



Defence Research and  
Development Canada

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pour la défense Canada



# **DRDC Suffield Soil Laboratory Program**

*Progress Report – Piston and Onager Sites*

J. Barchard and A. Kupper  
AMEC Earth & Environmental Limited

Contract Scientific Authority: S.L. Hlady  
Defence R&D Canada – Suffield

The scientific or technical validity of this Contract Report is entirely the responsibility of the contractor and the contents do not necessarily have the approval or endorsement of Defence R&D Canada.

Contract Report  
DRDC Suffield CR 2004-112  
January 2004

Canada



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## *Progress Report – Piston and Onager Sites*

J. Barchard and A. Kupper  
AMEC Earth & Environmental Limited

AMEC Earth & Environmental Limited  
4810 - 93 Street

Edmonton, AB  
Canada T6E 5M4

Contract Number: W7702-03-R527

Contract Scientific Authority: S.L. Hlady (403-544-4727)

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## **Defence R&D Canada – Suffield**

Contract Report

DRDC Suffield CR 2004-112



## Abstract

AMEC Earth & Environmental Limited (AMEC) was retained by Defence Research & Development Canada (DRDC) Suffield to carry out laboratory testing on soil samples from prairie soil samples from the Mine Effects Site near Building 148 on the Experimental Proving Ground at DRDC Suffield. AMEC's geotechnical laboratory in Edmonton, Alberta received three large, bag soil samples in late October 2003 for DRDC's Piston, Onager East and Onager West sites.

The following laboratory tests were requested by DRDC:

1. · Determination of water content of soil samples;
2. · Preparation of compacted samples in range of natural water contents;
3. · Consolidation tests using ASTM D2435 on two samples; and
4. · Triaxial undrained tests (CUP) using ASTM D4767 on three samples.

A typical range of natural water contents of 13 to 19 percent was provided to AMEC by DRDC Suffield for similar soil at these sites. For testing, compacted samples were prepared at water contents within the natural water content range, with target water contents of approximately 15 percent.

Results are provided according to American Standard Testing Methods (ASTM) standards where applicable. Results for the Triaxial undrained tests (CUP) using ASTM D4767 on three samples are provided in CR 2004-138, DRDC Soil Laboratory Program Triaxial Test Results – Onager Site.





10 December 2003  
BX02777

Defence R&D Canada - Suffield  
PO Box 4000, Stn Main  
Medicine Hat, AB T1A 8K6

**Attention: Ms. Sheri Hlady, Defence Scientist**

Dear Ms. Hlady,

**Re: DRDC - Suffield  
Soil Laboratory Program - Progress Report  
Piston and Onager Sites**

## **1.0 INTRODUCTION**

AMEC Earth & Environmental Limited (AMEC) was retained by Defence Research & Development Canada (DRDC) Suffield to carry out laboratory testing on soil samples from research sites at or near their Suffield operation. A summary of the testing completed to date is provided below.

## **2.0 LABORATORY TEST PROGRAM**

AMEC's geotechnical laboratory in Edmonton, Alberta received three large, bag soil samples in late October 2003 for DRDC's Piston, Onager East and Onager West sites. The following laboratory tests were requested by DRDC:

- Determination of water content of soil samples;
- Preparation of compacted samples in range of natural water contents;
- Consolidation tests using ASTM D2435 on two samples; and
- Triaxial undrained tests (CUP) using ASTM D4767 on three samples.

A typical range of natural water contents of 13 to 19 percent was provided to AMEC by DRDC for similar soil at these sites. For testing, compacted samples were prepared at water contents within the natural water content range, with target water contents of approximately 15 percent. All testing is completed to date, with the exception of the triaxial tests, which are currently in progress. Results are provided according to American Standard Testing Methods (ASTM) standards where applicable.

## 2.1. AVAILABLE RESULTS

### 2.1.1. Water Content

All three samples received were described based on visual examination. The sample from the Piston site was described as a clayey, low plastic, brown silt with interbedded clay layers and coal fragments up to 10 mm in size, while the soil samples from the Onager site were described as a sandy, silty, low plastic, brown clay, containing roots. The water contents of the samples were found to generally range between 6 to 8 percent, and were as low as 3.3 percent, all of which are lower than the natural water content range provided by DRDC. Laboratory results of the water contents tests on each sample are attached.

### 2.1.2. Compacted Samples

The water content results were reported to DRDC by Email on 31 October 2003 and DRDC requested that the soil samples be prepared to a water content within the natural water content range i.e. approximately 15 percent. Compacted samples were then prepared for each site and the wet and dry densities were determined for the water content of the compacted samples. This test is referred to as a "One Point Proctor Test". This information was then used in preparing the samples for consolidation and triaxial testing. Results of the One Point Proctor Tests are provided in Table 1 below.

**Table 1.: One Point Proctor Test Results**

Sample	Water Content (%)	Wet Density (kg/m <sup>3</sup> )	Dry Density (kg/m <sup>3</sup> )
Piston Site	14.2	1852.1	1621.8
Onager Site East	13.4	1823.6	1608.1
Onager Site West	15.3	1780.5	1544.0

### 2.1.3. Consolidation Tests

Consolidation tests were performed on a compacted sample from the Piston site and a combined compacted sample from the Onager East and West sites, as requested by DRDC. Testing was completed according to ASTM D2435-90, Test Method B with incremental loading and rebound (unloading). Results from the consolidation tests are attached. Note that as the samples were prepared by remolding and compacting the soil in the laboratory, the pre-consolidation pressure provided does not necessarily reflect the in-situ (on site) condition of the soil.

## 2.2. PROGRESS ON TRIAXIAL TESTS

Samples were prepared from each of the three sites for triaxial testing and testing is currently in progress. The time required to complete these tests depends on the behaviour of the soil during testing and an approximate completion date is late December 2003. Based on this,





results should be available in early January 2004 and will be reported as soon as they are available.

### **3.0 CLOSURE**

We trust that the results of the testing completed to date provide the intended soil properties from the laboratory test program. If there were further testing required or that you would like to discuss, AMEC would be pleased to assist DRDC.

Should you have any questions or comments please contact the undersigned.

Respectfully submitted,

**AMEC Earth & Environmental Limited**

Ja'net Barchard, M.Sc., EIT

Angela Kupper, Ph.D., P.Eng  
Senior Geotechnical Engineer



Project No.	BX02777
Lab No.	0
Technician	LK
Date	October 30, 2003

**MOISTURE CONTENT WORKSHEET**

Hole No.	Piston #1	Piston #2				
Depth						
	<b>Record Tare Weight (zero or actual weight)</b>					
Wt. Sample Wet + Tare	242.35	331.05				
Wt. Sample Dry + Tare	228.36	310.37				
Wt. Water	13.99	20.68				
Tare Container	0.00	0.00				
Wt. Dry Sample	228.36	310.37				
Moisture Content %	6.1	6.7				
Hole No.	Onager #1	Onager #2	Onager #3	Onager #4		
Depth						
Tare No.	<b>Record Tare Weight (zero or actual weight)</b>					
Wt. Sample Wet + Tare	182.63	154.05	344.33	187.22		
Wt. Sample Dry + Tare	169.51	149.09	324.42	174.47		
Wt. Water	13.12	4.96	19.91	12.75		
Tare Container	0.00	0.00	0.00	0.00		
Wt. Dry Sample	169.51	149.09	324.42	174.47		
Moisture Content %	7.7	3.3	6.1	7.3		
Hole No.						
Depth						
Tare No.	<b>Record Tare Weight (zero or actual weight)</b>					
Wt. Sample Wet + Tare						
Wt. Sample Dry + Tare						
Wt. Water						
Tare Container						
Wt. Dry Sample						
Moisture Content %						
Hole No.						
Depth						
Tare No.	<b>Record Tare Weight (zero or actual weight)</b>					
Wt. Sample Wet + Tare						
Wt. Sample Dry + Tare						
Wt. Water						
Tare Container						
Wt. Dry Sample						
Moisture Content %						
Hole No.						
Depth						
Tare No.	<b>Record Tare Weight (zero or actual weight)</b>					
Wt. Sample Wet + Tare						
Wt. Sample Dry + Tare						
Wt. Water						
Tare Container						
Wt. Dry Sample						
Moisture Content %						

<b>AMEC EARTH &amp; ENVIRONMENTAL LIMITED</b> <i>Engineering &amp; Environmental Services</i> <i>Edmonton, Alberta, Canada</i>  <b>ONE-DIMENSIONAL CONSOLIDATION TEST</b> ( ASTM D2435-90 )	<b>Project</b>	Defence Research Development Canada		
	<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
	<b>Location</b>	Medicine Hat		
	<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
	<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
	<b>Technician</b>	LK	<b>Date Started</b>	06/11/2003

Apparatus Data			Moisture Content Data		
Ring No.	#1		Wt. of Ring + Soil + Water ( Start )	215.20	g
Weight of ring	80.34	g	Wt. of Ring + Soil + Water ( End )	233.60	g
Thickness	18.974	mm	Wt. of Ring	80.34	g
Diameter	70.053	mm	Wt. of Soil + Water ( End )	233.60	g
Area	38.543	cm <sup>2</sup>	Wt. of Tare ( Tare # )	14.70	g
Machine No.	#1		Wt. of Soil Dry + Tare	212.50	g
Loading Beam Ratio	11:01		Wt. of Soil	117.46	g
Weight of Top + Stone	0.575	kg			

Specimen Data	Initial	Final		Index Tests	Calculated	Final
Specimen Height	18.9740	16.855	mm	Specific Gravity ( Assumed )	2.68	
Volume of Specimen	73.13	64.96	ml			
Volume of Solids	43.83	43.83	ml			
Volume of Voids	29.30	21.14	ml			
Volume of Water	17.40	21.10	ml			
Void Ratio	0.669	0.482				
Saturation	59	100	%			
Moisture Content	14.8	18.0	%	<b>Soil Description</b>	Silt, clayey, low plastic, interbedded CI layers, coal frags to 10mm.	
Height of Solids	11.37	11.37	mm			

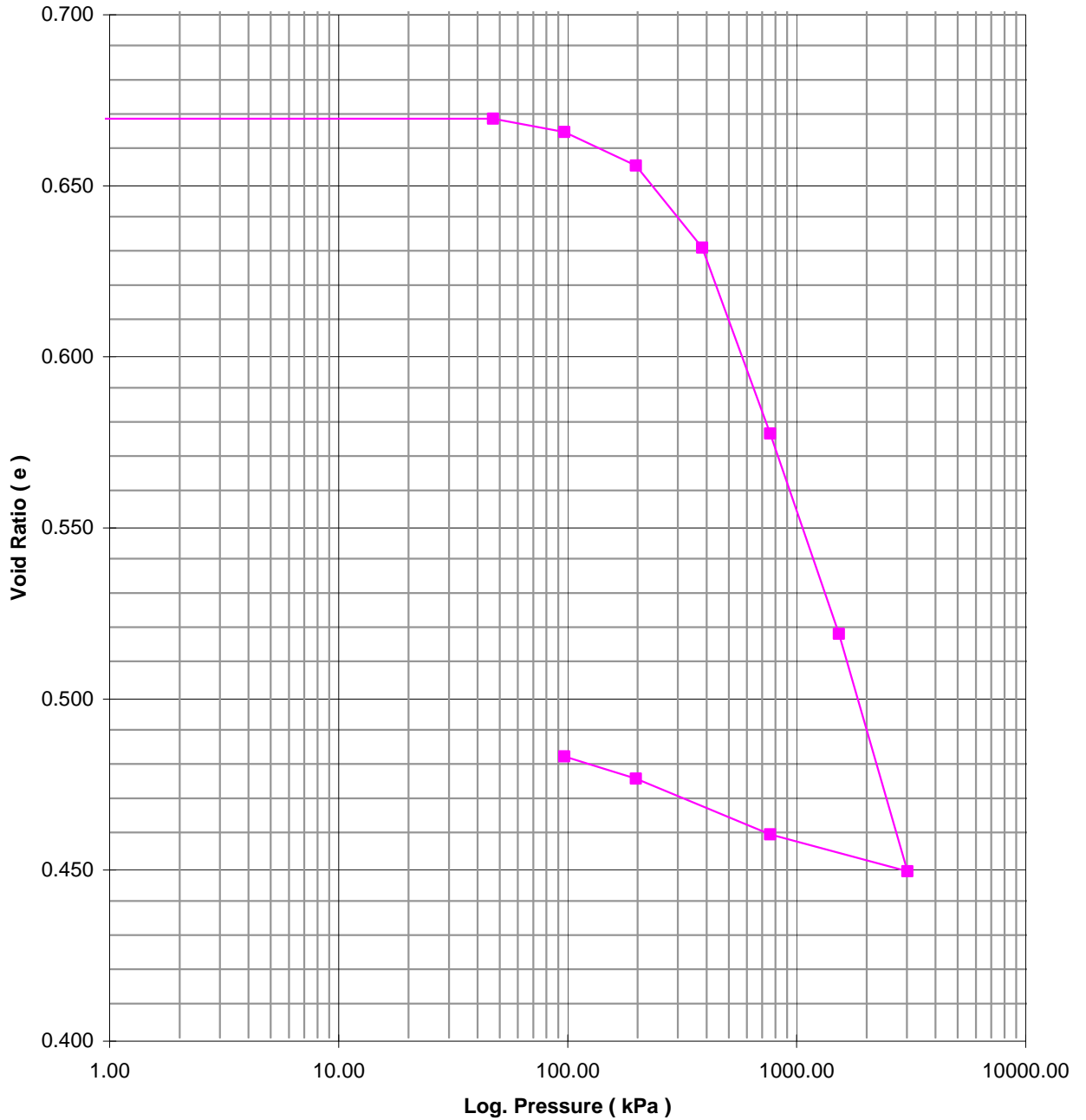
Note: Sample Remolded and Compacted

Swelling Pressure $P_s$	46.8	kPa			
Pre-Consolidation Pressure $P_o'$	400	kPa			

Pressure $p$ (kPa)	Dial Reading (mm)	Apparatus Deformation (mm)	Corrected Height (mm)	Vertical Strain $\epsilon$ (%)	Void Ratio $e$	Constrained Modulus $E = \Delta p / \Delta \epsilon$ (MPa)	Coeff. of Consolidation $c_v$ (m <sup>2</sup> /yr)	Coeff. of Volume Compressibility $m_v$ (m <sup>2</sup> /MN)	
0.10	18.97400		18.974	0.00	0.669				
46.80	18.97400	0.0000	18.974	0.00	0.669				
95.86	18.86470	-0.0658	18.931	0.23	0.665	21.40	36.26	4.7E-02	
196.40	18.66450	-0.1545	18.819	0.82	0.655	17.11	10.69	5.9E-02	
382.80	18.33870	-0.2068	18.546	2.26	0.631	12.93	10.37	7.8E-02	
757.68	17.69140	-0.2363	17.928	5.51	0.577	11.51	20.96	8.9E-02	
1513.90	17.00090	-0.2613	17.262	9.02	0.518	21.56	26.96	4.9E-02	
3012.20	16.1773	-0.2954	16.473	13.18	0.449	36.01	24.56	3.1E-02	
757.7	16.3572	-0.2386	16.596	12.53	0.459	347.50			
196.4	16.5744	-0.2068	16.781	11.56	0.476	57.44			
95.9	16.7007	-0.1545	16.855	11.17	0.482	25.78			

<b>Project</b>	Defence Research Development Canada		
<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Date Started</b>	06/11/2003

