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PHILLIPS PETROLEUM COMPANY

BARTLESVILLE, OKLAHOMA 74004

918 661-8153

HEALTH, ENVIRONMENT AND SAFETY

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August 24, 1992

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Environmental Protection Agency
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Attn: Section 8(e) Coordinator
(CAP Agreement)

Gentlemen:

Phillips Petroleum Company is submitting the enclosed sixty (60) reports (two boxes, numbered 1 and 2) of toxicological studies pursuant to category II.B.2.b of the CAP Agreement 8ECAP-0075 Reports. Reports being submitted contain no confidential business information.

We are sending an additional five boxes (box numbers 3-7) of reports of studies that have, previously, been submitted to the FYI coordinator of the Office of Pollution Prevention and Toxics by the American Petroleum Institute (API). These are being provided solely for the Agency's convenience.

For questions concerning this correspondence, please contact Fred Marashi at 918-661-8153.

Very truly yours,

Barbara J. Price
Vice President
Health, Environment & Safety

Enclosure (Seven Boxes)

3/7/95

FFM/dh:29



Phillips Petroleum Company

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CAP Identification Number: 8ECAP-0075
Pursuant to Category: II.B.2.b

Title of Study: Acute Toxicity Tests API #78-4 #2 Home Heating Oil (50% Cat.)

Name of Chemical: #2 Home Heating Oil (50% Cat.)

CAS#: 68476-30-2

Summary: Subacute dermal testing produced not only acute dermal corrosion but also obvious treatment-related signs at the 10 ml/kg dosage level; histopathologic examination of tissues confirmed dermal toxicity at all dosage levels.

Fiche # 1654

Contact:

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ELARS BIORESEARCH LABORATORIES

225 Commerce Drive
Fort Collins, Colorado 80524
303-221-2050



Acute Toxicity Tests
API #78-4
#2 Home Heating Oil (50% Cat)

Acute Toxicity Tests

API #78-4

#2 Home Heating Oil (50% Cat)

Conducted By:

Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

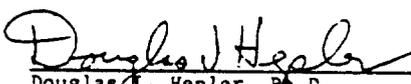
Dates of Studies:

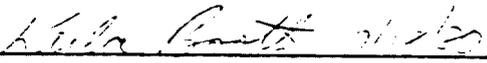
April 11, 1979 - October 27, 1979

Report To:

American Petroleum Institute
2101 L Street, Northwest
Washington, DC 20037


L. Steven Beck, D.V.M., M.S.
Assistant Director of
Toxicology
Study Director


Douglas J. Hepler, Ph.D.
Vice President, Toxicity
Evaluation Division

REVIEWED BY QUALITY ASSURANCE: 

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Acute Toxicity Tests
API #78-4
#2 Home Heating Oil (50% Cat)

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ABSTRACT

The test material, API #78-4, #2 Home Heating Oil (50% Cat), was tested for potential acute toxicity, using a battery of six tests: Primary Skin Irritation, Primary Eye Irritation, Skin Sensitization, Acute Dermal Toxicity, Acute Oral Toxicity, and Subacute Dermal Toxicity. Materials, methods, and results of individual tests are presented in this report.

The test material API #78-4 produced moderately irritating primary skin effects. The acute dermal test resulted in skin irritation but not systemic toxicity. Subacute dermal testing, however, produced not only acute dermal corrosion but also obvious treatment-related signs at the 10 ml/kg dosage level; histopathologic examination of tissues confirmed dermal toxicity at all dosage levels. The oral median lethal dose, i.e., oral LD₅₀, of the test material is 21.2 ml/kg. The test material, on the other hand, was essentially negative for primary eye irritation and did not cause skin sensitization.

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Primary Skin Irritation
API #78-4
#2 Home Heating Oil (50% Cat)

Conducted By:
Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

Dates Of Study:
April 30, 1979 - May 14, 1979

Conducted For:
American Petroleum Institute
2101 L Street, Northwest
Washington, D.C. 20037

Vicki Mills
Vicki Mills, B.S.
Toxicology Technician
Project Coordinator

Douglas U. Hepler
Douglas U. Hepler, Ph.D.
Director of Toxicology
Principal Investigator

REVIEWED BY QUALITY ASSURANCE: *Karla Roth 5/27/79*

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Primary Skin Irritation
API #78-4
#2 Home Heating Oil (50% Cat)

OBJECTIVE:

The objective of this study was to determine the potential dermal irritation of the test material in albino rabbits.

MATERIALS AND METHODS:

1. Test Material:

The test material, a liquid in a metal container identified as API #78-4, #2 Home Heating Oil (50% Cat), was received by Elars on April 3, 1979. The concentration, purity, and stability were not provided by the sponsor. The test material was stored in Elars' test material storage room.

2. Animals:

Three male and three female New Zealand White rabbits, weighing between 2-4 kg and aged approximately 4 months, were purchased from Pel-Freeze Farms, Inc., Rogers, Arkansas. Upon arrival at Elars, all animals were identified individually by ear tags and corresponding cage tags. Rabbits were housed individually in stainless steel cages with grated bottoms. All animals were provided Purina Rabbit Chow® and fresh water ad libitum.

3. Procedures:

Before testing, the animals were allowed to acclimate at least two weeks at Elars. Before application of the test material, the rabbits were examined and clipped free of hair with a No. 40 Oster clipper blade in an area extending from

the shoulders to the hips and halfway down either side of the thorax.

There were four test sites per animal which were located lateral to the midline of the back (two sites on each side) and approximately 10 centimeters apart. The day of the study, the test sites on the right anterior and the left posterior of each rabbit were abraded with the tip on an eighteen gauge needle. Abrasions consisted of four incisions, two parallel to the long axis of the rabbit and two at right angles to the first. Incisions penetrated the stratum corneum but not the dermis. Test areas on the left anterior and the right posterior were left intact. A dose of test material equal to 0.5 ml was applied to each of four one-inch square gauze patches backed by Saran Wrap[®]. The patches were then applied to the four test sites on each rabbit and secured in place with Band-Aid[®] sheer strips. The rabbits' trunks were then wrapped with Conform[®] elastic tape to help prevent movement of the patches. The test substance was kept in contact with the skin for 24 hours. At the end of the exposure period, the wrapping material and patches were removed. Excess test material was removed by wiping (but not washing) the skin with gauze sponges dampened with distilled water.

At 24 and 72 hours post dose, animals were observed and signs of erythema and edema were scored according to the technique of Draize (1).

RESULTS:

Individual rabbit erythema and edema scores for the 24 and 72 hour readings are presented in Table 1. Scores for days 7 and 14 are presented in Table 3. Computation of the mean primary irritation score is presented in Table 2.

Both edema and erythema were noted at the 24 hour, 72 hour and the day 7 readings. By the fourteenth day, all edema and erythema had subsided. It was noted that hair did not grow back on the test sites during the 14 day observation period but was growing normally on the surrounding skin.

CONCLUSIONS:

Based on the conditions of this trial, the test substance is to be considered moderately irritating.

RAW DATA:

Raw data can be found in Elars' notebook #650 in file #1443-A.

PERSONNEL:

Personnel responsible for the conduct and interpretation of this test include the following Elars personnel: Denice Morita, B.S., and David Carlson, B.S., Laboratory Animal Technicians; Vicki Mills, B.S., Project Coordinator; and Douglas I. Hepler, Ph.D., Principal Investigator and Director of Toxicology.

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Primary Skin Irritation
API #78-4

Project No. 1443-A

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REFERENCES:

1. Draize, J.H. 1959, "Dermal Toxicity," The Appraisal Of The Safety Of Chemicals In Foods, Drugs And Cosmetics. Assoc. of Food and Drug Officials of the U.S., Austin, Texas, p. 46.
2. Draize, J.H., Woodward, Geoffry, and Calvery, Herbert O., "Methods For The Study Of Irritation And Toxicity Of Substances Applied Topically To The Skin And Mucous Membranes," J. Pharm. And Exp. Ther., 82, p. 377 (1944).

