CONTAINS NO CBI

8EHQ-0494-12965

Halocarbon

PRODUCTS CORPORATION

887 KINDERKAMACK ROAD • RIVER EDGE, NEW JERSEY 07661
TELEPHONE: 201-262-8899 FAX: 201-262-0019
MAILING ADDRESS JERSEY 07661

FYI-94-000954
INIT 04/12/94

REC'D OFFICE OF POLLUTION PREVENTION AND TOXICS
94 APR 12 AM 8:54

April 7, 1994

FYI-0494-000954

CERTIFIED MAIL

Document Processing Center (TS-790)
Attn: Section 8(e) Coordinator
Office of Toxic Substances
U.S. Environmental Protection Agency
401 "M" Street, S.W.
Washington, D.C. 20460

A

84940000054

ORIGINAL

SECTION 8(e) NOTICE

Re: $Cl(CF_2CFCl)_2Cl$ (CAS 423-38-l) [Report Name: QC-253]

Dear Sir/Madame:

The following notice is submitted to you in accordance with paragraph V, F in the Agreement between Halocarbon Products Corporation (the Company) and the EPA, "Consent Agreement re Docket No. TSCA-90-H-18", with respect to Section 8(e). Although the report indicates the substance is slightly toxic to animals, this notice is FOR YOUR INFORMATION ONLY because the information need not be reported under the provisions of Article V of EPA Statement of Interpretation and Enforcement Policy; Notification of Substantial Risk dated March 16, 1978.

I am the Vice President and Technical Director of the Company. My address is at Company headquarters:

Halocarbon Products Corporation
887 Kinderkamack Road
River Edge, New Jersey 07611
Phone: 201-262-8899

8/31/94

The address of the Company manufacturing site is:

Halocarbon Products Corporation
1100 Dittman Court
North Augusta, South Carolina 29841
Phone: 803-278-3500

SOUTH CAROLINA LOCATION: P.O. BOX 6369 • NORTH AUGUSTA, S.C. 29841 • TELEPHONE: 803 278-3500 • FAX: 803 279-7767

92 pgs.

The appended report for the chemical substance $Cl(CF_2CFCl)_2Cl$ (CAS 423-38-1) was prepared by:

Bio/dynamics Inc., (name changed to
Pharmaco LSR, Inc.),
P.O. Box 2360
Mettlers Road
East Millstone, NJ 08875

We are not aware of any additional information or supporting technical data.

In summary, the data show:
A study of rats exposed to different four-hour exposures resulted in a calculated LD50 of 4.6 mg/L placing the substance in EPA Toxicity Category III (slightly toxic). Postmortem findings were unremarkable.

Very truly yours,

Louis L. Ferstandig

Louis L. Ferstandig, Ph.D
Vice President & Technical Director

LLF:bc

PROJECT NO. 88-8098

AN ACUTE INHALATION TOXICITY STUDY OF HALOCARBON 0.8 OIL IN THE RAT

Final Report

Submitted to: Halocarbon Products, Inc.
Highway 1 and Revco Drive
North Augusta, S.C. 29841

Attn: Dr. Arthur Elliott

Date: February 21, 1989

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I. INTRODUCTION:

A series of single, four-hour, whole-body inhalation exposures was performed for Halocarbon Products, Inc. using Sprague-Dawley CD® rats (5/sex/group) to determine the acute inhalation toxicity of Halocarbon 0.8 Oil. The test substance was administered into the breathing zone of the animals as a vapor.

Species and strain of the test animal, method and route of test substance administration and target exposure levels were selected by the sponsor. The test procedures followed guidelines described in the Health Effects Test Guidelines; Office of Pesticides and Toxic Substances; United States Environmental Protection Agency (EPA/TSCA), Volume 50 of the Federal Register, Number 188, September 27, 1985, Part 798.1150.

This study was conducted following EPA Good Laboratory Practices as set forth in 40 CFR Part 792 (TSCA). The facilities of Bio/dynamics, Inc., and this study were operated/conducted in accordance with the requirements and recommendations of the Animal Welfare Act (P.L. 89-544 as amended by P.L. 91-579 and P.L. 94-279), and other applicable federal, state and local laws, regulations and policies.

This study was conducted at Bio/dynamics, Inc., Mettlers Road, East Millstone, New Jersey 08875. All raw data, the original study protocol and the original final report are stored in the Archives of Bio/dynamics, Inc.

II. MATERIALS AND METHODS:

A. Test Substance: Halocarbon 0.8 Oil

Supplier: Halocarbon Products, Inc.
82 Burlews Court
Hackensack, New Jersey 07601

Date Received: 19 September 1988

Label Information: Article: HALOCARBON OIL SERIES 0.8
Lot/Batch Number: 88-143
HALO CARBON PRODUCTS CORPORATION #2
BURLEWS COURT HACKENSACK NJ 9/15/88
P.O. VERBAL/AJE NT WT 3.5 LB
WE DO NOT RECOMMEND USING HALOCARBON LUBRICANTS IN CONTACT WITH THE FOLLOWING MATERIALS: SODIUM OR POTASSIUM METALS, AMINES INCLUDING AMINE ADDITIVES (ANTIOXIDANTS, ETC.), LIQUID FLUORINE OR LIQUID CHLORINE TRIFLUORIDE; ALUMINUM UNDER CONDITIONS OF LARGE SHEAR FORCES SUCH AS THREADED ALUMINUM TO ALUMINUM CONNECTIONS; OR USE ABOVE 500°F (260°C) FOR MORE INFORMATION WRITE FOR OUR HALOCARBON CHLOROFLUOROCARBON LUBRICANTS BROCHEURE. HALOCARBON IS A BLEND OF COMPLETELY HALOGENATED CHLOROFLUOROCARBONS AND IS COMPLETELY INERT TO ALL ACIDS, ALKALIS AND OXIDIZING AGENTS WET OR DRY. ANY OIL LABELED "S" CONTAINS 0.1% OF A HYDROCARBON-BASED RUST INHIBITOR AND HAS PASSED LOX IMPACT TEST AND OXYGEN TESTS AT 2000 PSI G AND 400°C.

Lot No.: 88-143

Description: Clear liquid

Analysis: The identity, strength, purity and composition; and synthesis, fabrication, and/or derivation of the test substance have been documented by the sponsor.

Stability: The stability of the test substance has been determined by the sponsor.

Storage: Temperature-monitored room (60-85°F).

Disposition: All remaining containers of the test substance will be returned to the sponsor after issuance of the final report.

II. MATERIALS AND METHODS (cont.):

B. Test Animal: Rat

Strain: Sprague-Dawley CD®

Justification for Animal Selection: Standard laboratory animal for inhalation toxicity studies. The Sprague-Dawley CD® rat was used due to its availability and due to the existing historical data base for comparative evaluation.

Number of Animals Placed on Test: 3 groups of 5 animals/sex/group

Supplier: Charles River Breeding Laboratories, Inc. Raleigh, North Carolina 27610

Test Group No.:	I	II	III
Date Received:	9/21/88	10/12/88	11/2/88
Date of Birth:			
Males:	8/7/88	8/28/88	9/18/88
Females:	7/28/88	8/18/88	9/8/88
Date of Exposure:	10/12/88	10/28/88	11/9/88
Acclimation Period:	3 weeks	2 weeks	1 week
Age at Exposure (approx.):			
Males:	9 weeks	9 weeks	7 weeks
Females:	11 weeks	10 weeks	9 weeks
Body Weights on Day of Exposure (grams):[1]			
Males:			
Range:	314-357	319-336	215-254
Mean:	336	326	230
Females:			
Range:	233-260	219-242	203-233
Mean:	249	230	216

[1]Represents a body weight measurement obtained immediately prior to exposure.

II. MATERIALS AND METHODS (cont.):

C. Selection and Group Assignment: Prior to the initiation of exposure to the test substance, animals were arbitrarily selected from the Bio/dynamics' in-house population based on acceptable pretest physical examinations and body weights.

D. Animal Identification: Each rat was identified after selection with a metal ear tag bearing its unique Bio/dynamics, Inc. animal number.

E. Experimental Outline: Three groups consisting of five male and five female Sprague-Dawley CD® rats, were exposed to atmospheres containing Halocarbon 0.8 Oil for four hours. All survivors were held for a 14-day post-exposure observation period. A gross necropsy examination was performed on all animals dying spontaneously during the study and on all survivors sacrificed at the end of the observation period.

F. Husbandry:

During Non-Exposure Periods:

Housing: Animals were doubly-housed in suspended, stainless steel, wire mesh cages during the first week of the acclimation period and individually-housed during the remainder of the acclimation period and all other non-exposure periods.

Food: ad libitum; standard laboratory diet (Purina Rodent Laboratory Chow® Brand Animal Diet #5001). Fresh food presented as required.

Water: ad libitum; by automated watering system (Elizabethtown Water Company).

Temperature: Specified range: 67-76°F
Monitored and recorded twice daily; maintained within this range to the maximum extent possible.

Relative Humidity: Specified range: 40-70%
Monitored and recorded twice daily; maintained within this range to the maximum extent possible.

II. MATERIALS AND METHODS (cont.):

F. Husbandry (cont.):

During Non-Exposure Periods (cont.):

Environmental Conditions:	12 hour light/dark cycle (7 AM to 7 PM) via automatic timer.

During Exposure Periods:

Housing:	Animals were individually-housed in a 100 liter Plexiglas® exposure chamber.
Food:	None
Water:	None
Temperature:	Monitored continuously and recorded once prior to exposure (T_0), and once every 1/2 hour during exposure. Specified range: 68-75°F Actual range: 69-74°F
Relative Humidity:	Monitored continuously and recorded once prior to exposure (T_0) and once every 1/2 hour during exposure. Specified range: 40-60% Actual range: 12-65%[2]

G. Test Substance Administration and Chamber Operation:

Justification of Route:	Inhalation was chosen as the route of administration to simulate potential exposure during manufacture and/or use.
Chamber Operation:	The Plexiglas® exposure chambers had a total volume of 100 liters and were operated dynamically at a calibrated airflow rate of 20 liters per minute (lpm). This flow rate was calculated to provide one complete air change every 5 minutes and a 99% equilibrium time of 23 minutes.

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[2]Although the chamber relative humidity deviated from the protocol-specified range on occasion, adjustments could not be made while the chamber was operating.

II. MATERIALS AND METHODS (cont.):

G. Test Substance Administration and Chamber Operation (cont.):

Exposure Procedure: Appropriate amounts (grams, g) of Halocarbon 0.8 Oil were placed into an Erlenmeyer flask connected to an FMI fluid metering pump (Model RPG-6), with a 1/8" piston and a pump setting of 16, 11 or 13% for Groups I, II and III, respectivley.[3] The test substance was delivered from the pump to a 1000 ml 3-neck volatization flask resting in a Glascol heating mantle regulated by a Staco variable autotransformer. The test substance was volatilized within the flask by dripping it down the side of the heated flask. The temperature within the flask was measured at a temperature of 30°C by a Fisher Scientific Brand precision thermometer. House-line air was delivered to the flask, through a Union Carbide regulator equipped with a U.S. Gauge backpressure gauge, a Nupro metering valve, a Dwyer® flowmeter and a Matheson backpressure gauge via 1/4" Tygon® tubing. The resultant vapor-laden airstream was directed into the chamber which housed the animals. Chamber pressure was monitored using an uncalibrated Magnehelic gauge. The animals remained in the chamber for 30 minutes following the exposure to allow the chamber to clear, using room air at the same airflow rate used during exposure.