**Void ratio vs. Log Pressure**

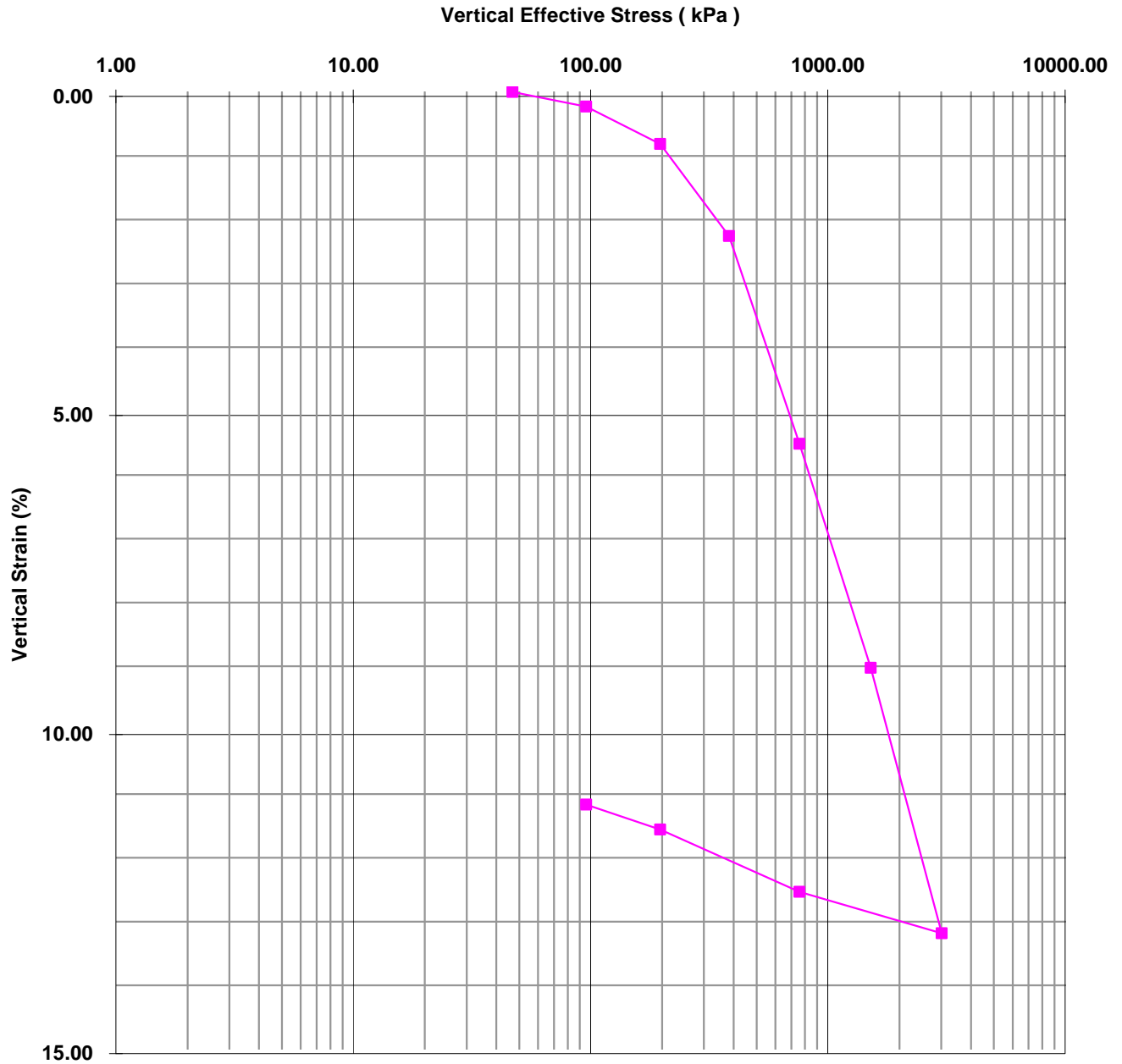


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Engineering & Environmental Services  
Edmonton, Alberta, Canada

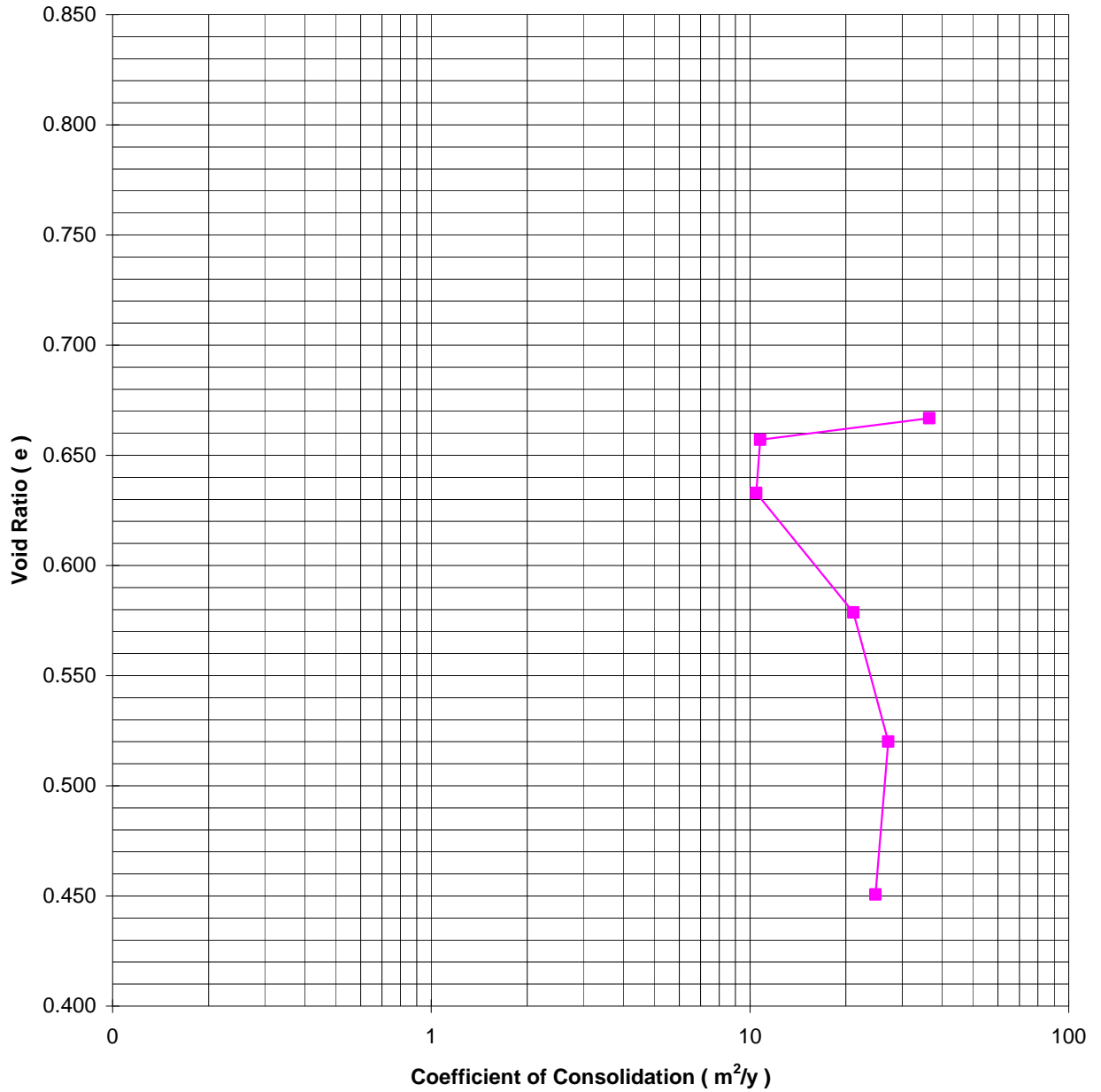
**ONE-DIMENSIONAL CONSOLIDATION TEST**  
( ASTM D2435-90 )

<b>Project</b>	Defence Research Development Canada		
<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Date Started</b>	06/11/2003

**Vertical Strain vs. Vertical Effective Stress**

**AMEC EARTH & ENVIRONMENTAL LIMITED***Engineering & Environmental Services  
Edmonton, Alberta, Canada***ONE-DIMENSIONAL CONSOLIDATION TEST**  
( ASTM D2435-90 )

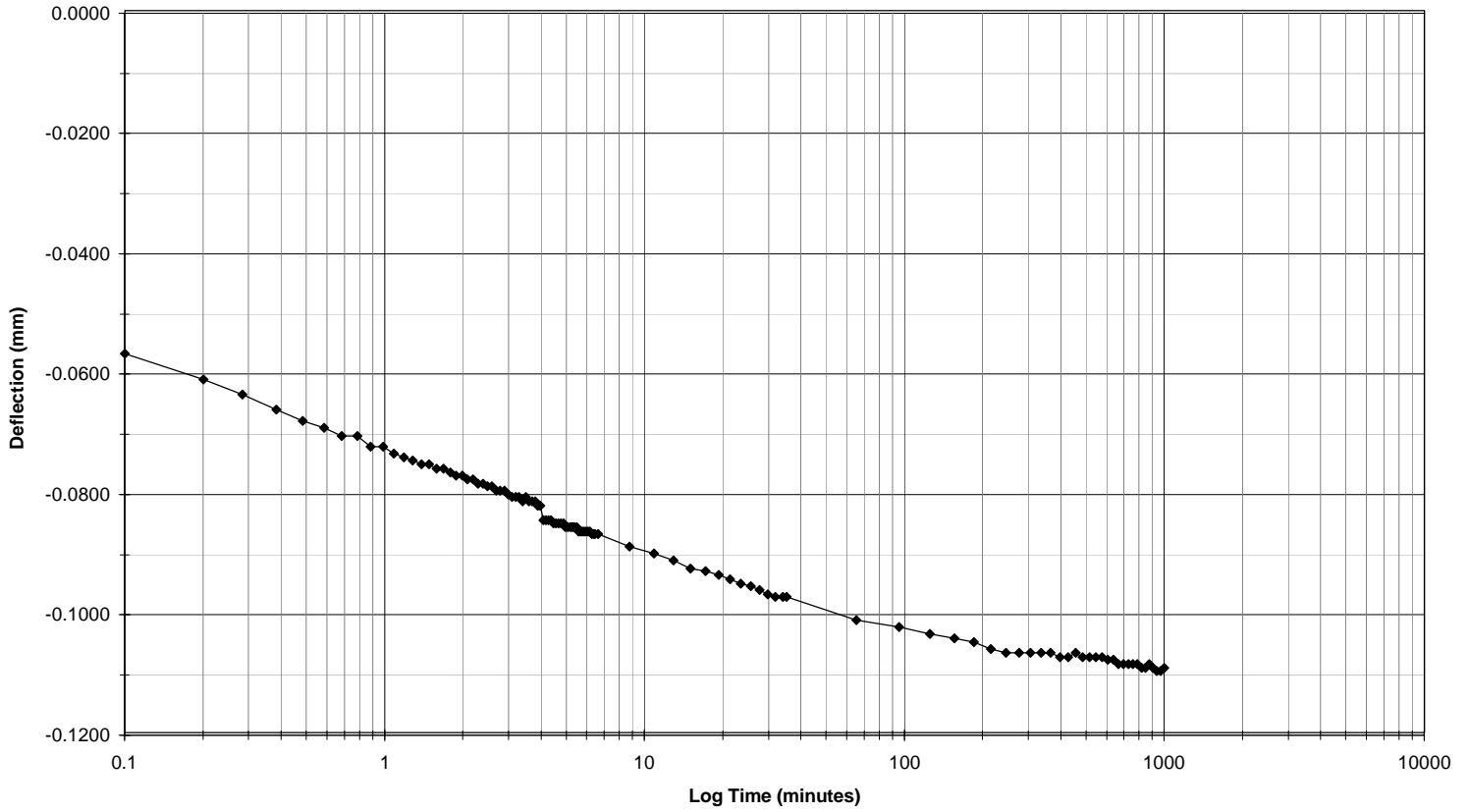
<b>Project</b>	Defence Research Development Canada		
<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Date Started</b>	06/11/2003

**Void Ratio vs. Coefficient of Consolidation**

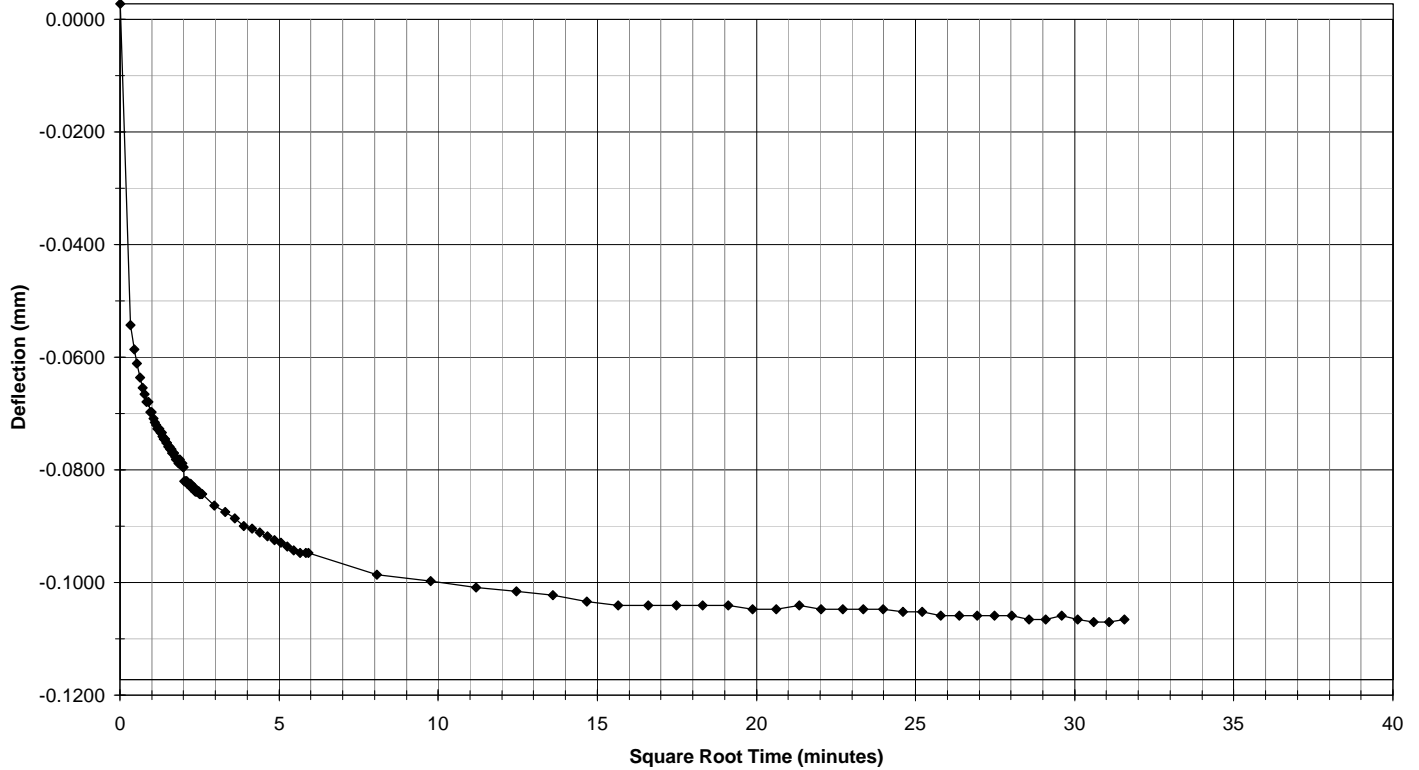
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	06/11/2003
<b>Loading Stage</b>	95.86kPa	<b>Start Loading Time</b>	17:10:19

