

# **Warren Environmental**

**P.O. Box 1206  
Carver, MA. 02330**

## **FACSIMILE TRANSMISSION**

**DATE: 2-28-01**

**NUMBER OF PAGES: 4  
(Including this sheet)**

**TO: Dave Fields**

**TEL #: (508) 261-7375**

**FAX #: (508) 261-7343**

**Dave:**

**Here is a copy of the Water Vapor Permeation report. If you have any questions, please call.**

**FROM: Fred Tacker**

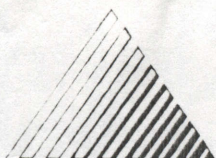
**FAX #: (508) 866-7172**

**PHONE #: (508) 866-5277**

**e-mail: [awmaintenance@aol.com](mailto:awmaintenance@aol.com)**

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Since 1959

# Chemir / Polytech

## Laboratories, Inc.

6 October 2000

### Materials Analysis Specialists

- ▲ Materials Identification
- ▲ Polymer Testing
- ▲ Deformulations

Mr. Danny Warren  
A & W Maintenance  
P. O. Box 125  
South Carver, MA 02366

Re: WVTR Analysis

P.O. #: Verbal

Chemir/Polytech Job #31610

Dear Mr. Warren:

Per your request, we have completed the analysis of your sample "Epoxy" (Chemir/Polytech #502245) determining the Water Vapor Permeability in accordance with ASTM D 1653 – 93 *Standard Test Method for Water Vapor Transmission of Organic Coating Films, Method B Wet Cup Method*. The results are summarized below.

### SAMPLE LOG-IN

The sample was logged as follows:

SAMPLE DESCRIPTION	CHEMIR/POLYTECH SAMPLE NUMBER
Epoxy	502245

### ANALYSIS RESULTS

The thickness of the "Epoxy" sample is 0.264 inches (264 mils).

Specimen #	WVTR grams 100in <sup>2</sup> ·24hrs·atm	WVTR grams m <sup>2</sup> ·24hrs·atm
1	0.04	0.62
2	0.03	0.47
3	0.04	0.62
Average	0.04	0.57

### ANALYSIS DISCUSSION

This test method covers the determination of the rate at which water vapor passes through films of paint, varnish, lacquer, and other organic coatings. Water Vapor Transmission Rate is the steady water vapor flow in unit time through unit area of a body, between two specific parallel surfaces, under specific conditions of temperature and humidity at each surface. Accepted SI units are grams per 100 square inches per 24 hours per atmosphere (g/100in<sup>2</sup>·24hrs·atm), and grams per square meter per 24 hours per atmosphere (g/m<sup>2</sup>·24hrs·atm). The test conditions were 23°C and 50% relative humidity. Specimen thickness was determined using a TMI Micrometer. Five areas were measured for thickness and the values then averaged. The test dishes were filled with de-ionized water, sealed with the test material, and weighed initially and daily until equilibrium was reached.





The following calculation was used to determine the WVTR.

$$\text{WVTR} = G/tA = (G/t)/A$$

Where:

G = weight change, grams (from the straight line),

t = time during which G occurred, hr,

G/t = slope of the straight line, grams/hr.,

A = test area (cup mouth area), ft<sup>2</sup>, and

WVTR = rate of water vapor transmission,  $\frac{\text{grams}}{100\text{in}^2 \cdot 24\text{hr} \cdot \text{atm}}$

To obtain grams per m<sup>2</sup>, multiply by 15.5

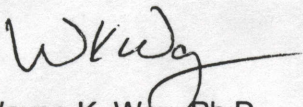
## CHARTS

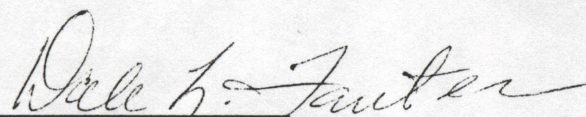
Enclosed please find the following charts generated during the analysis.

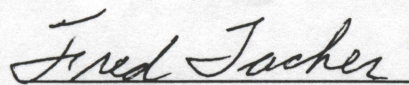
ENCLOSURE	DESCRIPTION
CHART 1	Weight loss vs. time plot showing when the point of equilibrium was reached between 96 hours and 144 hours.

