

Webb, Bruce (SD)

From: Webb, Bruce (SD)
Sent: July-18-19 2:46 PM
To: 'Chunhe Liu'
Cc: Kyle (kyle.wiebe@jkwconstruction.ca); maendelrm@gmail.com; Markwart, Larry (SD)
Subject: RE: HC report (EAL#1542)

Thanks! Approval to use the new cell is provided in accordance with Clause 20 of the Licence. Record drawings are due within four months, so by November 18, 2019.

Bruce.

From: Chunhe Liu <cliu@dghengineering.com>
Sent: July-18-19 1:18 PM
To: Webb, Bruce (SD) <Bruce.Webb@gov.mb.ca>
Cc: Kyle (kyle.wiebe@jkwconstruction.ca) <kyle.wiebe@jkwconstruction.ca>; maendelrm@gmail.com
Subject: HC report (EAL#1542)

Good day, Bruce.

Please find attached reports of hydraulic conductivity test.

I'll send the record drawing to you later.

Regards,

Charles



420 Turenne Street, Winnipeg, Manitoba R2J 3W8
Phone: (204) 233-1694 Fax: (204) 235-1579
E-mail: engtech@mymts.net
www.eng-tech.ca

"Engineering and Testing Solutions That Work for You"

July 18, 2019

File No. 19-030-02

DGH Engineering Ltd.
12 Aviation Boulevard
St. Andrews, Manitoba
R1A 3N5

ATTENTION: Charles Liu

RE: Hydraulic Conductivity Test Results, Blue Clay Colony Domestic Lagoon

ENG-TECH Consulting Limited (ENG-TECH) received two (2) Shelby tube samples from the above project on June 19, 2019 and completed the requested hydraulic conductivity testing on the samples selected by Manitoba Sustainable. The Shelby tube samples were extracted on June 21, 2019 at ENG-TECH laboratory.

The samples identified as Blue Clay #1 and Blue Clay #2 were prepared for testing in accordance with ASTM D5084-16a, *Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter*. The final hydraulic conductivity values (k_{20}) of 2.5×10^{-8} cm/sec and 4.8×10^{-9} cm/sec were obtained for the samples identified as Blue Clay #1 and Blue Clay #2, respectively. The hydraulic conductivity test data is outlined in Table 1, while the graphical representations of the hydraulic conductivity versus elapsed time are shown in Figures 1 and 2. Photographs of the samples are attached.

ENG-TECH trusts the above is all the information you require. If you have any questions, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

Paula Filizzola Pinheiro Chagas
B.Sc. (C.E.), B.Sc. (Enviro. E.), C.E.T.
Engineering Department