H. Exposure Chamber Sampling and Monitoring:

Chamber Sampling: Samples for determination of Halocarbon 0.8 Oil exposure levels were analyzed using a MIRAN® 1A Ambient Air Analyzer and a strip chart recorder (Omni Scribe Model B5117-5AE). The test atmosphere was drawn through a Balston DFU filter (grade DQ) via 1/4" Teflon® line at a flow rate of 20 lpm, using a Neptune 4K Dyna-pump. Samples were drawn hourly from the normal sampling

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[3]A 100% FMI pump setting is rated at 0.4 ml/min for a 1/8" piston.

II. MATERIALS AND METHODS (cont.):

H. Exposure Chamber Sampling and Monitoring (cont.):

Chamber Sampling (cont.): portal (designated H-1 in Figure 1). In addition, a distribution sample was drawn once from the distribution sampling portal (designated H-2 in Figure 1).

The exposure level of Halocarbon 0.8 Oil was determined by comparison of the resultant absorbance to a calibrated response curve constructed using the same instrument settings (see Appendix A, page A-2).

Particle Size Analysis: Particle size distribution measurements were performed at hourly intervals for chamber and room air using a TSI Aerodynamic Particle Sizer (Model 3300). An Apple II Computer was used to program the system to the appropriate settings prior to sampling. Samples were withdrawn hourly for 20 seconds at an airflow rate of 5 lpm. The particle size distributions were calculated by the computer and printed out based on the amount of material collected.

Nominal Concentration: The nominal concentration was determined by weighing the generation apparatus containing the test substance before and after the exposure and dividing the difference in these weights by the total volume of air delivered during exposure (volumetric flowrate times total exposure time).

Chamber Monitoring: A Taylor thermometer was used to continuously monitor air temperature, an Airguide® Humidity Indicator was used to continuously monitor relative humidity, and a Dwyer® flowmeter was used to continuously monitor airflow rate in the exposure chamber. Recordings of temperature, relative humidity and airflow rate were made every 1/2 hour during exposure.

II. MATERIALS AND METHODS (cont.):

I. In-Life Observations:

Day 1 (Day of Exposure):	All animals were observed individually, immediately prior to exposure, as a group at approximately fifteen minute intervals during the first hour of exposure, and hourly for the remainder of the exposure period. All survivors were observed individually upon removal from the chamber (half hour after exposure was completed) and hourly for two hours post-exposure. Detailed physical observations were recorded at each interval.
Days 2 through 15 (Post-exposure):	Detailed observations were recorded for survivors once daily; viability was assessed twice daily.
J. Body Weight:	Day 1 (immediately prior to exposure) and on Days 2, 3, 5, 8 and 15 (just prior to sacrifice).
K. Postmortem:	A complete gross postmortem examination was performed on all animals dying spontaneously during the course of the study as well as those animals surviving to the end of the 14-day post-exposure observation period. The gross post-mortem examinations included examination of the nasal passages, trachea, external surface, all orifices, the cranial cavity, carcass, the brain and spinal cord, the thoracic, abdominal and pelvic cavities and their viscera, and the cervical tissues and organs.
Terminal Necropsy:	Post-exposure Day 15 (see Animal Termination History for actual dates of sacrifice).
Method of Sacrifice:	Exsanguination while under ethyl ether anesthesia.
L. Statistical Analysis:	A calculation of median lethal concentration and 95% confidence limits was performed according to the method of Litchfield and Wilcoxon.[4]

[4]Litchfield, J.T. and F. Wilcoxon 1949. J. Pharma. Exp. Therapy 96: 99-115.

III. RESULTS AND DISCUSSION:

A. Chamber Monitoring and Mortality (Figure 2; Tables 1, 2 and 3):

The mean analytical and nominal concentrations of Halocarbon 0.8 Oil along with the resultant mortality for each exposure group are summarized as follows:

Group	Mean Exposure Concentration (mg/l)	Nominal Concentration (mg/l)	Mortality No. Dead/No. Exposed Male	Female	Total
I	5.0	7.2	4/5	3/5	7/10
III	4.0	5.2	0/5	2/5	2/10
II	3.2	4.1	0/5	0/5	0/10

The individual analytical values showed little variation about the mean; these values are presented in Table 2. The differences in nominal and analytical exposure concentrations are attributed to absorption of the vapor on the surfaces in the exposure chamber.

Particle size distribution measurements showed no real difference between chamber air (average of 0.0030 mg/m^3 of particulates) and room air (average of 0.012 mg/m^3 of particulates). Therefore, it was considered that there was no measurable formation of aerosol during the exposures.

Chamber temperatures were generally within the protocol-specified range of 68-75°F. Chamber relative humidities were generally outside the protocol-specified range of 40-60%; this was attributed to the background humidity conditions on the day of exposure.

III. RESULTS AND DISCUSSION (cont.):

A. Chamber Monitoring and Mortality (cont.):

Based on the mean analytical exposure concentration of Halocarbon 0.8 Oil and the resultant mortality, the LC_{50} values and 95% confidence limits were calculated to be:

Sex	LC_{50} (mg/l)	95% Confidence Limits (mg/l)
Combined sexes	4.6	4.2 to 5.0
Males	4.5	4.0 to 5.0
Females	4.5	3.6 to 5.7

These values indicate a similarity of response for male and female animals. Deaths occurred between Test Day 3 and Test Day 6.

B. Physical Observations:

1. Exposure Period (Table 4):

During exposure, there were no signs of toxicity.

2. Upon Removal From Exposure Chamber and Over the Two-Hour Post-Exposure Observation Period (Table 4):

The animals were also generally unremarkable during this interval.

3. Daily Observations During the 14-Day Post-Exposure Observation Period (Table 5):

The animals were generally unremarkable for a day after exposure. However, starting 2 or 3 days after exposure, the animals began showing signs of toxicity including tremors, nasal discharge, labored breathing and rales. These delayed responses led to mortality at the two higher levels. However, the surviving animals began showing a recovery about a week after exposure and were generally unremarkable by test day 15.

III. RESULTS AND DISCUSSION (cont.):

C. Body Weights (Table 6):

Significant weight losses were observed during the first week following exposure. However, recovery of weight occurred over time and all surviving animals were in excess of their pre-exposure body weight by termination of the study.

D. Gross Postmortem Observations (Appendix B):

The lungs and several other tissues were discolored in the spontaneously dying animals. These findings are not considered unusual in spontaneously dying animals. Therefore, the toxicological significance of these and other sporadic observations are considered equivocal.

IV. CONCLUSION:

A series of four-hour, whole-body inhalation exposures was performed with three groups, each consisting of five male and five female Sprague-Dawley CD® rats to determine the median lethal concentration of Halocarbon 0.8 Oil. The animals were exposed to Halocarbon 0.8 Oil as a vapor at analytical concentrations of 5.0, 4.0 and 3.2 mg/l resulting in mortalities of 70%, 20% and 0%, respectively. The LC_{50} was calculated to be 4.6 mg/l for the combined sexes and 4.5 mg/l for the males, or females, separately. These results would place this test substance into EPA Toxicity Category III (slightly toxic).

The animals generally showed no response to the test substance during exposure or for at least one day post-exposure. Signs of toxicity including tremors, nasal discharge, and labored breathing began appearing two or three days after exposure, leading to mortality at the two higher exposure levels. The responses generally abated in surviving animals during the second week after exposure.

Significant decreases in body weight gain were observed during the first week following exposure, however, recovery occurred over time and all surviving animals were in excess of their pre-exposure body weight by termination of the study.

Postmortem findings were generally unremarkable.

Gary M. Hoffman, B.A., D.A.B.T.
Study Director
Inhalation Toxicology

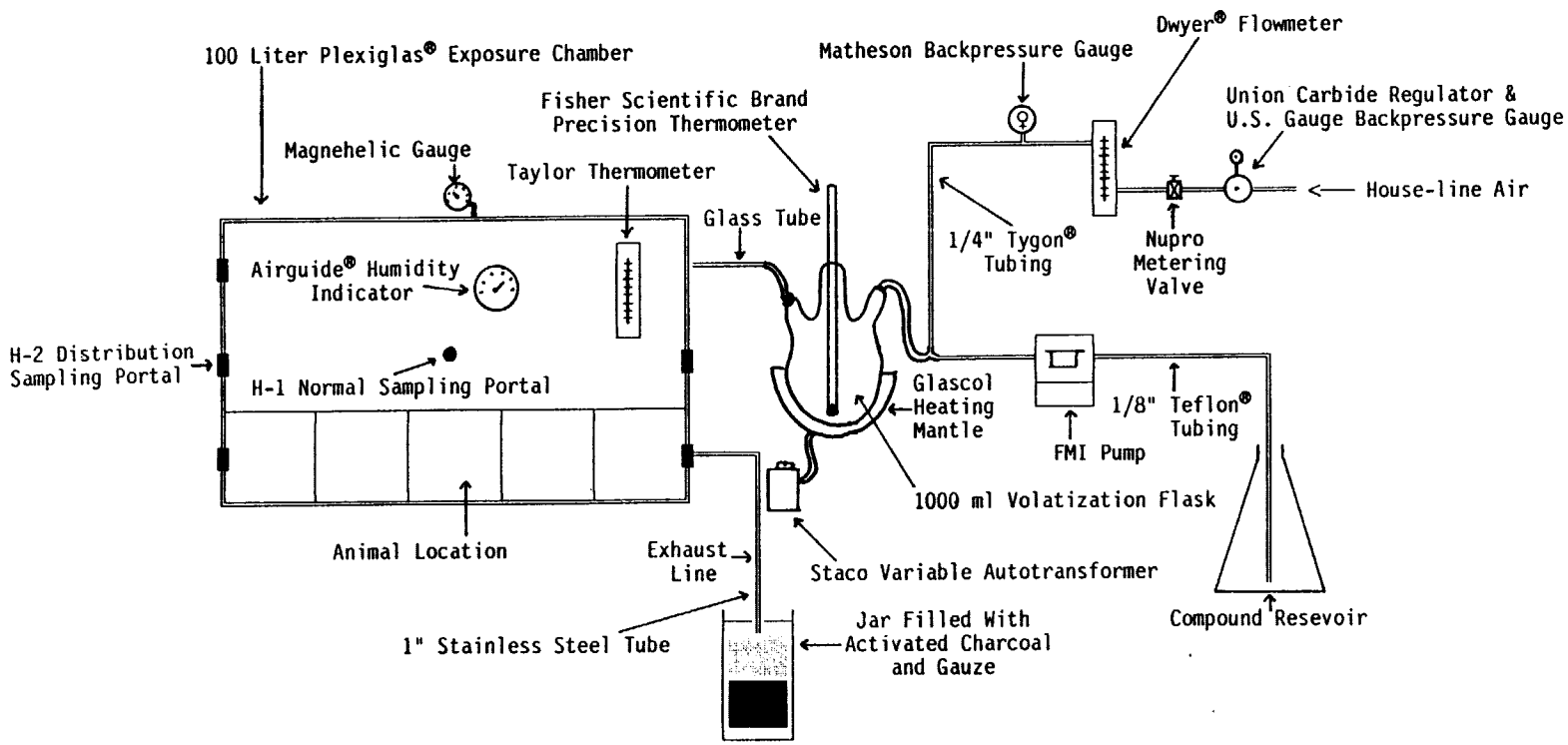
2-21-89
Date

Paul E. Newton, Ph.D., D.A.B.T.
Director of Inhalation Toxicology

2/21/89
Date

F 1-1
Figure 1
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Diagram of 100 Liter Chamber and Generation System



F 2-1

FIGURE 2

AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

LC50 CALCULATION - COMBINED SEXES

==========

THE WEIGHT VALUES READ IN AT THIS
STEP WILL BE USED FOR ALL OTHER STEPS DURING
THIS RUN.

