TGG: JGL: FGJ: AC: AJØ: RF

TO: Distribution

XF: None

FROM: T. G. Grumbles
DATE: November 12, 1991

Interoffice Communication

SUBJ: EO PERMEATION STUDY

VISTA

The attached report was done to evaluate breakthrough times for garments typically used for emergency response in EO environments. A vapor test and a splash test were run. A full publication of the work is being done, but for now the results table is available.

T. G. Grumbles

dlj
.335

Attachment

Distribution: Keith Fogg-LCCP, Robert Martin-Austin

CHEMICAL MANUFACTURERS ASSOCIATION

October 24, 1991

TO: EOIC Industrial Hygiene Task Group

RE: Completion and results of permeation study

Please find enclosed one copy of a summary table and individual test reports of the nine selected materials, against ethylene oxide.

I hope you find the material useful. If you have any questions or comments, please do not hesitate to contact me at (202)-887-1198.

Sincerely yours,

Robert R. Romano

Robert R. Romano, Ph.D.
Associate Director CHEMSTAR
Manager, E.O.I.C.

Encl.

VVV 000008089

2501 M Street, NW, Washington, DC 20037 202-887-1100 Panafax 202-887-1237 Telex 89617 (CMA WSH)
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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

304-747-5352

August 26, 1991

Mr. Robert Romano
Chemical Manufacturers Association
2501 M. Street NW
Washington, DC 20037

Dear Mr. Romano:

We have completed the permeation study of the nine selected materials against ethylene oxide as specified in Amendment No. 2 to the CMA-TRI Contract No. EO-28.0-TRI. Attached are a summary table and individual test reports for each material tested.

We tested each of the nine material to ethylene oxide gas for 8 hours in accordance with ASTM F739. The North G-1510-R PVC coated glove originally specified is no longer produced. Instead we substituted their model number 3112 PVC coated glove which replaces the specified model. We tested Responder Seam twice, since in the initial test, we found one breakthrough within four minutes while in the other replicates there was no breakthrough. When we tested a different lot of Responder Seam, we saw breakthrough times all less than 4 minutes.

As instructed, we tested those materials demonstrating a breakthrough times greater than 60 minutes to liquid ethylene oxide splash exposures. The liquid splash was conducted for a period of 10 seconds and then removed from the test cell. This test was conducted for four of the materials: Ansell nitrile glove, 4H glove, Chemrel Max seam, and Responder seam. The Responder seam was included despite its inconsistent performance against ethylene oxide gas.

Please contact me if you have any questions.

Sincerely,

Jeffrey O. Stull
Division Manager
Barrier & Materials Technology

VVV 000008090

JOS:jmm

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PERMEATION SUMMARY RESULTS FOR CHEMICAL MANUFACTURERS ASSOCIATION

MATERIAL	CHEMICAL	EXPOSURE	PERMEATION BREAKTHROUGH TIME (minutes)			PERMEATION RATE (µg/cm2·hr)			MINIMUM DETECTION LIMIT (ppm)
			CELL 1	CELL 2	CELL 3	CELL 1	CELL 2	CELL 3	
Ansell Edmont Nitrile Glove (Solvex 37-155)	Ethylene Oxide	Gas	60	68	84	47	42	57	.09
Ansell Edmont Nitrile Glove (Solvex 37-155)	Ethylene Oxide	Splash	<4	4	4	40	61	180	1
Chemrel Seam	Ethylene Oxide	Gas	<4	<4	<4	1.1	.21	.32	.2
Chemrel Max Seam	Ethylene Oxide	Gas	NO BT	NO BT	NO BT	N/A	N/A	N/A	.2
Chemrel Max Seam	Ethylene Oxide	Splash	NO BT	NO BT	NO BT	N/A	N/A	N/A	.1
4-H Glove Seam	Ethylene Oxide	Gas	NO BT	NO BT	NO BT	N/A	N/A	N/A	.3
4-H Glove Seam	Ethylene Oxide	Splash	NO BT	NO BT	NO BT	N/A	N/A	N/A	.6
North PVC Coated Glove (Model 3112)	Ethylene Oxide	Gas	8	8	4	120	120	130	.1
North 12 Mil Viton	Ethylene Oxide	Gas	28	20	24	77	72	73	.06
Pioneer Stanzoil/Milled Neoprene Gloves	Ethylene Oxide	Gas	36	28	38	70	55	90	.2
Responder Seam	Ethylene Oxide	Gas	NO BT	NO BT	<4	N/A	N/A	>6.2	.08
Responder Seam	Ethylene Oxide	Gas	<4	<4	<4	1.5	.04	.03	.08
Responder Seam	Ethylene Oxide	Splash	NO BT	NO BT	NO BT	N/A	N/A	N/A	.2
Silvershield Seam	Ethylene Oxide	Gas	<4	<4	<4	11	.37	2.3	.9

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CHEMICAL MANUFACTURERS ASSOCIATION
2501 M. STREET, NW
WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-152-2

Test Date 08-01-91

Catherine R. Dodgen — Analyst
8/23/91 — QC Date

PERMEATION TEST REPORT

Material Name: ANSELL EDMONT NITRILE GLOVE (SOLVEX 37-155)

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27° C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	60	68	84
Permeation Rate Steady State [x] Maximum [ ]	$\mu g/cm^2$-min	47	42	57
Unit Area Weight	gms/cm^2	0.0540	0.0594	0.0515
Thickness	mils	16	16	13