Clark Hryhoruk, M.Sc., P.Eng.
President, Geotechnical Engineer

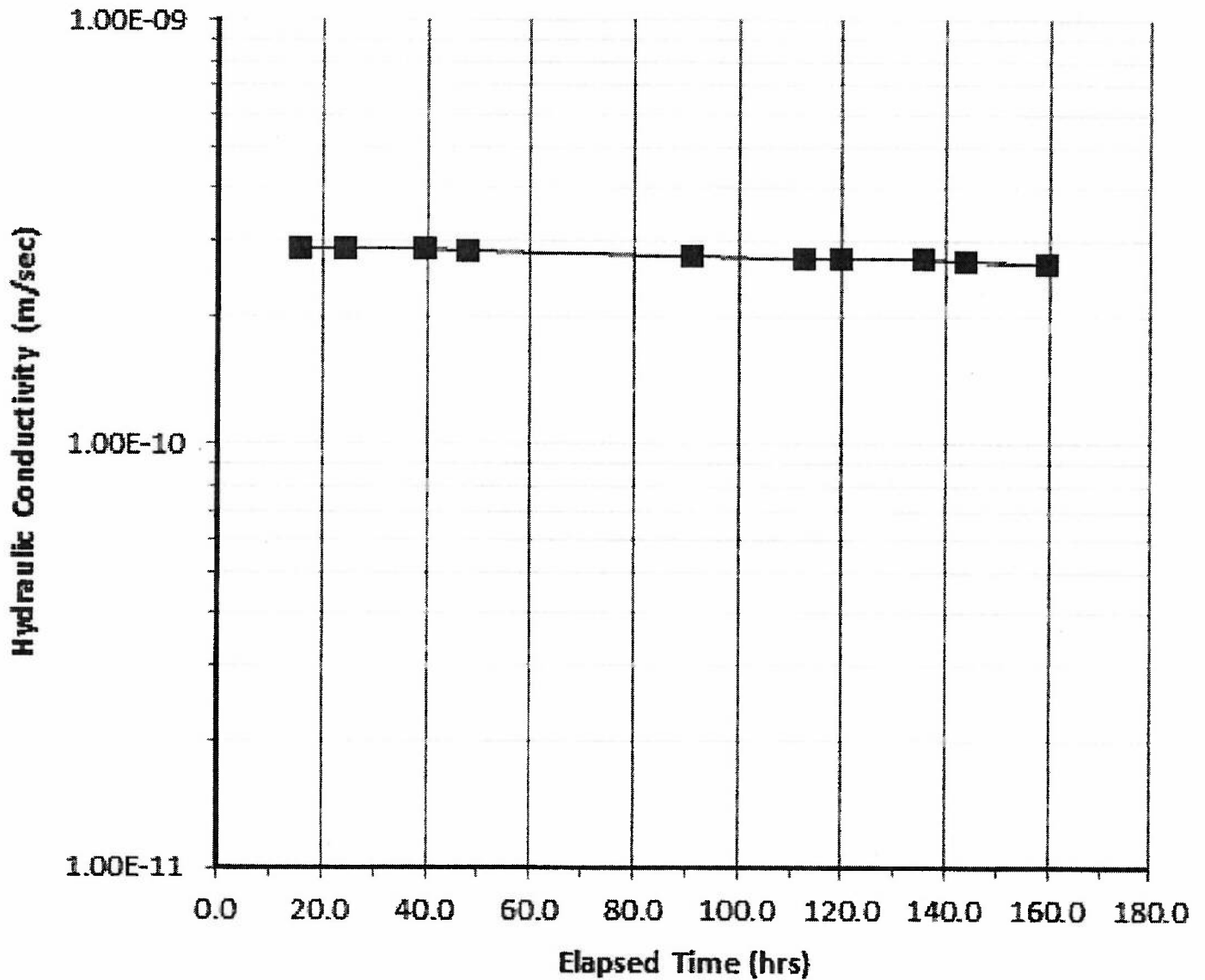
CDH/pfpc

Attachments: Table 1 – Hydraulic Conductivity Test Data (Blue Clay Colony Domestic Lagoon)
Figure 1 – Hydraulic Conductivity Versus Elapsed Time (Blue Clay #1)
Figure 2 – Hydraulic Conductivity Versus Elapsed Time (Blue Clay #2)
Photographs (1 to 4)



**TABLE 1
HYDRAULIC CONDUCTIVITY TEST DATA
BLUE CLAY COLONY DOMESTIC LAGOON**

SAMPLE IDENTIFICATION	Blue Clay #1	Blue Clay #2
INITIAL VALUES		
ENG-TECH Reference No.	19-030-2-1	19-030-2-2
Length of Sample in Tube (cm)	58.5	49.0
Length (cm)	6.54	6.36
Diameter (cm)	7.19	7.20
Area (cm ²)	40.6	40.7
Volume (cm ³)	265.4	258.8
Water Content (%)	49.9	38.7
Bulk Dry Density (kg/m ³)	1139	1318
Specific Gravity (G _s) (assumed)	2.70	2.70
Void Ratio	1.370	1.049
Degree of Saturation (%)	98.4	99.6
FINAL VALUES		
Length (cm)	6.49	6.46
Diameter (cm)	7.24	7.35
Area (cm ²)	41.1	42.4
Volume (cm ³)	267.0	274.0
Water Content (%)	52.1	43.7
Bulk Dry Density (kg/m ³)	1135	1251
Specific Gravity (G _s) (assumed)	2.70	2.70
Void Ratio	1.379	1.158
Degree of Saturation (%)	100	100
CONSOLIDATION PHASE		
Confining Pressure (kPa)	103.4	103.4
Pore Water Pressure (kPa)	82.7	82.7
Effective Stress (kPa)	20.7	20.7
PERMEATION PHASE		
Confining Pressure (kPa)	103.4	103.4
Pore Water Pressure (kPa)	82.7	82.7
Effective Stress (kPa)	20.7	20.7
Hydraulic Gradient	17.3	17.4
Permeant Fluid	Potable Tap Water	Potable Tap Water
HYDRAULIC CONDUCTIVITY AT TEST TEMPERATURE OF 24 °C (cm/sec)	2.7×10^{-8}	5.3×10^{-9}
HYDRAULIC CONDUCTIVITY AT TEMPERATURE OF 20 °C (K₂₀) (cm/sec)	2.5×10^{-8}	4.8×10^{-9}



420 Turenne Street
 Winnipeg, MB R2J 3W8
 Phone: (204) 233-1694
 Fax: (204) 235-1579

ENG. STAMP:

ENGINEERS
 GEOSCIENTISTS
 MANITOBA
 Certificate of Authorization
 ENG-TECH Consulting Limited
 No. 2473

CLIENT:

DGH ENGINEERING LTD.