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



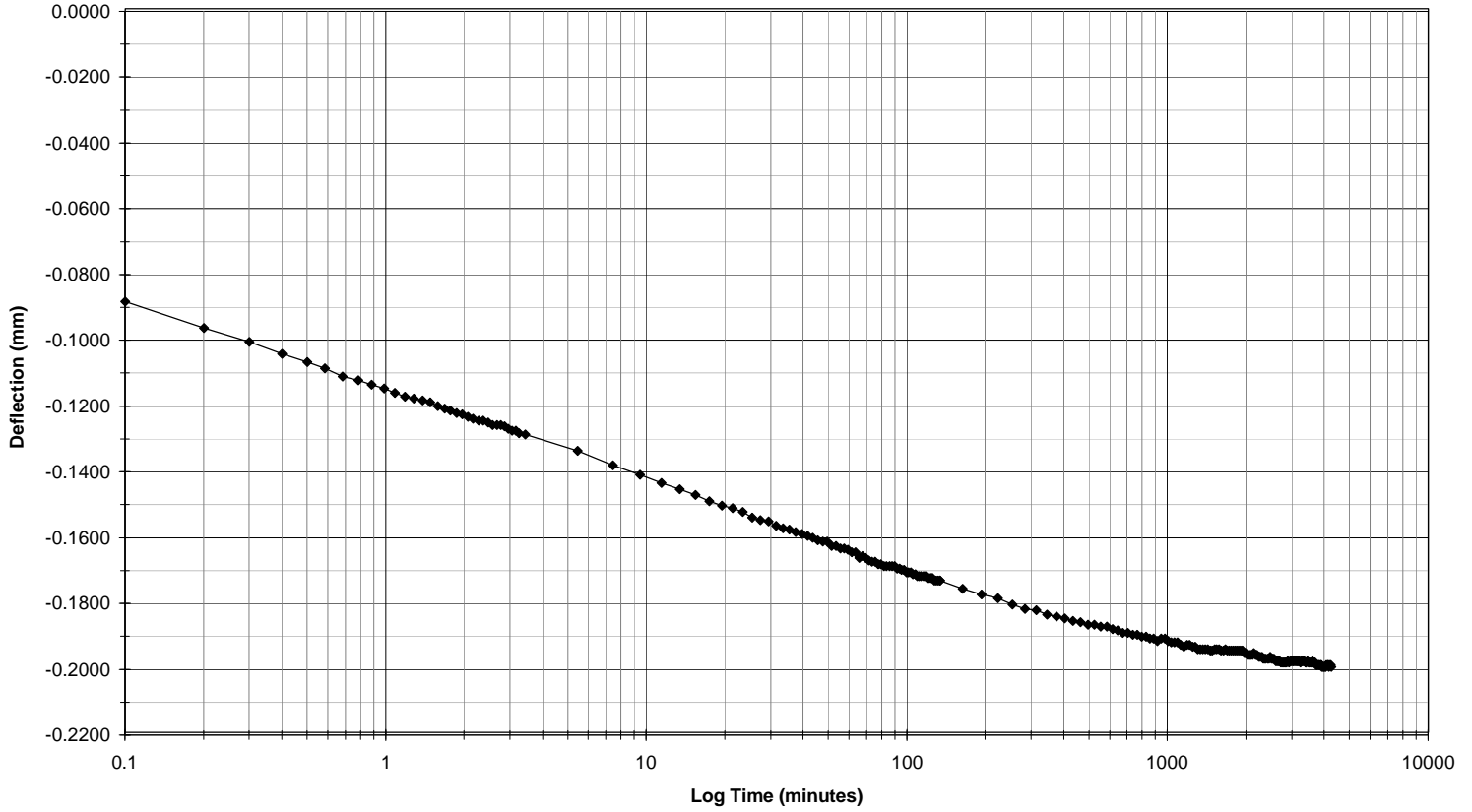
**Square Root of Time vs Deflection**



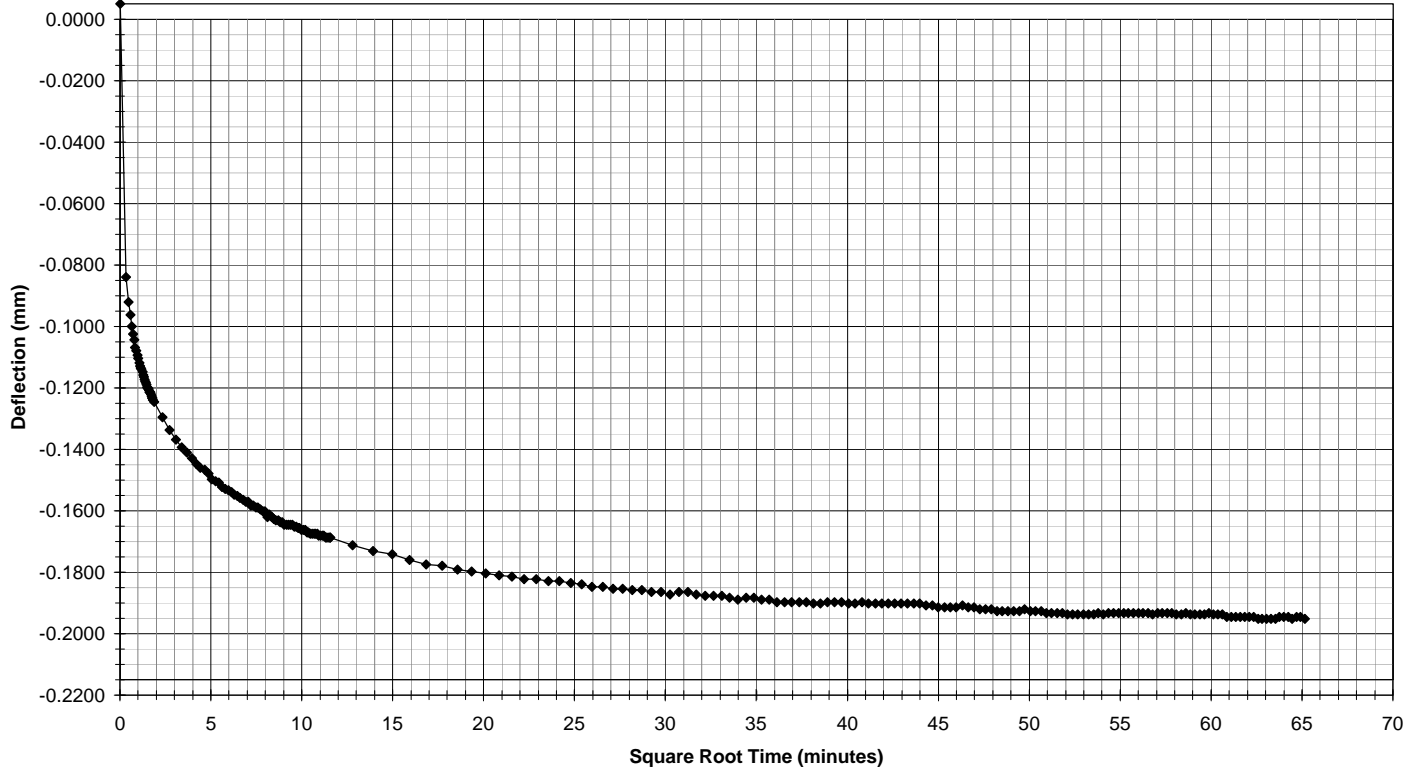
**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	07/11/2003
<b>Loading Stage</b>	196.4 kPa	<b>Start Loading Time</b>	10:01:19

**Log Time vs Deflection**



**Square Root of Time vs Deflection**

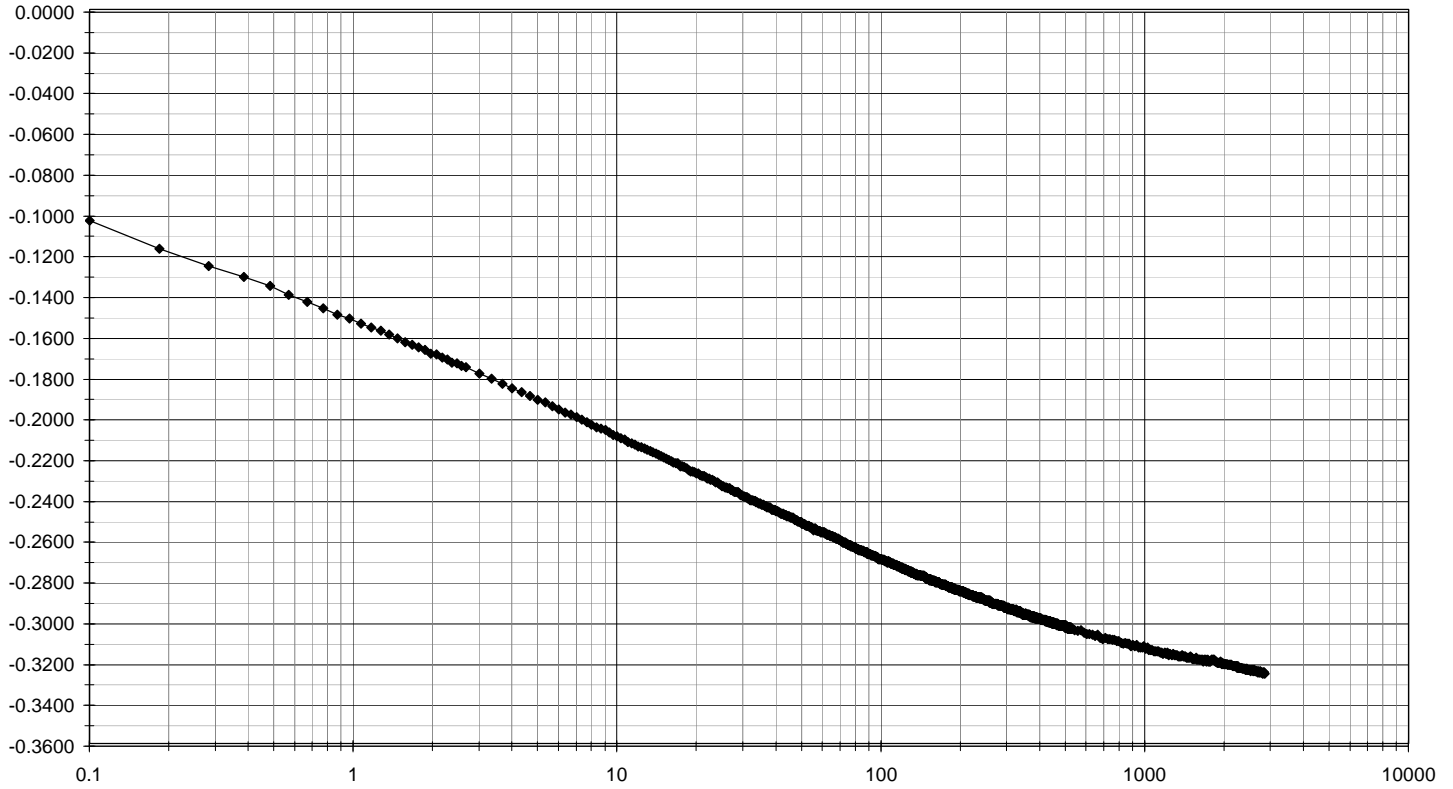




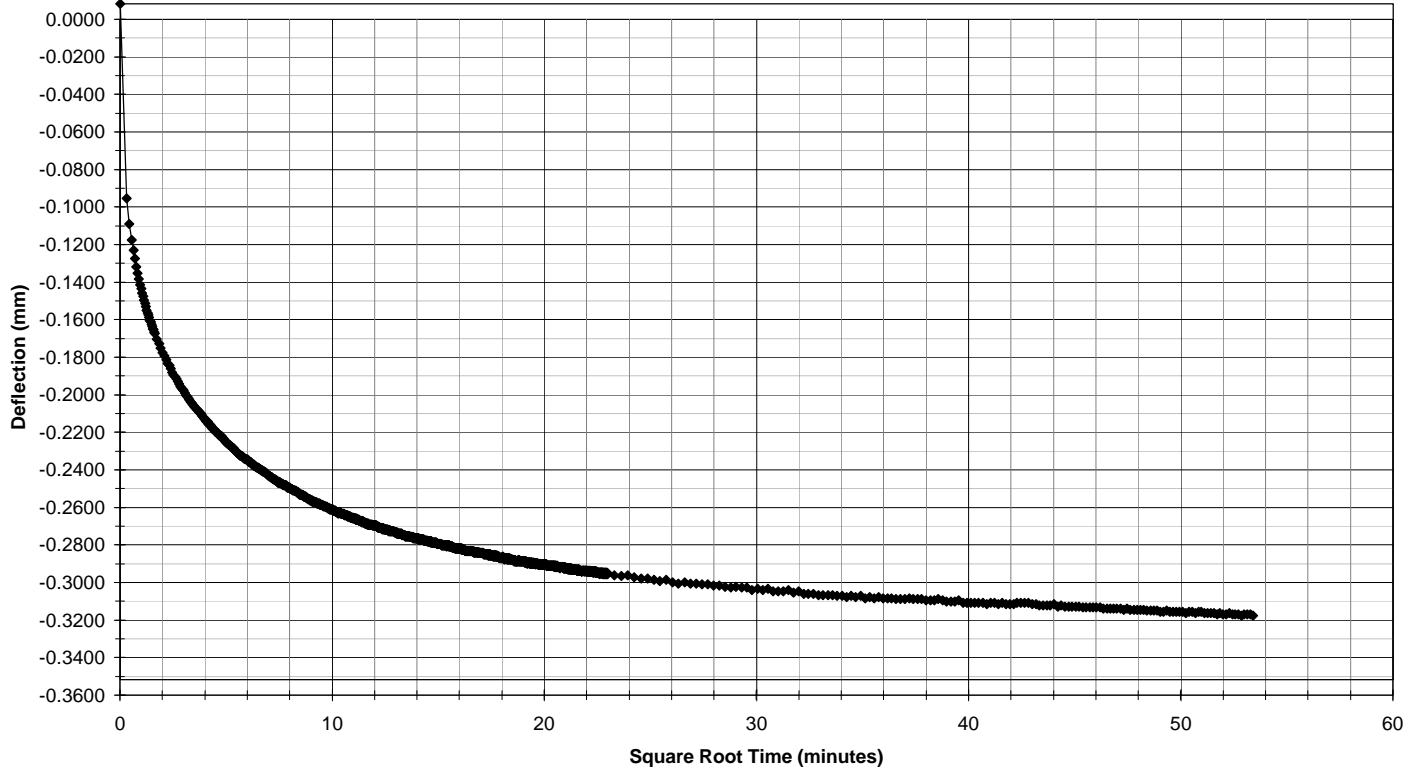
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	10/11/2003
<b>Loading Stage</b>	382.8 kPa	<b>Start Loading Time</b>	9:40:57

