



Serving Construction Industry
Since 1977

TERRA TESTING, INC.

ENVIRONMENTAL | GEOTECHNICAL | CONSTRUCTION MATERIAL TESTING

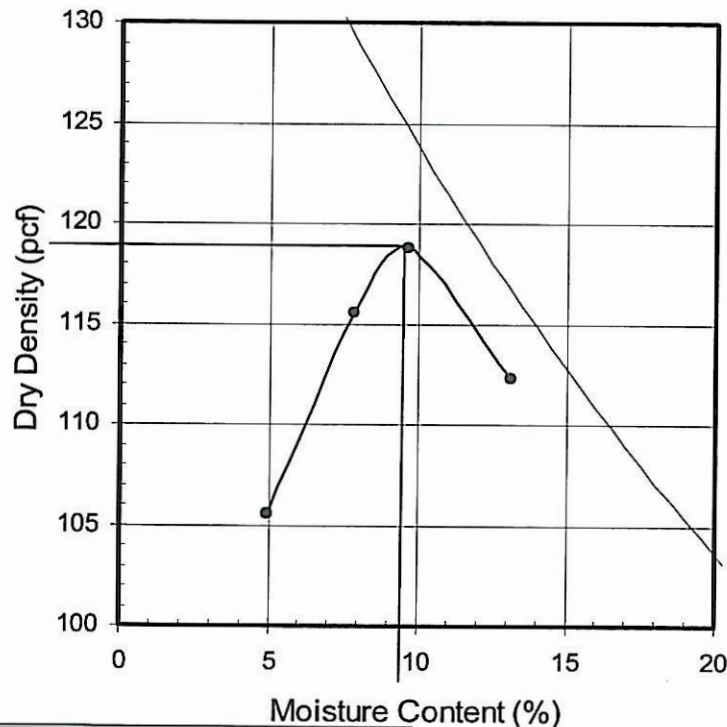
Attachment 1

Client: Viper Products & Services	Date of Report: 12-9-10
Project: Viper Seal Pit Liner	Project No.: Mise-51
Description of sample: Clayey Sand Mixed with 0.5% Viper Seal Pit Liner	Invoice No.: 231741
Location of sample: Submitted by Client	Reference No.: 231741/ 12-09-10
Method: ASTM D-698 <input checked="" type="checkbox"/> ASTM -1557 <input type="checkbox"/>	Sample No.: 9923
Procedure: A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	Date of Sample: 12-09-10
	Reviewed by: Abraham Benjamin

Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D 698

General test parameters				Soil sieve data	
Sample preparation:	Moist <input type="checkbox"/>	Dry <input checked="" type="checkbox"/>		% Retained 3/4-in	0.0
Type of rammer:	Mechanical <input checked="" type="checkbox"/>	Manual <input type="checkbox"/>		% Retained 3/8-in.	0.0
Specific gravity:	Actual <input type="checkbox"/>	Estimated <input checked="" type="checkbox"/>		% Retained #4	0.0

Maximum Dry Density, pcf = 119.0 Optimum Moisture, % = 9.4



Distribution:

Zack Tuttle,

1 Copy

Respectfully submitted,
TERRA TESTING, INC.


Jerry Sayson, BSCE
Vice President-Operations

This report is for the sole use of the client addressed. The use of our company name must receive prior written consent. It applies only to the sample tested, and does not necessarily represent identical or similar sample.

WWW.TERRA-ENG.COM

P. O. BOX 16605 | 5208 34TH STREET | LUBBOCK, TX 79490-6605 | 806.793.4767 | FAX 806.793.4768



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Attachment 2

Client: Viper Products & Services	Project #: Misc 51
Project: Viper Seal Pit Liner	Invoice #: 231741
Identification: Clayey Sand mixed with 0.5% of Viper Seal Pit Liner	Sample #: 9923
	Date of Sample: 12/8/2010

FLEXIBLE WALL PERMEABILITY TEST, ASTM D-5084

Sampling Method: Client submitted the samples on December 7, 2010.

Test Method: Method C

Sample Preparation: Mixed soil sample remolded by ASTM D 698.

Test Specimen

Diameter (inch): 4.00

Height (inch): 1.20

Temperature, ° C: 22

Moisture Density Relationship

Proctor Type: ASTM D 698

Optimum Moisture: 9.4

Max. Dry Density: 119.0

Date	Final Time		Initial Time		t, in sec	Inflow, cm		Outflow, cm		Pressure, psi			h1 in cm	h2 in cm	Hydraulic conductivity, cm/sec
	hr	min	hr	min		Final	initial	Final	Initial	Cell	In	Out			
12/13/10	11	40	8	10	12600	2.10	1.00	22.90	24.00	50	45	40	378.14	375.59	8.712E-09
	15	10	11	40	12600	3.20	2.10	21.80	22.90	50	45	40	375.59	373.05	8.771E-09
12/14/10	11	40	8	10	12600	4.30	3.20	20.70	21.80	50	45	40	373.05	370.51	8.831E-09
	15	10	11	40	12600	5.40	4.30	19.60	20.70	50	45	40	370.51	367.97	8.892E-09