DATE:

JULY 2019

DRAWN BY:

PFPC

FIGURE No.:

1

REV.:

PROJECT:

BLUE CLAY COLONY DOMESTIC LAGOON

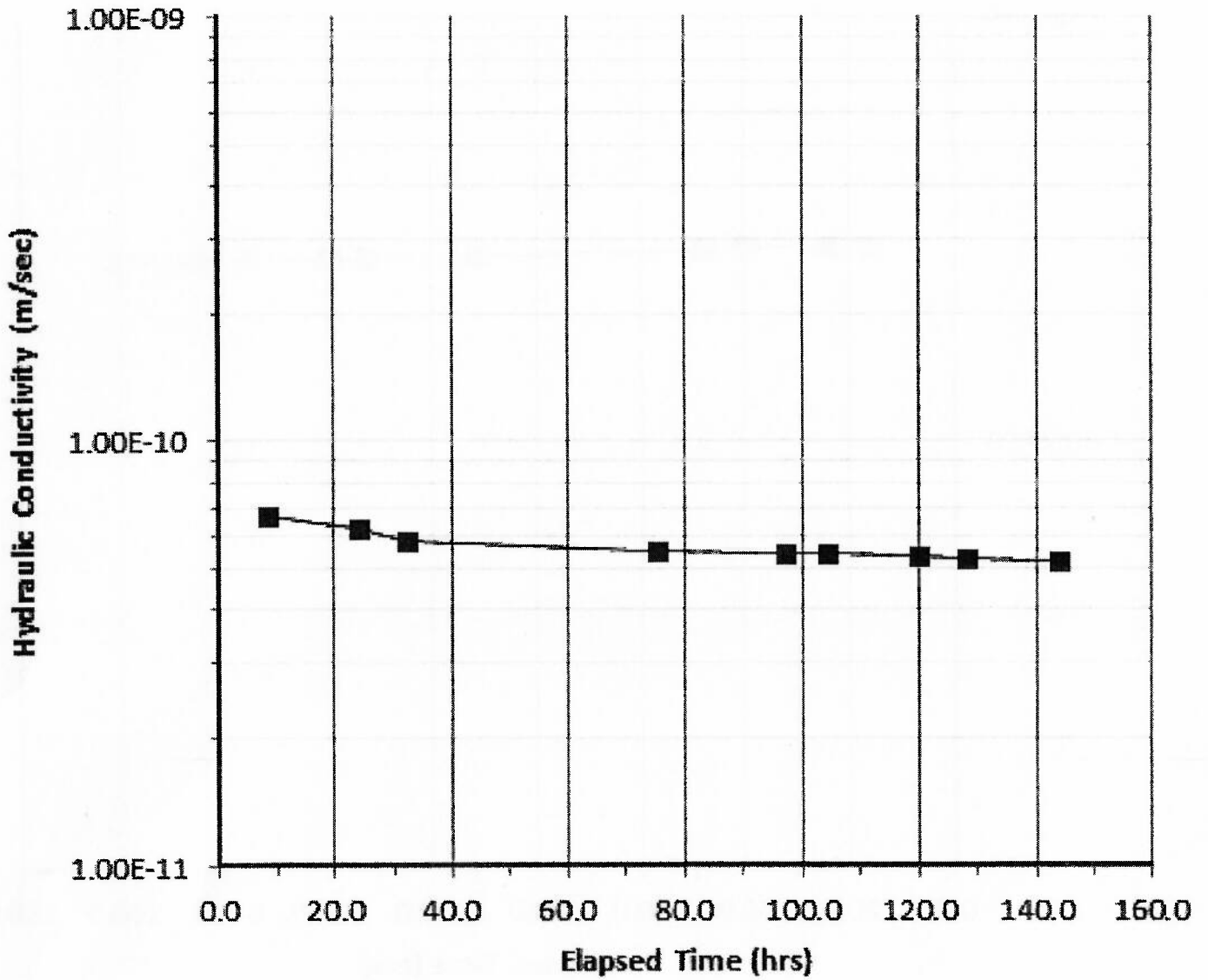
FILE No.:

19-030-02

SCALE:

N/A

HYDRAULIC CONDUCTIVITY
 VERSUS ELAPSED TIME
 (BLUE CLAY #1)



420 Turenne Street
 Winnipeg, MB R2J 3W8
 Phone: (204) 233-1694
 Fax: (204) 235-1579

ENG. STAMP:

**ENGINEERS
 GEOSCIENTISTS
 MANITOBA**
 Certificate of Authorization
 ENG-TECH Consulting Limited
 No. 2473

CLIENT:

DGH ENGINEERING LTD.