THE WEIGHTINGS BY 0.5 SD ARE:
9.00 3.00 1.00 1.00 0.10 0.10

THE DOSAGE GROUPS ARE: UNITS ARE: mg/l
3.20000 4.00000 5.00000

THE NUMBER OF DEAD ANIMALS IN EACH DOSAGE GROUP ARE:
0. 2. 7.

THE NUMBER OF ANIMALS IN EACH DOSAGE GROUP ARE:
10. 10. 10.

PREDICTION EQUATION:
PROBIT(FRACTION DEAD) = -3.689 + 13.136 TIMES LOG BASE 10 OF DOSAGE

THE LC50, LC16 AND LC84 ARE ; 4.586 3.849 5.465

FOR THE INPUT DATA

OBS	DOSAGE	FRACTION DEAD	PREDICTED FRACTION	WEIGHT
1	3.20	0.03	0.02	1.00
2	4.00	0.20	0.22	3.00
3	5.00	0.70	0.69	3.00

TO TEST THE GOODNESS OF FIT, THE
CHISQUARE VALUE IS 0.04 WHICH IS SIGNIFICANT AT 0.848
IF THE SIGNIFICANCE IS GREATER THAN 0.05 THEN
THE STANDARD LITCHFIELD WILCOXON TECHNIQUE IS USED.
IF THE SIGNIFICANCE IS LESS THAN 0.05 THEN THE FIT
OF THE LINE TO THE DATA IS POOR, AND THE MODIFIED
LITCHFIELD WILCOXON TECHNIQUE IS USED.

THE SLOPE AND ASSOCIATED CONFIDENCE INTERVAL 1.192, (1.087, 1.307)

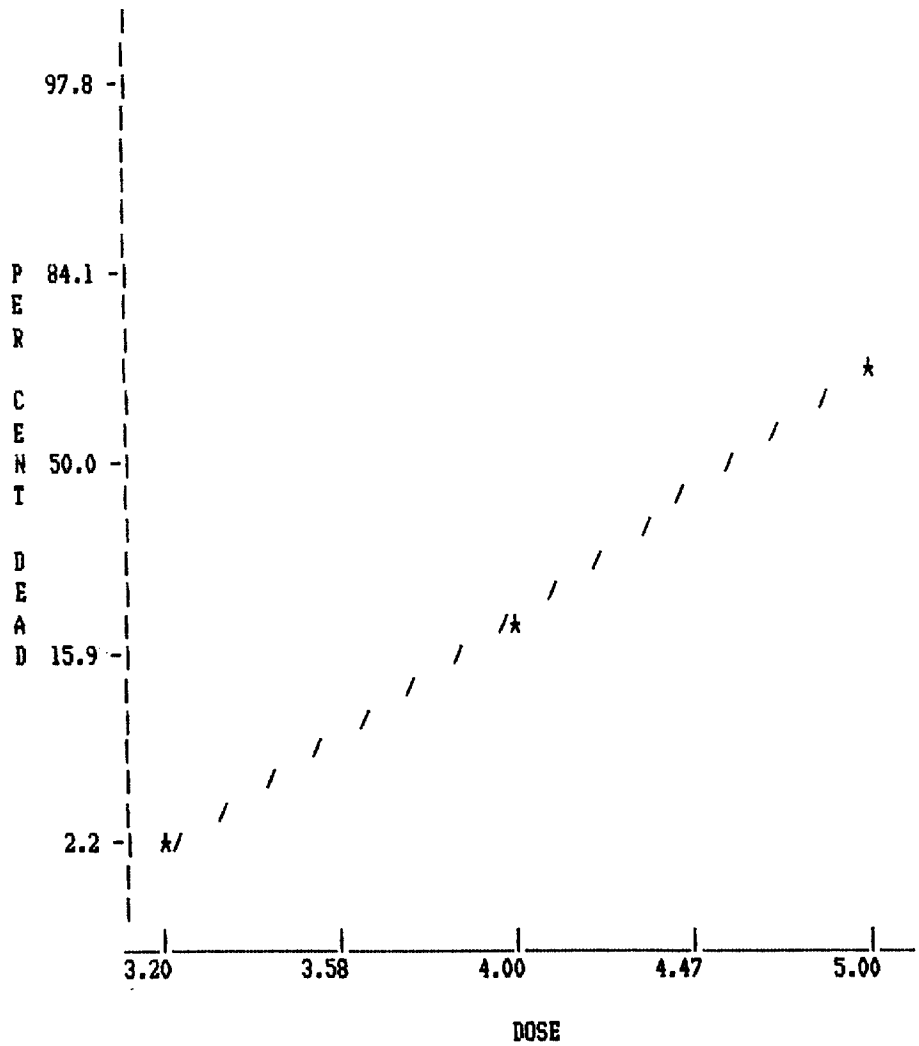
THE LC 50 IS 4.586,
WITH 95% CONFIDENCE LIMITS
OF 4.197 TO 5.011

F 2-2
FIGURE 2 (cont.)
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

LC50 CALCULATION - COMBINED SEXES

==========

PLOT OF THE OBSERVED PERCENT DEAD, AND
THE PREDICTION EQUATION FOR THE LC50:



F 2-3

FIGURE 2 (cont.)
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

LC50 CALCULATION - MALES

==========

THE WEIGHT VALUES READ IN AT THIS
STEP WILL BE USED FOR ALL OTHER STEPS DURING
THIS RUN.

THE WEIGHTINGS BY 0.5 SD ARE:
9.00 3.00 1.00 1.00 0.10 0.10

THE DOSAGE GROUPS ARE: UNITS ARE: mg/l
3.20000 4.00000 5.00000

THE NUMBER OF DEAD ANIMALS IN EACH DOSAGE GROUP ARE:
0. 0. 4.

THE NUMBER OF ANIMALS IN EACH DOSAGE GROUP ARE:
5. 5. 5.

PREDICTION EQUATION:
PROBIT(FRACTION DEAD) = -4.403 + 14.434 TIMES LOG BASE 10 OF DOSAGE

THE LC50, LC16 AND LC84 ARE ; 4.482 3.821 5.257

FOR THE INPUT DATA

OBS	DOSAGE	FRACTION DEAD	PREDICTED FRACTION	WEIGHT
1	3.20	0.05	0.02	1.00
2	4.00	0.05	0.24	1.00
3	5.00	0.80	0.75	3.00

TO TEST THE GOODNESS OF FIT, THE
CHISQUARE VALUE IS 1.34 WHICH IS SIGNIFICANT AT 0.246
IF THE SIGNIFICANCE IS GREATER THAN 0.05 THEN
THE STANDARD LITCHFIELD WILCOXON TECHNIQUE IS USED.
IF THE SIGNIFICANCE IS LESS THAN 0.05 THEN THE FIT
OF THE LINE TO THE DATA IS POOR, AND THE MODIFIED
LITCHFIELD WILCOXON TECHNIQUE IS USED.

THE SLOPE AND ASSOCIATED CONFIDENCE INTERVAL 1.173, (1.053, 1.307)

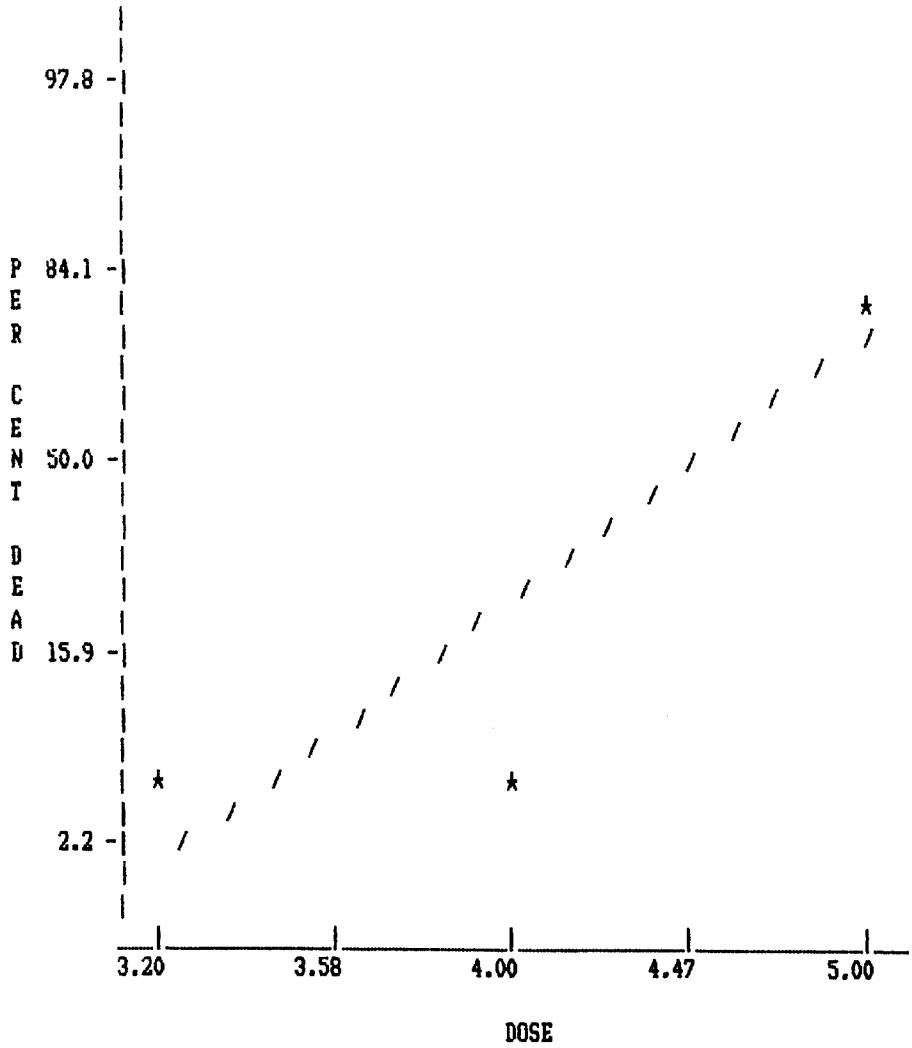
THE LC 50 IS 4.482,
WITH 95% CONFIDENCE LIMITS
OF 3.998 TO 5.023

F 2-4
FIGURE 2 (cont.)
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

LC50 CALCULATION - MALES

==========

PLOT OF THE OBSERVED PERCENT DEAD, AND
THE PREDICTION EQUATION FOR THE LC50:



F 2-5

FIGURE 2 (cont.)

AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

LC50 CALCULATION - FEMALES

==========

THE WEIGHT VALUES READ IN AT THIS
STEP WILL BE USED FOR ALL OTHER STEPS DURING
THIS RUN.

THE WEIGHTINGS BY 0.5 SD ARE:
9.00 3.00 1.00 1.00 0.10 0.10

THE DOSAGE GROUPS ARE: UNITS ARE: mg/l
3.20000 4.00000 5.00000

THE NUMBER OF DEAD ANIMALS IN EACH DOSAGE GROUP ARE:
0. 2. 3.

THE NUMBER OF ANIMALS IN EACH DOSAGE GROUP ARE:
5. 5. 5.

PREDICTION EQUATION:
PROBIT(FRACTION DEAD) = 0.298 + 7.180 TIMES LOG BASE 10 OF DOSAGE

THE LC50, LC16 AND LC84 ARE ; 4.518 3.278 6.226

FOR THE INPUT DATA

OBS	DOSAGE	FRACTION DEAD	PREDICTED FRACTION	WEIGHT
1	3.20	0.05	0.14	1.00
2	4.00	0.40	0.35	9.00
3	5.00	0.60	0.62	9.00

TO TEST THE GOODNESS OF FIT, THE
CHISQUARE VALUE IS 0.41 WHICH IS SIGNIFICANT AT 0.525
IF THE SIGNIFICANCE IS GREATER THAN 0.05 THEN
THE STANDARD LITCHFIELD WILCOXON TECHNIQUE IS USED.
IF THE SIGNIFICANCE IS LESS THAN 0.05 THEN THE FIT
OF THE LINE TO THE DATA IS POOR, AND THE MODIFIED
LITCHFIELD WILCOXON TECHNIQUE IS USED.

THE SLOPE AND ASSOCIATED CONFIDENCE INTERVAL 1.378, (0.891, 2.132)

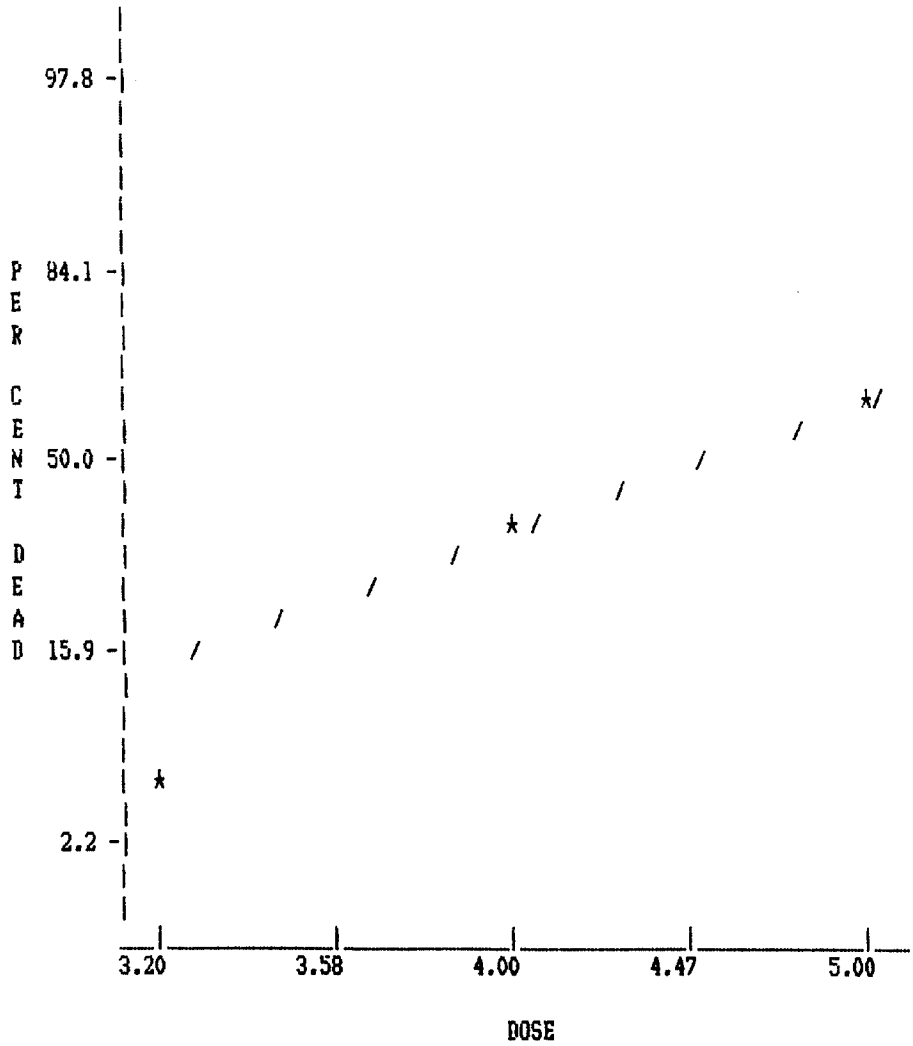
THE LC 50 IS 4.518,
WITH 95% CONFIDENCE LIMITS
OF 3.592 TO 5.682

F 2-6
FIGURE 2 (cont.)
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

LC50 CALCULATION - FEMALES

==========

PLOT OF THE OBSERVED PERCENT DEAD, AND
THE PREDICTION EQUATION FOR THE LC50:



T 1-1
Table 1
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Summary of Exposure Conditions and Mortality

Group	Date of Exposure	Nominal Concentration (mg/l)	Exposure Concentration (mg/l)	Length of Exposure (min.)	Mortality Male	Mortality Female	Mortality Total	Day of Last Spontaneous Death	Average Chamber Temperature (°F)	Average Chamber Relative Humidity (%)
I	10/12/88	7.2	5.0	240	4/5	3/5	7/10	4	71	21
II	10/28/88	4.1	3.2	240	0/5	0/5	0/10	-	72	62
III	11/9/88	5.2	4.0	240	0/5	2/5	2/10	6	74	30

25

Table 2
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Analytical Chamber Concentrations, Chamber Temperatures
and Chamber Relative Humidities
Group I - 5.0 mg/l

Minutes into Exposure	Analytical Chamber Concentration (mg/l)	Chamber Temperature (°F)	Chamber Relative Humidity[a] (%)
0[b]	-	68	25
30	-	69	29
45	4.4	-	-
60	-	70	28
90	-	72	25
105	5.2	-	-
120	-	72	22
150	-	72	21
165	5.2[c]	-	-
179	5.2[d]	-	-
184	-	72	17
210	-	72	14
225	5.2	-	-
239	-	72	12
Mean:	5.0	71	21

[a]Although chamber relative humidity was below the protocol-specified range, adjustments could not be made while the chamber was operating.
[b]T_0 chamber temperature and relative humidity are presented for comparison purposes and have been excluded from mean calculations.
[c]Distribution sample obtained from the H-1 area of the chamber; value included in mean calculation.
[d]Distribution sample obtained from the H-2 area of the chamber; value excluded from mean calculation.

Table 2 (cont.)
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Analytical Chamber Concentrations, Chamber Temperatures
and Chamber Relative Humidities (cont.)
Group II - 3.2 mg/l

Minutes into Exposure	Analytical Chamber Concentration (mg/l)	Chamber Temperature (°F)	Chamber Relative Humidity[a] (%)
0[b]	-	68	55
30	-	70	64
45	3.2	-	-
60	-	71	65
90	-	71	64
105	3.4[c]	-	-
118	3.2[d]	-	-
120	-	72	63
150	-	73	61
165	2.9	-	-
180	-	74	61
210	-	74	60
225	3.2	-	-
238	-	74	60
Mean:	3.2	72	62

[a]Although chamber relative humidity was exceeded the protocol-specified range on occasion, adjustments could not be made while the chamber was operating.
[b]T_0 chamber temperature and relative humidity are presented for comparison purposes and have been excluded from mean calculations.
[c]Distribution sample obtained from the H-1 area of the chamber; value included in mean calculation.
[d]Distribution sample obtained from the H-2 area of the chamber; value excluded from mean calculation.

Table 2 (cont.)
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Analytical Chamber Concentrations, Chamber Temperatures
and Chamber Relative Humidities (cont.)
Group III - 4.0 mg/l

Minutes into Exposure	Analytical Chamber Concentration (mg/l)	Chamber Temperature (°F)	Chamber Relative Humidity[a] (%)
0[b]	-	72	36
35	-	72	34
45	3.8	-	-
60	-	74	32
90	-	74	31
105	4.4[c]	-	-
118	4.2[d]	-	-
120	-	74	29
150	-	74	29
165	3.8	-	-
180	-	74	29
210	-	74	29
225	3.9	-	-
239	-	74	29
Mean:	4.0	74	30

[a]Although chamber relative humidity was below the protocol-specified range, adjustments could not be made while the chamber was operating.
[b]T_0 chamber temperature and relative humidity are presented for comparison purposes and have been excluded from mean calculations.
[c]Distribution sample obtained from the H-1 area of the chamber; value included in mean calculation.
[d]Distribution sample obtained from the H-2 area of the chamber; value excluded from mean calculation.

T 3-1
Table 3
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Animal Termination History

Group (mg/l)	Males An. No.	Males Date of Death	Males Type of Death[a]	Males Test Day	Females An. No.	Females Date of Death	Females Type of Death[a]	Females Test Day
I	1031	10/15/88	S	4	1531	10/15/88	S	4
5.0	1032	10/15/88	S	4	1532	10/26/88	T	15
	1033	10/14/88	S	3	1533	10/15/88	S	4
	1034	10/26/88	T	15	1534	10/26/88	T	15
	1035	10/14/88	S	3	1535	10/15/88	S	4
II	2031	11/11/88	T	15	2531	11/11/88	T	15
3.2	2032	11/11/88	T	15	2532	11/11/88	T	15
	2033	11/11/88	T	15	2533	11/11/88	T	15
	2034	11/11/88	T	15	2534	11/11/88	T	15
	2035	11/11/88	T	15	2535	11/11/88	T	15
III	3031	11/23/88	T	15	3531	11/23/88	T	15
4.0	3032	11/23/88	T	15	3532	11/14/88	S	6
	3033	11/23/88	T	15	3533	11/23/88	T	15
	3034	11/23/88	T	15	3534	11/23/88	T	15
	3035	11/23/88	T	15	3535	11/12/88	S	4

[a]T = Terminal sacrifice; S = Spontaneous death.