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Primary Skin Irritation
API #78-4

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Project No. 1443-A

Table 1
Dermal Irritation Scores

Rabbit Number	Erythema				Edema			
	Abraded		Intact		Abraded		Intact	
	RF*	LR*	LF*	RR*	RF*	LR*	LF*	RR*
<u>24 Hour</u>								
341M	2	3	3	2	2	2	3	2
349M	1	1	1	1	0	1	0	0
365M	2	2	2	2	1	1	1	2
388F	1	1	1	1	0	0	0	0
390F	1	1	1	1	0	0	0	0
392F	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
Totals	9	10	10	9	4	5	5	5
Averages	1.58		1.58		0.75		0.83	
<u>72 Hour</u>								
341M	4	4	4	4	2	2	2	2
349M	3	1	4	2	2	1	2	2
365M	4	3	3	2	2	2	3	1
388F	4	2	4	4	3	3	3	3
390F	4	4	4	4	2	2	2	2
392F	<u>2</u>	<u>2</u>	<u>4</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>1</u>
Totals	21	16	23	18	12	11	15	11
Averages	3.08		3.42		1.92		2.17	

*Patch Location: RF = Right Front
LR = Left Rear
LF = Left Front
RR = Right Rear

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Table 2
Summary Of Dermal Irritation Scores

<u>Summary</u>	<u>Exposure Time Hours</u>	<u>Exposure Unit Values*</u>
<u>Erythema</u>		
Intact Skin	24	1.58
	72	3.42
Abraded Skin	24	1.58
	72	<u>3.08</u>
Subtotal		9.66
<u>Edema</u>		
Intact Skin	24	0.83
	72	2.17
Abraded Skin	24	0.75
	72	<u>1.92</u>
Subtotal		<u>5.67</u>
TOTAL		15.33

Primary Irritation Score = Total ÷ 4 = 3.83

Irritation Category - Moderately Irritating

* The "value" recorded for each reading is the average value of the animals used on the test.

<u>Mean Primary Irritation Scores</u>	<u>Descriptive Rating</u>
(Range Of Values)	
0	Non-irritating
0.1 - 0.5	Minimally Irritating
0.6 - 1.5	Slightly Irritating
1.6 - 3.0	Mildly Irritating
3.1 - 5.0	Moderately Irritating
5.1 - 6.5	Severely Irritating
6.6 - 8.0	Extremely Irritating

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Primary Skin Irritation
API #78-4

Project No. 1443-1

Table 3
Dermal Irritation Scores

Rabbit Number	Erythema				Edema			
	Abraded		Intact		Abraded		Intact	
	RF*	LR*	LF*	RR*	RF*	LR*	LF*	RR*
<u>Day 7</u>								
341M	4	4	4	4	2	2	2	2
349M	3	2	4	3	1	2	1	2
365M	4	1	3	1	2	0	2	0
388F	3	3	3	3	2	2	2	2
390F	3	3	3	3	2	2	2	2
392F	<u>2</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Totals	19	14	18	15	10	8	9	8
Averages	2.75		2.75		1.50		1.42	
<u>Day 14</u>								
341M	0	0	0	0	0	0	0	0
349M	0	0	0	0	0	0	0	0
365M	0	0	0	0	0	0	0	0
388F	0	0	0	0	0	0	0	0
390F	0	0	0	0	0	0	0	0
392F	<u>0</u>							
Totals	0	0	0	0	0	0	0	0
Averages	0		0		0		0	

* Patch Location: RF = Right Front
 LR = Left Rear
 LF = Left Front
 RR = Right Rear

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Evaluation Of Skin Reactions

	<u>Value</u>
Erythema and eschar formation:	
No erythema.....	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4
Edema formation:	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edge of area well defined by definite raising)	2
Moderate edema (raised approximately 1 millimeter)	3
Severe edema (raised more than 1 millimeter and extending beyond the area of exposure)	4

Draize, J.H.: Dermal Toxicity. In Appraisal Of The Safety Of Chemicals In Foods, Drugs and Cosmetics. Published by the Assoc. of Food and Drug Officials of the U.S., Texas State Dept. of Health, Austin, Texas, p. 46, 1959.

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Primary Eye Irritation

API #78-4

#2 Home Heating Oil (50% Cat)

Conducted By:

Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

Dates Of Study:

May 28, 1979 - June 1, 1979

Report To:

American Petroleum Institute
2101 L Street, Northwest
Washington, D.C. 20037

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Principal Investigator
Senior Toxicologist

Douglas I. Hepler

Douglas I. Hepler, Ph.D.
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REVIEWED BY QUALITY ASSURANCE: 10/10/79

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Primary Eye Irritation
API #78--4

#2 Home Heating Oil (50% Cat)

OBJECTIVE:

The study detailed herein was conducted to determine the potential ocular irritation of the test material.

MATERIALS AND METHODS:

1. Test Material:

The test material, a liquid in a metal container identified as API #78-4, #2 Home Heating Oil (50% Cat), was received by Elars on April 3, 1979. The concentration, purity, and stability were not provided by the sponsor. The test material was stored in Elars' test material storage room.

2. Test System:

Nine young adult New Zealand White rabbits, four females and five males weighing between 2 and 3 kg, were purchased from Pel-Freeze Farms, Inc., Rogers, Arkansas. They were identified individually by ear tags and corresponding cage tags and were allowed to acclimate at least two weeks at Elars. Rabbits were housed in stainless steel cages and fed Purina Rabbit Chow[®] and fresh water ad libitum. Both eyes of all nine rabbits were examined 24 hours before beginning of testing with fluorescein dye to determine the absence of pre-existing corneal lesions.

DESCRIPTION OF STUDY DESIGN AND PROCEDURES:

A dose of 0.1 ml of undiluted test material was placed on the everted lower lid of the right eye of each rabbit within the group. The test

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BIORESEARCH LABORATORIES
Primary Eye Irritation
API #78-4

2

Project No. 1443-B
July 25, 1979

eyes of three rabbits, one male and two females, were flushed for one minute with distilled warm water starting 30 seconds after application of the test material. The untreated left eye of each rabbit served as a control.

Scoring of ocular lesions was done at 24, 48, and 72 hours after treatment. Fluorescein dye evaluation was used for the 24 hour reading. Grading and scoring of irritation was done in accordance with the procedure described by Draize (1959).

RESULTS:

Individual scores for each rabbit are presented in Table 1. One rabbit exhibited minor conjunctival erythema at the 24 and 48 hour reading. All other rabbits were normal.

The rinsed rabbits were better than the unrinsed rabbits at the 24 and 48 hour readings. Both treatment groups were 0 at 72 hours.

CONCLUSIONS:

Under the conditions of this test and according to EPA classification procedures (from the Federal Register, Vol. 40, No. 129 - Thursday, July 3, 1975), the test material may be placed in category III, i.e., no corneal opacity; irritation reversible within seven days.

According to the attached classification scheme, the test substance can be considered practically non-irritating, with a 24 hour average of 0.22; all scores were zero at 7 days.

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BIORESEARCH LABORATORIES
Primary Eye Irritation
API #78-4

3

Project No. 1443-B
July 25, 1979

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PERSONNEL:

Personnel responsible for the conduct and interpretation of this test include the following Elars personnel: Vicki Mills, B.S., Toxicology Technician and Project Coordinator; Denice Morita, B.S., Toxicology Technician; L. Steven Beck, D.V.M., M.S., Principal Investigator and Senior Toxicologist; and Douglas I. Hepler, Ph.D., Director of Toxicology.

RAW DATA:

Raw data can be found in Elars' notebook #651 in project file #1443-B.

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Rabbit No. & Sex	Item	Tissue	Reading						
			5/30 24 hr	5/31 48 hr	5/1 72 hr				
432 Female Unrinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
		(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0				
	TOTALS ADDED = (1+2+3)	0	0	0					
433 Male Unrinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	1	1	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
		(3) CONJ. TOTAL = (D+E+F) x 2	2	2	0				
	TOTALS ADDED = (1+2+3)	2	2	0					
434 Female Unrinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
		(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0				
	TOTALS ADDED = (1+2+3)	0	0	0					

* See attached sheet for "Scale for Scoring Ocular Lesions"

Rabbit No. & Sex	Item	Tissue	Reading						
			5/30 24 hr	5/31 48 hr	5/1 72 hr				
429 Male Unrinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
	(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0					
	TOTALS ADDED = (1+2+3)	0	0	0					
430 Female Unrinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
	(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0					
	TOTALS ADDED = (1+2+3)	0	0	0					
431 Male Unrinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
	(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0					
	TOTALS ADDED = (1+2+3)	0	0	0					

* See attached sheet for "Scale for Scoring Ocular Lesions"

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Rabbit No. & Sex	Item	Tissue	Reading						
			5/30 24 hr	5/31 48 hr	6/1 72 hr				
435 Male Rinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
		(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0				
	TOTALS ADDED = (1+2+3)	0	0	0					
436 Female Rinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
		(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0				
	TOTALS ADDED = (1+2+3)	0	0	0					
450 Female Rinsed	A	Cornea Opacity	0	0	0				
	B	Cornea Area	0	0	0				
		(1) CORNEA TOTAL = (AxB) x 5	0	0	0				
	C	Iris	0	0	0				
		(2) IRIS TOTAL = (C) x 5	0	0	0				
	D	Conjunctiva Redness	0	0	0				
	E	Conjunctiva Chemosis	0	0	0				
	F	Conjunctiva Discharge	0	0	0				
		(3) CONJ. TOTAL = (D+E+F) x 2	0	0	0				
	TOTALS ADDED = (1+2+3)	0	0	0					