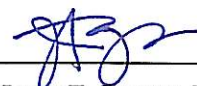
Termination criteria: The permeation was discontinued when at least four values of hydraulic conductivity were obtained over an interval of time in which; 1) the ratio of outflow to inflow rate was between 0.75 and 1.25 and 2) the hydraulic conductivity was steady. The hydraulic conductivity shall be considered steady if 4 or more consecutive reading range within ±50% for $k < 1 \times 10^{-8}$ cm/sec or, within ±25% for $K = 1 \times 10^{-8}$ cm/sec.

Hydraulic conductivity, k in cm/sec (Average of last four (4) consecutive reading)	$k = \frac{a_{in} a_{out} L}{A t (a_{in} + a_{out})} \ln \frac{h_1}{h_2}$	=	8.861E-9
Temperature Correction		=	0.95329
Corrected hydraulic conductivity for	$20^\circ \text{C} (68^\circ \text{F}), k_{20} R_T k$, in cm/sec	=	8.447E-9

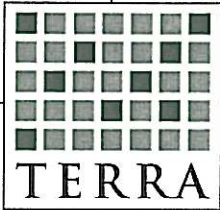
where:

- a_{in} = cross-sectional area of the reservoir containing the influent liquid, 0.8653 cm²
- a_{out} = cross-sectional area of the reservoir containing the influent liquid, 0.8653 cm²
- L = length of specimen, cm
- A = cross-sectional area of the specimen, cm²
- t = elapsed time between determination of h1 and h2
- h₁ = head loss across the specimen at time t1, in cm
- h₂ = head loss across the specimen at time t2, in cm
- R_T = Viscosity of water at test temperature, in ° C

Reviewed By:



 Jerry T. Sayson, BSCE
 Vice President, Operations



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ENVIRONMENTAL | GEOTECHNICAL | CONSTRUCTION MATERIAL TESTING

Client: Viper Products & Services	Date of Report: 12-14-10
Project: Viper Seal Pit Liner	Project No.: Mise-51
Description of sample: Clayey Sand and Viper Seal Pit liner	Invoice No.: 231741
	Sample No.: 9923

Summary of Test Results

Terra Testing, Inc. (Terra) was commissioned by Viper Products & Services to perform permeability tests on their Viper Seal Pit Liner. The Client submitted the materials to Terra. It consisted of 40 pounds of clayey soil and 50 pounds of white powder material identified as Viper Seal Pit Liner. The Client requested permeability tests in accordance with ASTM D 5084 – Standard Test Method for Hydraulic Conductivity of Saturated Porous Materials by Flexible Wall Permeameter Method C.

Permeability Test of Saturated Pure Viper Seal Pit Liner – The Viper Seal Pit Liner was poured on a 4 inch cylinder to mold a sample 1.0 inch thick with 4.0 inches diameter. It was then subjected to permeability test in accordance with Method C of ASTM D 5084. Water was introduced to the sample and allowed to saturate. After five days of saturation and monitoring, readings were taken and indicated that the sample has become impervious. There was no measurable flow going through the sample. We therefore conclude that the Viper Seal Pit Liner will become impervious when allowed to get saturated with water.

Permeability Test of Saturated Soil and Viper Seal Pit Liner mix – Terra determined the maximum density and optimum moisture of the clayey soil through laboratory compaction characteristic test in accordance with ASTM D 698 (see attachment 1). Soil sample was then mixed with 0.5% of Viper Seal Pit Liner by weight. The sample was then remolded in accordance with ASTM D 698. It was then subjected to permeability test in accordance with Method C of ASTM D 5084. After five days of saturation and monitoring, readings were taken and indicated that the resulting hydraulic conductivity is 8.44×10^{-9} cm/sec (see attachment 2).

Distribution:

Zack Tuttle,

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Respectfully submitted,
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Jerry Sayson, BSCE
Vice President-Operations

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ENVIRONMENTAL | GEOTECHNICAL | CONSTRUCTION MATERIAL TESTING

Client: Viper	Project #: Misc 51
Project: Viper Seal Pit Liner	Invoice #: 231812
Identification: Silty Clayey Sand (SC-SM)	Sample #: 9923A
	Date of Report: 2/2/2011

FLEXIBLE WALL PERMEABILITY TEST, ASTM D-5084-90

Sampling Method: Client submitted the Samples on December 7, 2010.

