Anderson
Laboratories
Inc. EFFECTS OF SMOKES AND OFFGASING

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REPORT OF MORTALITY FOLLOWING SINGLE EXPOSURE TO THERMAL DECOMPOSITION PRODUCTS OF PHANTASY PLUS FABRIC

TEST #505
SAMPLE #V-216

Submitted By:

VITRULAN CORPORATION
P.O. BOX 1725
WAYNESBORO, VA 22980
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Prepared By:

ANDERSON LABORATORIES, INC.
773 WEST HARTFORD MAIN STREET
WEST HARTFORD, VT 05084-0323

MARCH 13, 1999

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Client: VITRULAN CORPORATION
Product Tested: PHANTASY PLUS FABRIC
Test Number: #505
Report Date: 3/13/00

SUMMARY OF TESTING BY ANDERSON LABORATORIES, INC.[a]

TEST: UPITT Test for Combustion Product Toxicity

TEST RESULTS:

LC_{50} (grams)[b]: **35.8**

LA_{50} (mm^2)[c]: **126,950**

Date Completed: **3/10/00**

INFORMATION PROVIDED BY CLIENT:

Product Description/I.D.: **PHANTASY PLUS FABRIC**

INFORMATION PROVIDED BY ANDERSON LABORATORIES, INC.

Case Number: **030600-01**

Sample Number: **V-216**

AL Test Number: **#505**

Sample Thickness[d]: **More than 1mm**

Rosalind C. Anderson, Ph.D.
President

3/15/00
Date

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[a] See full report for complete details.
[b] Weight of product lethal to 1/2 of test animals under these test conditions.
[c] Surface area of product lethal to 1/2 of test animals under these test conditions.
[d] Ames Bench Comparator, Model 2W.

Client: VITRULAN CORPORATION
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UPITT TEST REPORT

MORTALITY AND EYE DAMAGE IN MICE FOLLOWING SINGLE EXPOSURE TO THERMAL DECOMPOSITION PRODUCTS

1. Purpose

The purpose of the study was to evaluate acute lethal effects and eye damage resulting from exposure to thermal decomposition products from the test sample(s) identified below.

Sample description: **PHANTASY PLUS FABRIC**
AL test number: **#505**
AL sample number: **V-216**
Date work completed: **3/10/00**

2. Summary of Test Method

The test method employed is the UPITT Test for evaluation of toxicity of thermal decomposition products. This is the method specified by New York State Uniform Building Code 1120/15. It is the method used by the City of New York, Office of Materials and Equipment Acceptance, Department of Buildings.

Test materials are conditioned at approximately 50% relative humidity for at least 48 hours before use. The sample is weighed immediately before being placed in a furnace on a weight sensor. The test sample is incrementally heated at a rate of 20°C per minute for 30 minutes during which time the test animals, positioned for head only exposure, breathe the atmosphere generated. After a 10 minute post-exposure observation period, animals are examined for survival and eye damage.

A series of sample weights is tested allowing the construction of a concentration response curve in which sample size is plotted versus percent mortality. The sample which causes death of 50% of the test animals is calculated statistically and can be quantitated by weight (LC_{50}) or surface area (LA_{50}).

Standard measurements include sample weight loss, furnace and exposure chamber temperatures. Measurements of carbon

monoxide, carbon dioxide and oxygen in the exposure chamber atmosphere provide additional information about the test conditions at the LC_{50}.

The complete protocol is available upon request.

3. Test Results

The detailed test results are presented on the following table and excerpted on the brief summary, page one.

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President

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Test Number: #505
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DATA TABLE FOR PHANTASY PLUS FABRIC

AL Test #505, Sample #V-216	Case #030600-01
LC_{50}[a] (Mass)	35.8 grams
95% Confidence interval[a]	30.7 - 42.1 grams
LA_{50} (Surface Area)	126,950 mm^2
Product thickness	1.12 mm
Furnace temperature at 1% weight loss	176°C
Temperature range at most rapid weight loss[b]	176 - 295°C
Furnace temperature at apparent spontaneous flame (mean of 6 samples)	NONE
Percent residue (mean of 5 samples)	80%
Maximal CO in exposure chamber[b]	0.39%, 3900 PPM
Furnace temperature at maximal CO[b]	254°C
Maximal CO_2 in exposure chamber[b]	1.93%
Furnace temperature at maximal CO_2[b]	295°C
Minimal O_2 in exposure chamber[b]	18.6%
Furnace temperature at minimal O_2[b]	295°C
Number of times exposure chamber exceeded 45°C[b]	1
Duration exposure chamber exceeded 45°C[b]	600 sec
Eye damage (severity)[c]	(1) NONE
Number of test runs on sample material	6
Date testing completed	3/10/00

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a Calculated according to the method of C. Weil, 1952.
b From single experiment using 32.0 gram test sample.
c From single experiment with animals using 35.8 gram test sample; sample weight equal or closest to the LC_{50} value.

THE UNIVERSITY OF PITTSBURGH PROTOCOL

X. TEST PROCEDURE

A. Animal Exposure

Animals will be exposed in a head-only position to thermal decomposition products at chosen concentrations. Animals will be weighed prior to exposure and the weights will be recorded on the case data sheet. The exposure will last 30 minutes. Following the exposure, animals will be observed for 10 minutes then sacrificed.

B. Necropsy

There will be no necropsy conducted on animals in this study.

C. Test Sample Preparation

The test sample will be a single piece, if possible. The sample (solids) will be maintained at approximately 50% relative humidity at room temperature for 48 hours prior to use. Fifty percent relative humidity is achieved by equilibration with room air having a relative humidity between 40% and 60%.

D. Test Atmosphere Generation

The test atmosphere will be generated by placing a weighed sample into a Lindberg furnace which is then heated at 20°C/minute. The sample is placed on a weight sensor. The temperature of the furnace will be determined by the use of a thermocouple positioned in the furnace chamber. Furnace temperature is continuously recorded as is sample weight. When a 1.0% weight loss is recorded the animal exposure is initiated by connecting the furnace to the animal chamber by means of a pyrex and quartz tube. The exposure atmosphere is pulled through the system by negative pressure at a volume of 20 liters/minute. This volume is comprised of 11 liters drawn from the furnace and 9 liters of chilled room air. Because of the substantial quantity of room air being added to the thermal decomposition products low oxygen (below 18%) has seldom been identified in the exposure chamber.

E. Heat Stress

Because heat stress could interact with toxic thermal decomposition products the animal exposure chamber temperature is recorded.

F. Quantitative Description of Samples

All samples will be quantitated by mass. Thus for a series of experiments with a single material, a curve will be constructed of sample weight versus effect (% mortality). In addition, for appropriate samples length, surface area and volume will be recorded and these parameters will be analyzed for utility in quantitatively describing the sample.

XI. EVALUATION OF DATA

In order to evaluate the data generated by this test system, the LC_{50} (lethal concentration for 50% of exposed animals) will be calculated using a standard method[1]. Special note will be made of any animal which dies of a cause apparently unrelated to the test exposure.

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[1] Weil, C.S.: "Tables for convenient calculation of median - effective dose (LD_{50} or ED_{50}) and instruction for their use." Biometrics, 8:249-261, 1952.