DATE:

JULY 2019

DRAWN BY:

PFPC

FIGURE No.:

2

REV.:

PROJECT:

BLUE CLAY COLONY DOMESTIC LAGOON

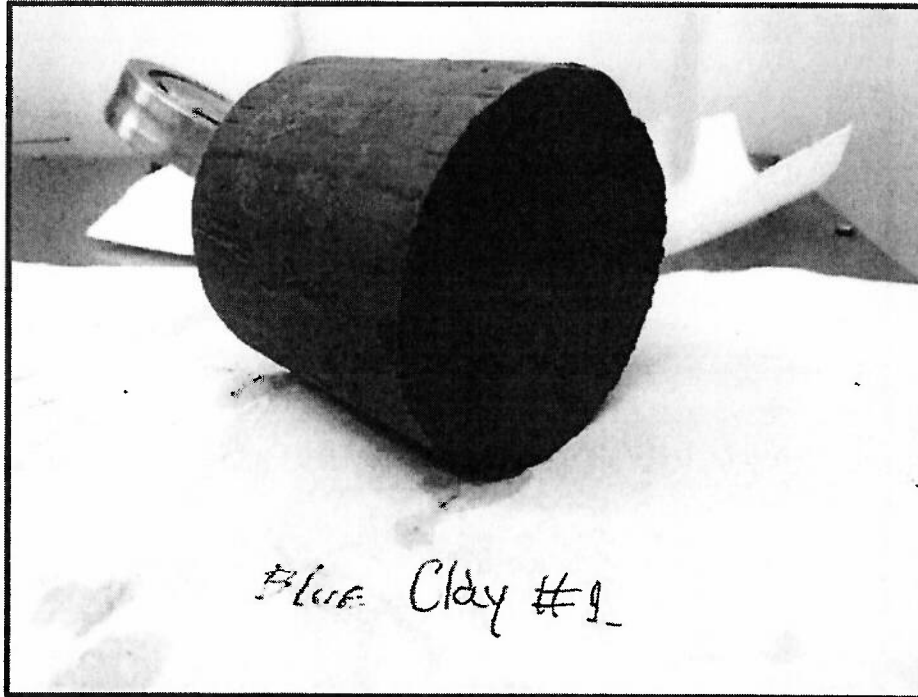
FILE No.:

19-030-02

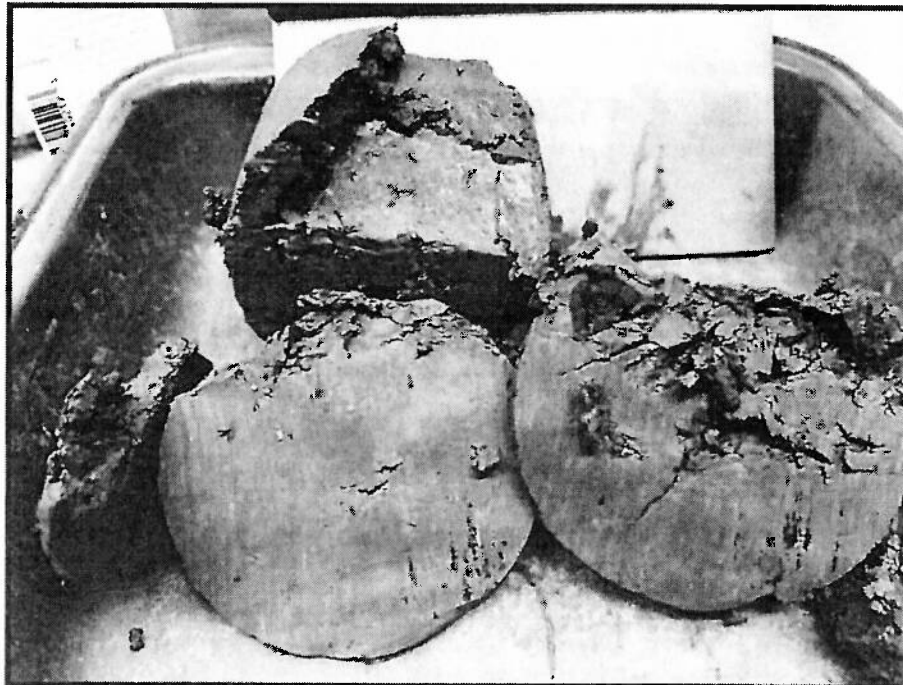
SCALE:

