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INITIAL SUBMISSION: FINAL REPORT: 13-WEEK SUB-CHRONIC FEEDING STUDY IN MICE WITH DECABROMODIPHENYL OXIDE

Chemical Category
DECABROMODIPHENYL OXIDE

CODING FORM FOR GLOBAL INDEXING

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SPONSOR: Tracor-Jitco, Inc.
Subcontract No. 78-52-106002

DATE: July 27, 1979

MATERIAL: Decabromodiphenyl Oxide (C55287)

SUBJECT: Final Report
13-Week Sub-Chronic Feeding Study - Mice

SUMMARY

The test material Decabromodiphenyl Oxide (C55287) was administered in the diet of five groups of 10 male and 10 female mice for 13 weeks at levels of 0.31, 0.62, 1.25, 2.5, and 5.0%. A sixth group of mice served as control and received the basal diet only.

Throughout the study there was not evidence of a compound effect with regard to survival, physical appearance and behavior, body weight gain, food consumption, and gross microscopic pathology.

Based on these results, the following dose levels are recommended for the 104-weeks chronic study in mice on Decabromodiphenyl Oxide:

Males - 2.5 and 5.0%

Females - 2.5 and 5.0%

FYI-94-001102
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INTRODUCTION

This study was conducted to evaluate and characterize the effects of Decabromodiphenyl Oxide (C55287) in mice after 13 weeks of dietary administration and to determine the maximum test dose that could be utilized for a subsequent chronic (104 weeks) feeding study. The study was initiated February 27, 1979, and terminated May 30, 1979.

TEST MATERIAL

1. Identification
   Decabromodiphenyl Oxide (C55287), Lot No. 98287-2 Batch No. 1 and Lot No. D12478 Batch No. 2
2. Description
   Lot No. 08287-2 and D12478; white crystalline powder
3. Receipt Date
   Lot No. 08287-2 was received on September 21, 1978, from Midwest Research Insitute and was used from week 1 to 6.
   Lot No. D12478 was received on December 18, 1978, fromMidwest Research Institute and was used from week 7 to 13.
4. Purity
   Considered 100% active for purpose of dosage calculation. Thin layer chromotography indicated one major spot only according to Midwest Research Institute report of September 5, 1978.
5. Handling
   Both lot numbers were contained in fiberboard drums lined with a polyethylene bag. The chemical was stored in a light-resistant container in the freezer for the duration of the study.
6. Test Diet Formulation
   The basal diet used was Purina Rodent Laboratory Chow 5001 (see attached analysis/ingredients). Each dose level was prepared in 10 kg batches once every two weeks. The chemical DBDPO was mixed directly into the basal diet.

7. Experimental Animals

Sixty male and sixty female B6C3F1 mice were selected for use in the study. The mice were received on January 30, 1979 from the Charles River Breeding Laboratories, Portage, Michigan. Shortly after arrival, two animals of each sex were sacrificed and examined grossly for any unusual lesions and endo and ecto parasites. The mice were quarantined in the test room for a period of three weeks and were placed on test at age of approximately 8 weeks. The animals were ear tagged for identification.

Weight range at initiation: Males: 17.4 to 31.0 grams
17.2 to 23.5 grams

8. Selection for Groups

Assignment to the treatment groups was performed using a computer that generated random numbers assigned to the available animals, ranked the numbers and assigned the random numbers and corresponding animals to the treatment groups.

9. Animal Maintenance

Rats and mice were housed together in a temperature and humidity-controlled room. The temperature was maintained at 70°F ± 1°F and the relative humidity at 45% ± 5% during the study. The animals were housed five per cage in polycarbonate cages (Hazleton Systems, Inc.) suspended on stainless steel drawer-type racks (Hazleton Systems, Inc., Aberdeen, Md.) supplied with filer sheets. All cages were furnished with heat-treated hardwood chip bedding (Sani-Chips®, P.J. Murphy, Moonachie, N.J.). Cages and bedding were changed twice a week. Racks were sanitized every two weeks. Diet and county-supplied water (automatic waterers) were provided ad libitum.

10. Experimental Design

The treatment groups, feeding levels, and duration of the study are shown in Table 1.