Liquid Limit (ASTM D4318): 21

Plasticity Index (ASTM D4318): 6

Test Specimen

Diameter (inch): 4.00

Height (inch): 1.20

Temperature, ° C: 22

Sieve Analysis

% Passing # 40: 97.6

% Passing #200: 36.2

Moisture Density Relationship

Proctor Type: ASTM D 698

Optimum Moisture, %: 9.4

Max. Dry Density, pcf: 119

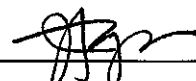
Date	Final Time		Initial Time		t, in sec	Inflow, cm		Outflow, cm		Pressure, psi			h1 in cm	h2 in cm	Hydraulic conductivity, cm/sec
	hr	min	hr	min		Final	initial	Final	Initial	Cell	In	Out			
4/22/09	10	5	10	0	300	6.00	1.00	19.00	24.00	50	45	40	378.14	366.58	1.683E-06
	10	10	10	5	300	11.00	6.00	14.00	19.00	50	45	40	366.58	355.02	1.737E-06
	10	15	10	10	300	16.00	11.00	9.00	14.00	50	45	40	355.02	343.46	1.795E-06
	10	20	10	15	300	21.00	16.00	4.00	9.00	50	45	40	343.46	331.90	1.856E-06
	10	25	10	20	300	6.00	1.00	19.00	24.00	50	45	40	378.14	366.58	1.683E-06
	10	30	10	25	300	11.00	6.00	14.00	19.00	50	45	40	366.58	355.02	1.737E-06
	10	35	10	30	300	16.00	11.00	9.00	14.00	50	45	40	355.02	343.46	1.795E-06

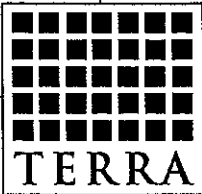
Termination criteria: The permeation was discontinued when at least four values of hydraulic conductivity were obtained over an interval of time in which; 1) the ratio of outflow to inflow rate was between 0.75 and 1.25 and 2) the hydraulic conductivity was steady. The hydraulic conductivity shall be considered steady if 4 or more consecutive reading ranges within ± 50% for $k < 1 \times 10^{-8}$ cm/sec or, within ±25% for $K = 1 \times 10^{-8}$ cm/sec.

Hydraulic conductivity, k in cm/sec (Average of last four (4) consecutive reading)	$k = \frac{a_{in} a_{out} L}{A t (a_{in} + a_{out})} \ln \frac{h_1}{h_2} = 1.768E-6$
Temperature Correction	= 0.95329
Corrected hydraulic conductivity for	$20^\circ \text{C} (68^\circ \text{F}), k_{20} R_T k, \text{ in cm/sec} = 1.685E-6$

- where:
- a_{in} = cross-sectional area of the reservoir containing the influent liquid, 0.8653 cm²
 - a_{out} = cross-sectional area of the reservoir containing the influent liquid, 0.8653 cm²
 - L = length of specimen, cm
 - A = cross-sectional area of the specimen, cm²
 - t = elapsed time between determination of h1 and h2
 - h_1 = head loss across the specimen at time t1, in cm
 - h_2 = head loss across the specimen at time t2, in cm
 - R_T = Viscosity of water at test temperature, in ° C

Reviewed By:


Jerry T. Sayson, BSCE
Vice President, Operations



TERRA TESTING, INC.