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



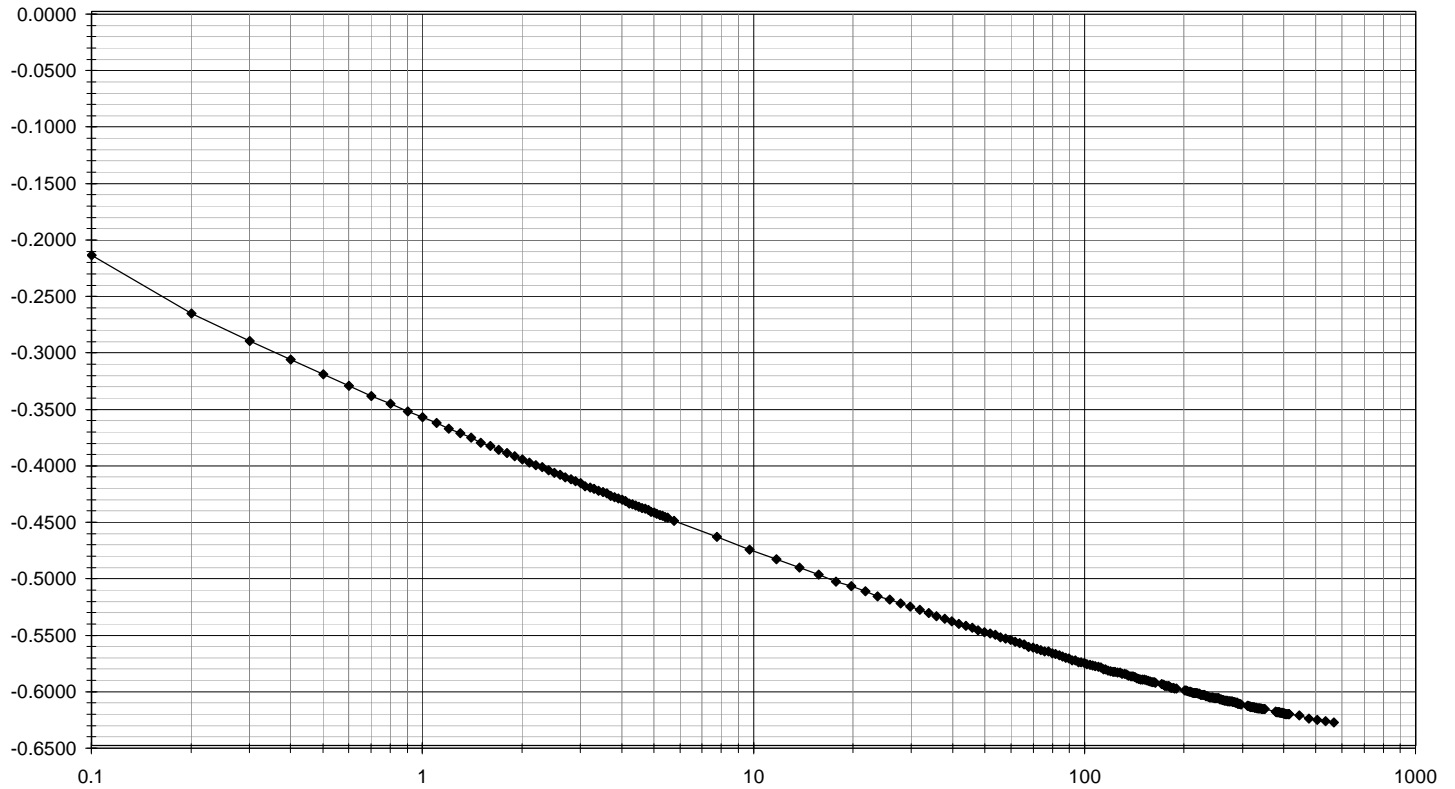
**Square Root of Time vs Deflection**



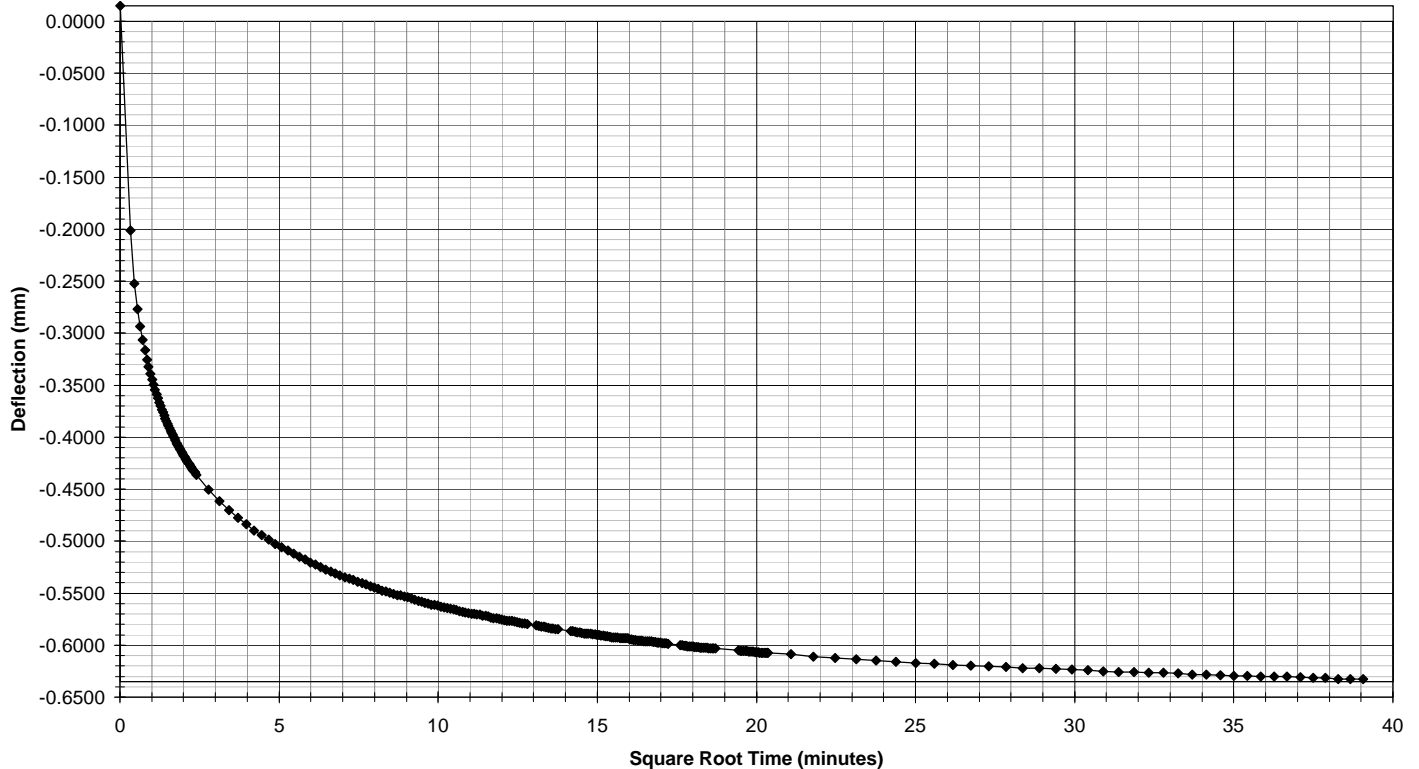
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	12/11/2003
<b>Loading Stage</b>	757.68 kPa	<b>Start Loading Time</b>	9:40:34

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



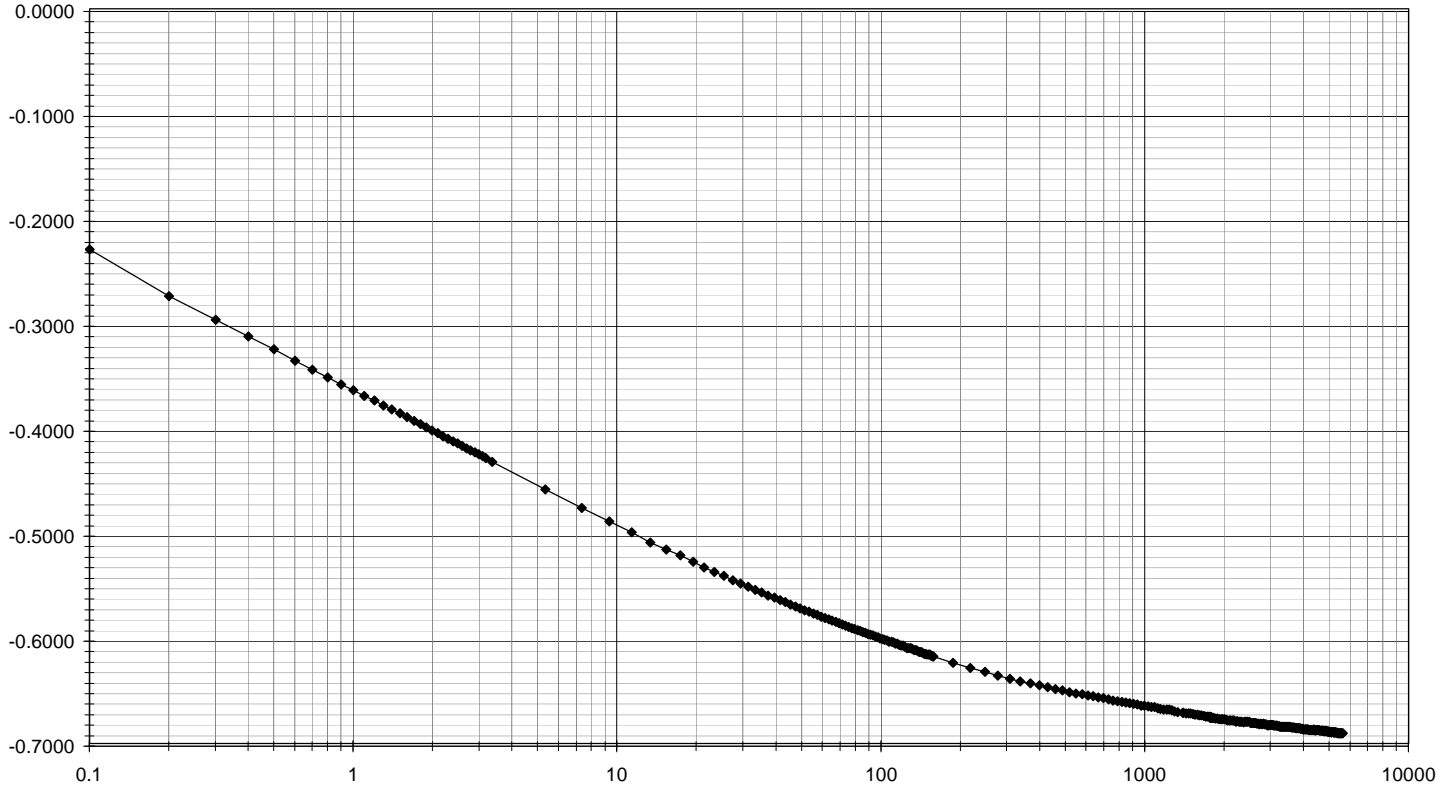
**Square Root of Time vs Deflection**



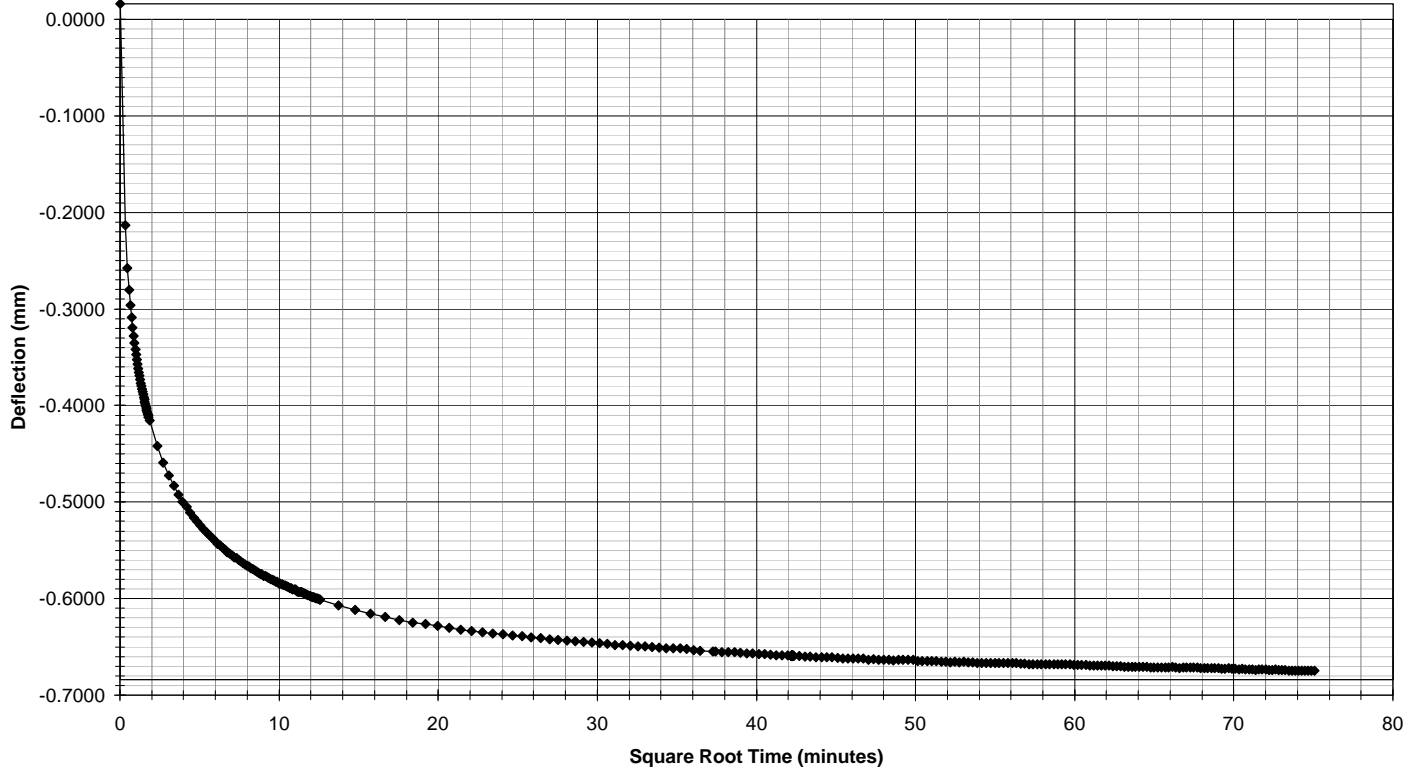
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	13/11/2003
<b>Loading Stage</b>	1513.9 kPa	<b>Start Loading Time</b>	11:54:21

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



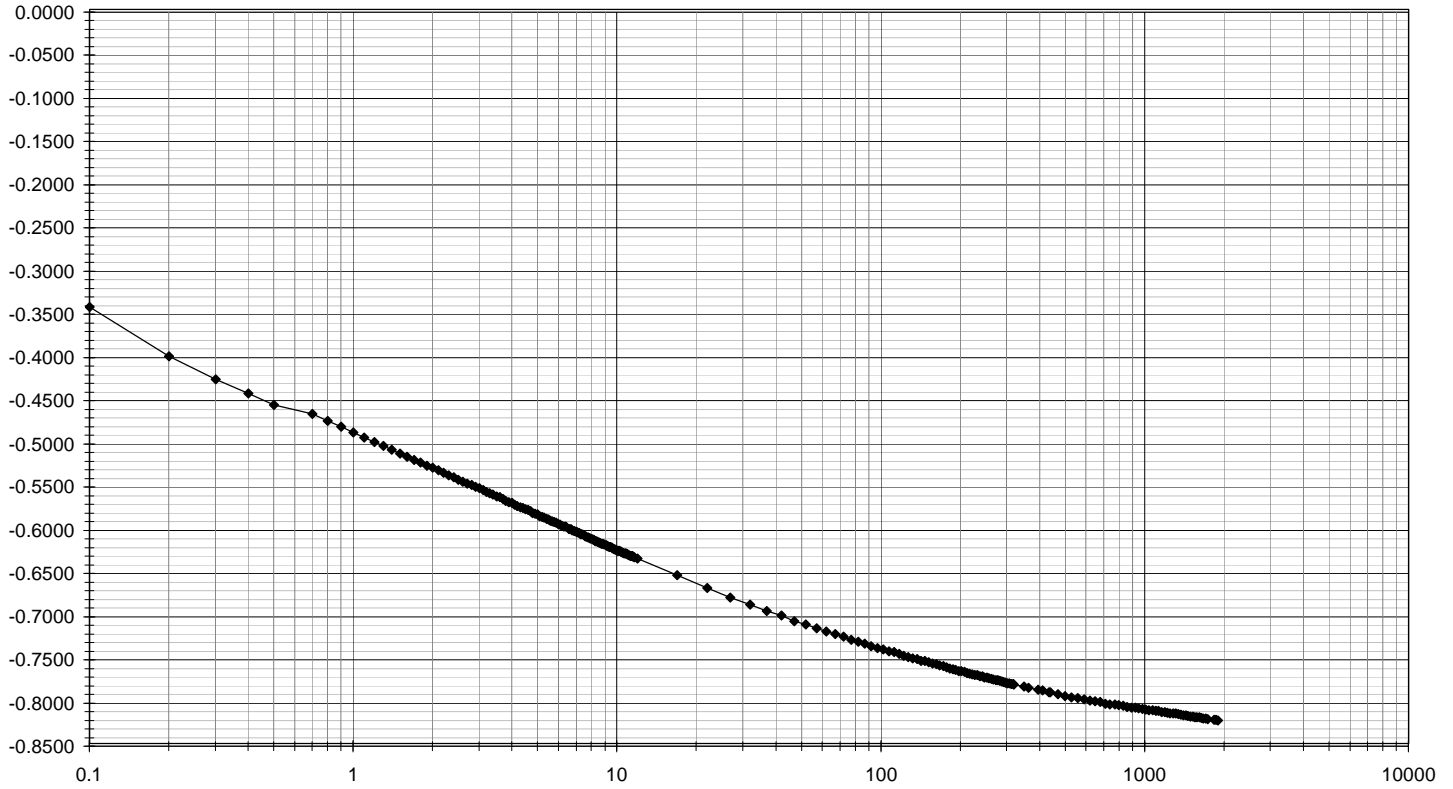
**Square Root of Time vs Deflection**



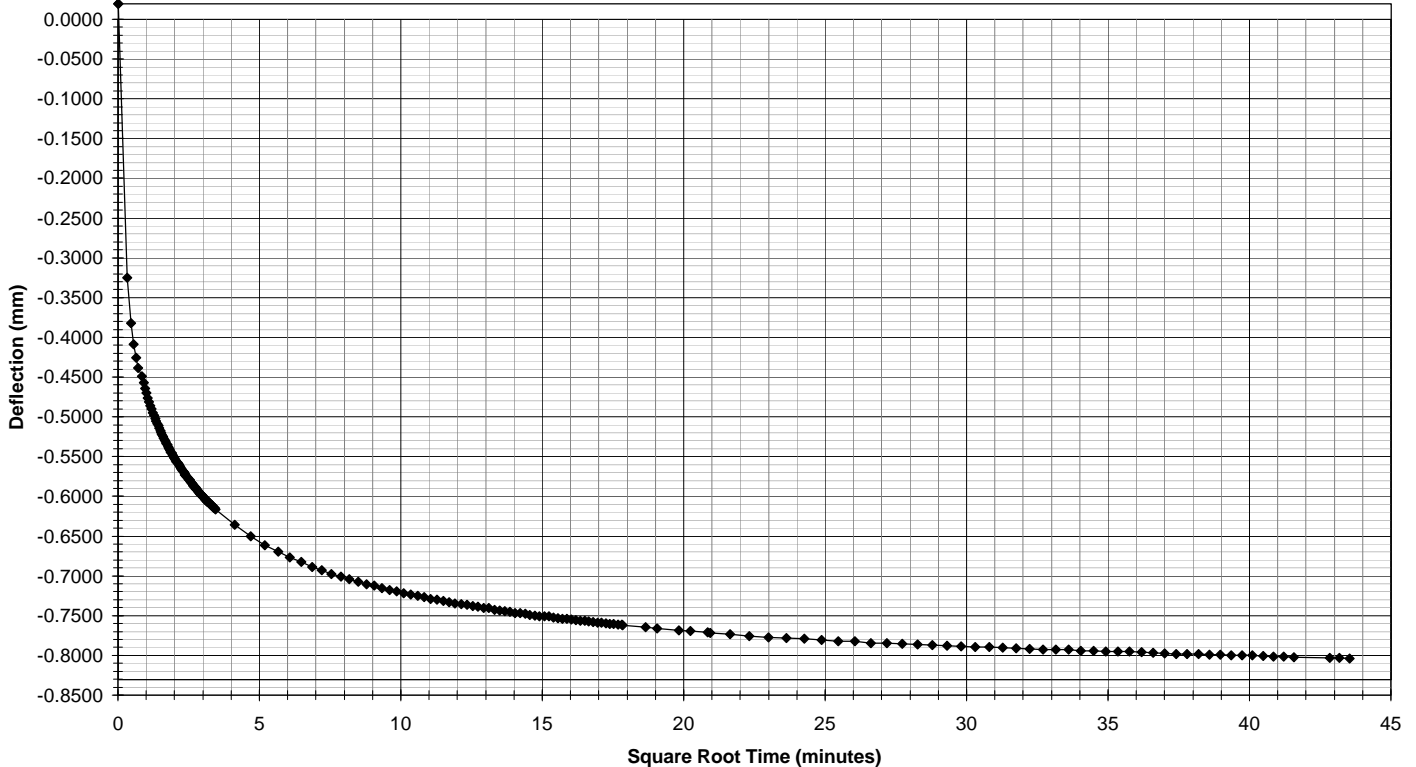
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 1
<b>Hole No.</b>	Piston Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	17/11/2003
<b>Loading Stage</b>	3012.2 kPa	<b>Start Loading Time</b>	10:24:03