11. Observation and Records

All animals were observed twice daily (8:30 a.m. to 9:00 a.m. and 3:00 p.m. to 3:30 p.m.) for mortality. Individual body weights, cage food consumption, appearance, and behavior were recorded weekly using the automatic data recording system. DBDPO was fed in the diet for a period of 13 weeks.

12. Termination

After 13 weeks, all surviving mice were exsanguinated following I.P. injections of sodium pentobarbital (Diabutal-Diamond Laboratories, Inc., Des Moines, Iowa). Sera from four male and four female control mice were submitted to Microbiological Associates, Bethesda, Maryland for viral screen tests.

13. Postmortem Procedures

Necropsies were performed and representative tissues were preserved on all mice that died during the study and those sacrificed after 13 weeks. Necropsy procedures followed were those specified and described in the Bioassay Operations Protocol (78-52-106002).

14. Tissues Preserved

The following tissues were preserved in 10% neutral buffered formalin

Gross Lesions
Skin
Mandibular Lymph Node
Mammary Gland
Salivary Gland
Thigh Muscle
Sciatic Nerve
Sternebrae, Vertebrae, or Femur including Marrow
Costochondral Junction, Rib
Thymus
Layrnx
Trachea
Lungs and Bronchi
Heart
Thyroid
Parathyroids
Esophagus
Stomach
Duodenum
Jejunum

Tissue Masses or Suspect Tumors and Regional Lymph Nodes
Ileum
Colon
Cecum
Rectum
Mesenteric Lymph Node
Liver
Gall Bladder
Pancreas
Spleen
Kidneys
Adrenals
Urinary Bladder
Seminal Vesicles
Prostate
Testes
Ovaries
Uterus
Nasal Cavity
Brain
Pituitary
Spinal Cord
Eyes

15. Microscopic Pathology

The following tissues from the control and high-dose mice were processed histologically and examined microscopically:

Gross Lesions and Tissue Masses (and Regional Lymph Nodes, if possible)	Heart
Blood Smear (as required by the pathologist)	Esophagus
Mandibular or Mesenteric Lymph Node	Stomach
Salivary Gland	Uterus
Sternebrae, Femur, or Vertebrae including Marrow	Brain (three sections, including Frontal Cortex and Basal Ganglia, Parietal Cortex and Thalmus, and Cerebellum and Pons)
Thyroid	Thymus
Parathyroids	Trachea
Small Intestine (one section)	Pancreas
Colon	Spleen
Liver	Kidneys
Gall Bladder	Adrenals
Prostate	Urinary Bladder
Testes	Pituitary
Ovaries	Spinal Cord (if neurologic signs are present)
Lungs and Mainstem Bronchi	Eyes (if grossly abnormal)
	Mammary Gland

RESULTS

1. Appearance and Behavior

Throughout the study there was no evidence of compound effect with regard to physical appearance and behavior among the mice at any treatment level. Incidental signs commonly seen among B6C3F1 mice were noted at a comparable rate between the control and treated groups. These signs included small areas of alopecia of the nose, head, back, paws and tail, and swollen or protuding penis.

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2. Body weight, Food Consumption and Survival Data

Group mean body weights, group mean food consumption, and survival data are presented in appended Table No. 2 and 2a. Graphs of mean body weights for each week on appended figure 1 and 1a are enclosed. Calculated differential weight gain relative to controls is appended in Table 2b and 2c. Initial and terminal individual body weights are shown on Tables 2b and 2c.

Throughout the study there was no distinct indication of compound effect upon body weight gain and food consumption.

3. Observation of Necropsy

Necropsy findings in the animals sacrificed at termination did not reveal any consistent tissue or organ changes which could be attributed to the administration of the test material. Findings are presented in appended Table No. 3 and 3a.

4. Histopathology

A detailed incidence of microscopic findings and tissues examined for individual animals is presented in appended Tables No. 4 and 4a. No compound-related histomorphologic alterations were observed in any of the mice.