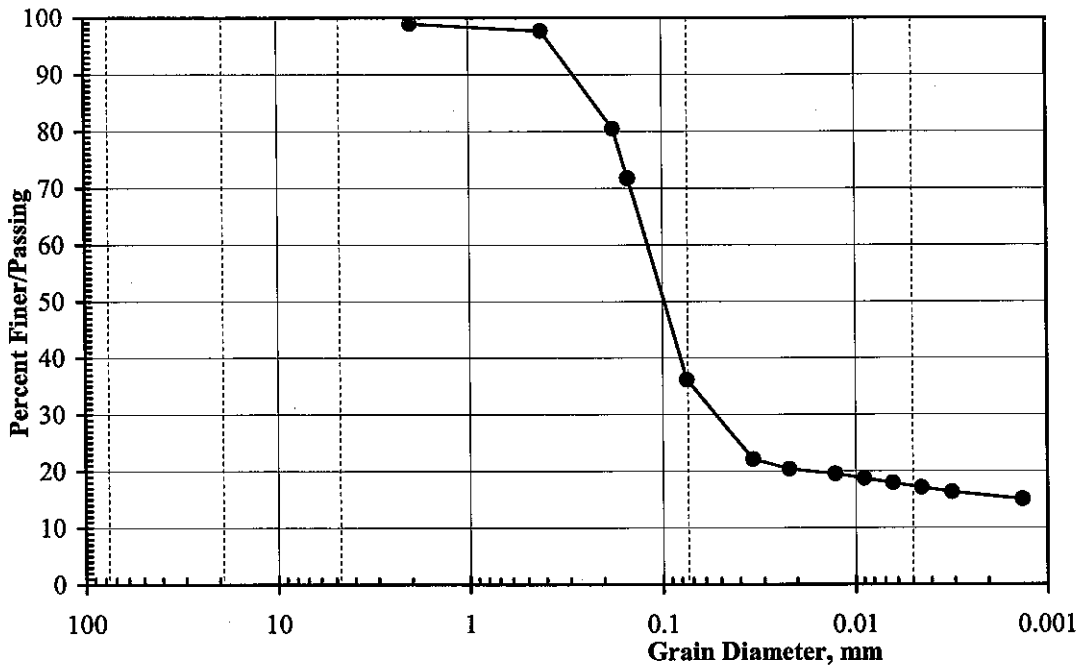
ENVIRONMENTAL | GEOTECHNICAL | CONSTRUCTION MATERIAL TESTING

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Client: Viper
 Project: Viper Pit Liner Seal
 Sample Identification: Silty Clayey Sand (SC-SM)
 Test Method: ASTM D 422, ASTM D 421
 Preparation Method: Wet

Project Number: Misc 51
 Invoice Number: 231812
 Sample No.: 9923A
 Sample Date: 12/9/2010
 Test Date: 2/2/2011

PARTICLE SIZE DISTRIBUTION CURVE



ECOLOGICAL INFORMATION VIPER SEAL (1-3-10)

This material is not classified as dangerous for the environment. Acute toxicity tests conducted using environmentally representative water gave these results:

ALGAE TEST RESULTS

Test: Acute Alga Toxicity, seawater (ISO 10253)

Duration: 72 hr

No toxicity detected at maximum test exposure limits

Species: Marine Algae (*Skeletonema costatum*)

Test: Growth Inhibition (OECD 201)

Duration: 72 hr.

No growth inhibition detected at maximum test exposure limits

Species: Green Algae (*Selenastrum capricornutum*)

Duration: 72 hr.

No growth inhibition detected at maximum test exposure limits

FISH TEST RESULTS

Test: Acute toxicity, freshwater (OECD 203)

Species: Bluegill Sunfish (*Lepomis macrochirus*)

No toxicity detected at maximum test exposure limits

Test: Acute toxicity, freshwater (OECD 203)

Species: Rainbow Trout (*Oncorhynchus mykiss*)

No toxicity detected at maximum test exposure limits

Test: Acute toxicity, freshwater (OECD 203)

Species: Fathead Minnow (*Pimephales promelas*)

No toxicity detected at maximum test exposure limits

Test: Acute toxicity, freshwater (OECD 203)

Species: Zebra Fish (*Brachydanio rerio*)

No toxicity detected at maximum test exposure limits

MAMMALIAN TEST RESULTS

Test: Fixed Dose Procedure (OECD 420)

Species: Rat (*Rattus norvegicus*)

No toxicity detected at maximum test exposure limits

INVERTEBRATE TEST RESULTS

Test: Acute Immobilization (OECD 202)

Species: Water Flea (*Daphnia magna*)

No immobilization detected at maximum test exposure limits

Test: Acute Immobilization (OECD 202)

Species: Marine Copepod (*Acartia tonsa*)

Duration: 96 hr.

No immobilization detected at maximum test exposure limits

OTHER TEST RESULTS

Test: Sediment Toxicity (PARCOM)

Species: Marine Amphipod (*Corophium volutator*)

No toxicity detected at maximum test exposure limits

DEGRADATION

Test: Closed Bottle (OECD 301D)

Product is biodegradable at test conditions in ~ 25 years

ROB COCHRAN CONSULTING, INC.
P. O. Box 2154
Midland, Texas 79703

ULTRAVIOLET & VISABLE LIGHT DEGRADATION TESTING OF
PUDDLE SEAL

METHODOLOGY

The following test methodology was utilized all or in part for the testing of the product labeled PUDDLE SEAL:

- 1) ASTM G155-07
- 2) ASTM D 2565
- 3) ISO-4892

<u>PRODUCT TESTED</u>	<u>RANGE OF LIGHT</u>	<u>ATF*</u>	<u>SURFACE DEGRADATION</u>
1) PUDDLE SEAL	Visable 500 lux	1 year	Less than 0.1 %
		5 years	0.28%
		10 years	0.46%
		20 years	0.84%
2) PUDDLE SEAL	UVB 280-320 nm	1 year	0.11%
		5years	0.30%
		10years	0.62%
		20years	1.38%
3) PUDDLE SEAL	UVB 320-400 nm	1 year	0.14%
		5years	0.32%
		10 years	0.65%
		20years	1.40%

REMARKS: Product was applied to compacted soil and hydrated according to manufacturer's instructions. No detectable (electrical resistance probe measurement) water leakage occurred during any of the Degradation testing.

*ATF = Accelerated Time Frame

lux = foot candles

nm = nanometers