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



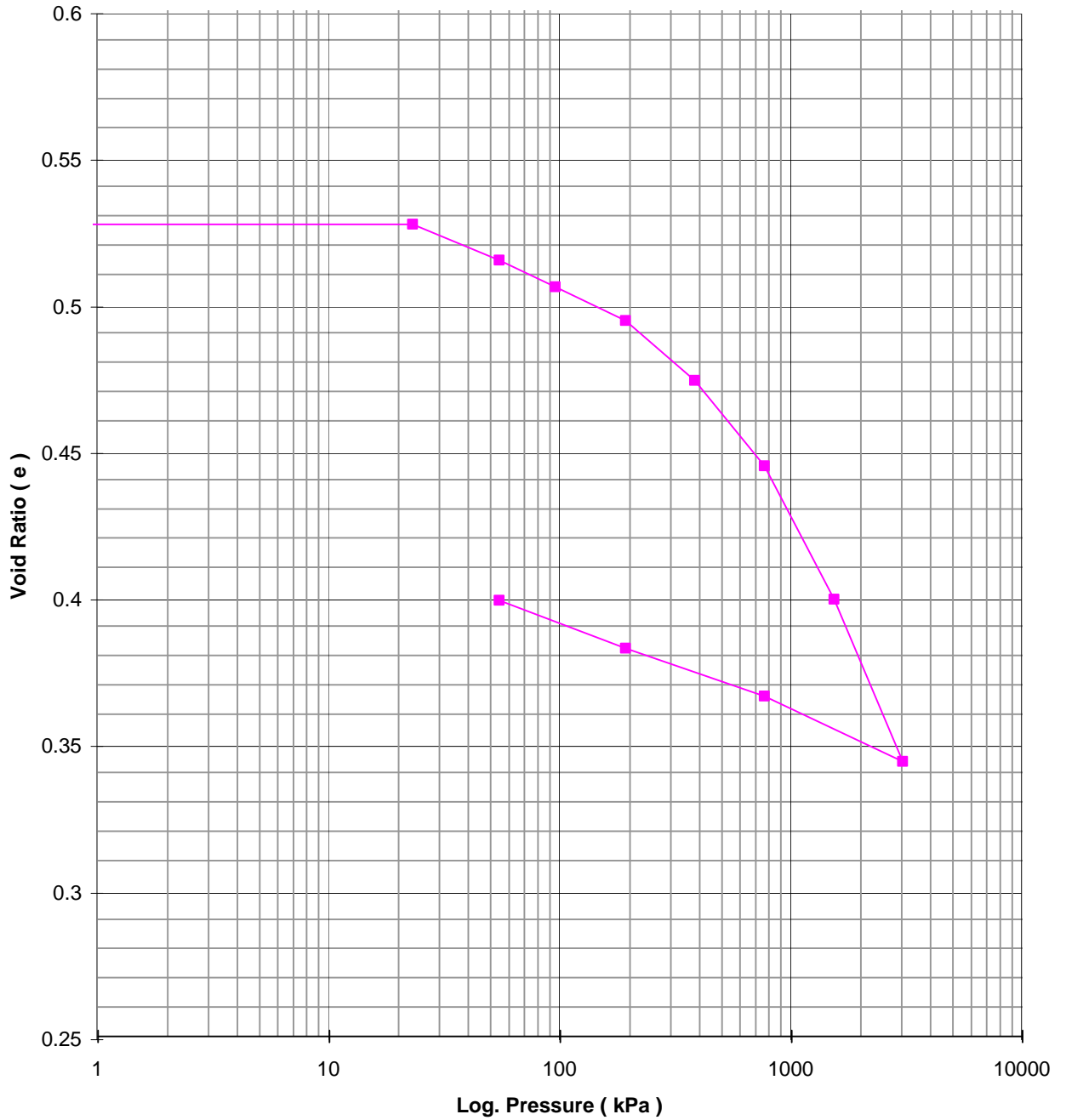
**Square Root of Time vs Deflection**





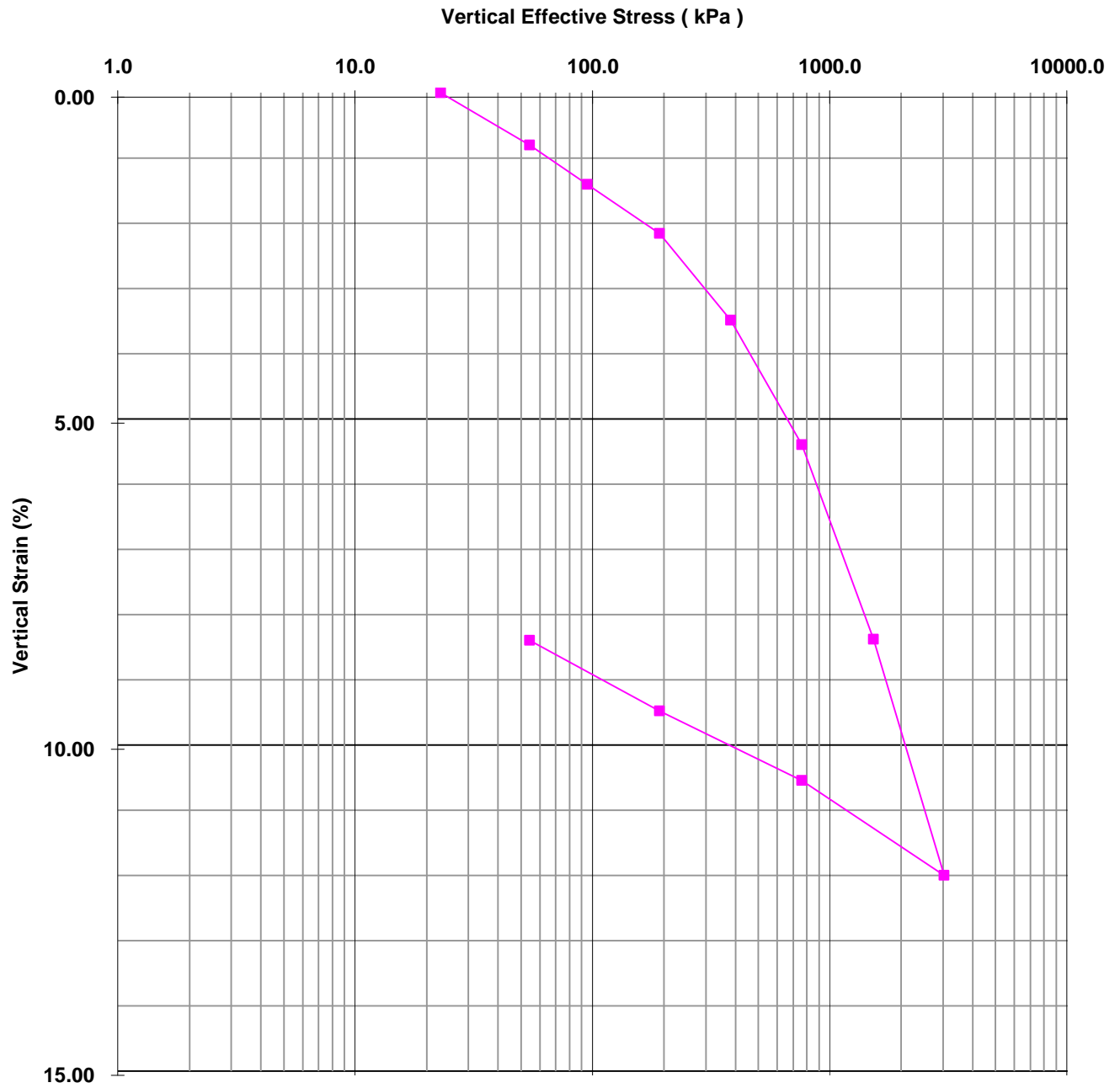
<b>AMEC EARTH &amp; ENVIRONMENTAL LIMITED</b> <i>Engineering &amp; Environmental Services</i> <i>Edmonton, Alberta, Canada</i>  <b>ONE-DIMENSIONAL CONSOLIDATION TEST</b> ( ASTM D2435-90 )	<b>Project</b>	Defence Research Development Canada		
	<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
	<b>Location</b>	Medicine Hat, AB		
	<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
	<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
	<b>Technician</b>	LK	<b>Date Started</b>	05/11/2003

**Void ratio vs. Log Pressure**



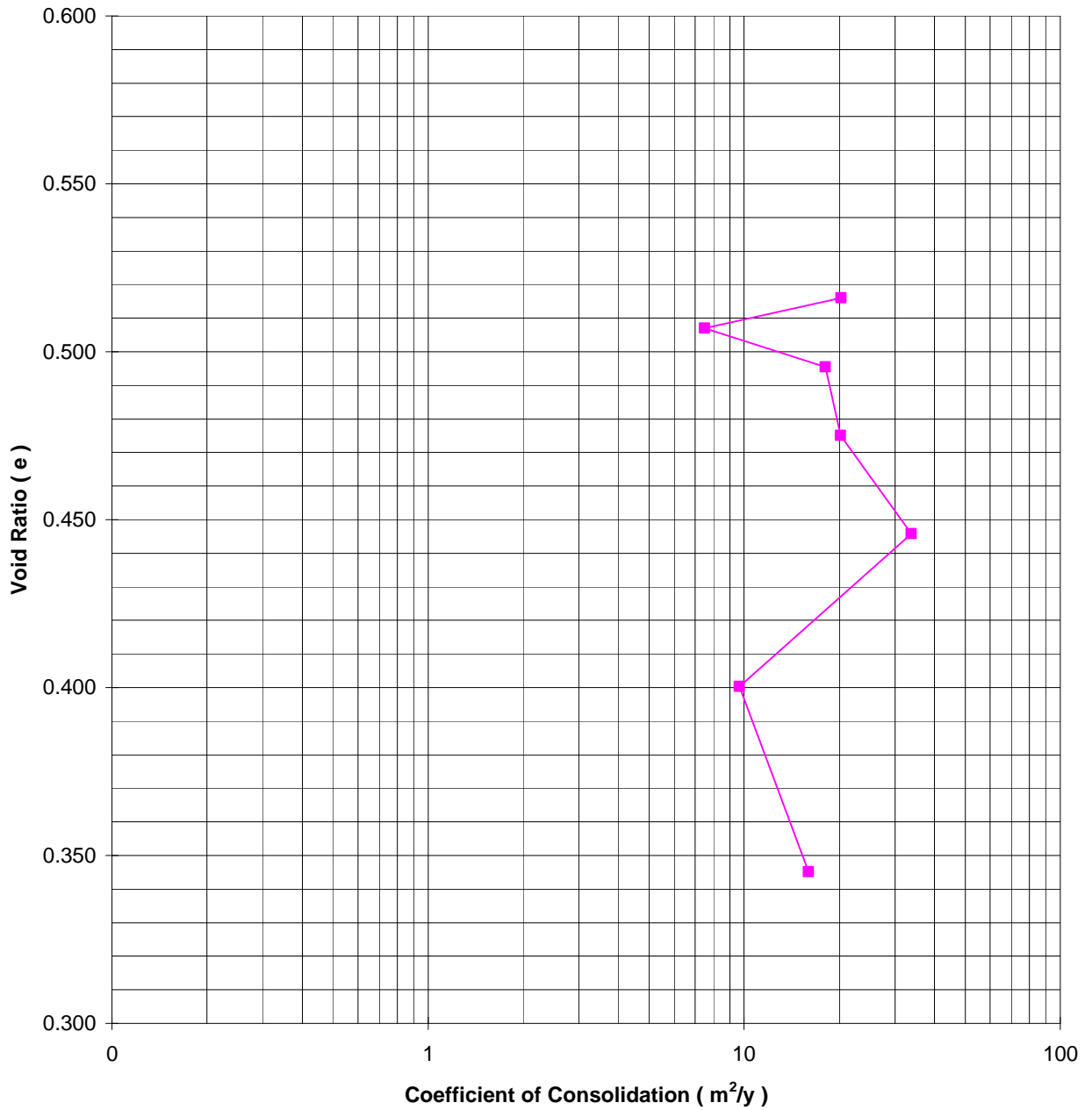
**AMEC EARTH & ENVIRONMENTAL LIMITED***Engineering & Environmental Services  
Edmonton, Alberta, Canada***ONE-DIMENSIONAL CONSOLIDATION TEST**  
( ASTM D2435-90 )

<b>Project</b>	Defence Research Development Canada		
<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Date Started</b>	05/11/2003

**Vertical Strain vs. Vertical Effective Stress**

**AMEC EARTH & ENVIRONMENTAL LIMITED***Engineering & Environmental Services  
Edmonton, Alberta, Canada***ONE-DIMENSIONAL CONSOLIDATION TEST**  
( ASTM D2435-90 )

<b>Project</b>	Defence Research Development Canada		
<b>Test</b>	Test Method B (Remolded & Compacted Sample)		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Date Started</b>	05/11/2003

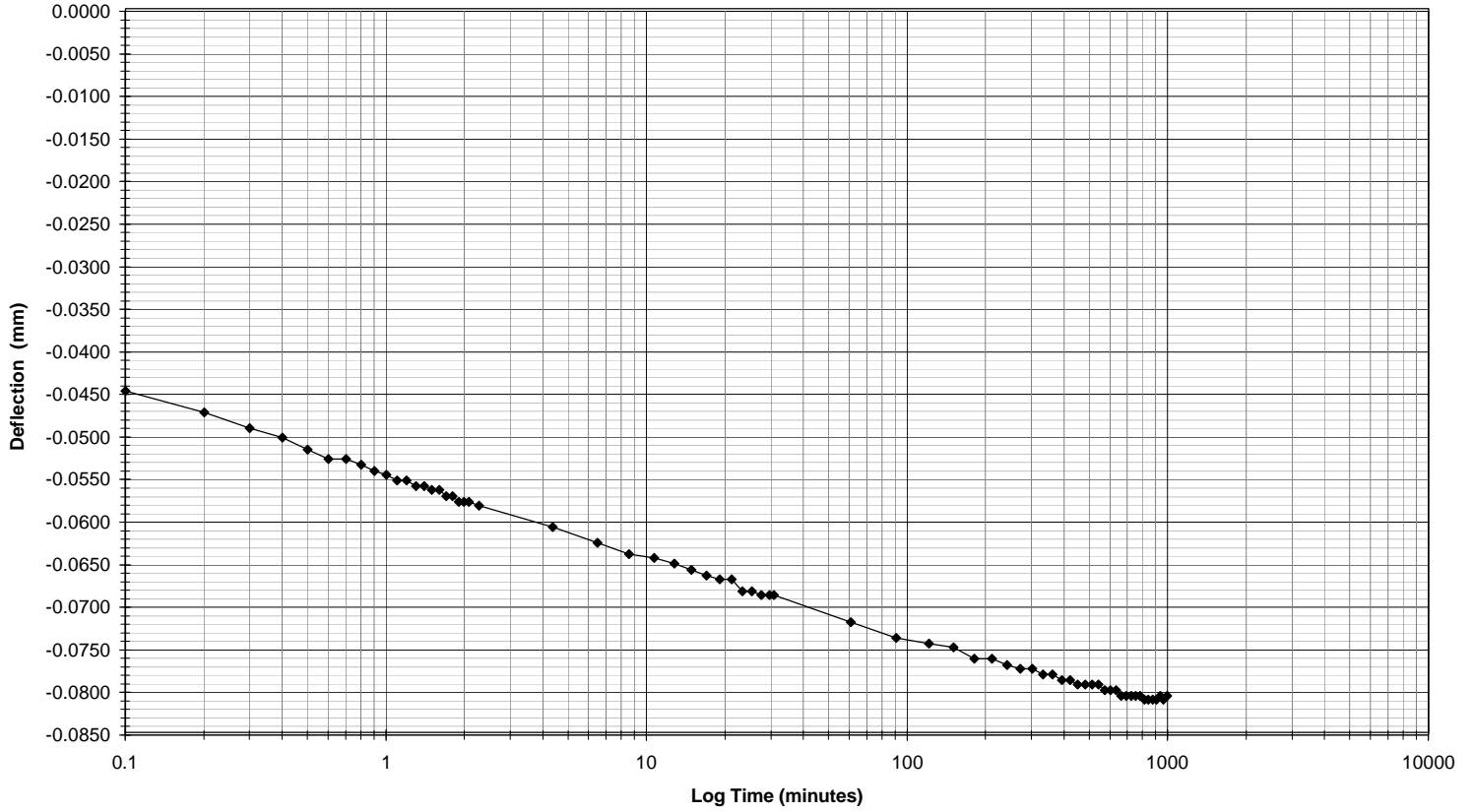
**Void Ratio vs. Coefficient of Consolidation**