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

Collection Medium: NITROGEN

Minimum Detection Limit: .09 ppm

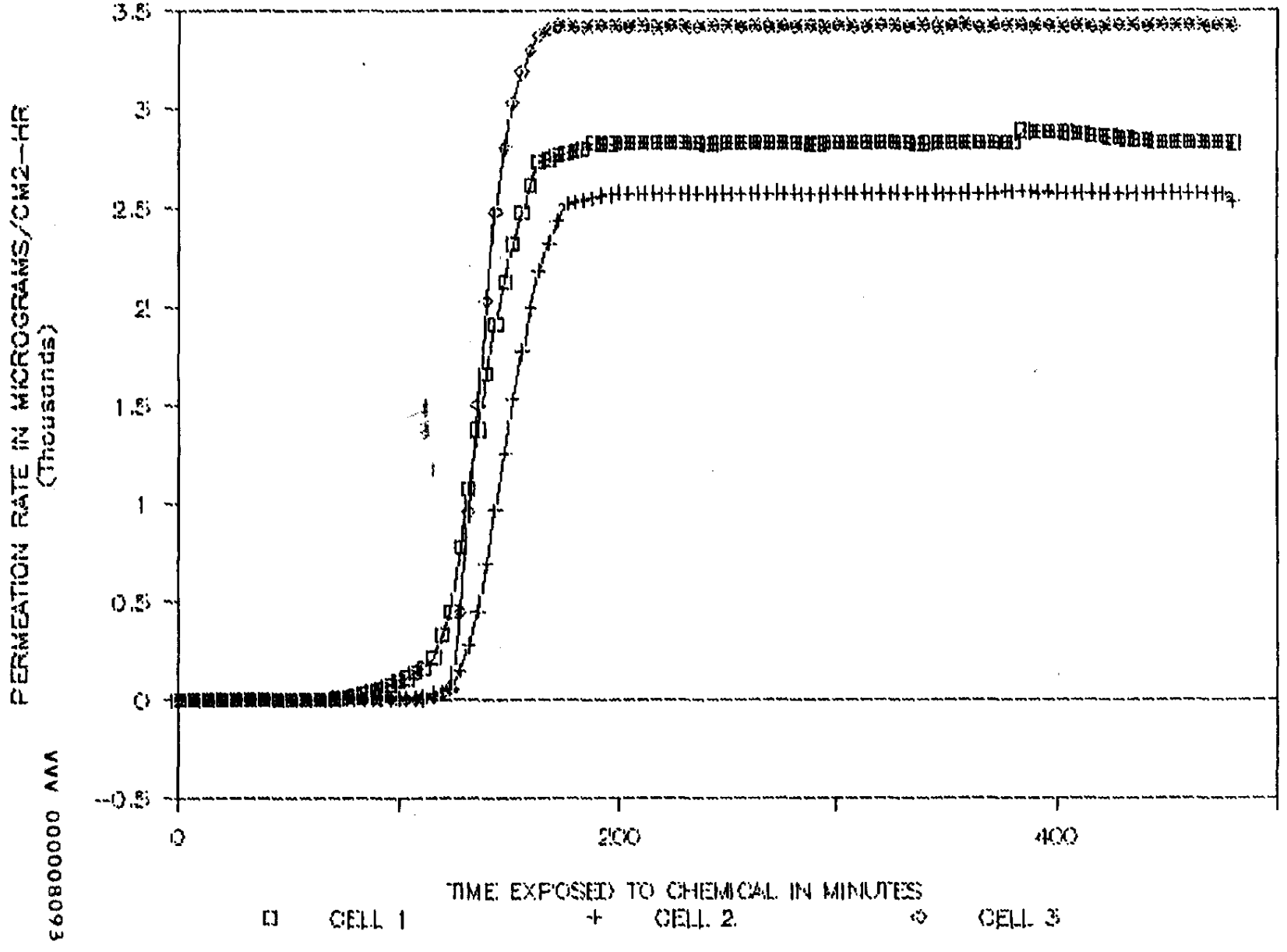
Minimum Detectable Rate: .003 $\mu g/cm^2$*min

Comments:

VVV 000008092

PERMEATION TEST ASTM 739-85

A--EDMONT NITRILE GLOVE/ETHYLENE OXIDE



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CHEMICAL MANUFACTURERS ASSOCIATION
2501 M. STREET, NW
WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-152-2

Test Date 08-21-91

Catherine R. Dodge 8/23/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: ANSELL EDMONT NITRILE

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27° C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	<4	4	4
Permeation Rate Steady State [x] Maximum [ ]	$\mu g/cm^2$-min	40	61	180
Unit Area Weight	gms/cm^2	.0417	.0398	.0383
Thickness	mils	14	14	14

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: LIQUID

Type of Contact: 10 SEC EXPOSURE

Collection Medium: NITROGEN

Minimum Detection Limit: 1 ppm

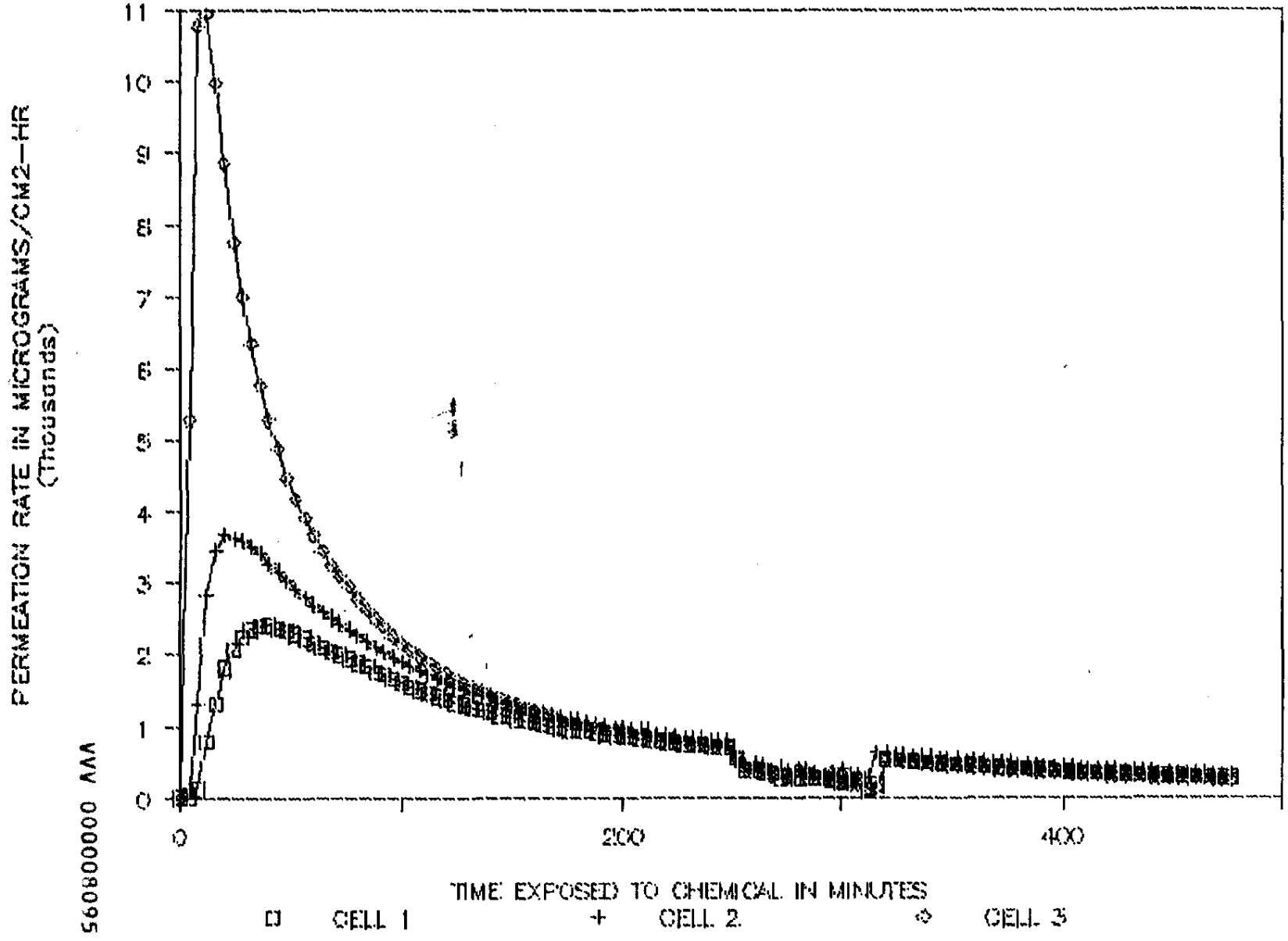
Minimum Detectable Rate: .05 $\mu g/cm^2$*min