T 4-1
Table 4
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Summary of Day 1 Exposure and Post-Exposure Observations

Group (mg/l)	Observation	Pre-test	Hours into Exposure[a] 1/4	1/2	3/4	1	2	3	4	Hours Post-Exposure[b] *T	1	2
I 5.0	Dried red nasal discharge	-	-	-	-	-	-	-	-	1	1	-
	No observed abnormalities:	10	all	all	all	all	all	all	all	9	9	10
	Cumulative mortality:	0	-	-	-	-	-	-	-	0	0	0
II 3.2	No observed abnormalities:	10	all	all	all	all	all	all	all	10	10	10
	Cumulative mortality:	0	-	-	-	-	-	-	-	0	0	0
III 4.0	No observed abnormalities:	10	all	all	all	all	all	all	all	10	10	10
	Cumulative mortality:	0	-	-	-	-	-	-	-	0	0	0

*T - Animals observed upon removal from the chamber. Number represents number of animals exhibiting signs.

[a]Since animals were housed in such a manner as their ID was not clearly visible, the following scheme was used: Few = 10-30%, Some = 40-60%, Most = 70-90% and All = 100% of animals.

[b]The post-exposure period began when the generation of the test atmosphere stopped. The chamber was allowed to clear for one half hour prior to the removal of the animals at the same airflow rate which was used during the exposure.

T 5-1
TABLE 5
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

SUMMARY OF 14-DAY POST-EXPOSURE OBSERVATIONS - BOTH SEXES

	DAY :	2	3	4	5	6	7	8	9	10	11	12	13	14	15
# OF ANIMALS EXAMINED	I	10	10	9	3	3	3	3	3	3	3	3	3	3	3
	II	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	III	10	10	10	9	9	8	8	8	8	8	8	8	8	8
NORMAL															
NO SIGNIFICANT CLINICAL OBSERVATIONS	I	7	0	0	0	0	3	2	3	3	2	3	2	3	3
	II	6	7	0	0	0	5	9	7	6	9	8	7	8	6
	III	9	3	0	2	4	3	4	8	8	4	8	7	7	7
DEAD															
SPONTANEOUS DEATH	I	0	1	6	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	1	0	1	0	0	0	0	0	0	0	0	0
TERMINAL SACRIFICE	I	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	10
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	8
BODY POSITION															
HUNCHED APPEARANCE	I	0	0	2	1	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXCITATION															
TREMORS, FINE	I	0	1	0	0	1	0	0	0	0	0	0	0	0	0
	II	0	0	4	4	3	2	1	0	1	0	0	0	0	0
	III	0	0	3	1	0	4	3	0	0	0	0	0	0	0
TREMORS, COARSE	I	0	8	3	3	2	0	0	0	0	0	0	0	0	0
	II	0	0	6	6	7	2	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	1	1	0	0	0	0	0	0	0
EYES															
EXCESS LACRIMATION	I	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	8	5	2	0	0	0	0	0	0	0	0	0
EYE(S) CLOSED	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	1	0	0	0	0	0	0	0	0	0	0

T 5-2

TABLE 5 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

SUMMARY OF 14-DAY POST-EXPOSURE OBSERVATIONS - BOTH SEXES

	DAY :	2	3	4	5	6	7	8	9	10	11	12	13	14	15
# OF ANIMALS EXAMINED	I	10	10	9	3	3	3	3	3	3	3	3	3	3	3
	II	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	III	10	10	10	9	9	8	8	8	8	8	8	8	8	8
MISCELLANEOUS															
DECREASED ACTIVITY	I	0	8	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	1	0	0	0	0	0	0	0	0	0	0
COOL TO TOUCH	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	2	2	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOSE															
DRIED RED NASAL DISCHARGE	I	3	7	3	0	0	0	1	0	0	1	0	0	0	0
	II	4	3	7	7	3	1	0	0	1	1	2	3	2	4
	III	1	6	8	3	0	2	1	0	0	0	0	0	1	1
MUCOID NASAL DISCHARGE	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	1	0	0	0	0	0	0	0	1	0	0	0	0	1
	III	0	0	0	3	0	0	0	0	0	1	0	0	0	0
RED NASAL DISCHARGE	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	1	0	0	0	0	0	0	0	0	0	0	0	0
RESPIRATION															
LABORED BREATHING	I	0	9	1	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	10	10	10	4	1	0	0	0	0	0	0	0
	III	0	0	1	1	0	5	4	0	0	0	0	0	0	0
MOIST RALES	I	0	7	1	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	3	3	1	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	1	0	0	0	0	1	0	0	0	0
DRY RALES	I	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	II	0	0	1	0	0	0	0	3	1	0	0	0	0	0
	III	0	0	0	0	2	0	0	0	0	2	0	1	0	0

TABLE 5 (cont.)
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

SUMMARY OF 14-DAY POST-EXPOSURE OBSERVATIONS - BOTH SEXES

	DAY :	2	3	4	5	6	7	8	9	10	11	12	13	14	15
# OF ANIMALS EXAMINED	I	10	10	9	3	3	3	3	3	3	3	3	3	3	3
	II	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	III	10	10	10	9	9	8	8	8	8	8	8	8	8	8
SKIN/FUR															
DRIED RED MATERIAL ON FACIAL AREA	I	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	2	0	1	2	0	0	0	0	0	0	0	0	0
DRIED BLACK MATERIAL ON FACIAL AREA	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	III	0	0	2	0	0	0	0	0	0	0	0	0	0	0
DRIED RED MATERIAL ON EXTREMITIES	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	3	1	0	0	0	0	0	0	0	0	0	0
YELLOW ANO-GENITAL STAINS	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	1	0	0	0	0	0	0	0	0	0	0
STOOL/URINE															
SOFT STOOL	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	1	0	0	0	0	0	0	0	0	0	0	0	0

T 6-1

TABLE 6
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

MEAN BODY WEIGHT VALUES - grams
MALES

	DAY 1	DAY 2	DAY 3	DAY 5	DAY 8	DAY 15
GROUP I - 5.0 mg/l						
MEAN	336	324	294	279	315	359
S.D.	15	20	20	-	-	-
N	5	5	4	1	1	1
GROUP II - 3.2 mg/l						
MEAN	326	321	302	279	315	385
S.D.	8	7	6	19	16	13
N	5	5	5	5	5	5
GROUP III - 4.0 mg/l						
MEAN	230	218	210	222	257	316
S.D.	16	9	8	15	18	25
N	5	5	5	5	5	5

T 6-2
TABLE 6 (cont.)
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT

MEAN BODY WEIGHT VALUES - grams
FEMALES

	DAY 1	DAY 2	DAY 3	DAY 5	DAY 8	DAY 15
GROUP I - 5.0 mg/l						
MEAN	249	240	229	217	237	275
S.D.	11	12	8	13	14	35
N	5	5	5	2	2	2
GROUP II - 3.2 mg/l						
MEAN	230	226	216	201	225	254
S.D.	9	11	12	24	16	20
N	5	5	5	5	5	5
GROUP III - 4.0 mg/l						
MEAN	216	206	203	198	227	257
S.D.	14	14	16	31	14	12
N	5	5	5	4	3	3

T 6-3

TABLE 6 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

INDIVIDUAL BODY WEIGHT VALUES - grams

MALES

ANIMAL NO.	SEX	DAY 1	2	3	5	8	15
GROUP I				5.0 mg/l			
1031	M	314	294	269	DEAD	-	-
1032	M	334	328	287	DEAD	-	-
1033	M	357	351	314	DEAD	-	-
1034	M	335	324	307	279	315	359
1035	M	341	322	DEAD	-	-	-
MEAN		336	324	294	279	315	359
S.D.		15	20	20	0	0	0
N		5	5	4	1	1	1

DEAD =ANIMAL EXPIRED

T 6-4

TABLE 6 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

INDIVIDUAL BODY WEIGHT VALUES - grams

MALES

ANIMAL NO.	SEX	DAY 1	2	3	5	8	15
GROUP II				3.2 mg/l			
2031	M	319	316	291	257	305	385
2032	M	334	327	302	307	334	400
2033	M	336	331	307	286	327	396
2034	M	324	317	304	268	296	371
2035	M	319	315	305	275	311	373
MEAN		326	321	302	279	315	385
S.D.		8	7	6	19	16	13
N		5	5	5	5	5	5

T 6-5

TABLE 6 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

INDIVIDUAL BODY WEIGHT VALUES - grams

MALES

ANIMAL NO.	SEX	DAY 1	2	3	5	8	15
GROUP III				4.0 mg/l			
3031	M	217	214	210	225	245	294
3032	M	254	219	206	246	288	359
3033	M	224	221	214	208	251	314
3034	M	215	205	200	212	245	300
3035	M	238	229	222	217	256	314
MEAN		230	218	210	222	257	316
S.D.		16	9	8	15	18	25
N		5	5	5	5	5	5

T 6-6

TABLE 6 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

INDIVIDUAL BODY WEIGHT VALUES - grams

FEMALES

ANIMAL NO.	SEX	DAY 1	2	3	5	8	15
GROUP I			5.0 mg/l				
1531	F	254	249	236	DEAD	-	-
1532	F	255	244	232	226	247	300
1533	F	260	254	236	DEAD	-	-
1534	F	244	226	220	208	227	250
1535	F	233	229	219	DEAD	-	-
MEAN		249	240	229	217	237	275
S.D.		11	12	8	13	14	35
N		5	5	5	2	2	2

DEAD =ANIMAL EXPIRED

T 6-7

TABLE 6 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

INDIVIDUAL BODY WEIGHT VALUES - grams

FEMALES

ANIMAL NO.	SEX	DAY 1	2	3	5	8	15
GROUP II			3.2 mg/l				
2531	F	224	224	208	176	209	242
2532	F	242	241	231	230	244	268
2533	F	232	232	218	191	234	280
2534	F	232	222	221	221	230	248
2535	F	219	213	200	185	207	230
MEAN		230	226	216	201	225	254
S.D.		9	11	12	24	16	20
N		5	5	5	5	5	5

T 6-8

TABLE 6 (cont.)

AN ACUTE INHALATION TOXICITY STUDY

OF HALOCARBON 0.8 OIL IN THE RAT

88-8098

INDIVIDUAL BODY WEIGHT VALUES - grams

FEMALES

ANIMAL NO.	SEX	DAY 1	2	3	5	8	15
GROUP III			4.0 mg/l				
3531	F	227	209	210	214	225	248
3532	F	204	192	186	157	DEAD	-
3533	F	233	227	228	229	242	270
3534	F	212	207	201	190	214	253
3535	F	203	196	192	DEAD	-	-
MEAN		216	206	203	198	227	257
S.D.		14	14	16	31	14	12
N		5	5	5	4	3	3

DEAD =ANIMAL EXPIRED

Appendix A
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Methodology and References - General

Parameter	Reference or Description
Physical Examination	Included examination for the following: Secretory responses - lacrimation, mucoid, red or dried red nasal discharge, salivation, chromodacryorrhea and dried material on facial area. Respiration - labored breathing, gasping, dry or moist rales. General responses - tremors, hunched appearance, alopecia, matted coat, eyes closed, prostration, poor condition, emaciation, yellow or brown anogenital staining, soft stool, torn or encrusted ears, increased or decreased activity, corneal irregularity, scabs and/or any unusual observation not included above.
Body Weights	Torbal Weighing System, Model - Torsion PL12D.