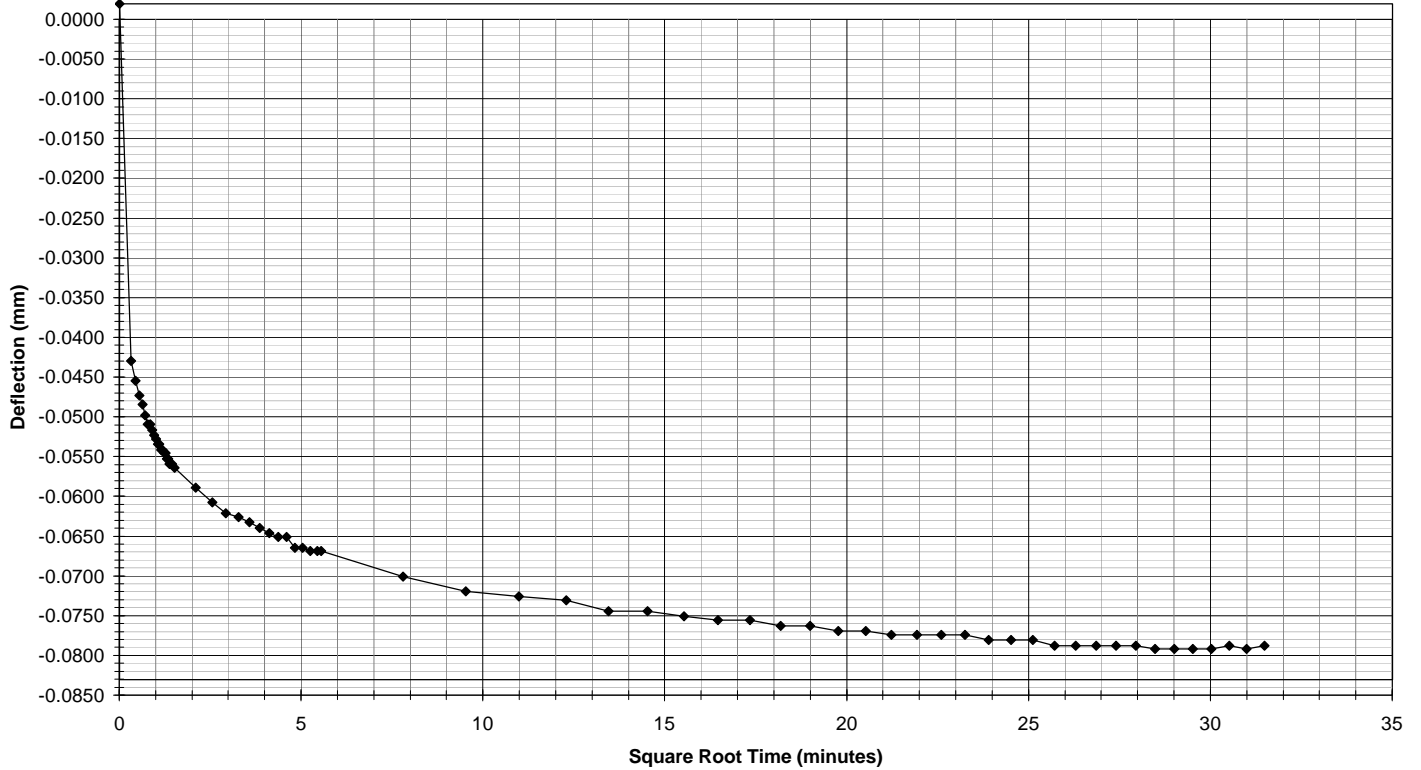
**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 (ASTM D2435-90)

<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	06/11/2003
<b>Loading Stage</b>	54.45 kPa	<b>Start Loading Time</b>	17:14:41 PM

**Log Time vs Deflection**



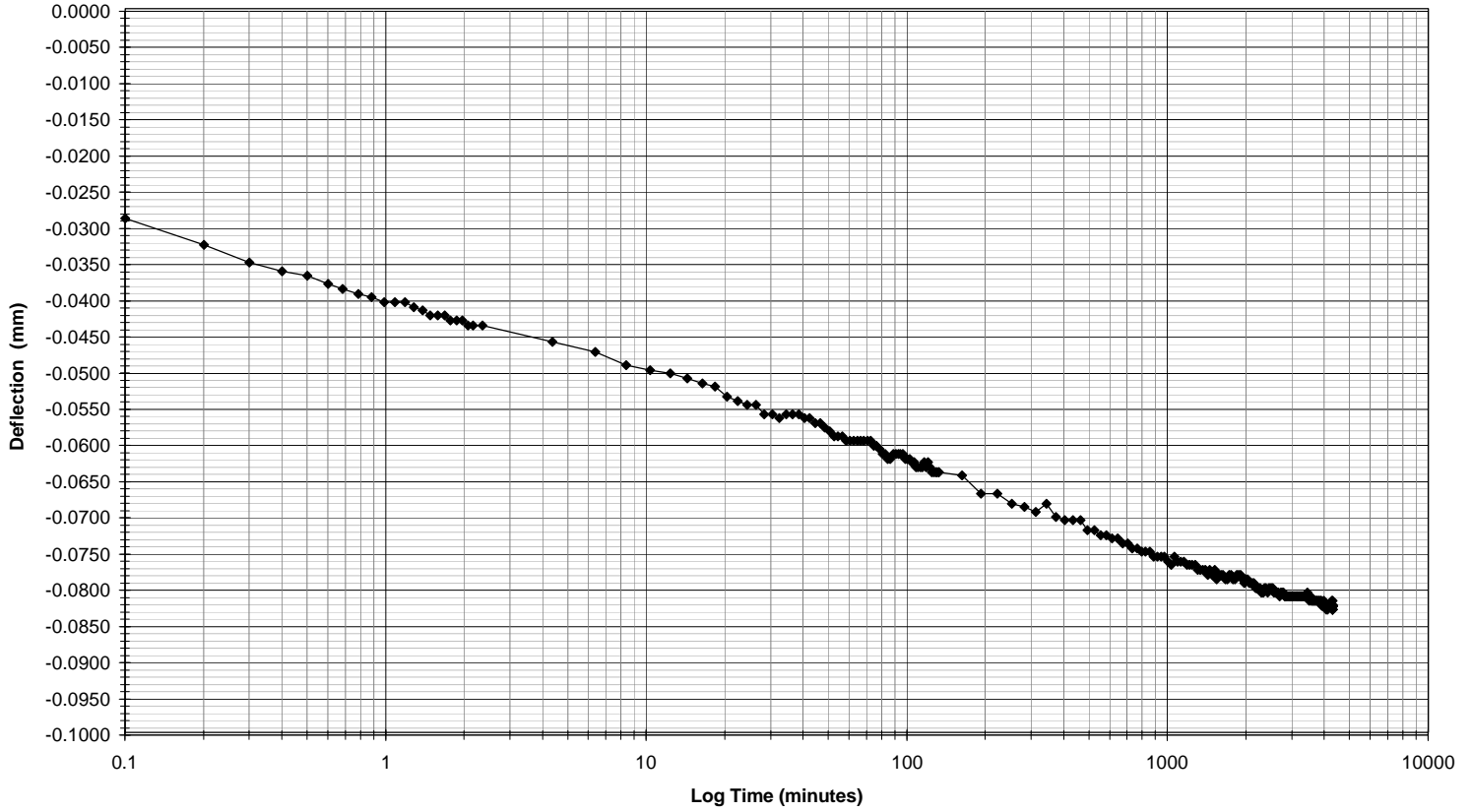
**Square Root of Time vs Deflection**



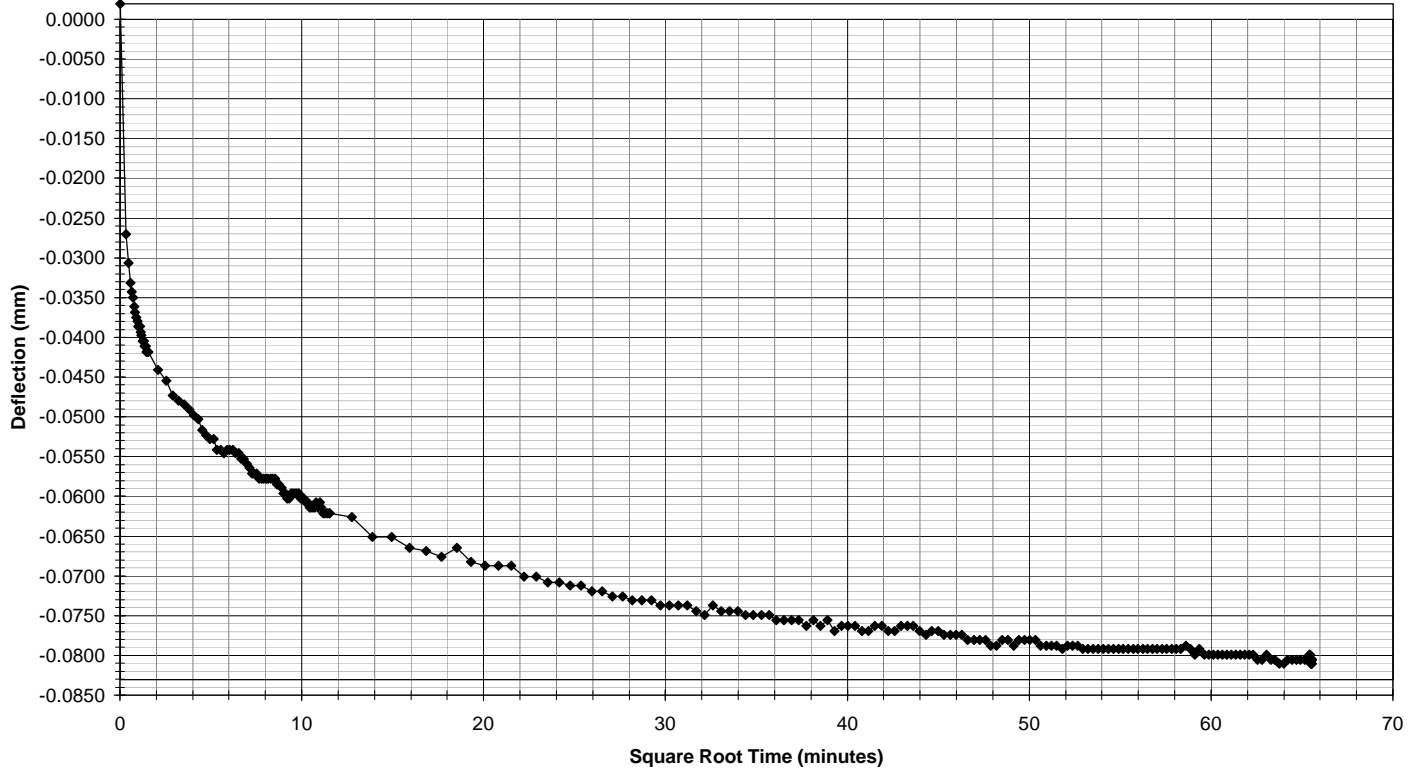
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	07/11/2003
<b>Loading Stage</b>	95.23 kPa	<b>Start Loading Time</b>	10:02:24

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



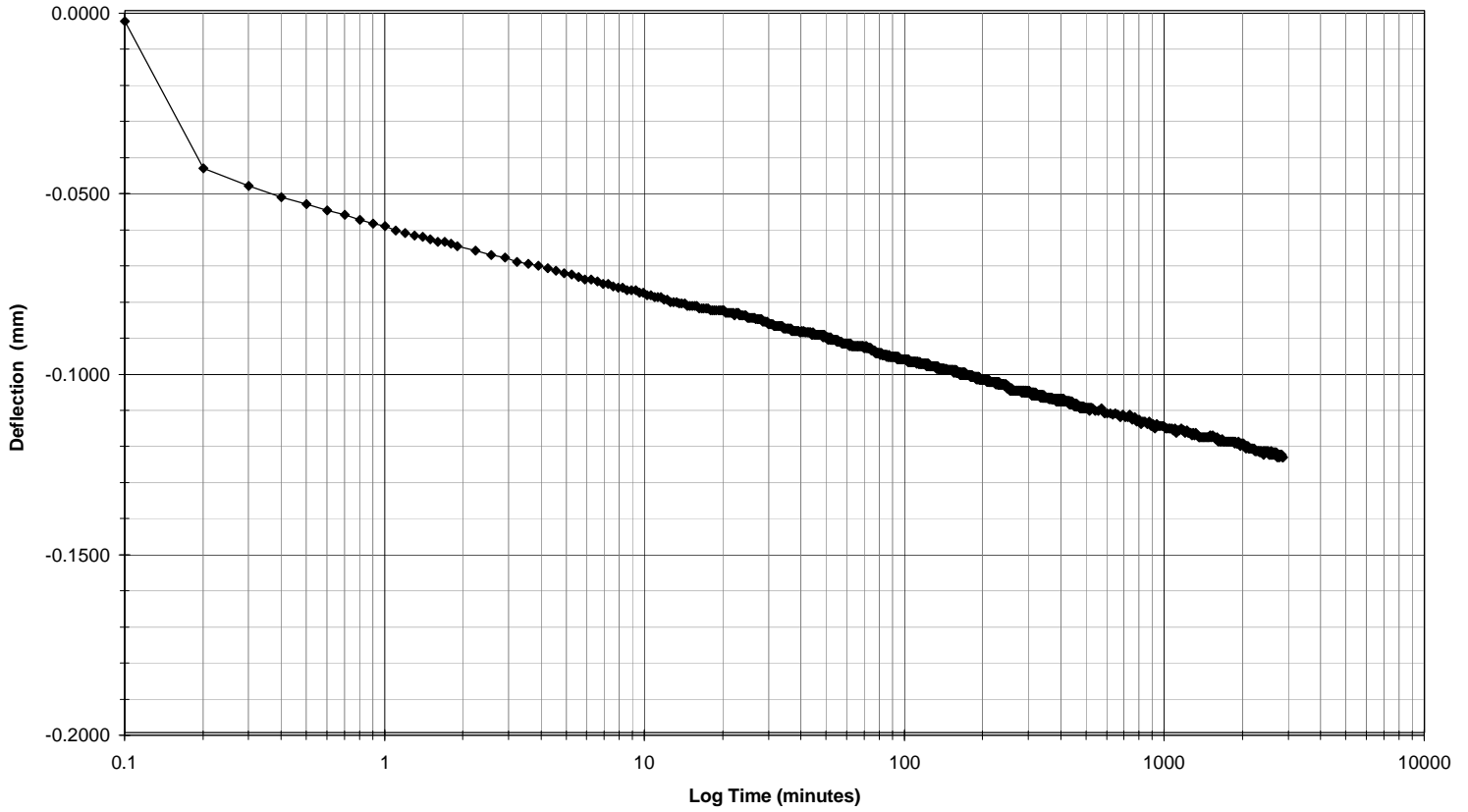
**Square Root of Time vs Deflection**



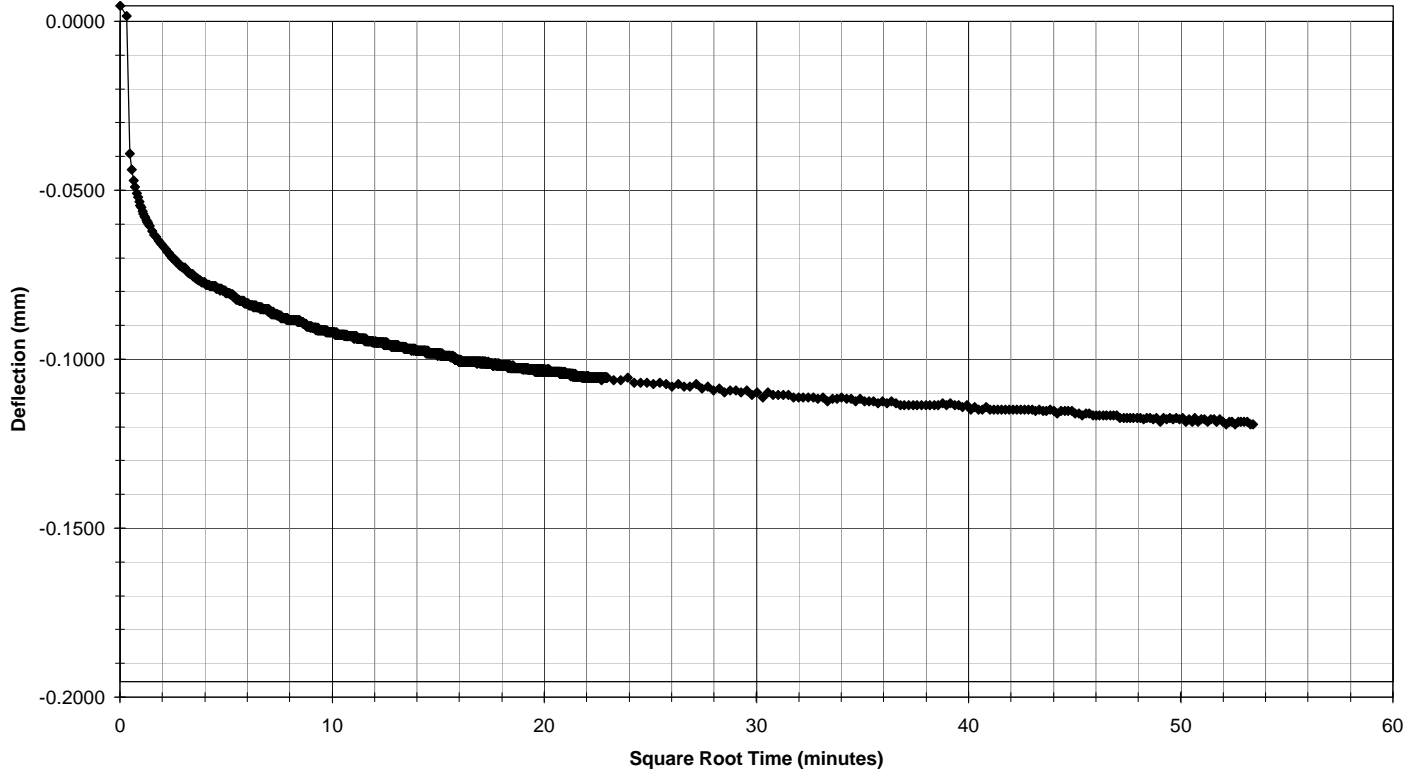
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	10/11/2003
<b>Loading Stage</b>	191.85 kPa	<b>Start Loading Time</b>	9:41:43