Comments:

VVV 000008094

PERMEATION TEST ASTM 739-85

ANSELL EDMONT NITRILE/LIQUID ETO



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CHEMICAL MANUFACTURERS ASSOCIATION
2501 M. STREET, NW
WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-32-4

Test Date 07-29-91

Catherine R. Dodgen
Analyst

8/2/91
QC Date

PERMEATION TEST REPORT

Material Name: CHEMREL SEAM

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27 °C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	<4	<4	<4
Permeation Rate Steady State x Maximum	$\mu g/cm^2$-min	1.1	.21	.32
Unit Area Weight	gms/cm^2	0.0291	0.0298	0.0284
Thickness	mils	31	32	25

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

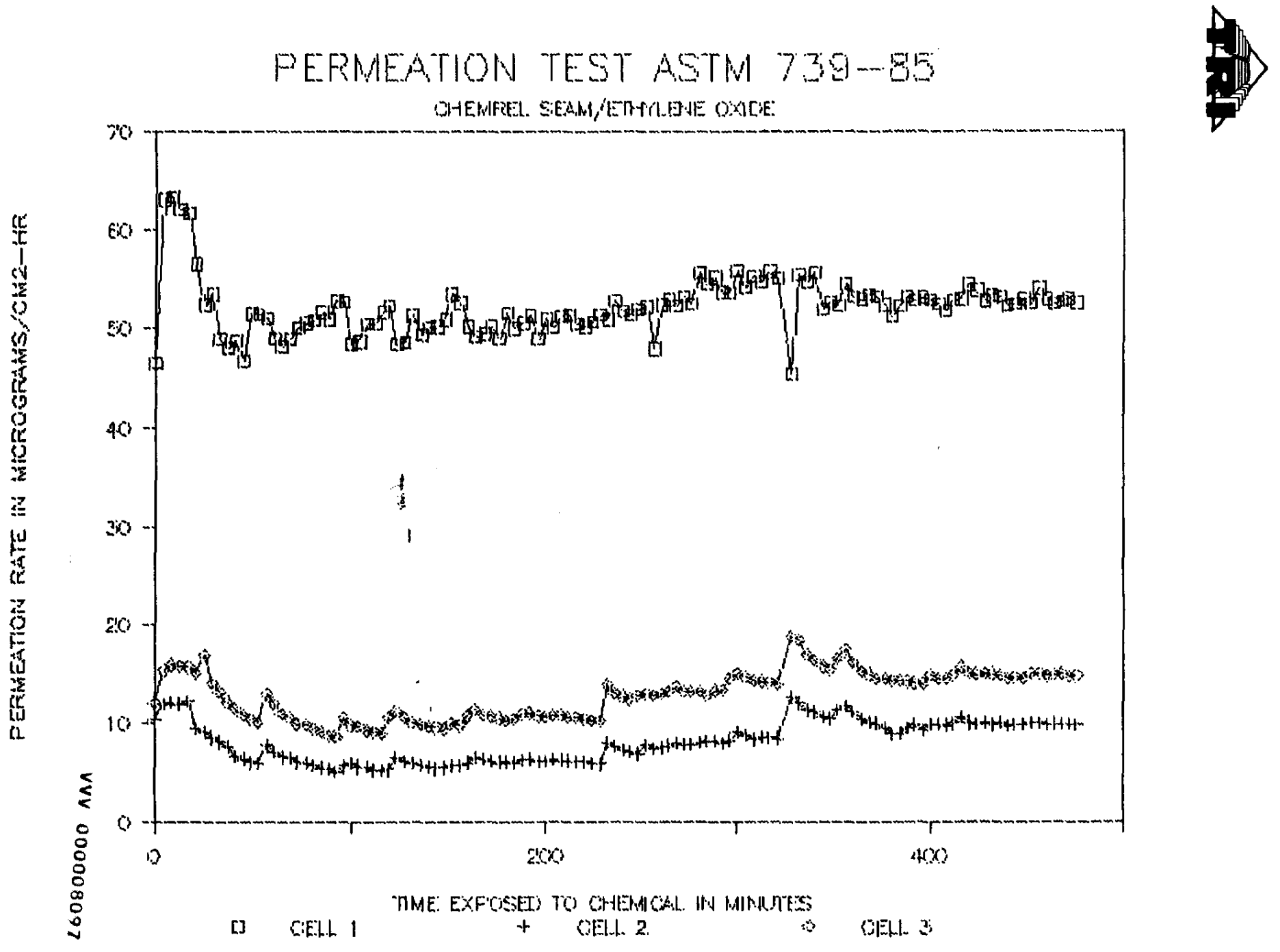
Collection Medium: NITROGEN

Minimum Detection Limit: .2 ppm

Minimum Detectable Rate: .007 $\mu g/cm^2$*min

Comments:

VVV 000008096


PERMEATION TEST ASTM 739--85
CHEMREL STEAM/ETHYLENE OXIDE
PERMEATION RATE IN MICROGRAMS/CM2--HR
70
60
50
40
30
20
10
0
0
200
400
TIME EXPOSED TO CHEMICAL IN MINUTES
CELL 1
CELL 2
CELL 3

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 91-543-2-9

Test Date 07-25-91

Catherine R. Dodgen 8/19/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: CHEMREL MAX SEAM

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27 °C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	NO BT	NO BT	NO BT
Permeation Rate Steady State Maximum	$\mu g/cm^2$-min	N/A	N/A	N/A
Unit Area Weight	gms/cm^2	0.0599	0.0590	0.0594
Thickness	mils	73	73	73

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

Collection Medium: NITROGEN

Minimum Detection Limit: .1 ppm

Minimum Detectable Rate: .1 $\mu g/cm^2$*min

Comments:

VVV 000008098

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-32-4

Test Date 08-21-91

Catherine R. Dodgen 8/23/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: CHEMREL MAX SEAM

Test Temperature: 27° C

Prior Conditioning: NONE

Test Duration: 8 hours

Challenge Chemical: ETHYLENE OXIDE

Concentration: 100 %

Chemical Source LINDE

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	NO BT	NO BT	NO BT
Permeation Rate Steady State Maximum	$\mu g/cm^2$-min	N/A	N/A	N/A
Unit Area Weight	gms/cm^2	.0147	.0136	.0138
Thickness	mils	11	9	10

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: LIQUID

Type of Contact: 10 SEC EXPOSURE

Collection Medium: NITROGEN

Minimum Detection Limit: .2 ppm

Minimum Detectable Rate: .008 $\mu g/cm^2$*min

Comments:

VVV 000008099

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-111-5

Test Date 07-26-91

Catherine R. Dodge 8/19/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: 4 H GLOVE SEAM

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27 °C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	NO BT	NO BT	NO BT
Permeation Rate Steady State Maximum	$\mu g/cm^2$-min	N/A	N/A	N/A
Unit Area Weight	gms/cm^2	0.0116	0.0108	0.0111
Thickness	mils	15	15	15

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

Collection Medium: NITROGEN

Minimum Detection Limit: .3 ppm

Minimum Detectable Rate: .01 $\mu g/cm^2$*min

Comments:

VVV 000008100

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-111-5

Test Date 08-20-91

Catherine R. Dodgen 8/23/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: 4-H GLOVE SEAM

Test Temperature: 27° C

Prior Conditioning: NONE

Test Duration: 8 hours

Challenge Chemical: ETHYLENE OXIDE

Concentration: 100 %

Chemical Source LINDE

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	NO BT	NO BT	NO BT
Permeation Rate Steady State Maximum	$\mu g/cm^2$-min	N/A	N/A	N/A
Unit Area Weight	gms/cm^2	.009	.007	.009
Thickness	mils	3	3	3

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: LIQUID

Type of Contact: SPLASH

Collection Medium: NITROGEN

Minimum Detection Limit: .6 ppm

Minimum Detectable Rate: .02 $\mu g/cm^2$*min

Comments:

VVV 000008101

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-154-1

Test Date 08-14-91

Catherine R Dodson
Analyst

QC 8/26/91
Date

PERMEATION TEST REPORT

Material Name: NORTH PVC COATED GLOVE (MODEL 3112)

Test Temperature: 27° C

Prior Conditioning: NONE

Test Duration: 8 hours

Challenge Chemical: ETHYLENE OXIDE

Concentration: 100 %

Chemical Source LINDE

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	8	8	4
Permeation Rate Steady State [x] Maximum [ ]	$\mu g/cm^2$-min	120	120	130
Unit Area Weight	gms/cm^2	0.1255	0.1374	0.1371
Thickness	mils	47	52	51