* See attached sheet for "Scale for Scoring Ocular Lesions"

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Primary Eye Irritation
API #78-4

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Project No. 14-3-B
July 25, 1979

Table 2
Averages of Rabbit Eye Irritation Scores

-----Unrinsed-----		
<u>24 Hour</u>	<u>48 Hour</u>	<u>72 Hour</u>
0.33	0.33	0.00

-----Rinsed-----		
<u>24 Hour</u>	<u>48 Hour</u>	<u>72 Hour</u>
0.00	0.00	0.00

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Classification Of Test Materials
Based On Eye Irritation Properties

Rating	Average For 24 Hr. Reading	Definition
Non-Irritating	0.0 - 0.5	To maintain this rating, all scores at the 24 hour reading must be zero; otherwise, increase rating one level.
Practically Non-Irritating	Greater than 0.5 - 2.5	To maintain this rating, all scores at the 72 hour reading must be zero; otherwise, increase rating one level.
Minimally Irritating	Greater than 2.5 - 15.0	To maintain this rating, all scores at the 72 hour reading must be zero; otherwise, increase the rating one level.
Mildly Irritating	Greater than 15.0 - 25.0	To maintain this rating, all scores at the 7 day reading must be zero; otherwise, increase rating one level.
Moderately Irritating	Greater than 25.0 - 50.0	To maintain this rating, scores at 7 days must be less than or equal to 10 for 60% or more of the animals. Also, mean 7 day score must be less than or equal to 20 but less than 60% of animals show scores less than 10, then no animal among those showing scores greater than 10 can exceed a score of 30 if rating is to be maintained; otherwise, increase rating one level.
Severely Irritating	Greater than 50.0 - 80.0	To maintain this rating, scores at 7 days must be less than or equal to 30 for 60% or more of the animals. Also mean 7 day score must be less than or equal to 40. If 7 day mean score is less than or equal to 40 but less than 60% of the animals show scores less than or equal to 30, then no animal among those showing scores greater than 30 can exceed a score of 60 if rating is to be maintained; otherwise, increase rating one level.
Extremely Irritating	Greater than 80.0 - 110.0	

Kay, J.H., and Colandra, J.C., "Interpretation Of Eye Irritation Tests," Journal Of Society Of Cosmetic Chemists, 13, 181-189 (1962).

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Scale for Scoring Ocular Lesions*

(1) Cornea	
(A) Opacity-degree of density (area most dense taken for reading)	
No opacity.....	0
Scattered or diffuse area, details of iris clearly visible.....	1
Easily discernible translucent areas, details of iris slightly obscured...	2
Opalescent areas, no details of iris visible, size of pupil barely discernible.....	3
Opaque, iris invisible.....	4
(B) Area of cornea involved	
One quarter (or less) but not zero.....	1
Greater than one quarter, but less than half.....	2
Greater than half, but less than three quarters.....	3
Greater than three quarters, up to whole area.....	4
Score equals A x B x 5	Total maximum =80
(2) Iris	
(A) Values	
Normal.....	0
Folds above normal, congestion, swelling, circumcorneal injection (any or all of these or combination of any thereof) iris still reacting to light (sluggish reaction is positive).....	1
No reaction to light, hemorrhage, gross destruction (any or all of these).	2
Score equals A x 5	Total maximum =10
(3) Conjunctivae	
(A) Redness (refers to palpebral and bulbar conjunctivae excluding cornea and iris).....	
Vessels normal.....	0
Vessels definitely injected above normal.....	1
More diffuse, deeper crimson red, individual vessels not easily discernible.....	2
Diffuse beefy red.....	3
(B) Chemosis	
No swelling.....	0
Any swelling above normal (includes nictitating membrane).....	1
Obvious swelling with partial eversion of lids.....	2
Swelling with lids about half closed.....	3
Swelling with lids about half closed to completely closed.....	4
(C) Discharge	
No discharge.....	0
Any amount different from normal (does not include small amounts observed in inner canthus of normal animals).....	1
Discharge with moistening of the lids and hairs just adjacent to lids.....	2
Discharge with moistening of the lids and hairs, and considerable area around the eye.....	3
Score equals (A+B+C)x2	Total maximum =20

The maximum total score is the sum of all scores obtained for the cornea, iris, and conjunctivae. Total maximum score possible = 110.

*Draize et al. (1944).

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Skin Sensitization

API #78-4

#2 Home Heating Oil (50% Cat)

Conducted By:

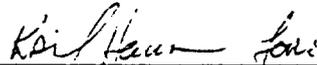
Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

Dates of Study:

September 21, 1979 - October 27, 1979

Report To:

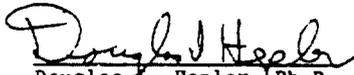
American Petroleum Institute
2101 L Street, Northwest
Washington, DC 20037



Denise E. Morita, B.S.
Toxicology Technician
Study Coordinator

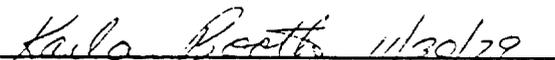


L. Steven Beck, D.V.M., M.S.
Senior Toxicologist
Study Director



Douglas L. Hepler, Ph.D.
Director of Toxicology

REVIEWED BY QUALITY ASSURANCE:

 11/30/79

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Skin Sensitization
API #78-4
#2 Home Heating Oil (50% Cat)

OBJECTIVE:

The study described herein was conducted to evaluate the test material's potential for causing dermal sensitization in guinea pigs.

MATERIALS AND METHODS:

1. Test and Control Material:

The test material, a liquid in a metal container identified as API #78-4, #2 Home Heating Oil (50% Cat), was received at Elars on April 3, 1979. The concentration, purity, and stability of the test material were not provided by the sponsor. An allotment of 30 ml was removed from the Elars' test material storage room, placed in an amber vial, and kept in the study room for the duration of the trial. More test material was removed as needed.

The positive control was a 0.05 percent (w/v) dilution of chlorodinitrobenzene in absolute ethanol. The positive control was stored in an amber glass jar and kept refrigerated throughout the study. The control solution was mixed on September 22 and October 4, 1979.

2. Test System:

The test animals were young adult male albino guinea pigs. The test and control groups each consisted of ten guinea pigs. The guinea pigs were housed in stainless steel cages with indirect bedding and were fed Purina Guinea Pig Chow[®] and fresh water ad libitum. The guinea pigs were identified by cage tag, but not ear tags because the animals easily tear the tags from their ears.

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The animals arrived on September 11, 1979, from CAMM Research Institute, Wayne, New Jersey, and were acclimated 11 days before testing.

3. Study Design:

On September 21, 1979, the day prior to dosing, the guinea pigs were shaved in an area on their backs approximately 3" x 3" with a No. 40 Oster® clipper blade. The test area was depilated with Neet®. On September 22, 1979, a dose of 0.5 ml of the test material was placed on a one-inch square gauze patch, covered with plastic wrap and wrapped with elastic bandaging. The gauze patch was left in place for 6 hours before removal. This procedure was followed three times a week for three weeks (for a total of 10 treatments). After the last treatment, the animals were given a two week rest period with no dosing. At the end of the two week rest period, a final challenge dose was given in the same manner as before, but on the animals' left sides.

In addition to the test group, a positive control consisting of ten guinea pigs was also employed according to the described test procedure. A 0.05 percent (w/v) dilution of chlorodinitrobenzene in ethanol was used as the positive control material.

Scoring of erythema and edema was made at 24 hours after each application according to the attached scale. A dose titration was not conducted since it was felt that the primary skin irritation test in rabbits produced negative results.

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RESULTS:

Erythema and edema score averages for the test and control groups appear in Table 1. No statistically significant difference ($p > 0.1$, student's t-test) between the mean of the averages of the ten sensitizing treatments and the mean of the challenge treatment for either erythema or edema was observed in the test or control group. On a subjective basis, the challenge treatment did not appear to be more reactive than the sensitizing treatment. Based on test results, the test material is considered non-sensitizing.

CONCLUSIONS:

Under the conditions of the test and on the basis of study results, API compound #78-4 is non-sensitizing.

PERSONNEL:

Personnel responsible for the conduct and interpretation of this test include the following Elars' personnel: Denice E. Morita, B.S., Toxicology Technician and Study Coordinator; Vicki J. Mills, B.S., Anne E. McDowell, B.S., Jeanette Walker, Susan Almasy, Irma Albinana, David Carlson, B.S., Toxicology Technicians; L. Steven Beck, D.V.M., M.S., Senior Toxicologist and Study Director; and Douglas I. Hepler, Ph.D., Director of Toxicology.