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



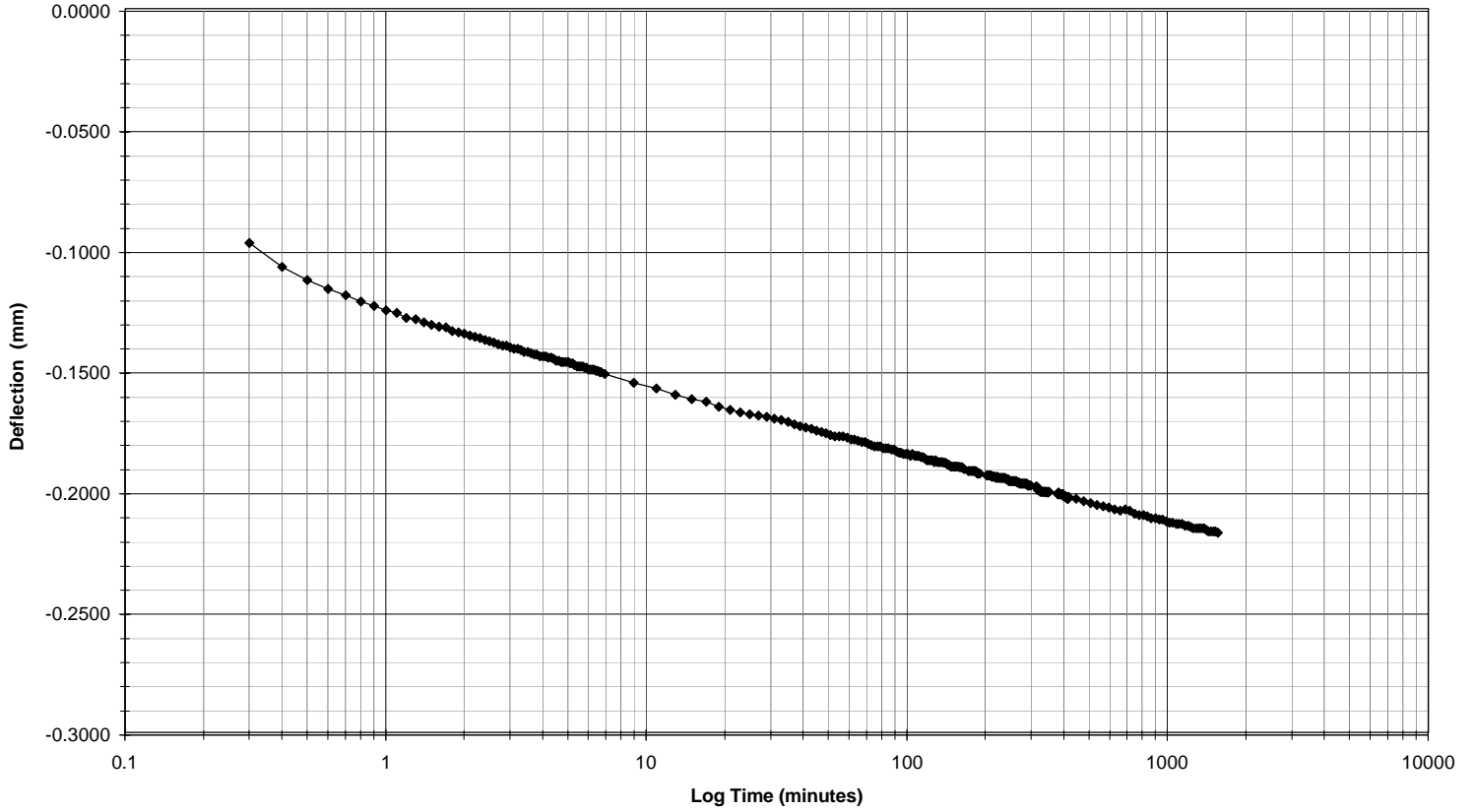
**Square Root of Time vs Deflection**



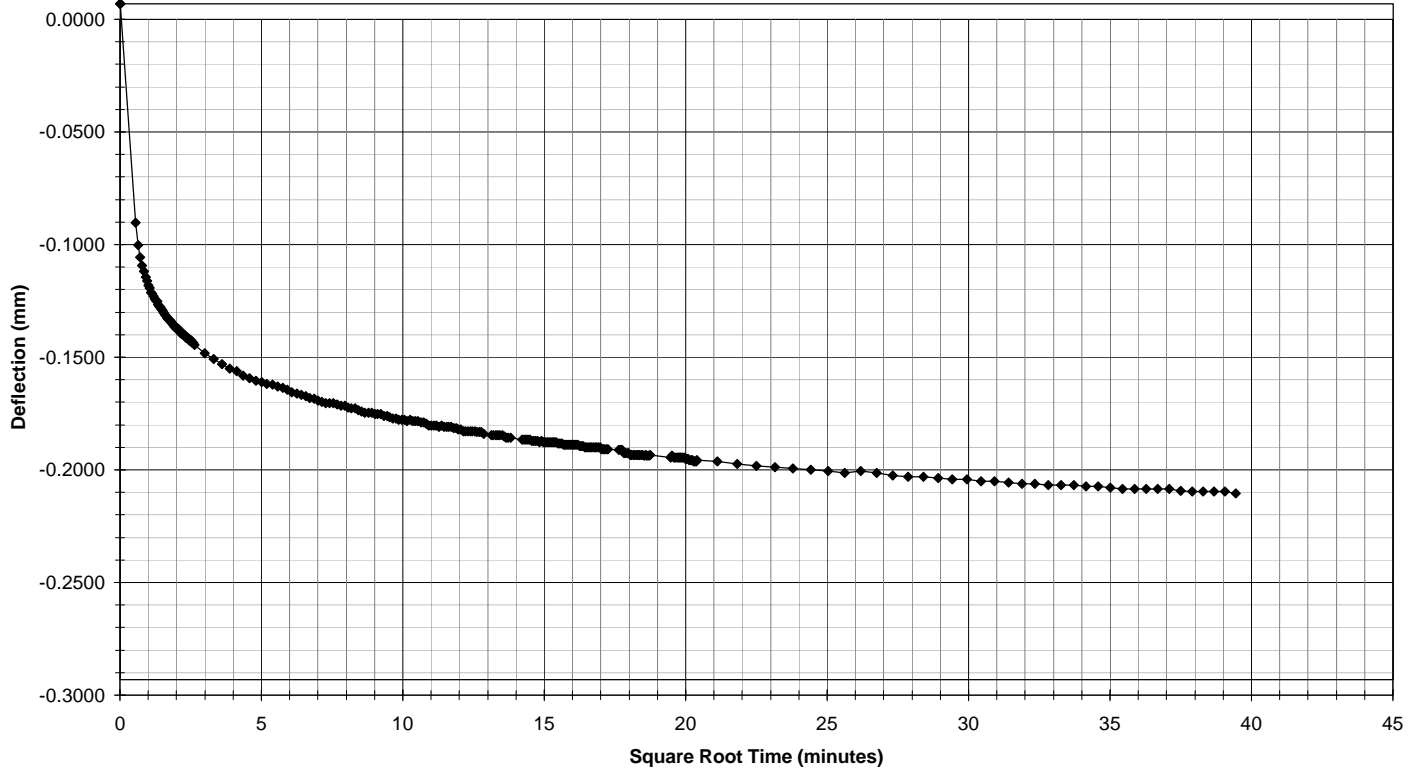
**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	12/11/2003
<b>Loading Stage</b>	382.58 kPa	<b>Start Loading Time</b>	9:39:34

**Log Time vs Deflection**



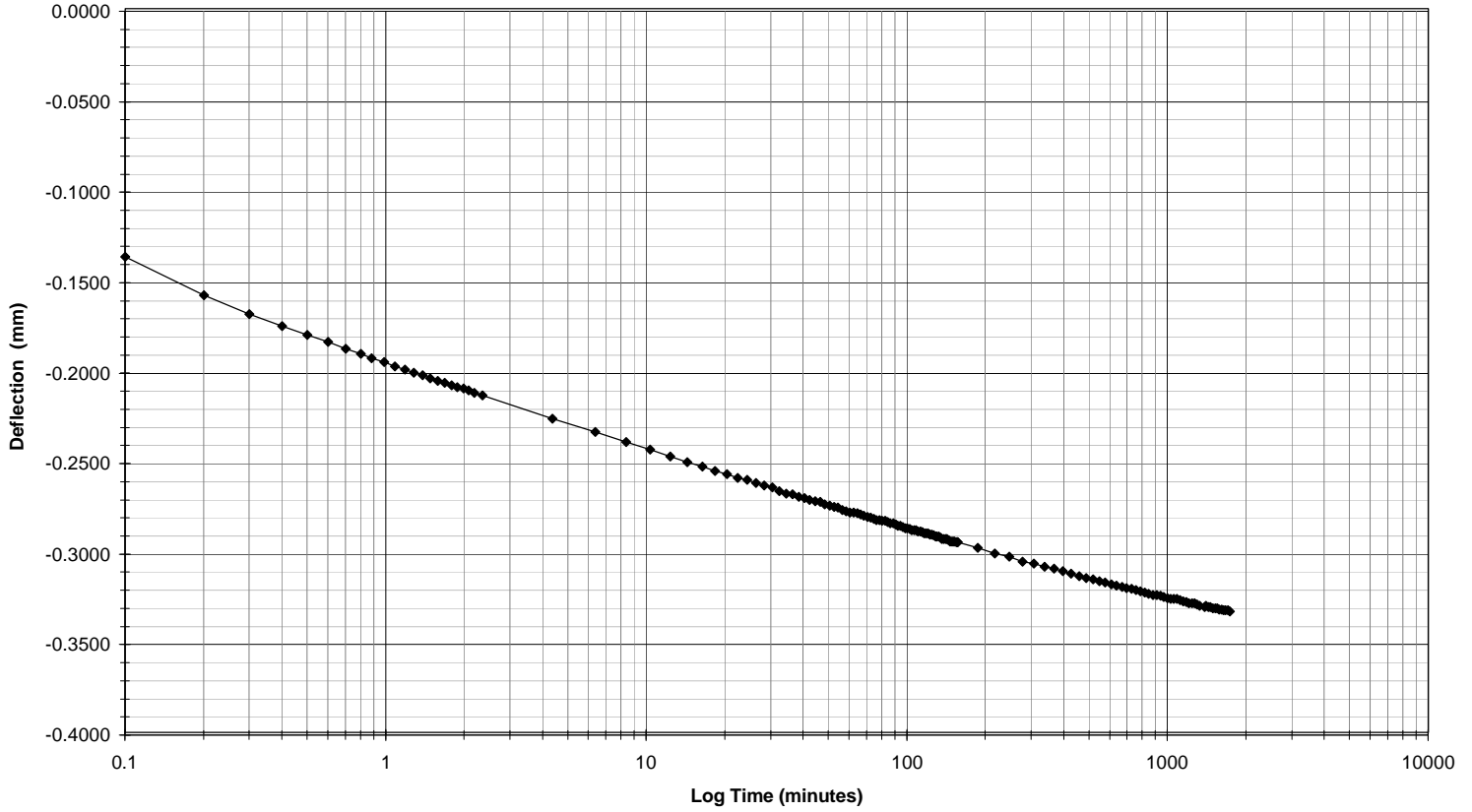
**Square Root of Time vs Deflection**



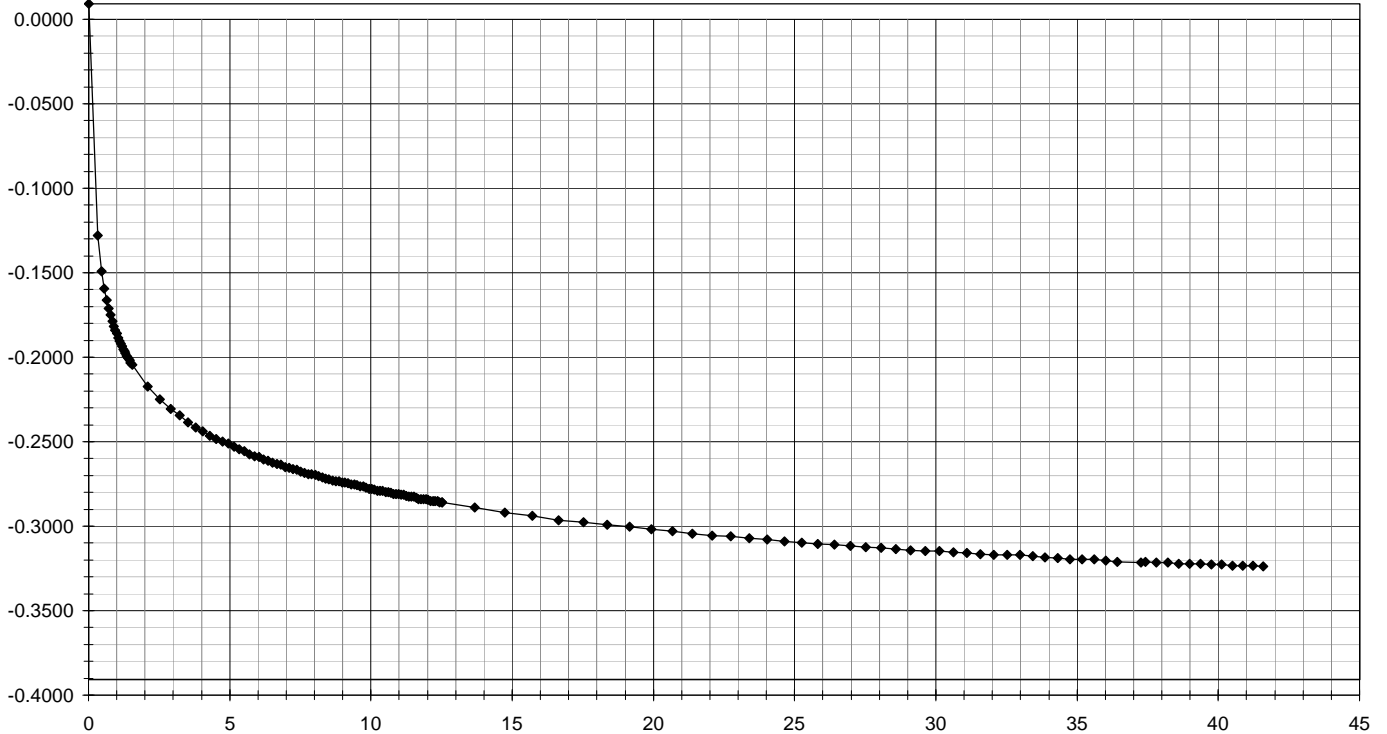
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	13/11/2003
<b>Loading Stage</b>	764.04 kPa	<b>Start Loading Time</b>	11:55:21