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

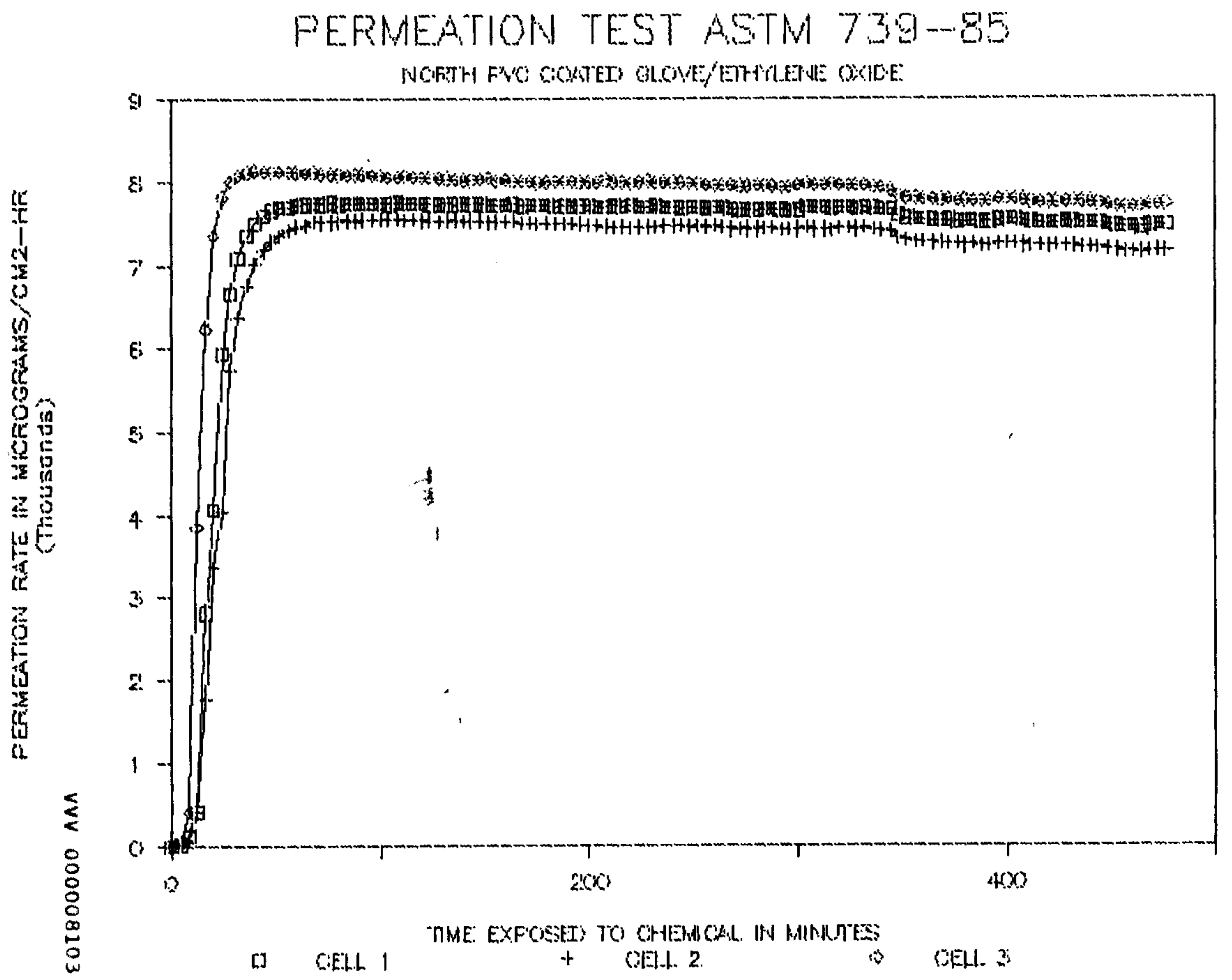
Collection Medium: NITROGEN

Minimum Detection Limit: .1 ppm

Minimum Detectable Rate: .005 $\mu g/cm^2$*min

Comments:

VVV 000008102



VVV 000008103

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 89-543-10-4

Test Date 07-25-91

Catherine R. Dobyns 8/23/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: NORTH 12 MIL VITON

Test Temperature: 27° C

Prior Conditioning: NONE

Test Duration: 8 hours

Challenge Chemical: ETHYLENE OXIDE

Concentration: 100 %

Chemical Source LINDE

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	28	20	24
Permeation Rate Steady State [X] Maximum [ ]	$\mu g/cm^2$-min	77	72	73
Unit Area Weight	gms/cm^2	0.1077	0.1101	0.1084
Thickness	mils	17	17	17

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

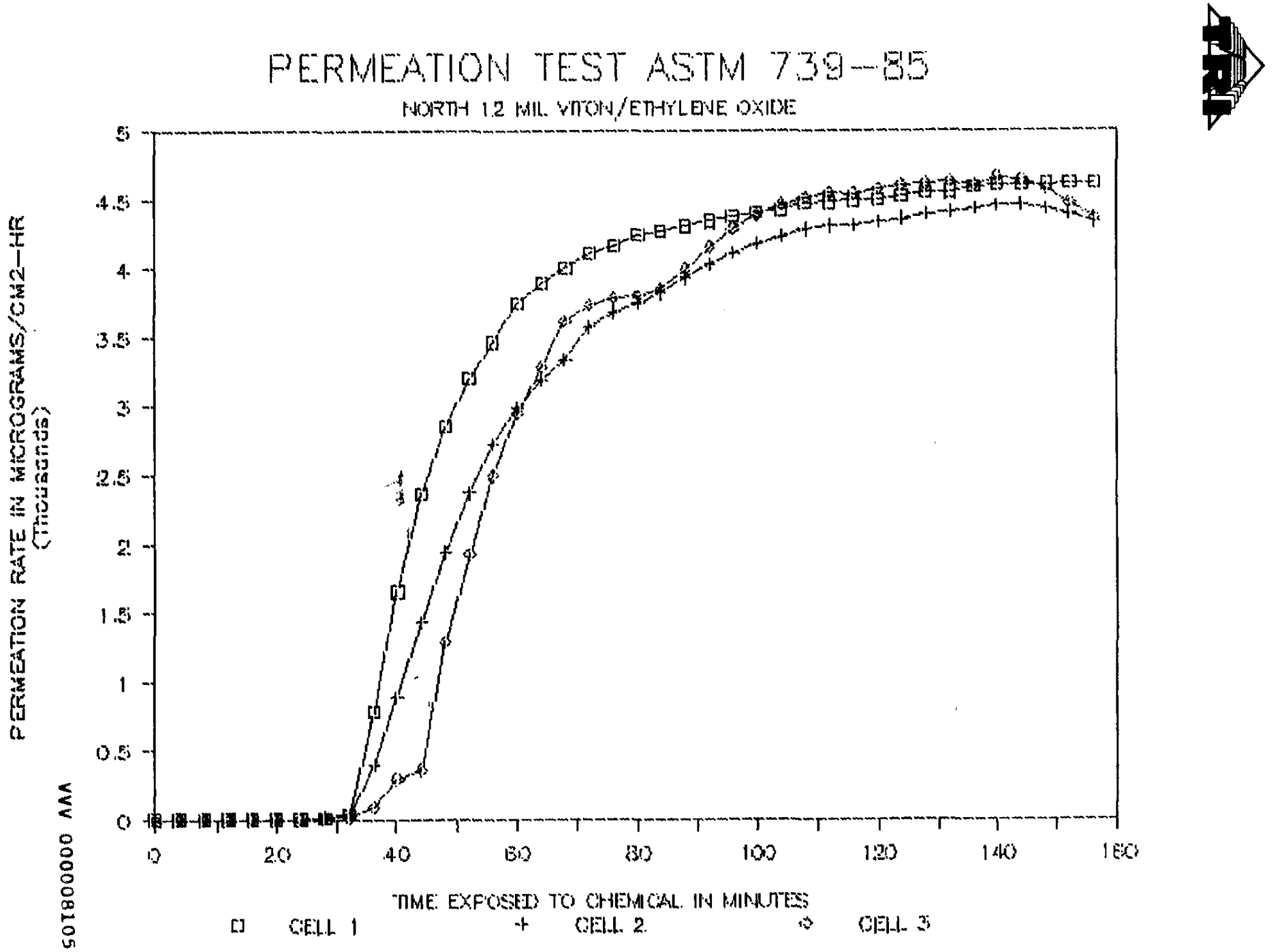
Collection Medium: NITROGEN

Minimum Detection Limit: .06 ppm

Minimum Detectable Rate: .002 $\mu g/cm^2$*min

Comments: MATERIAL SWELLED.