RAW DATA:

Raw data regarding this study are to be found in Elars' notebook #1019 in file #1443-C.

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Table 1
Scoring Averages for Dermal Irritation

Treatment	----API #78-4----		-Positive Control-	
	Erythema	Edema	Erythema	Edema
1	0.7	0.1	0.3	0.0
2	0.7	0.0	0.3	0.0
3	0.9	0.0	0.9	0.0
4	1.5	0.6	1.8	0.0
5	1.4	0.4	2.1	0.4
6	1.0	0.3	1.6	0.6
7	0.7	0.2	1.4	0.5
8	1.5	0.6	1.5	0.5
9	0.8	0.3	1.4	0.3
10	1.0	0.0	1.8	0.7
Average	1.0	0.3	1.3	0.3
Challenge Average	1.1	0.5	1.9	0.7
Significance Level	>0.1	>0.1	>0.1	>0.1

All scores were statistically non-significant.

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Evaluation Of Skin Reactions

	<u>Value</u>
Erythema and eschar formation:	
No erythema.....	0
Very slight erythema (barely perceptible).....	1
Well-defined erythema.....	2
Moderate to severe erythema.....	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth).....	4
Edema formation:	
No edema.....	0
Very slight edema (barely perceptible).....	1
Slight edema (edges of area well defined by definite raising).....	2
Moderate edema (raised approximately 1 millimeter).....	3
Severe edema (raised more than 1 millimeter and extending beyond the area of exposure).....	4

Draize, J.H.: Dermal Toxicity. In Appraisal Of The Safety Of Chemicals In Foods, Drugs and Cosmetics. Published by the Assoc. of Food and Drug Officials of the U.S. Texas State Dept. of Health, Austin, Texas, pp. 46, 1959.

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Acute Dermal Toxicity
API #78-4
(Revised)
#2 Home Heating Oil (50% Cat)

Conducted By:
Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

Dates Of Study:
May 21, 1979 - June 5, 1979

Report To:
American Petroleum Institute
2101 L Street Northwest
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Douglas J. Hepler, Ph.D.
Director of Toxicology

REVIEWED BY QUALITY ASSURANCE *L. S. Beck*

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Acute Dermal Toxicity

API #78-4

#2 Home Heating Oil (50% Cat)

OBJECTIVE:

The study described herein was conducted to evaluate the acute (single dose) dermal toxicity of the test material in New Zealand White rabbits.

MATERIALS AND METHODS:A. Test Material:

The test material, a liquid in a metal container identified as API #78-4, #2 Home Heating Oil (50% Cat), was received by Elars on April 3, 1979. The concentration, purity, and stability of the test material were not provided by the sponsor. The test material was stored in Elars' test material storage room.

B. Animals:

Eight adult New Zealand White rabbits, four males and four females, 2-3.8 kg in body weight, were used. The rabbits were purchased from Pel-Freez Laboratories, Rogers, Arkansas. They were identified individually by metal ear tags and corresponding cage tags. The rabbits were allowed to acclimate at Elars at least one week. Purina Rabbit Chow[®] and fresh water were provided ad libitum. Throughout acclimation and testing, the rabbits were housed individually in standard stainless steel laboratory rabbit cages.

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C. Method:

On June 21, 1979, twenty-four hours prior to application of test material, the rabbits were shaved free of hair with a number 40 Oster[®] clipper blade. The shaved area on each animal constituted about 30 percent of the total body surface area. The animals were then returned to their stock cages. The 24-hour waiting period allows recovery of the stratum corneum from the disturbance which accompanies the close-clipping procedure and also permits healing of any microscopic abrasions possibly produced during the process.

On the testing day, prior to application of test material, the exposure sites of four rabbits (2 males and 2 females) were abraded by making epidermal incisions every two or three centimeters longitudinally over the area of exposure. The abrasions were minor incisions through the stratum corneum that were not sufficiently deep to disturb the derma or to produce bleeding.

A single dose of 5 ml of test material per kilogram body weight was calculated for each test rabbit, measured in a syringe, and applied to gauze sponges backed with Saran Wrap[®] to help prevent evaporation of the test material. The sponges and Saran Wrap[®] were then taped to the shaved area of the rabbits' backs with porous adhesive tape. The entire trunk was wrapped with Conform[®] elastic tape to prevent slippage of the patches. The rabbits were then returned to their cages.

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The test material remained in contact with the skin for 24 hours. At 24 hours the bandaging was removed and the exposure sites were examined for local reactions and the animals returned to their stock cages. Observations for mortality, local reactions, and behavioral abnormalities were continued for a total of 14 days following the skin applications. Initial, 7 and 14 day body weights were recorded. On the 14th day, all rabbits were euthanized with T-61 and subjected to gross necropsy.

RESULTS:

Individual animal weights and doses are given in Table 1. At the time of bandage removal, erythema was observed in the test area and later dry cracked skin was noted in all the rabbits during the study. No treatment related signs of systemic toxicity were observed in any rabbit during the fourteen day post-dose observation period. Two rabbits lost weight while on test.

One rabbit (#347) died on day 7 of the study. The post-mortem examination revealed congested lungs, fluid filled thoracic cavity, and stomach filled with hair and food. These lesions indicated a bacterial infection which in all probability caused the death of the animal.

The gross post-mortem examinations at 14 days revealed five rabbits with congested lungs, and one rabbit with a large maxillary abscess on the right side of its head, and a slightly congested liver. These observations are not believed to be compound related.

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BIORESEARCH LABORATORIES
Acute Dermal Toxicity
API #78-4

Project No. 1443-D
February 7, 1980

CONCLUSIONS:

The test material caused skin irritation and resulted in no obvious compound related signs of systemic toxicity during the 14 day observation period or at necropsy in the species examined.

PERSONNEL:

Personnel responsible for the collection and interpretation of data generated in the course of this study were Denise Morita, B.S., and Cristine Carpenter, B.S., Toxicology Technicians; Vicki Mills, B.S., Toxicology Technician and Project Coordinator; L. Steven Beck, D.V.M., M.S., Senior Toxicologist and Principal Investigator; and Douglas I. Hepler, Ph.D., Director of Toxicology.

RAW DATA:

Raw data regarding this study are to be found in Elars' notebook #653 in file #1443-D.

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Table 1
Body Weight Data And Doses

Rabbit No.	Weight (kg) Day 0	Dose (ml)	Weight (kg) Day 7	Weight (kg) Day 14	Weight Gain (kg)
Abraded Skin					
347M	3.8	19.0	3.3*	---	---
389M	2.5	12.5	2.7	1.8	-0.7
370F	3.1	15.5	3.0	3.2	0.1
368F	2.9	14.5	2.9	3.0	0.1
Intact Skin					
391M	2.5	12.5	2.5	2.6	0.1
393M	2.3	11.5	2.4	2.5	0.2
394F	2.1	10.5	2.0	1.9	-0.2
396F	2.0	10.0	2.4	2.6	0.6

* Terminal weight - found dead 5/29/79.

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BIORESEARCH LABORATORIES

August 17, 1979

Project No. 1443-E

32

Rat Acute Oral Toxicity Study

API #78-4

#2 Home Heating Oil (50% Cat)

Conducted By:

Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

Dates Of Study:

April 11, 1979 to June 5, 1979

Conducted For:

American Petroleum Institute
2101 L Street, Northwest
Washington, D.C. 20037

POOR
QUALITY
ORIGINAL

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Study Coordinator

L. Steven Beck

L. Steven Beck, D.V.M., M.S.
Senior Toxicologist
Principal Investigator

Douglas J. Hepler

Douglas J. Hepler, Ph.D.
Director of Toxicology

REVIEWED BY QUALITY ASSURANCE:

Karla R. Smith 8/22/79

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Rat Acute Oral Toxicity
API #78-4
#2 Home Heating Oil (50% Cat)

OBJECTIVES:

To test the toxicity of the test substance when administered orally by gavage in a single dose to albino rats. To establish the oral median lethal dose (LD_{50}) in rats of the test material.

MATERIALS AND METHODS:

1. Test Material:

The test material, a liquid in a metal container identified as API #78-4, #2 Home Heating Oil (50% Cat), was received by Elars on April 3, 1979. The concentration, purity, and stability of the test material were not provided by the sponsor. The test material was stored in Elars' test material storage room.

2. Test System:

Healthy, young adult male and female Sprague-Dawley rats with an average body weight of approximately 200-400 grams were used. Rats were obtained from Charles River Laboratories, and were allowed to acclimate for at least two weeks. Animals were housed individually in suspended cages and fed Purina Laboratory Chow [®] and water ad libitum. Identification of the animals was by ear tag and corresponding cage tags. Rats were divided into five groups of ten rats each (five males, five females).