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



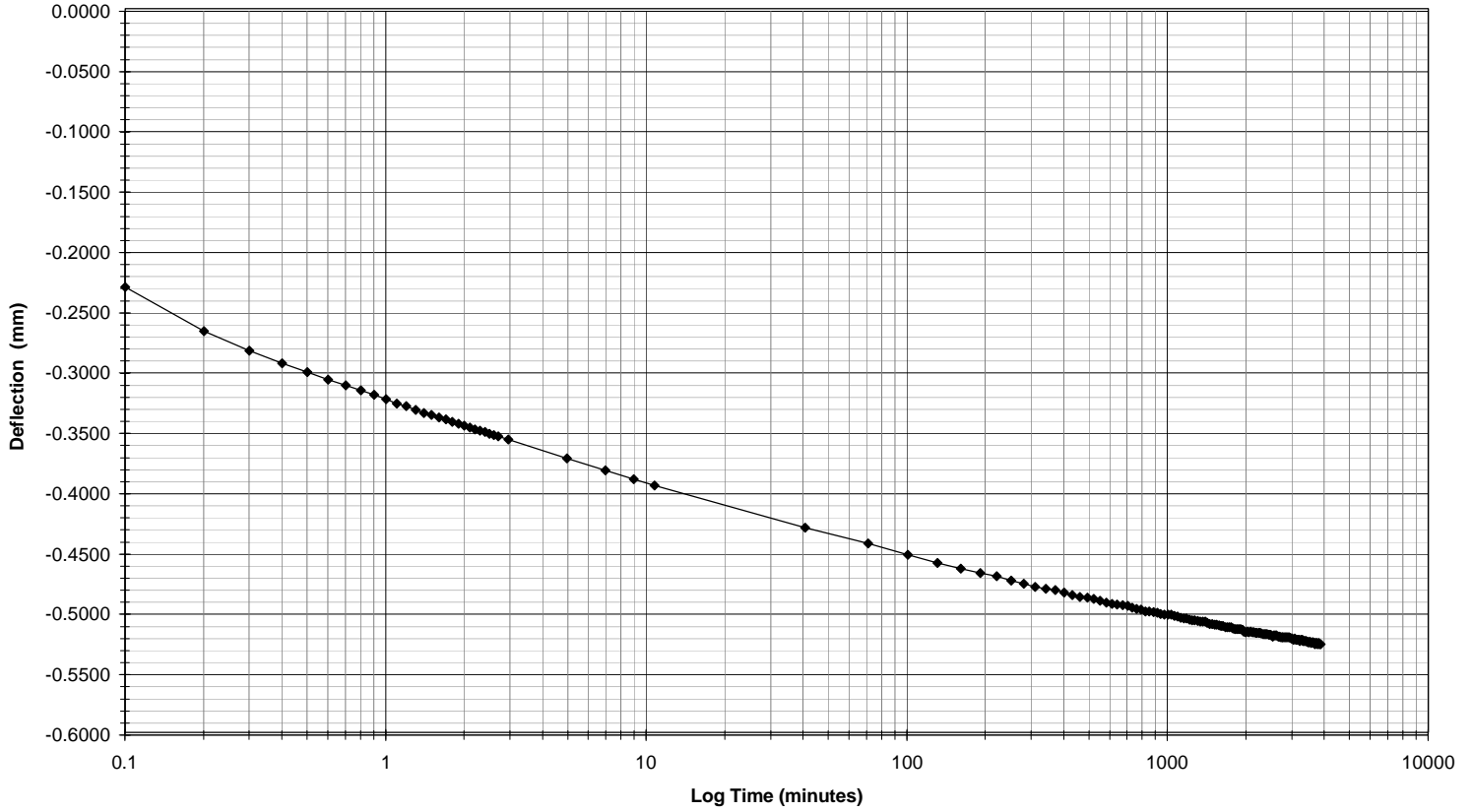
**Square Root of Time vs Deflection**



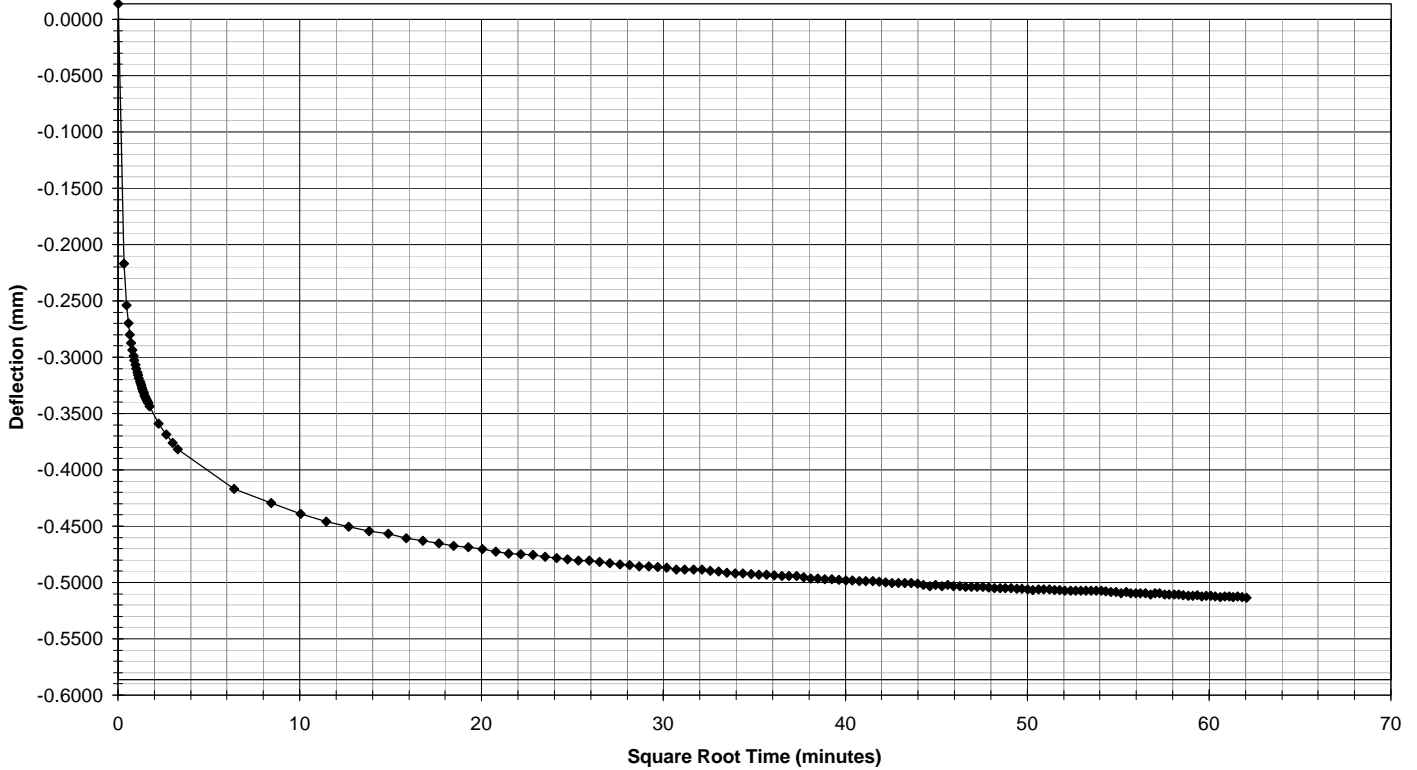
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	14/11/2003
<b>Loading Stage</b>	1527 kPa	<b>Start Loading Time</b>	17:35:08 PM

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



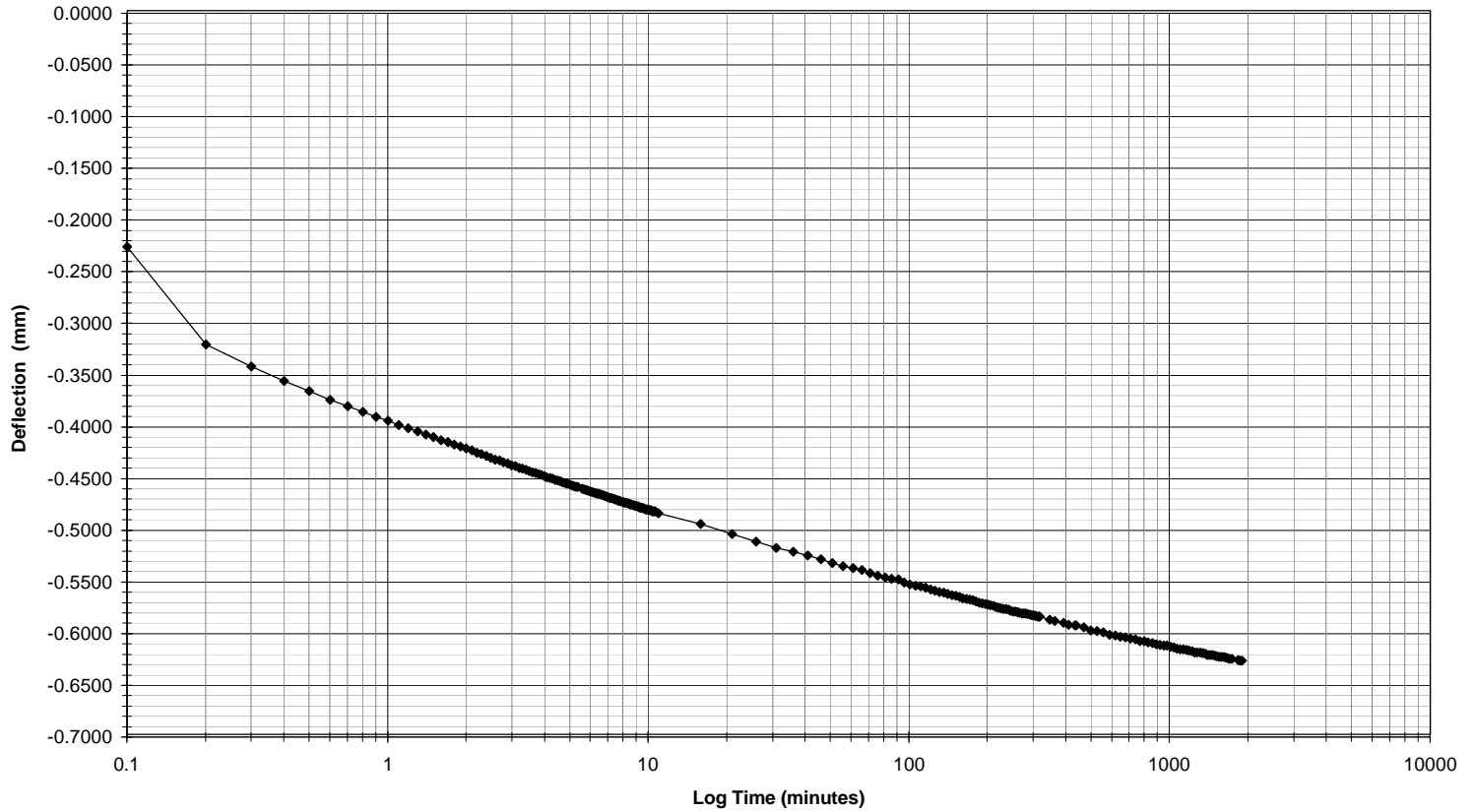
**Square Root of Time vs Deflection**



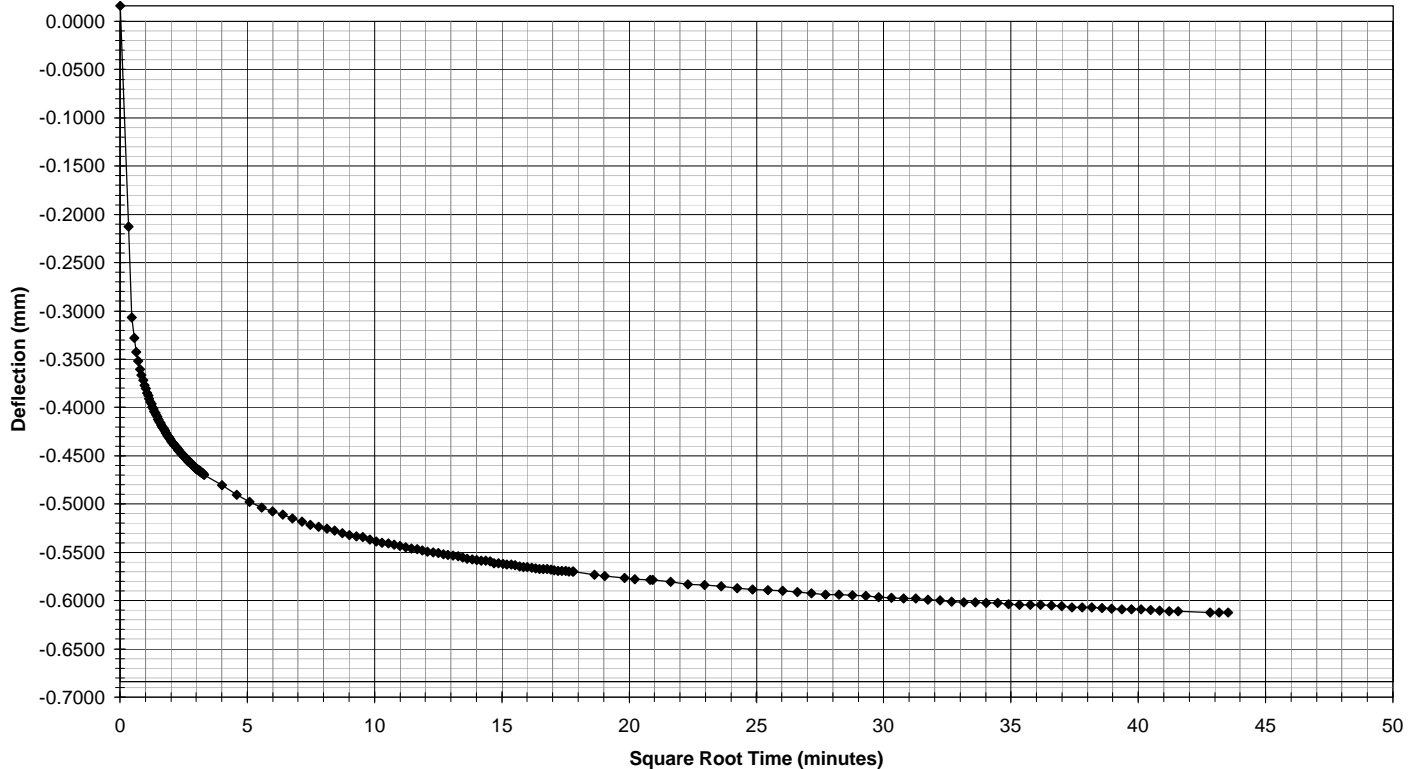
<b>Project</b>	Defence Research Development Canada		
<b>Location</b>	Medicine Hat, AB		
<b>Job No.</b>	BX02777	<b>Sample No.</b>	Machine # 7
<b>Hole No.</b>	Onager Site	<b>Depth ( m )</b>	-
<b>Technician</b>	LK	<b>Loading Date</b>	17/11/2003
<b>Loading Stage</b>	3034.8 kPa	<b>Start Loading Time</b>	10:25:03

**ONE-DIMENSIONAL CONSOLIDATION TEST**  
 ( ASTM D2435-90 )

**Log Time vs Deflection**



**Square Root of Time vs Deflection**







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**(highest classification of Title, Abstract, Keywords)**

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AMEC Earth & Environmental Limited (AMEC) was retained by Defence Research & Development Canada (DRDC) Suffield to carry out laboratory testing on soil samples from prairie soil samples from the Mine Effects Site near Building 148 on the Experimental Proving Ground at DRDC Suffield. AMEC's geotechnical laboratory in Edmonton, Alberta received three large, bag soil samples in late October 2003 for DRDC's Piston, Onager East and Onager West sites.

The following laboratory tests were requested by DRDC:

1. · Determination of water content of soil samples;
2. · Preparation of compacted samples in range of natural water contents;
3. · Consolidation tests using ASTM D2435 on two samples; and
4. · Triaxial undrained tests (CUP) using ASTM D4767 on three samples.

A typical range of natural water contents of 13 to 19 percent was provided to AMEC by DRDC Suffield for similar soil at these sites. For testing, compacted samples were prepared at water contents within the natural water content range, with target water contents of approximately 15 percent.

Results are provided according to American Standard Testing Methods (ASTM) standards where applicable. Results for the Triaxial undrained tests (CUP) using ASTM D4767 on three samples are provided in CR 2004-138, DRDC Soil Laboratory Program Triaxial Test Results – Onager Site.

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soil samples  
water  
compaction  
Consolidation  
Triaxial undrained