VVV 000008104


PERMEATION TEST ASTM 739-85
NORTH 12 MIL VITON/ETHYLENE OXIDE
PERMEATION RATE IN MICROGRAMS/CM2-HR
(Thousands)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
20
40
60
80
100
120
140
160
TIME EXPOSED TO CHEMICAL IN MINUTES
CELL 1
CELL 2
CELL 3

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WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-152-1

Test Date 08-01-91

Catherine R. Dodge 8/23/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: PIONEER STANZOIL/MILLED NEOPRENE GLOVES

Test Temperature: 27° C

Prior Conditioning: NONE

Test Duration: 8 hours

Challenge Chemical: ETHYLENE OXIDE

Concentration: 100 %

Chemical Source LINDE

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	36	28	38
Permeation Rate Steady State [x] Maximum [ ]	$\mu g/cm^2$-min	70	55	90
Unit Area Weight	gms/cm^2	0.1728	0.1770	0.1745
Thickness	mils	35	35	35

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

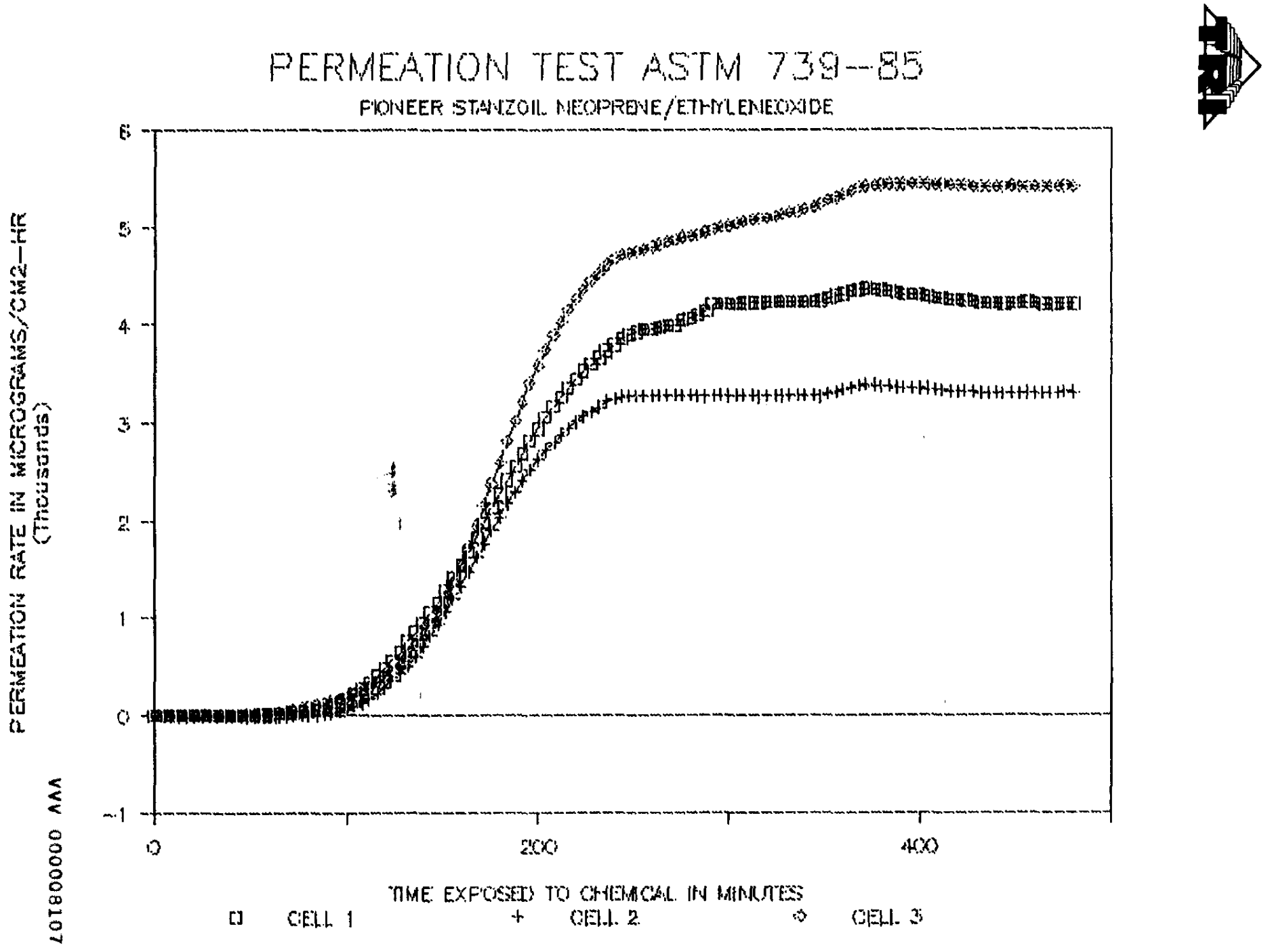
Collection Medium: NITROGEN

Minimum Detection Limit: .2 ppm

Minimum Detectable Rate: .006 $\mu g/cm^2$*min

Comments:

VVV 000008106


PERMEATION TEST ASTM 739--85
PIONEER STANZOIL NEOPRENE/ETHYLENEOXIDE
PERMEATION RATE IN MICROGRAMS/CM2--HR
(Thousands)
6
5
4
3
2
1
0
-1
0
200
400
TIME EXPOSED TO CHEMICAL IN MINUTES
CELL 1
CELL 2
CELL 3
VVV 00000807

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Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-75-2

Test Date 08-14-91

Analyst QC Date 8/14/91

PERMEATION TEST REPORT

Material Name: RESPONDER SEAM

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source: LINDE

Test Temperature: 27 °C

Test Duration: 8 hours

Concentration: 99.9 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	NO BT	NO BT	<4
Permeation Rate Steady State [ ] Maximum [X]	ug/cm^2-min	N/A	N/A	>6.2
Unit Area Weight	gms/cm^2	.0635	.0624	.0600
Thickness	mils	50	52	46