Methodology and References - Analytical Method

INHALATION CHAMBER MONITORING OF HALOCARBON 0.8 OIL
USING THE MIRAN® 1A AMBIENT AIR ANALYZER

The instrument settings for the unit are summarized below:

pathlength, dial setting	0.57
wavelength, microns	11
range	1A
response, seconds	1
slit width, mm	1
*chart speed, cm/min	1
*volts	1
gain	High

*Settings for the strip chart recorder.

MIRAN® CALIBRATIONS

The MIRAN® was turned on and allowed to warm up for approximately 20 minutes. The cleanliness of the cell was checked by flushing it with room air for approximately one minute. The loop was closed, the unit was zeroed and the injection series was performed as shown below. The resultant data was plotted to obtain a calibration curve.

Injection Volume (μl)	Cumulative Injection Volume (μl)	Calculated Concentration (mg/l)	Absorbance Operator 1 Run 1	Absorbance Operator 1 Run 2	Absorbance Operator 2 Run 1	Absorbance Operator 2 Run 2
6.6	6.6	2.0	0.2390	0.2403	0.2400	0.2434
6.7	13.3	4.0	0.435	0.436	0.434	0.439
6.6	19.9	6.0	0.590	0.593	0.590	0.594
6.6	26.5	8.0	0.716	0.720	0.717	0.721
6.7	33.2	10.0	0.827	0.827	0.827	0.829

DAILY MIRAN® CALIBRATION CHECK

A three-point calibration check of the MIRAN® was performed each trial/exposure day prior to sampling the chambers as shown on the following page.

Methodology and References - Analytical Method (cont.)

DAILY MIRAN® CALIBRATION CHECK (cont.)

Injection Volume (μl)	Cumulative Injection Volume (μl)	Expected Absorbance Reading	Calculated Concentration (mg/l)
6.6	6.6	0.2407	2.0
13.3	19.9	0.591	6.0
6.6	26.5	0.719	8.0

Injections were made with a 10 μl Hamilton Syringe (Model 701). The absorbance was recorded after each injection. The absorbance must be within 15% of the original calibrations series. If any of the absorbance values fell outside the 15% range, the injection was rechecked as follows: the volume for the value that was out of range was reinjected twice. The two closer pair of the three injections were averaged and the results compared with the original curve. If the value of the average was outside the 15% range, the Study Director would decide if a new graph was to be prepared.

CHAMBER SAMPLING

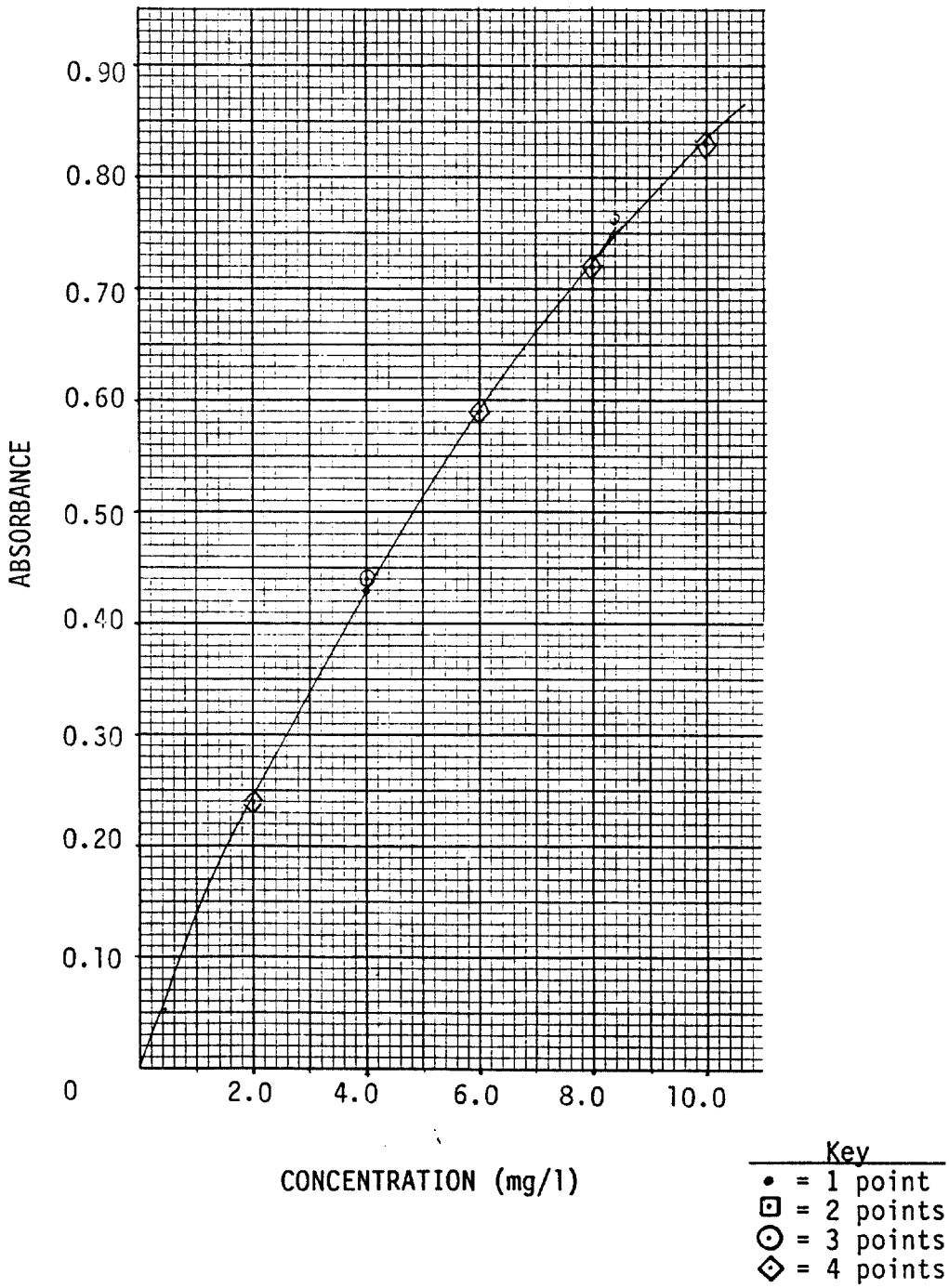
See Chamber Sampling Procedure, page 6.

SIGNIFICANT FIGURES

Sample concentrations and daily means were reported to two significant figures.

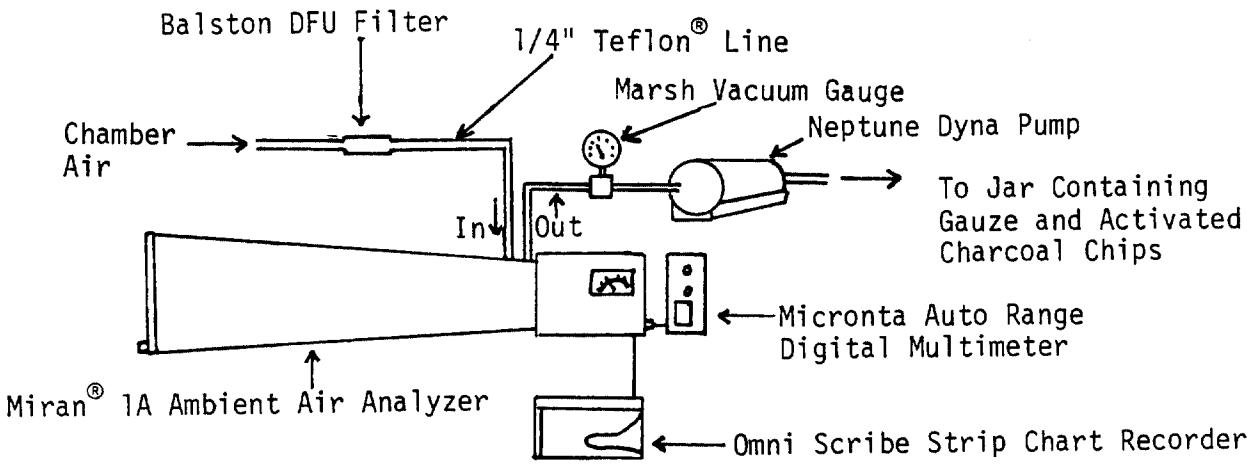
Methodology and References - Analytical Method (cont.)

CALIBRATION CURVE



Methodology and References - Analytical Method (cont.)

DIAGRAM OF SAMPLING SYSTEM SET-UP
USING MIRAN® 1A AMBIENT AIR ANALYZER



Appendix B

An Acute Inhalation Toxicity Study of Halocarbon 0.8 Oil in the Rat

Pathology Report

An Acute Inhalation Toxicity Study of Halocarbon 0.8 Oil in the Rat

Pathology Report

An Acute Inhalation Toxicity Study
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Pathology Report

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An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat
Pathology Report

SUMMARY STATEMENT OF GROSS POSTMORTEM OBSERVATIONS

Nine animals died prior to the end of their scheduled sacrifice date when all animals were killed by exsanguination under ethyl ether anesthesia. (Males: Group I-4/5; Females: Group I-3/5, Group III-2/5). All animals were examined postmortem for the presence of grossly visible morphologic abnormalities.

The lungs and several other tissues from animals which died spontaneously were various intensities of red. This was not considered to be uncommon for animals which died and were not exsanguinated prior to postmortem examination. The toxicologic significance of this finding and lung edema with respect to the test article, if any, remains equivocal on the basis of gross postmortem examination only and in the absence of a control group.

Other postmortem findings observed grossly occurred sporadically and were not considered to be related to the test article.