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STUDY DESIGN:

Feed was withheld overnight prior to dosing. Each rat was weighed the day of dosing and then administered a single dose of the appropriate amount of test material (ml/kg body weight) by means of gavage. Five dose levels were chosen to produce expected mortality rates between 10% and 90%. Initial dose was determined via expected LD₅₀ as provided by the sponsor.

Observations for death or toxic signs were made daily for the duration of the study (14 days). Initial (day 0), day 7, and terminal weights were taken and recorded. Gross necropsy was performed on each animal that died prior to day 14, and upon all sacrificed survivors on day 14.

The three surviving rats in the 25 ml/kg were accidentally sacrificed on the 11th day.

RESULTS:

Doses, body weights, and day of termination are presented in Tables 1, 2, 3, 4, and 5. Mortality rates of the five dose groups (10, 20, 22.5, 23 and 25 ml/kg) were 0%, 30%, 70%, 80% and 70%, respectively.

The same toxic signs were seen in all dose groups, increasing in severity with increased dose. Commonly seen were oily urine stains; it appeared that the test material was excreted in the urine and because of the oil base, stayed on the fur. This resulted in hair loss, irritation, redness and sores on the affected skin. The sores made the animals stiff and unwilling to move around much. The area involved and the severity



depended mainly on dosage level. In the higher doses the entire ventral side and legs were affected. Also commonly seen was blood around the eyes, nose and mouth. Other symptoms noted included lethargy and diarrhea.

The gross necropsy observations were also similar in each dose group. Those rats surviving the fourteen days had very few abnormalities and these were usually minor in nature such as enlarged Peyer's patches on the intestines indicating an irritation of the intestine. Also seen on both surviving animals and those dying before 14 days were numerous animals with lung problems from mild irritation and congestion to fluid filled abscesses. A few animals had enlarged adrenal glands. Almost all animals that died before the fourteenth day had intestinal damage. The intestines and often the stomach became hemorrhagic, sometimes with blood in the intestine or stomach. The intestinal walls became thin. An increased amount of gas was noted in the gastrointestinal tract. In some of the rats that died, the heart was enlarged or irregularly shaped.

CONCLUSIONS:

Under the conditions of this study, the material, API #78-4, administered orally by gavage to young adult rats, was determined to have an oral median lethal dose, i.e., Oral LD₅₀, of 21.2 ml/kg. The 95% confidence interval is 18.7 ml/kg to 24.9 ml/kg.

PERSONNEL:

Personnel responsible for the conduct and interpretation of this test include the following Elars personnel: Vicki Mills, B.S., Toxicology Technician and Project Coordinator; Denice Morita, B.S., David Carlson, B.S., Anne McDowell, B.S., Cristine Carpenter, B.S., Katie Lee, John Liddell, Arthur Siegel, B.S., Toxicology Technicians; L. Steven Beck, D.V.M., M.S., Senior Toxicologist and Principal Investigator; and Douglas I. Hepler, Ph.D., Director of Toxicology.

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BIORESEARCH LABORATORIES
Rat Acute Oral Toxicity
API #78-4

Project No. 1443-E
August 17, 1979

36

RAW DATA:

The raw data generated in this study can be found in notebooks #654, 225, 231 and 241, located in Elars file no. 1443-E.

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Table 1

#78-4 (10 ml/kg)

Animal Number	Sex	Body Wt. Day 0 (g)	Dose (10.0 ml/kg)	Body Wt. Day 7 (g)	Body Wt. Terminal	Wt. Gain (g)	Termination Day
21	Male	272	2.72	296	318	46	14
22	"	271	2.71	282	312	41	14
23	"	218	2.18	239	259	41	14
24	"	267	2.67	277	303	36	14
25	"	275	2.75	292	320	45	14
26	Female	199	1.99	221	237	38	14
27	"	150	1.50	221	230	80	14
28	"	202	2.02	203	218	16	14
29	"	187	1.87	205	221	34	14
30	"	201	2.01	227	240	39	14

Table 2

#78-4 (20 ml/kg)

Animal Number	Sex	Body Wt. Day 0 (g)	Dose (20.0 ml/kg)	Body Wt. Day 7 (g)	Body Wt. Terminal	Wt. Gain (g)	Termination Day
51	Male	285	5.70	270	313	28	14
52	"	295	5.90	238	286	-9	14
53	"	311	6.22	---	197	-114	7
54	"	257	5.14	222	257	0	14
55	"	265	5.30	---	265	0	0
56	Female	204	4.08	---	131	-73	7
57	"	201	4.02	161	177	-24	14
58	"	203	4.06	199	207	4	14
59	"	211	4.22	216	240	29	14
60	"	198	3.96	171	190	-8	14

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Table 3
 #78-4 (22.5 ml/kg)

Animal Number	Sex	Body Wt. Day 0 (g)	Dose (22.5 ml/kg)	Body Wt. Day 7 (g)	Body Wt. Terminal	Wt. Gain (g)	Termination Day
111	Male	314	7.1	---	198	-116	7
112	"	337	7.6	270	197	-140	13
113	"	272	6.1	230	173	-99	13
114	"	302	6.8	---	199	-103	7
115	"	326	7.3	---	222	-104	6
116	Female	231	5.2	---	180	-51	5
117	"	236	5.3	---	180	-56	6
118	"	219	4.9	180	188	-31	14
119	"	217	4.9	204	235	18	14
120	"	227	5.1	177	203	-24	14

Table 4
 #78-4 (23 ml/kg)

Animal Number	Sex	Body Wt. Day 0 (g)	Dose (23.0 ml/kg)	Body Wt. Day 8 (g)	Body Wt. Terminal	Wt. Gain (g)	Termination Day
161	Male	367	8.4	---	259	-108	7
162	"	374	8.6	285	226	-148	14
163	"	274	6.3	---	197	-77	6
164	"	333	7.7	---	221	-112	7
165	"	341	7.8	280	258	-83	14
166	Female	250	5.8	---	165	-85	7
167	"	261	6.0	---	177	-84	7
168	"	232	5.3	---	152	-80	7
169	"	252	5.8	---	175	-77	6
170	"	243	5.6	---	169	-74	7

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Table 5
#78-4 (25 ml/kg)

Animal Number	Sex	Body Wt. Day 0 (g)	Dose (25.0 ml/kg)	Body Wt. Day 7 (g)	Body Wt. Terminal	Wt. Gain (g)	Termination Day
81	Male	331	8.3	253	245	-86	11*
82	"	258	6.5	---	244	-14	2
83	"	278	7.0	---	192	-86	7
84	"	300	7.5	---	207	-93	6
85	"	275	6.9	239	256	-19	11*
86	Female	222	5.6	---	142	-80	7
87	"	199	5.0	---	184	-15	2
88	"	216	5.4	192	195	-21	11*
89	"	202	5.1	---	141	-61	6
90	"	210	5.3	---	139	-71	6

* sacrificed day 11 instead of 14.

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BIORESEARCH LABORATORIES
July 7, 1980

Project No. 1443-F

Subacute Dermal Toxicity
API #78-4
#2 Home Heating Oil (50% Cat)

Conducted By:
Elars Bioresearch Laboratories, Inc.
225 Commerce Drive
Fort Collins, Colorado 80524

Dates of Study:
May 21, 1979 - October 1, 1979

Report To:
American Petroleum Institute
2101 L Street Northwest
Washington, D.C. 20037

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Evaluation Division

REVIEWED BY QUALITY ASSURANCE: *Karla Roath 7/12/80*

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Westpach Laboratories, Inc.
Project Number 1014
June 18, 1980

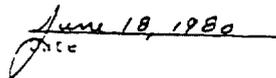
Elars Bioresearch Laboratories
Project Number 1443-F
API 78-4

QUALITY ASSURANCE STATEMENT

Subacute Dermal Toxicity
API 78-4
American Petroleum Institute

A quality assurance inspection was made of 20% of the data in this report and included inspection of pathologist's dictation to individual animal histopathology forms and review of tabular summaries.


Linda K. Hatler, B.S.
Quality Assurance


June 18, 1980
Jace

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Subacute Dermal Toxicity
API #78-4
#2 Home Heating Oil (50% Cat)

OBJECTIVE:

The study described herein was conducted to evaluate the dermal toxicity of the test material when applied in repeated doses over a period of two weeks.

MATERIALS AND METHODS:

1. Test Material:

The test material, a liquid in a metal container identified as API #78-4, #2 Home Heating Oil (50% Cat), was received by Elars on April 3, 1979. The concentration, purity, and stability were not provided by the sponsor. The test material was stored in Elars test material storage room.