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

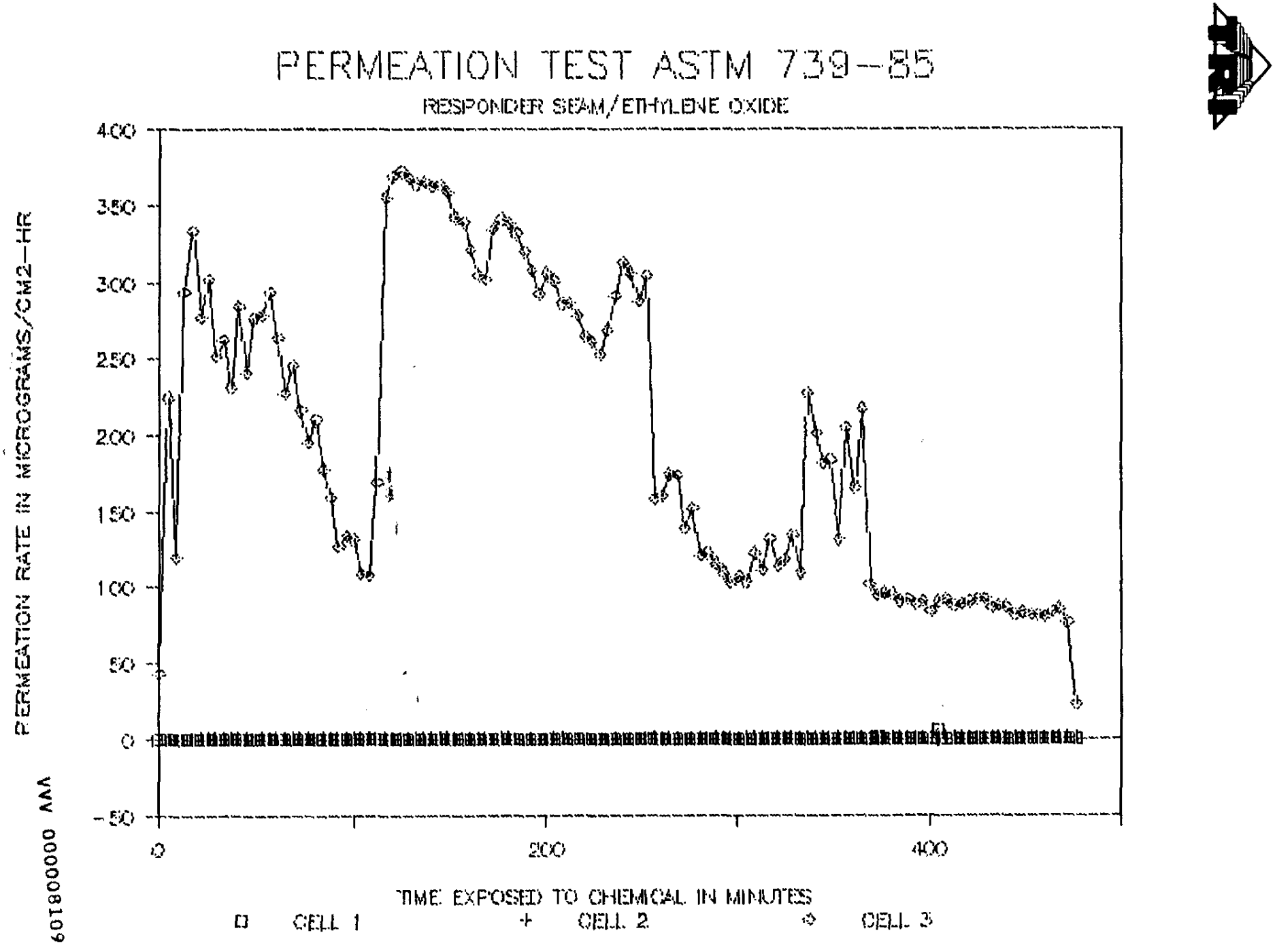
Collection Medium: NITROGEN

Minimum Detection Limit: .08 ppm

Minimum Detectable Rate: .003 ug/cm^2*min

Comments:

VVV 000008108


PERMEATION TEST ASTM 739-85
RESPONDER SEAM/ETHYLENE OXIDE
PERMEATION RATE IN MICROGRAMS/CM2-HR
400
350
300
250
200
150
100
50
0
-50
0
200
400
TIME EXPOSED TO CHEMICAL IN MINUTES
CELL 1
CELL 2
CELL 3
60T800000 VVV

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Phone: (512) 263 2101

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WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 39-75-2

Test Date 08-14-91

Catherine R. Dodgen 2/19/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: RESPONDER SEAM

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27 °C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	<4	<4	<4
Permeation Rate Steady State [X] Maximum [ ]	$\mu g/cm^2$-min	1.5	.04	.03
Unit Area Weight	gms/cm^2	0.0631	0.0642	0.0653
Thickness	mils	51	53	55

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

Collection Medium: NITROGEN

Minimum Detection Limit: .08 ppm

Minimum Detectable Rate: .003 $\mu g/cm^2$*min

Comments:

VVV 000008110

PERMEATION RATE IN MICROGRAMS/CM2-HR

PERMEATION TEST ASTM 739-85

PRESPONDER STEAM/ETHYLENE OXIDE

TRI/Environmental, Inc
9063 Bee Caves Road
Austin, TX 78733
Phone: (512) 263 2101

CHEMICAL MANUFACTURERS ASSOCIATION
2501 M. STREET, NW
WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 391-75-2

Test Date 08-20-91

Catherine R. Dodge 8/23/91
Analyst QC Date

PERMEATION TEST REPORT

Material Name: RESPONDER SEAM

Test Temperature: 27° C

Prior Conditioning: NONE

Test Duration: 8 hours

Challenge Chemical: ETHYLENE OXIDE

Concentration: 100 %

Chemical Source LINDE

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	NO BT	NO BT	NO BT
Permeation Rate Steady State Maximum	$\mu g/cm^2$-min	N/A	N/A	N/A
Unit Area Weight	gms/cm^2	.0629	.0612	.0621
Thickness	mils	35	31	31