An invoice is being sent to your accounts payable department. Samples are disposed of on the first Monday every month after being retained a maximum of 30 days unless you direct us otherwise in writing. Please review the Terms & Conditions on the inside back cover of this report that govern analysis work. Thank you for consulting Chemir/Polytech Laboratories, Inc. If you have any questions regarding this work, or if we can be of any further assistance, please call us at (314) 291-6620.

Sincerely,  
Chemir / Polytech Laboratories, Inc.

  
Wayne K. Way, Ph.D.  
Vice President - Technology

  
Dale L. Fanter, B.S.  
Director - Polymer Science

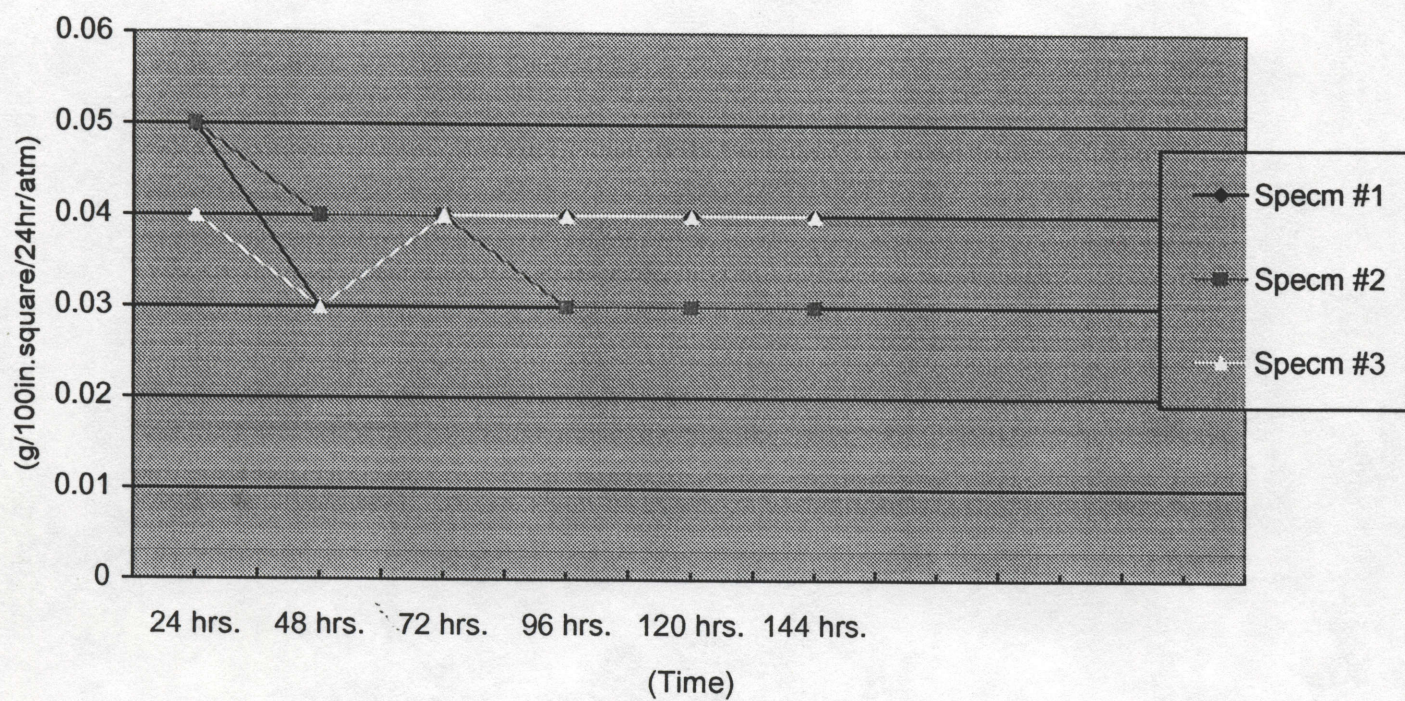
Project Chemist:   
Fred Tacker  
Lab Technician

WKW:js/A&W01000.doc/d1

Enclosures



**Water Vapor Transmission Rate**  
**Weight Loss vs. Time**  
**Sample "Epoxy" (Chemir/Polytech #502245)**  
**Specimens #1 – 5**



A &amp; W Maintenance

**CHART 1**