2. Animals:

Each dose group and a control group consisted of eight adult New Zealand White rabbits, four males and four females, weighing between 1.5 and 4 kg. The rabbits were purchased from L.I.T. Rabbitry, Aptos, California, and Pel-Freez Rabbitry, Rogers, Arkansas, and were identified individually by metal ear tags and corresponding cage tags. The rabbits were allowed to acclimate at Elars at least one week. Purina Rabbit Chow[®] and fresh water were provided ad libitum. Throughout acclimation and testing, the rabbits were housed individually in standard laboratory rabbit cages.

3. Method:

Prior to application of test material, the rabbits were shaved free of hair with a number 40 Oster® clipper blade. The shaved area on each animal constituted about 30 percent of the total body surface area.

The daily dosages used for this compound were 10 ml/kg, 3 ml/kg, and 1 ml/kg body weight, and an untreated control group. The rabbits were exposed to the test material for five consecutive days followed by a two day rest period and then again for five consecutive days. The test material was applied to four-inch square gauze sponges backed by plastic wrap. The sponges and plastic wrap were taped to the shaved area of the animals' backs with porous adhesive tape. The entire trunk of each rabbit was wrapped with elastic tape to prevent slippage of the patches. The rabbits remained bandaged for 24 hours, at which time the patches were removed and a new dose of test material was applied. This procedure was followed each day of the five day dosing period. During the two day rest period the animals were not dosed.

Observations for mortality, local reactions, and behavioral abnormalities were made daily during the 14 day period. Initial and final body weights were recorded.

Any animals which succumbed during the study as well as those killed with T-61 at the termination of the study were subjected to necropsy, and all significant gross pathological alterations were recorded. In addition, the following tissues were submitted for histopathologic examination: skin from the test site, liver, kidney, spleen and urinary bladder.

At Elars Bioresearch Laboratories, the tissues collected were fixed in 10% neutral buffered formalin. Afterwards, the tissues were trimmed, embedded in paraffin, sectioned at 4 to 5 microns, affixed to glass slides, and stained with hematoxylin and eosin. Histopathologic examination of the submitted tissues was conducted at Westpath Laboratories by William H. Halliwell, D.V.M., Ph.D., Diplomate: ACVP.

RESULTS:

Individual animal weights and doses are given in Tables 1-4 for dosage levels 10 ml/kg, 3 ml/kg, 1 ml/kg, and the control, respectively. The most significant daily observation recorded at all three test levels was the progressive deterioration of the test site area. The skin at the test area became necrotic; it appeared thickened, cracked, and was bleeding. Later it became green and odiferous. Some of the animals screamed during the application of the test material from the burning sensation of the material on the raw skin.

The animals in the 10 ml/kg group showed decreased appetites and became emaciated, with an average weight loss of 0.70 kg; this dosage group produced 87.5% mortality. The 3 ml/kg group exhibited an average weight loss of 0.26 kg and resulted in 25% mortality. Weight gains of 0.08 kg and 0.20 kg were observed for the 1 ml/kg dosage group and the control, respectively; no mortality was observed in either group.

The gross postmortem examinations of rabbits treated at 10 ml/kg showed signs of anorexia and severe skin lesions; treatment-related lesions were seen on the skin of rabbits dosed at 3.0 ml/kg and 1.0 ml/kg.

The histopathologic observations of selected tissues from rabbits exposed daily to 10 ml/kg, 3 ml/kg, 1 ml/kg of test material and from untreated control rabbits are presented in Tables 5-8, respectively. The

test material produced acanthosis, acute inflammation, chronic inflammation, crusting, deep pyoderma, dermal congestion, dermal edema, multifocal epidermal microabscesses, hyperkeratosis, liquefactive degeneration, and epidermal necrolysis in all groups treated with the test material. The severity of these cutaneous lesions varied from very slight to severe at all test sites and in all dose levels.

CONCLUSIONS:

The test material, API #78-4, #2 Home Heating Oil (50% Cat), caused acute dermal corrosion and resulted in obvious treatment related signs in the 10 ml/kg treatment group during the 14 day observation period and at necropsy in the species examined. The histopathologic observations of animals exposed to various dosages of the test material revealed evidence of dermal toxicity at all dosage levels.

The dermal LD₅₀ for the test material is calculated to be 4.72 ml/kg with a 95% confidence of 2.18 to 10.22.

PERSONNEL:

Personnel responsible for the collection and interpretation of data generated in the course of this study were Denise E. Morita, B.S., Toxicology Technician Supervisor and Study Coordinator; L. Steven Beck, D.V.M., M.S., Assistant Director of Toxicology and Study Director; Vicki J. Mills, B.S., Irma Albinana, David S. Carlson, B.S., Katherine J. Lee, John A. Liddell, Anne E. McDowell, B.S., Toxicology Technicians; Susan M. Almasy, Jeanette Walker, Laboratory Technicians; Douglas I. Hepler, Ph.D., Director of Toxicology; and William H. Halliwell, D.V.M., Ph.D., Pathologist.

RAW DATA:

Raw data regarding this study are to be found in Elars' notebooks #239 and #1505 in file #1443-F.

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BIORESEARCH LABORATORIES
Subacute Dermal Toxicity
API #78-4

5

Project No. 1443-F
July 7, 1980

Table 1
Individual Animal Weights and Dosages
Dose Level 10 ml/kg, 87.5% Mortality

Animal Number	Sex	Body Wt. Day 0 (kg)	Dose (ml)	Body Wt. Terminal	Weight Gain (kg)	Termination Day
413	M	2.5	25	1.6	-0.9	8
414	F	2.5	25	2.0	-0.5	14
415	M	2.4	24	1.6	-0.8	9
416	F	2.5	25	2.0	-0.5	11
417	M	2.4	24	1.6	-0.8	9
418	F	2.5	25	1.8	-0.7	8
419	M	2.5	25	1.8	-0.7	10
420	F	2.2	22	1.5	-0.7	10

Table 2
Individual Animal Weights and Dosages
Dose Level 3 ml/kg, 25% Mortality

Animal Number	Sex	Body Wt. Day 0 (kg)	Dose (ml)	Body Wt. Terminal	Weight Gain (kg)	Termination Day
551	M	3.8	11.4	3.6	-0.2	2
560	F	3.7	11.1	3.2	-0.5	14
564	F	3.6	10.8	3.2	-0.4	14
576	F	3.3	9.9	2.9	-0.4	14
590	F	3.3	9.9	2.8	-0.5	14
651	M	2.8	8.4	2.9	0.1	14
681	M	3.0	9.0	2.5	-0.5	11*
685	M	2.2	6.6	2.5	0.3	14

* Euthanatized due to broken back

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BIORESEARCH LABORATORIES
Subacute Dermal Toxicity
API #78-4

6

Project No. 1443-F
July 7, 1980

Table 3
Individual Animal Weights and Dosages
Dose Level 1 ml/kg, 0% Mortality

Animal Number	Sex	Body Wt. Day 0 (kg)	Dose (ml)	Body Wt. Terminal	Weight Gain (kg)	Termination Day
650	F	1.6	1.6	2.2	0.6	14
669	M	2.3	2.3	2.7	0.4	14
670	F	2.5	2.5	2.5	0.0	14
671	M	2.1	2.1	2.6	0.5	14
673	M	2.5	2.5	2.6	0.1	14
674	F	2.4	2.4	2.0	-0.4	14
676	F	3.3	3.3	2.5	-0.8	14
677	M	2.5	2.5	2.7	0.2	14

Table 4
Individual Animal Weights and Dosages
Dose Level Control, 0% Mortality

Animal Number	Sex	Body Wt. Day 0 (kg)	Dose (ml)	Body Wt. Terminal	Weight Gain (kg)	Termination Day
421	M	2.4	—	2.5	0.1	14
422	F	2.7	—	2.9	0.2	14
423	M	2.3	—	2.7	0.4	14
424	F	2.7	—	3.0	0.3	14
425	M	2.4	—	2.5	0.1	14
426	F	2.7	—	2.9	0.2	14
427	M	2.5	—	2.7	0.2	14
428	F	2.4	—	2.5	0.1	14

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INDIVIDUAL HISTOLOGIC OBSERVATIONS