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: LIQUID

Type of Contact: 10 SEC EXPOSURE

Collection Medium: NITROGEN

Minimum Detection Limit: 2 ppm

Minimum Detectable Rate: .07 $\mu g/cm^2$*min

Comments:

VVV 000008112

TRI/Environmental, Inc
9063 Bee Caves Road
Austin, TX 78733
Phone: (512) 263 2101

CHEMICAL MANUFACTURERS ASSOCIATION
2501 M. STREET, NW
WASHINGTON, DC 20037

Customer P.O. No. _____

Method Standard ASTM F739-85

Material Log No. 91-543-18-4

Test Date 07-29-91

Catherine R. Dodgen
Analyst

9/23/91
QC Date

PERMEATION TEST REPORT

Material Name: SILVERSHIELD SEAM

Prior Conditioning: NONE

Challenge Chemical: ETHYLENE OXIDE

Chemical Source LINDE

Test Temperature: 27 °C

Test Duration: 8 hours

Concentration: 100 %

CAS No.: 75-21-8

TEST RESULTS	Units	Cell 1	Cell 2	Cell 3
Breakthrough Time	Minutes	<4	<4	<4
Permeation Rate Steady State [ ] Maximum [X]	$\mu g/cm^2$-min	11	.37	2.3
Unit Area Weight	gms/cm^2	0.0157	0.0159	0.0165
Thickness	mils	26	26	26

Modifications of Method: 1" CELLS

Analytical Technique: CONTINUOUS PHOTOIONIZATION

Sampling Frequency: 4 MINUTES

Chemical State: GAS

Type of Contact: CONTINUOUS

Collection Medium: NITROGEN

Minimum Detection Limit: .9 ppm

Minimum Detectable Rate: .03 $\mu g/cm^2$*min

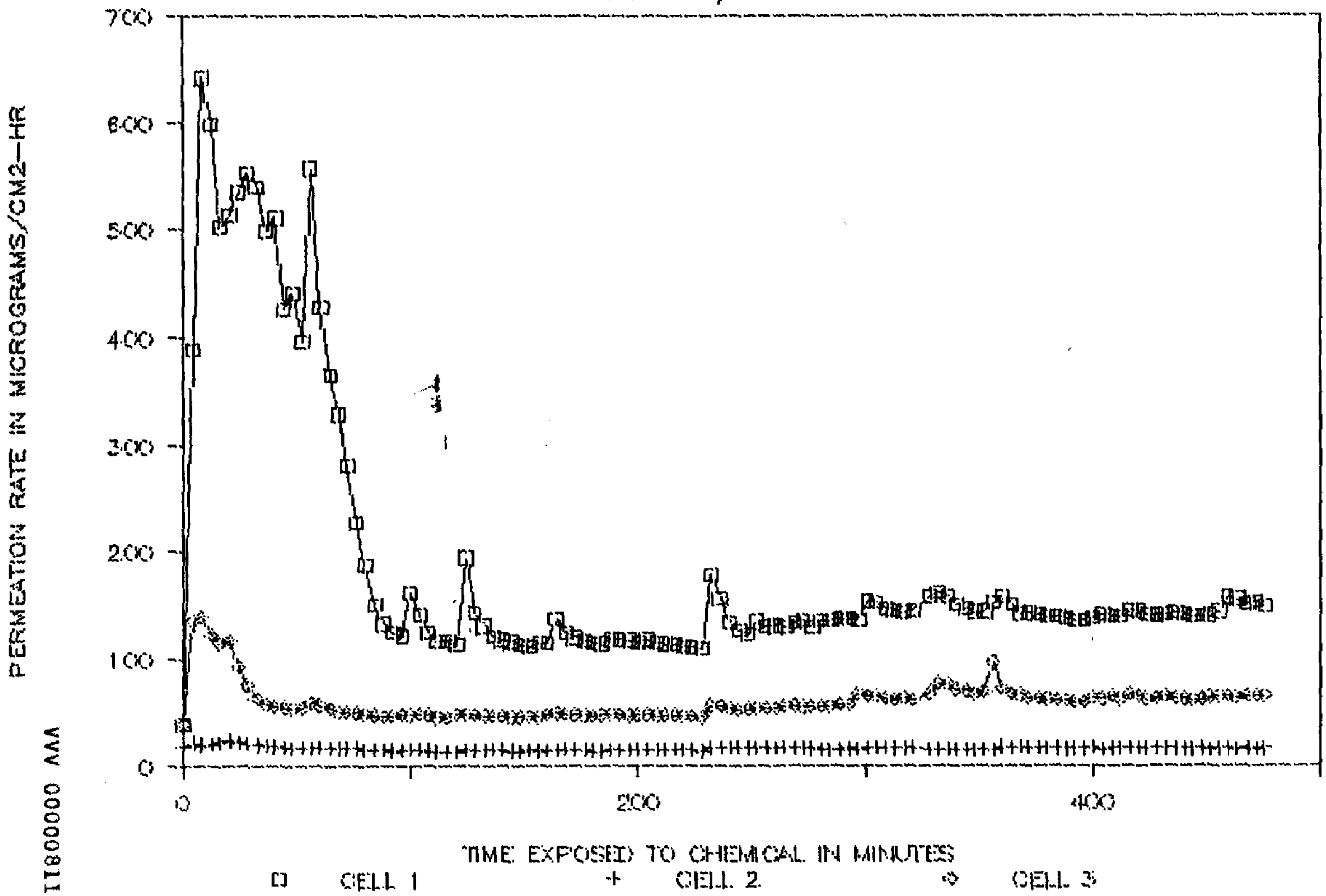
Comments:

VVV 000008113

These data are derived from tests performed in accordance with ASTM Standard F739-85. These tests were performed under laboratory conditions and not under actual usage conditions. TRI/Environmental, Inc. makes no warranties or other guarantees concerning protection by this material and assumed no liability for use of this material with the chemical tested. The user should determine the applicability of test conditions when assessing suitability of material for actual anticipated exposure.

PERMEATION TEST ASTM 739-85

SILVERSHIELD SEAM/ETHYLENE OXIDE



AAA 00000811 4