William L. Wooding 2/17/89

William L. Wooding, D.V.M., M.S. Date
ACVP DIP
Senior Pathologist

Table I

An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat
Pathology Report

Identification and Disposition of Individual Animals

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*** PATH/TOX SYSTEM OUTPUT ***
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
LIST OF SACRIFICED ANIMALS

STUDY NUMBER: 888098

ANIMAL-NUMBER	DOSE GROUP	SEX	DEATH CODE	TYPE OF DEATH	DESCRIPTION OF DEATH	DATE OF DEATH	DAY OF STUDY	WEEK OF STUDY
1031	1	MALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/15/88	4	1
1032	1	MALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/15/88	4	1
1033	1	MALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/14/88	3	1
1034	1	MALE	T	SCHEDULED	TERMINAL SACRIFICE	10/26/88	15	3
1035	1	MALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/14/88	3	1
2031	2	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2032	2	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2033	2	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2034	2	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2035	2	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
3031	3	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
3032	3	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
3033	3	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
3034	3	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
3035	3	MALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
1531	1	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
1532	1	FEMALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/15/88	4	1
1533	1	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	10/26/88	15	3
1534	1	FEMALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/15/88	4	1
1535	1	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	10/26/88	15	3
2531	2	FEMALE	D	UNSCHEDULED	UNSCHEDULED DEATH	10/15/88	4	1
2532	2	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2533	2	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2534	2	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
2535	2	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
3531	3	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/11/88	31	5
3532	3	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
3533	3	FEMALE	D	UNSCHEDULED	UNSCHEDULED DEATH	11/14/88	34	5
3534	3	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
3535	3	FEMALE	T	SCHEDULED	TERMINAL SACRIFICE	11/23/88	43	7
			D	UNSCHEDULED	UNSCHEDULED DEATH	11/12/88	32	5

Table II

An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat
Pathology Report

Summary-Incidence of Necropsy Data

TABLE INCLUDES:
SEX=ALL;GROUP=1,2,3;WEEKS=ALL
DEATH=ALL;SUBSET=ALL

ORGAN AND KEYWORD(S) OR PHRASE		--- NUMBER OF ANIMALS AFFECTED ---					
	SEX:	-----MALE----			----FEMALE---		
	GROUP:	-1-	-2-	-3-	-1-	-2-	-3-
	NUMBER:	5	5	5	5	5	5
** TOP OF LIST **							
SKIN (SK)	NUMBER EXAMINED:	5	5	5	5	5	5
DISCOLORED		3	0	0	2	0	1
HAIR LOSS		1	0	0	1	0	0
LUNGS (LU)	NUMBER EXAMINED:	5	5	5	5	5	5
DISCOLORED		3	3	0	3	1	2
EDEMA		4	0	0	3	0	2
EMPHYSEMA		0	1	0	0	0	0
TRACHEA (TR)	NUMBER EXAMINED:	5	5	5	5	5	5
CONTENTS: ABNORMAL		3	0	0	3	0	0
NOSE/TURBINATES (NT)	NUMBER EXAMINED:	5	5	5	5	5	5
DISCOLORED		4	0	2	3	0	0
STOMACH (ST)	NUMBER EXAMINED:	5	5	5	5	5	5
DISCOLORED		0	0	0	0	0	0
ADHESIONS		1	0	0	0	0	0
LYMPH NODE (LN)	NUMBER EXAMINED:	5	5	5	5	5	5
ENLARGED		0	1	0	0	0	0
SPLEEN (SP)	NUMBER EXAMINED:	5	5	5	5	5	5
SURFACE: IRREGULAR		0	1	0	0	0	0
DISCOLORED		0	1	0	0	0	0
THYMUS (TM)	NUMBER EXAMINED:	5	5	5	5	5	5
DISCOLORED		0	0	1	0	0	0
EYES (EY)	NUMBER EXAMINED:	5	5	5	5	5	5
ENOPHTHALMIC		0	0	0	0	0	1
OPACITY		0	0	0	0	0	1
LIVER (LI)	NUMBER EXAMINED:	5	5	5	5	5	5
DISCOLORED		0	0	0	0	0	1
SMALL		0	0	0	0	0	1

Table III

An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat
Pathology Report

Individual Animal Necropsy Findings

An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat
Pathology Report

Individual Animal Necropsy Findings

KEY TO NECROPSY OBSERVATIONS

X	=	TIMES
CM	=	CENTIMETERS
DIA	=	DIAMETER
SUBQ	=	SUBCUTANEOUS
A-G	=	ANO-GENITAL AREA
<	=	LESS THAN
>	=	GREATER THAN
T	=	TERMINAL SACRIFICE
D	=	SPONTANEOUS DEATH

NOTE: Study Day of Death indicates the number of days accumulated from the initiation of the study which is calculated form Day 1. It does not reflect the number of dosing days

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INDIVIDUAL ANIMAL NECROPSY DATA SHEET

PRINTED: 16-JAN-89
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STUDY NUMBER: 888098

ANIMAL NUMBER: 1031 SEX: MALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/15/88 STUDY DAY OF DEATH: 4 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 263.0 GRAMS

*** GROSS PATHOLOGY OBSERVATIONS ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, SEVERE	-ALL LOBES: DARK RED
	-EDEMA, SEVERE	-ALL LOBES: EDEMA
NOSE/TURBINATES (NT)	-DISCOLORED, MODERATE	-RED
SKIN (SK)	-DISCOLORED	-ON AND AROUND SNOUT: DRIED RED MATERIAL
	-HAIR LOSS, SLIGHT	-RIGHT HINDLEG
TRACHEA (TR)	-CONTENTS: ABNORMAL, SLIGHT	-FILLED WITH THICK WHITE FROTHY MATERIAL

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STUDY NUMBER: 888098

ANIMAL NUMBER: 1032 SEX: MALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/15/88 STUDY DAY OF DEATH: 4 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 271.0 GRAMS

*** GROSS PATHOLOGY OBSERVATIONS ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, SEVERE	-ALL LOBES: DARK RED
	-EDEMA, SEVERE	-ALL LOBES
NOSE/TURBINATES (NT)	-DISCOLORED	-REDDENED: WITH LITTLE THIN RED FLUID
SKIN (SK)	-DISCOLORED	-ON AND AROUND SNOUT: DRIED RED MATERIAL
TRACHEA (TR)	-CONTENTS: ABNORMAL	-CONTAINS THIN FROTHY FLUID

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STUDY NUMBER: 888098

ANIMAL NUMBER: 1033 SEX: MALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/14/88 STUDY DAY OF DEATH: 3 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 313.0 GRAMS

*** GROSS PATHOLOGY OBSERVATIONS ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-EDEMA, SLIGHT	-ALL LOBES: EDEMATOUS
NOSE/TURBINATES (NT)	-DISCOLORED, SLIGHT	-RED
STOMACH (ST)	-ADHESIONS	-YELLOW MATERIAL, TO FUNDIC MUCOSA
TRACHEA (TR)	-CONTENTS: ABNORMAL	-FILLED WITH WHITE FROTHY MATERIAL

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ANIMAL NUMBER: 1034 SEX: MALE DOSE GROUP: 1 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 10/26/88 STUDY DAY OF DEATH: 15 STUDY WEEK OF DEATH: 3 TERMINAL BODY WEIGHT: 359.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

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STUDY NUMBER: 888098

ANIMAL NUMBER: 1035 SEX: MALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/14/88 STUDY DAY OF DEATH: 3 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 304.0 GRAMS

* * * G R O S S P A T H O L O G Y O B S E R V A T I O N S * * *

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, MODERATE	-ALL LOBES: DARK RED
	-EDEMA, MODERATE	-ALL LOBES
NOSE/TURBINATES (NT)	-DISCOLORED, SEVERE	-BRIGHT RED
SKIN (SK)	-DISCOLORED, SLIGHT	-RED NASAL DISCHARGE

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STUDY NUMBER: 888098

ANIMAL NUMBER: 2031 SEX: MALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 385.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

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STUDY NUMBER: 888098

ANIMAL NUMBER: 2032 SEX: MALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 400.0 GRAMS

*** G R O S S P A T H O L O G Y O B S E R V A T I O N S ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED	-ALL LOBES: RED FOCI 0.1 CM DIA
LYMPH NODE (LN)	-ENLARGED, SLIGHT	-MANDIBULAR: 0.8X0.4 CM

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STUDY NUMBER: 888098

ANIMAL NUMBER: 2033 SEX: MALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 396.0 GRAMS

* * * G R O S S P A T H O L O G Y O B S E R V A T I O N S * * *

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED	-ALL LOBES: PALE WITH DARK RED PINPOINT FOCI
SPLEEN (SP)	-SURFACE: IRREGULAR	-ROUGH
	-DISCOLORED	-MULTIPLE TAN AREAS <0.4 CM DIA

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STUDY NUMBER: 888098

ANIMAL NUMBER: 2034 SEX: MALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 371.0 GRAMS

*** G R O S S P A T H O L O G Y O B S E R V A T I O N S ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, MODERATE	-LOBES: MOTTLED TAN
	-EMPHYSEMA, SLIGHT	-LOBES

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STUDY NUMBER: 888098

ANIMAL NUMBER: 2035 SEX: MALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 373.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

ANIMAL NUMBER: 3031 SEX: MALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 294.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

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STUDY NUMBER: 888098

ANIMAL NUMBER: 3032 SEX: MALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 359.0 GRAMS

*** G R O S S P A T H O L O G Y O B S E R V A T I O N S ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
THYMUS (TM)	-DISCOLORED	-MULTIPLE DARK RED FOCI 0.1 CM DIA

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OF HALOCARBON 0.8 OIL IN THE RAT
INDIVIDUAL ANIMAL NECROPSY DATA SHEET

STUDY NUMBER: 888098

ANIMAL NUMBER: 3033 SEX: MALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 314.0 GRAMS

* * * G R O S S P A T H O L O G Y O B S E R V A T I O N S * * *

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
NOSE/TURBINATES (NT)	-DISCOLORED	-DARK RED

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STUDY NUMBER: 888098

ANIMAL NUMBER: 3034 SEX: MALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 300.0 GRAMS

*** GROSS PATHOLOGY OBSERVATIONS ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
NOSE/TURBINATES (NT)	-DISCOLORED	-DARK RED

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STUDY NUMBER: 888098

ANIMAL NUMBER: 3035 SEX: MALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 314.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

ANIMAL NUMBER: 1531 SEX: FEMALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/15/88 STUDY DAY OF DEATH: 4 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 228.0 GRAMS

*** G R O S S P A T H O L O G Y O B S E R V A T I O N S ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, SEVERE	-ALL LOBES: DARK RED
	-EDEMA, SEVERE	-ALL LOBES
NOSE/TURBINATES (NT)	-DISCOLORED, SLIGHT	-REDDENED
SKIN (SK)	-HAIR LOSS, SLIGHT	-BOTH UPPER CERVICAL AND BOTH UPPER FORELIMBS
TRACHEA (TR)	-CONTENTS: ABNORMAL	-CONTAINS CLEAR THIN FROTHY FLUID

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AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
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STUDY NUMBER: 888098

ANIMAL NUMBER: 1532 SEX: FEMALE DOSE GROUP: 1 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 10/26/88 STUDY DAY OF DEATH: 15 STUDY WEEK OF DEATH: 3 TERMINAL BODY WEIGHT: 300.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

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OF HALOCARBON 0.8 OIL IN THE RAT
INDIVIDUAL ANIMAL NECROPSY DATA SHEET

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STUDY NUMBER: 888098

ANIMAL NUMBER: 1533 SEX: FEMALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/15/88 STUDY DAY OF DEATH: 4 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 226.0 GRAMS

* * * G R O S S P A T H O L O G Y O B S E R V A T I O N S * * *

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, SEVERE	-ALL LOBES: DARK RED
	-EDEMA, SEVERE	-ALL LOBES
NOSE/TURBINATES (NT)	-DISCOLORED, SLIGHT	-RED
SKIN (SK)	-DISCOLORED	-ON AND AROUND SNOUT: DRIED RED MATERIAL
TRACHEA (TR)	-CONTENTS: ABNORMAL	-CONTAINS CLEAR THIN FROTHY FLUID

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STUDY NUMBER: 888098

ANIMAL NUMBER: 1534 SEX: FEMALE DOSE GROUP: 1 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 10/26/88 STUDY DAY OF DEATH: 15 STUDY WEEK OF DEATH: 3 TERMINAL BODY WEIGHT: 250.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
INDIVIDUAL ANIMAL NECROPSY DATA SHEET