10 ml/kg/day

Accession Number	N217	N218	N219	N220	N221	N222	N223	N224
Animal Number	413	414	415	416	417	418	419	420
Sex	M	F	M	F	M	F	M	F
Reason Discontinued	MS	FS	DOT	DOT	MS	DOT	MS	DOT
Days on Test	8	14	9	11	9	9	10	10
LIVER								
Abscess, focal				4	4	3		
Congested								2
Mineralization								
Necrosis, multifocal	4		3			3		
Pericholangitis	1	2			2			
Vacuolar Degeneration, centrilobular	2	2					2	1
KIDNEY								
Congested	NR	NR	NR		NR	NR		NR
Mineralization, focal								
Mononuclear Cell Infiltrate, focal								
Mononuclear Cell Infiltrate, diffuse				2			2	
Nephrrosis, tubular								
SPLEEN								
Congested	NR	NR	NR		NR	NR	NR	
Hyperplasia, reactive				2				1
URINARY BLADDER								
SKIN (Test Site)	NR	NDT						
ACANTHOSIS								
Acute Inflammation	2	4	2	3	4	2	4	2
Chronic Inflammation	2		4	3	2	3	3	2
Crusting	2	2	2	2	2	2	2	
Deep Pyoderma	3	1	4	3			1	2
DERMAL CONGESTION								
Dermal Edema	3	2	3	2	2	2	2	2
Epidermal Microabscesses, multifocal	3	2	3	2	2	2	2	2
HYPERKERATOSIS								
Liquefactive Degeneration	2	4	2	3	4	2	4	2
Necrolysis, epidermal	3		4	3		3		
Parakeratosis	3		4	3	2	2	3	2
OTHER LESIONS								
LUNG								
Atelectasis	TNP							
STOMACH								
Congestion, mucosal	NR	NR	NDT	TNP	TNP	TNP	NR	NR
Lymphoid Hyperplasia, submucosal								

KEY: Acc = Accidental Death
 DOT = Died on Test
 FS = Final Sacrifice
 MS = Moribund Sacrifice
 SS = Scheduled Sacrifice
 NDT = Tissue Present, No Diagnosis Tendered

TNP = Tissue Not Present
 NR = Tissue Present, Not Remarkable
 AUT = Autolysis
 U-NR = Paired Organ, Unilateral Absence, Tissue Present, Not Remarkable
 U- = Unilateral Lesion

Severity
 1 = Very Slight
 2 = Slight or Small
 3 = Moderate
 4 = Severe

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INDIVIDUAL HISTOLOGIC OBSERVATIONS
3 ml/kg/day

POOR
QUALITY
ORIGINAL

Accession Number	N546	N547	N548	N549	N550	N551	N552	N553
Animal Number	551	651	681	685	560	564	576	590
Sex	M	M	M	M	F	F	F	F
Reason Discontinued	DOT	FS	Acc	FS	FS	FS	FS	FS
Days on Test	2	14	11	14	14	14	14	14
LIVER		NR	TNP		NR	NR		
Abscess, focal								
Congested				1				
Mineralization								
Necrosis, multifocal								
Pericholangitis	2						3	1
Vacuolar Degeneration, centrilobular								
KIDNEY		NR	NR		NR	NR		NR
Congested	1			1				
Mineralization, focal								
Mononuclear Cell Infiltrate, focal							3	
Mononuclear Cell Infiltrate, diffuse								
Nephrosis, tubular								
SPLEEN	NR	NR	NR	NR		NR	NR	NR
Congested					2			
Hyperplasia, reactive								
URINARY BLADDER	NR							
SKIN (Test Site)								
Acanthosis		3	4	3	2	4	3	2
Acute inflammation		2	2	2	2	2	2	2
Chronic Inflammation		3	2	2	2	2	2	2
Crusting		4	3	3	2	4	3	
Deep Pioderma								3
Dermal Congestion		3	3	3	2	3	3	3
Dermal Edema		3	3	3	2	3	3	3
Epidermal Microabscesses, multifocal	2							
Hyperkeratosis		3	4	3	2	4	3	2
Liquefactive Degeneration				1			1	
Necrosis, epidermal		2	3	3	2			
Parakeratosis								
OTHER LESIONS								
LUNG	TNP							
Atelectasis								
STOMACH	TNP							
Congestion, mucosal								
Lymphoid Hyperplasia, submucosal								

KEY: Acc = Accidental Death TNP = Tissue Not Present Severity
 DOT = Died on Test NR = Tissue Present, Not Remarkable 1 = Very Mild
 FS = Final Sacrifice AUT = Autolysis 2 = Mild
 MS = Moribund Sacrifice O-NR = Paired Organ, Unilateral Absence, Tissue Present, Not Remarkable 3 = Moderate
 SS = Scheduled Sacrifice 4 = Severe
 NDT = Tissue Present, No Diagnosis Tendered O- = Unilateral Lesion

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INDIVIDUAL HISTOLOGIC OBSERVATIONS

1 ml/kg/day

Accession Number	N554	N555	N556	N557	N558	N559	N560	N561
Animal Number	669	671	673	677	670	674	676	650
Sex	M	M	M	M	F	F	F	F
Reason Discontinued	FS							
Days on Test	14	14	14	14	14	14	14	14
LIVER	NR	NR			NR			
Abscess, focal								
Congested								
Mineralization								
Necrosis, multifocal								
Pericholangitis								
Vacuolar Degeneration, centrilobular			1	1			1	2
KIDNEY	NR		NR	NR	NR		NR	
Congested		1						1
Mineralization, focal								
Mononuclear Cell Infiltrate, focal						3		
Mononuclear Cell Infiltrate, diffuse								
Nephrosis, tubular						3		
SPLEEN	NR							
Congested								
Hyperplasia, reactive								
URINARY BLADDER	NR							
SKIN (Test Site)								
Acanthosis	4	2	4	3	2	3	3	2
Acute Inflammation	3	3	3	3	2	3	2	2
Chronic Inflammation	3	3	3	3	2	3	2	2
Crusting	4	2	3	3	2	3	3	2
Deep Pyoderma								1
Dermal Congestion	3	3	3	3	2		2	2
Dermal Edema	3	3	3	3	2		2	2
Epidermal Microabscesses, multifocal								
Hyperkeratosis	4	2	4	3	2	3	3	2
Liquefactive Degeneration						3		
Necrosis, epidermal	1		2	1		4	1	
Parakeratosis								
OTHER LESIONS								
LUNG	TNP							
Atelectasis								
STOMACH	TNP							
Congestion, mucosal								
Lymphoid Hyperplasia, submucosal								

KEY: Acc = Accidental Death
 DOT = Died on Test
 FS = Final Sacrifice
 MS = Moribund Sacrifice
 SS = Scheduled Sacrifice
 NDT = Tissue Present, No Diagnosis Tendered

TNP = Tissue Not Present
 NR = Tissue Present, Not Remarkable
 AUT = Autolysis
 O-NR = Paired Organ, Unilateral Absence, Tissue Present, Not Remarkable
 O- = Unilateral Lesion

Severity
 1 = Very Slight
 2 = Slight or Moderate
 3 = Moderate
 4 = Severe

POOR
 QUALITY
 ORIGINAL

INDIVIDUAL HISTOLOGIC OBSERVATIONS

Control

Accession Number	N225	N226	N227	N228	N229	N230	N231	N232
Animal Number	421	422	423	424	425	426	427	428
Sex	M	F	M	F	M	F	M	F
Reason Discontinued	FS							
Days on Test	14	14	14	14	14	14	14	14
LIVER			NR		NR	NR		
Abscess, focal				4			4	
Congested								
Mineralization								
Necrosis, multifocal								
Pericholangitis	1	3						1
Vacuolar Degeneration, centrilobular	3							
KIDNEY	NR							
Congested								
Mineralization, focal								
Mononuclear Cell Infiltrate, focal								
Mononuclear Cell Infiltrate, diffuse								
Nephrosis, tubular								
SPLEEN			NR		NR	NR		NR
Congested							3	
Hyperplasia, reactive	2	1		2			2	
URINARY BLADDER	NR							
SKIN (Test Site)	NR							
Acanthosis								
Acute Inflammation								
Chronic Inflammation								
Crusting								
Deep Pycoderma								
Dermal Congestion								
Dermal Edema								
Epidermal Microabscesses, multifocal								
Hyperkeratosis								
Liquefactive Degeneration								
Necrosis, epidermal								
Parakeratosis								
OTHER LESIONS								
LUNG	TNP							
Atelectasis								
STOMACH	NR	NR	NR		NR	NR	NR	NR
Congestion, mucosal								
Lymphoid Hyperplasia, submucosal				2				

KEY: Acc = Accidental Death TNP = Tissue Not Present Severity
 DOT = Died on Test NR = Tissue Present, Not Remarkable 1 = Very Slight
 FS = Final Sacrifice AUT = Autolysis 2 = Slight or Moderate
 MS = Moribund Sacrifice O-NR = Paired Organ, Unilateral Absence, Tissue Present, Not Remarkable 3 = Moderate
 SS = Scheduled Sacrifice NDT = Tissue Present, No Diagnosis Tendered 4 = Severe
 O- = Unilateral Lesion

POOR
QUALITY
ORIGINAL



Analysis of Feed

The guaranteed analyses of feed for Purina Guinea Pig Chow[®], Purina Formulab Chow[®], and Purina Rabbit Chow[®], as provided on the manufacturer's labels, are listed below. No additional analyses of feed were made.