N/A

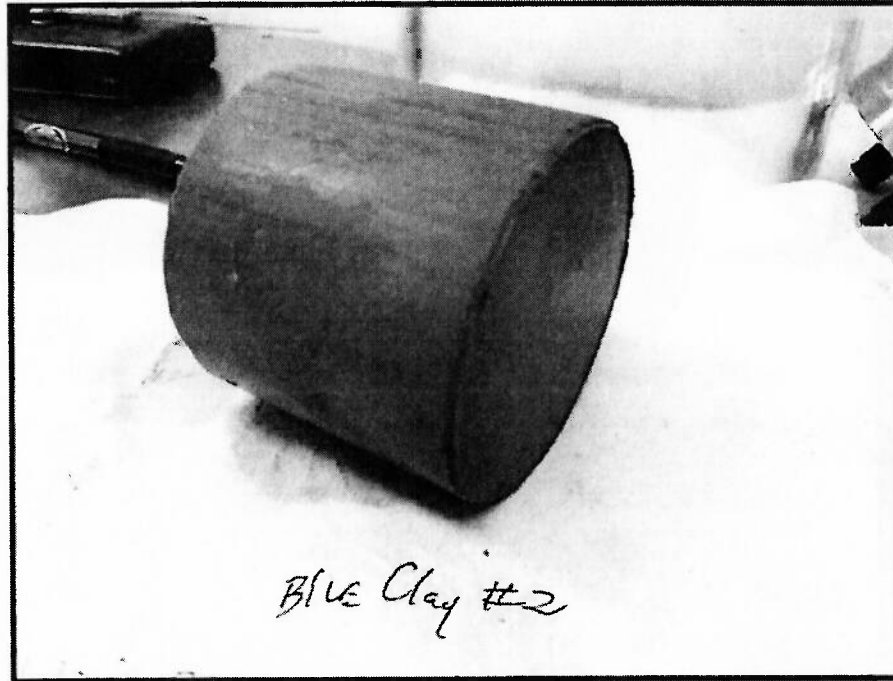
**HYDRAULIC CONDUCTIVITY
 VERSUS ELAPSED TIME
 (BLUE CLAY #2)**



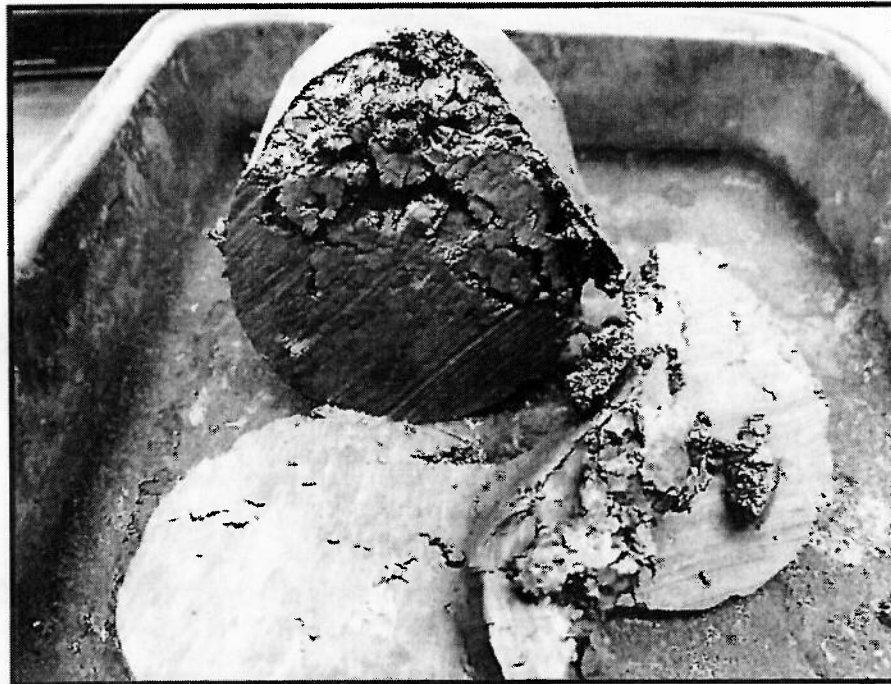
PHOTOGRAPH #1: Sample (Blue Clay #1) upon completion of test.



PHOTOGRAPH #2: Sample (Blue Clay #1) after breaking apart.



PHOTOGRAPH #3: Sample (Blue Clay #2) upon completion of test.



PHOTOGRAPH #4: Sample (Blue Clay #2) after breaking apart.