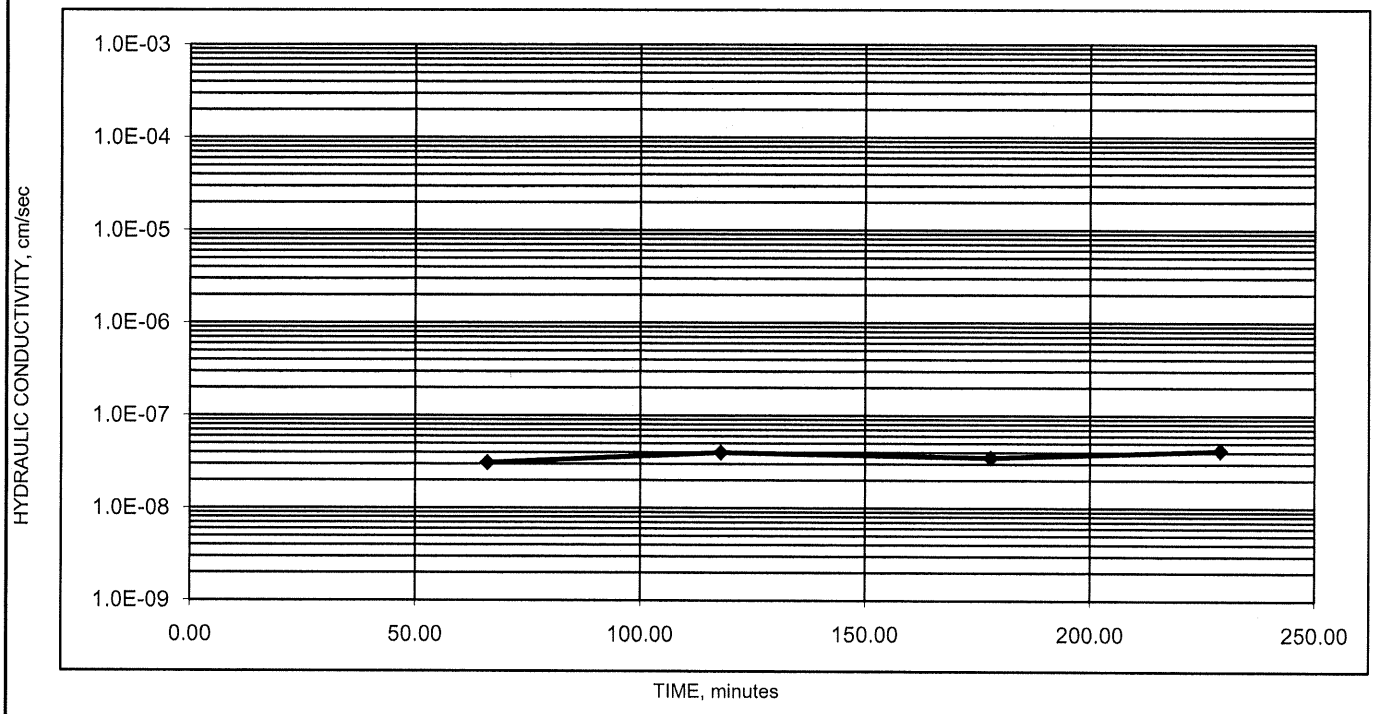
SATURATION:	LATERAL PRESS.:	104.0	psi	BACK PRESSURE (=UPPER=LOWER):	100.0	psi	
DURING TEST:	LATERAL PRESS.:	104.0	psi	H2: 100.0 psi	H1:	100.0	psi
				BIAS PRESSURE (=H1-H2)		0.0	psi

H1 VALUE	H2 VALUE	ELAPSED TIME, min	DELTA H cm	Ln H1/H2	HYD CON k, cm/sec	OUT FLOW cm^3	IN FLOW cm^3	OUT/IN RATIO	HYD GRAD	% FROM MEAN k	TEMP.: C	TEMP. CORR.:
8.7	65.5	0.00	56.8									
9.0	65.2	66.00	56.2	0.010620	3.10E-08	0.09	0.09	1.00	22.3	16	25.5	0.879
9.3	64.9	118.00	55.6	0.010734	3.99E-08	0.09	0.09	1.00	22.0	8	25.3	0.883
9.6	64.6	178.00	55.0	0.010850	3.51E-08	0.09	0.09	1.00	21.8	5	25.1	0.887
9.9	64.3	229.00	54.4	0.010969	4.18E-08	0.09	0.09	1.00	21.6	13	25.0	0.889

HYDRAULIC CONDUCTIVITY (k_{20}) = AVERAGE 3.7E-08 cm/sec

MAXIMUM	1.0E-03 TO	1.0E-04	2	0.75<	30
HYDRAULIC	1.0E-04 TO	1.0E-05	5	RATIO	MAX
GRADIENT	1.0E-05 TO	1.0E-06	10	<1.25	HYDRAULIC
	1.0E-06 TO	1.0E-07	20		GRADIENT
	less than	1.0E-07	30		ALLOWED

% < 25 AT > 1.0E-8 OR % < 50 AT < 1.0E-8



Terracon