Guaranteed Analysis of Feed

Nutritional Content	-----Type of Purina [®] Chow-----		
	Purina Guinea Pig Chow [®] 5025 (%)	Purina Formulab Chow [®] 5008 (%)	Purina Rabbit Chow, Checkers [®] 5301 (%)
Crude protein, minimum	18.0	23.0	16.0
Crude fat, minimum	4.0	6.5	2.0
Crude fiber, maximum	16.0	4.0	18.0
Ash, maximum	9.0	8.0	9.0
Added minerals, maximum	3.5	2.5	3.0

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Barbara J. Price
Vice President
Health, Environment & Safety
Phillips Petroleum Company
Bartlesville, Oklahoma 74004

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MAY 08 1995

EPA acknowledges the receipt of information submitted by your organization under Section 8(e) of the Toxic Substances Control Act (TSCA). For your reference, copies of the first page(s) of your submission(s) are enclosed and display the TSCA §8(e) Document Control Number (e.g., 8EHQ-00-0000) assigned by EPA to your submission(s). Please cite the assigned 8(e) number when submitting follow-up or supplemental information and refer to the reverse side of this page for "EPA Information Requests".

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EPA looks forward to continued cooperation with your organization in its ongoing efforts to evaluate and manage potential risks posed by chemicals to health and the environment.

Sincerely,

Terry R. O'Bryan

Terry R. O'Bryan
Risk Analysis Branch

Enclosure

12576A



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Triage of 8(e) Submissions

Date sent to triage: 12/14/95

NON-CAP

CAP

Submission number: 12576A

TSCA Inventory

Y

N

D

Study type (circle appropriate):

Group 1 - Dick Clements (1 copy total)

ECO

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Group 2 - Ernie Falke (1 copy total)

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~~SEN~~

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Contractor reviewer: <u>LPS</u>	Date: <u>4/14/95</u>



CECATS/TRIAGE TRACKING DBASE ENTRY FORM

CECATS DATA: Submission # BEHQ-0992-12576 SEQ. A

TYPE: INT SUPP FLWP

SUBMITTER NAME: Phillips Petroleum Company

INFORMATION REQUESTED: FLWP DATE:
 0501 NO INFO REQUESTED
 0502 INFO REQUESTED (TECH)
 0503 INFO REQUESTED (VOL ACTIONS)
 0504 INFO REQUESTED (REPORTING RATIONALE)
 DISPOSITION:
 0639 REFER TO CHEMICAL SCREENING
 0678 CAP NOTICE

VOLUNTARY ACTIONS:
 0401 NO ACTION REPORTED
 0402 STUDIES PLANNED/IN PROGRESS
 0403 NOTIFICATION OF WORKER RECEIVED
 0404 LABELS/MSDS CHANGES
 0405 PROCESS/HANDLING CHANGES
 0406 APP USE DISCONTINUED
 0407 PRODUCTION DISCONTINUED
 0408 CONFIDENTIAL

SUB. DATE: 08/24/92 OTS DATE: 09/02/92 CSRAD DATE: 03/07/95

CHEMICAL NAME:
API 78-4
~~No. 2 Home Heating Oil~~

CASE:
68476-30-2

INFORMATION TYPE:	P.F.C.	INFORMATION TYPE:	P.F.C.	INFORMATION TYPE:	P.F.C.
0201 ONCO (HUMAN)	01 02 04	0216 EPICLIN	01 02 04	0241 IMMUNO (ANIMAL)	01 02 04
0202 ONCO (ANIMAL)	01 02 04	0217 HUMAN EXPOS (PROD CONTAM)	01 02 04	0242 IMMUNO (HUMAN)	01 02 04
0203 CELL TRANS (IN VITRO)	01 02 04	0218 HUMAN EXPOS (ACCIDENTAL)	01 02 04	0243 CHEMPHYS PROP	01 02 04
0204 MUTA (IN VITRO)	01 02 04	0219 HUMAN EXPOS (MONITORING)	01 02 04	0244 CLASTO (IN VITRO)	01 02 04
0205 MUTA (IN VIVO)	01 02 04	0220 ECO/AQUA TOX	01 02 04	0245 CLASTO (ANIMAL)	01 02 04
0206 REPRO/TERATO (HUMAN)	01 02 04	0221 ENV. OCCUREL/FATE	01 02 04	0246 CLASTO (HUMAN)	01 02 04
0207 REPRO/TERATO (ANIMAL)	01 02 04	0222 EMER INCI OF ENV CONTAM	01 02 04	0247 DNA DAM/REPAIR	01 02 04
0208 NEURO (HUMAN)	01 02 04	0223 RESPONSE REQEST DELAY	01 02 04	0248 PRODUSE/PROC	01 02 04
0209 NEURO (ANIMAL)	01 02 04	0224 PROD/COMP/CHEM ID	01 02 04	0251 MSDS	01 02 04
0210 ACUTE TOX. (HUMAN)	01 02 04	0225 REPORTING RATIONALE	01 02 04	0299 OTHER	01 02 04
0211 CHR. TOX. (HUMAN)	01 02 04	0226 CONFIDENTIAL	01 02 04		
0212 ACUTE TOX. (ANIMAL)	01 02 04	0227 ALLERG (HUMAN)	01 02 04		
0213 SUB ACUTE TOX (ANIMAL)	01 02 04	0228 ALLERG (ANIMAL)	01 02 04		
0214 SUB CHRONIC TOX (ANIMAL)	01 02 04	0229 METAB/PHARMACO (ANIMAL)	01 02 04		
0215 CHRONIC TOX (ANIMAL)	01 02 04	0240 METAB/PHARMACO (HUMAN)	01 02 04		

TRIAGE DATA: NON-CBI INVENTORY YES
 CAS SR: NO
 ONGOING REVIEW: YES (DROP/REFER)
 NO (CONTINUE)
 SPECIES: RBT, GP, RAT
 TOXICOLOGICAL CONCERN: LOW Eye irrit RBT; Dermal sensit G.P.; Acute dermal RBT
MED Dermal irrit RBT; Subacute dermal, RBT
 USE: HIGH
 PRODUCTION: Acute oral RAT

COMMENTS:

12576A

M

Dermal irritation in rabbits is of moderate concern. Application of 0.5 mL of the substance to the intact and abraded skin of six New Zealand White rabbits resulted in moderate irritation. At 25 hours, erythema was very slight to moderate in 6/6 animals, and erythema was very slight to moderate in 4/6 animals. At 72 hours, erythema was slight to severe in 6/6 animals, and edema was very slight to moderate in 6/6 animals. Edema and erythema subsided by day 14. Hair did not grow back at the application site but grew normally on the surrounding skin.

L

Eye irritation in rabbits is of low concern. Application of 0.1 mL of the substance to the everted lower lid of nine New Zealand White rabbits (3 washed/6 unwashed) resulted in minimal irritation. One rabbit (unwashed) exhibited slight conjunctival erythema at 24 and 48 hours, which cleared by 72 hours.

L

Dermal sensitization in guinea pigs is of low concern. Induction consisted of application of 0.5 mL to the depilated backs of ten guinea pigs, three times a week for three weeks. Following a two-week rest period, the animals were challenged with a single application of 0.5 mL to the depilated left side. There was no significant difference in average erythema and edema scores during induction and at challenge. The compound was considered non-sensitizing.

L

Acute dermal toxicity in rabbits is of low concern. A single dermal dose was administered to the intact or abraded skin of New Zealand White rabbits (4/group) at a level of 5000 mg/kg. There were no compound-related deaths, clinical signs of systemic toxicity, or gross pathological effects. Erythema and dry cracked skin were noted in all rabbits.

L

Acute oral toxicity in rats is of low concern. Single oral gavage doses to CR rats (5/sex/dose) at levels of 10,000, 20,000, 22,500, 23,000, and 25,000 mg/kg were lethal (0/10, 3/10, 7/10, 8/10, and 7/10, respectively). The LD₅₀ was 21,200 mg/kg. Clinical signs included oily urine, which stayed on the fur and resulted in hair loss, irritation, redness, and sores. Animals also exhibited blood around the eyes, nose, and mouth. Gross necropsy revealed severe irritation of the gastric mucosa and lungs.

M

Subacute dermal toxicity in rabbits is of low concern. New Zealand White rabbits

(4/sex/dose) received dermal doses of 1000, 3000, and 10,000 mg/kg/day for five days. In all groups, the skin at the test area became necrotic, green, and odiferous. Death occurred in 2/8 mid-dose and 7/8 high-dose animals. All animals in these groups exhibited weight loss. There was no mortality or weight loss in low-dose animals. Gross and histopathological examination revealed severe skin lesions and dermal corrosion at all dose levels.