PRINTED: 16-JAN-89
PAGE: 22

STUDY NUMBER: 888098

ANIMAL NUMBER: 1535 SEX: FEMALE DOSE GROUP: 1 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 10/15/88 STUDY DAY OF DEATH: 4 STUDY WEEK OF DEATH: 1 TERMINAL BODY WEIGHT: 202.0 GRAMS

*** GROSS PATHOLOGY OBSERVATIONS ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED, SEVERE	-ALL LOBES: MOTTLED DARK RED
	-EDEMA, MODERATE	-ALL LOBES
NOSE/TURBINATES (NT)	-DISCOLORED, SLIGHT	-RED
SKIN (SK)	-DISCOLORED	-AROUND SNOUT: LITTLE DRIED RED NASAL DISCHARGE
TRACHEA (TR)	-CONTENTS: ABNORMAL	-CONTAINS THIN WHITE FROTHY MATERIAL

BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
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OF HALOCARBON 0.8 OIL IN THE RAT
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PRINTED: 16-JAN-89
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STUDY NUMBER: 888098

ANIMAL NUMBER: 2531 SEX: FEMALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 242.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
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PRINTED: 16-JAN-89
PAGE: 24

STUDY NUMBER: 888098

ANIMAL NUMBER: 2532 SEX: FEMALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 268.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
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STUDY NUMBER: 888098

ANIMAL NUMBER: 2533 SEX: FEMALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 280.0 GRAMS

*** G R O S S P A T H O L O G Y O B S E R V A T I O N S ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED	-LEFT DIAPHRAGMATIC LOBE: DARK RED FOCI 0.1 CM DIA

ANIMAL NUMBER: 2534 SEX: FEMALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 248.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
INDIVIDUAL ANIMAL NECROPSY DATA SHEET

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STUDY NUMBER: 888098

ANIMAL NUMBER: 2535 SEX: FEMALE DOSE GROUP: 2 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/11/88 STUDY DAY OF DEATH: 31 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 230.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

ANIMAL NUMBER: 3531 SEX: FEMALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 248.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

ANIMAL NUMBER: 3532 SEX: FEMALE DOSE GROUP: 3 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 11/14/88 STUDY DAY OF DEATH: 34 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 154.0 GRAMS

*** G R O S S P A T H O L O G Y O B S E R V A T I O N S ***

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
EYES (EY)	-ENOPHTHALMIC, SLIGHT	
	-OPACITY, MODERATE	
GENERAL COMMENTS (GC)	-EMACIATED	
	-POOR CONDITION	
LIVER (LI)	-DISCOLORED, SEVERE	-RED
	-SMALL, SLIGHT	
LUNGS (LU)	-DISCOLORED, SEVERE	-RED
	-EDEMA, MODERATE	-EDEMATOUS
SKIN (SK)	-DISCOLORED	-A-G: SLIGHT STAINS; AROUND SNOUT: RED DRIED MATERIAL

ANIMAL NUMBER: 3533 SEX: FEMALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 270.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
INDIVIDUAL ANIMAL NECROPSY DATA SHEET

PRINTED: 16-JAN-89
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STUDY NUMBER: 888098

ANIMAL NUMBER: 3534 SEX: FEMALE DOSE GROUP: 3 SACRIFICE STATUS: SCHEDULED, TERMINAL SACRIFICE
DATE OF DEATH: 11/23/88 STUDY DAY OF DEATH: 43 STUDY WEEK OF DEATH: 7 TERMINAL BODY WEIGHT: 253.0 GRAMS

*** ANIMAL HAS NO GROSS OBSERVATIONS RECORDED ***

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BIO/DYNAMICS, INC.
DEPARTMENT OF PATHOLOGY
EAST MILLSTONE, NJ 08873

*** PATH/TOX SYSTEM OUTPUT ***
AN ACUTE INHALATION TOXICITY STUDY
OF HALOCARBON 0.8 OIL IN THE RAT
INDIVIDUAL ANIMAL NECROPSY DATA SHEET

PRINTED: 16-JAN-89
PAGE: 32
STUDY NUMBER: 888098

ANIMAL NUMBER: 3535 SEX: FEMALE DOSE GROUP: 3 SACRIFICE STATUS: UNSCHEDULED (D)
DATE OF DEATH: 11/12/88 STUDY DAY OF DEATH: 32 STUDY WEEK OF DEATH: 5 TERMINAL BODY WEIGHT: 176.0 GRAMS

* * * G R O S S P A T H O L O G Y O B S E R V A T I O N S * * *

ORGAN NAME	SEVERITY, KEYWORD(S) OR PHRASE	FREE-TEXT COMMENTS AND NOTES
LUNGS (LU)	-DISCOLORED	-ALL LOBES: MOTTLED DARK RED
	-EDEMA, SLIGHT	-ALL LOBES

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Appendix C
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

PERSONNEL

DEPARTMENT/TITLE	NAME	DEGREE
TOXICOLOGY		
VICE PRESIDENT AND DIRECTOR	Ira W. Daly	Ph.D., D.A.B.T.
STUDY MONITOR	Albert Couchman	B.A.
INHALATION SECTION		
DIRECTOR	Paul E. Newton	Ph.D., D.A.B.T.
STUDY DIRECTOR	Gary M. Hoffman	B.A., D.A.B.T
SUPERVISOR	Theresa L. Josephson	B.S.
TECHNICIAN-IN-CHARGE	Nancy L. Beck	B.S., AALAS, L.A.T.
PHARMACY AND DIET PREPARATION		
MANAGER	Jeffrey P. Lefrancois	B.S.
SUPERVISOR	Donald Wagner	
TECHNICIAN-IN-CHARGE	Barbara Bernard	AALAS L.A.T.
VETERINARIAN	Edward T. Greenstein	D.V.M., D.A.C.L.A.M.

Appendix C (cont)
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

PERSONNEL (cont.)

DEPARTMENT/TITLE	NAME	DEGREE
PATHOLOGY		
PATHOLOGIST	William L. Wooding	D.V.M., M.S., D.A.C.V.P.
STUDY MONITOR	Paul C. Anderson, Jr.	
SENIOR PATHOLOGIST AND MANAGER, NECROPSY	William L. Wooding	D.V.M., M.S., D.A.C.V.P.
SUPERVISOR, NECROPSY	Henning Jonassen	B.S., AALAS R.L.A.T.
QUALITY ASSURANCE		
SUPERVISOR	William M. Harrison	B.S.

Appendix D
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Quality Assurance Statement

Listed below are dates that this study was inspected by the Quality Assurance Unit of Bio/dynamics, Inc. and the dates findings were reported to the Study Director and Management.

Date(s) of Inspection	Reported to Study Director	Reported to Management
10/12/88	10/12/88	10/13/88
10/26/88	10/27/88	11/6/88
11/4/88	11/4/88	12/9/88 and 12/12/88
11/9/88	11/10/88	12/9/88 and 12/12/88
11/10/88	11/10/88	11/11/88 and 11/12/88
11/14/88	11/14/88	11/15/88
1/11/89	1/23/89	1/24/89 and 1/25/89
1/18/89 to 1/20/89	1/24/89	1/24/89 and 1/25/89

William M. Harrison, B.S.
Supervisor of Quality Assurance

1/25/89
Date

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Appendix E
An Acute Inhalation Toxicity Study
of Halocarbon 0.8 Oil in the Rat

Statement of Compliance

Results of inspections made by the Quality Assurance Unit at Bio/dynamics, Inc. indicate that this study was conducted in compliance with the United States Environmental Protection Agency's Good Laboratory Practice Standards and applicable Standard Operating Procedures except as noted in the raw data or final report.

Gary M. Hoffman, B.A., D.A.B.T.
Study Director
Inhalation Toxicology

2-21-89
Date

Halocarbon
PRODUCTS CORPORATION
887 KINDERKAMACK ROAD • RIVER EDGE, NEW JERSEY 07661
TELEPHONE: 201-262-8899 FAX: 201-262-0019
MAILING ADDRESS: P.O. BOX 661 • RIVER EDGE, NEW JERSEY 07661

April 7, 1994

RECD
OFFICE OF POLLUTION
PREVENTION AND TOXICS
94 APR 12 PM 3:52

Document Processing Center (TS-790)
Attn: Section 8(e) Coordinator
Office of Toxic Substances
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460

Re: Consent Order regarding Halocarbon Products Corporation Docket No. TSCA 90-H-18

Dear Sir/Madame:

This submission is made pursuant to the Consent Order referenced above.

Transmitted herewith are reports on the chemicals listed below:

* Trifluoroacetyl chloride (CAS 354-32-5)
** 2-Chloro-1,1,1,4,4,4-hexafluorobutene-2 (CAS 400-44-2)
** Asym dibromodifluoroethylene (CAS 430-85-3)
** 1,1,1,2-Tetrabromo-2,2,-difluoroethane (CAS 3470-67-5)
** 1,3,4,4-Tetrachloro-1,2,3,4-tetrafluoro-1-butene
** $C_4F_6Br_4$ (CAS 375-24-6)
** $C_4F_4Br_4Cl_2$
** $CFCl_2(CF_2CFBr)_nCl$ where $_n$ is approximately 2 to 5
** $CFClBr(CF_2CFBr)_nBr$ where $_n$ is approximately 5 to 10
** $CFClBr(CF_2CFBr)_nBr$ where $_n$ is approximately 4 to 8
** $CFClBr(CF_2CFBr)_nBr$ where $_n$ is approximately 2 to 5
** $CFCl_2(CF_2CFBr)_nCl$ where $_n$ is approximately 3 to 6
** $CFCl_2(CF_2CFBr)_nCl$ where $_n$ is approximately 4 to 8
** 1,1,1,4,4,4-Hexafluoro-2-butanone
** 2-Hydroxy-1,1,1,4,4,4-hexafluorobutane
* 1,1,3,3-Tetrabromo-1,2,2,3-tetrafluoropropane (99%) (CAS 36567-29-0)
** Mixture of 2,3-dichloro-1,1,1,4,4,4-hexafluoro-2-butene (99.94%) (CAS 374-07-2) & 2-chloro-1,1,1,4,4,4-hexafluoro-2-butene (0.06%) (CAS 400-44-2)
** 1,1-Dibromo-1-chloro-2,2,2-trifluoroethane (CAS 754-17-6)
** $Cl(CF_2CFCl)_2Cl$ (CAS 423-38-1)

Reports on chemicals designated by a single asterisk (*) are submitted under paragraph V.F.b of said Consent Order.

Reports on chemicals designated by double asterisks (**) are submitted under paragraph V.F.c on a For Your Information Only basis.

I hereby certify on behalf of Halocarbon Products Corporation that the audit required by said Consent Order has been completed and that to the best of my information and belief the reports listed above are the only reports or studies required or questionably required to be submitted to EPA pursuant to said Concent Order.

Very truly yours,
Halocarbon Products Corporation

By Louis L. Ferstandig
Louis L. Ferstandig, Ph.D
Vice President & Technical Director

LLF:bc
Enclosures

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