Submitted by Henry A. Rutter Jr.
HENRY A. RUTTER, Jr., PH.D.
Principal Investigator

Samuel Machotka
SAMUEL MACHOTKA, D.V.M.
Pathologist
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Report Preparation: K. Petrovics
KP:sb

TABLE #2

Sub-Chronic Test - 90-day Male Mice
Chemical - Decabromodiphenyl Oxide C55287

976-615
Mice, Males

Week No.	Group 1 - Control			Group 2 - 0.31%			Group 3 - 0.63%			Group 4 - 1.25%			Group 5 - 2.5%			Group 6 - 5.0%		
	Body Wt.*	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv
0	26		10/10	24		10/10	25		10/10	26		10/10	25		10/10	27		10/1
1	27	35		26	-		27	32		26	37		26	34		29	35	
2	29	35		28	36		29	40		29	39		28	37		30	34	
3	30	44		29	44		29	44		30	39		28	44		30	-	
4	31	43		29	42		30	39		31	40		30	40		32	40	
5	31	36		29	35		30	37		31	39		31	35		32	37	
6	32	35		30	36		31	36		32	33		32	38		33	35	
7	31	41		30	42		32	40		32	40		32	42		33	44	
8	32	47		31	44		33	38		33	42		32	38		34	45	
9	33	42		31	40		32	33		33	38	9/10	32	37		34	36	
10	33	36		31	39		33	33		34	40	9/10	333	39		35	36	
11	34	38		32	41		34	32		34	38	9/10	33	37		35	42	
12	34	33		32	39		34	33		34	35	9/10	33	37		36	37	
13	34	44**		32	38**		35	29**		35	36**	9/10	34	43**		34	47**	

* Body weights and food consumption in grams.

** Food consumption average for five animals.

Survival; one animal at the 1.25% dose level was accidentally killed.

TABLE #2a

Sub-Chronic Test - 90-day Female Mice
Chemical - Decabromodiphenyl Oxide C55287

976-615
Mice, Female

	Group 1 - Control			Group 2 - 0.31%			Group 3 - 0.63%			Group 4 - 1.25%			Group 5 - 2.5%			Group 6 - 5.0%		
Week No.	Body Wt.*	Food Cons	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.	Body Wt.	Food Cons.	Surv.
0	19		10/10	20		10/10	19		10/10	19		10/10	20		10/10	19		10/
1	19	47		21	47		22	-		21	46		21	46		21	41	
2	22	-		23	41		23	-		21	-		23	46		21	36	
3	23	46		23	42		23	46		22	48		22	44		21	46	
4	23	48		23	44		22	47		23	45		23	47		23	48	
5	24	45		24	44		24	43		23	44		24	46		23	43	
6	24	43		24	41		25	43		24	45		25	45		24	4[illegible]	
7	25	43		24	46		25	50		23	45		25	46		25	47	
8	24	49		25	49		26	47		25	48		24	47		24	46	
9	25	45		26	45		26	44		24	46		25	44		25	46	
10	26	45		26	46		27	46		25	43		26	45		25	45	
11	25	45		26	41		26	40		24	48	9/10	26	46		25	46	
12	27	44		27	43		28	43		26	48	9/10	27	46		26	46	
13	27	44**		27	47**		28	48**		26	47**	9/10	28	38**		27	42**	

* Body weights and food consumption in grams.

** Food consumption average for five animals.

Survival; one animal at the 1.25% dose level was accidentally killed.

Table 2b
INDIVIDUAL BODY WEIGHT IN GRAMS - MALES
Chemical - Decabromodiphenyl Oxide C55287

976-615
Mice

At Start

2Ø1		2A2		2B3		2C4		2D5		2E6	
Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight
01	26.9	21	26.0	41	25.8	61	27.1	81	23.1	101	30.4
02	26.3	22	25.3	42	25.0	62	25.1	82	26.8	102	27.9
03	28.4	23	26.5	43	25.7	63	23.8	83	26.5	103	25.8
04	24.7	24	23.2	44	24.2	64	23.1	84	25.9	104	26.4
05	27.0	25	24.5	45	22.3	65	26.5	85	27.2	105	26.0
06	25.5	26	23.9	46	25.4	66	24.1	86	25.7	106	29.0
07	25.3	27	25.3	47	26.7	67	29.1	87	21.9	107	26.1
08	26.5	28	24.1	48	22.1	68	25.6	88	24.8	108	26.1
09	26.4	29	17.4	49	27.6	69	25.7	89	24.4	109	25.9
10	24.9	30	24.0	50	24.8	70	31.0	90	26.6	110	29.0
Avg. B.Wt.	26.2		24.0		25.0		26.1		25.3		27.3

At Termination

2Ø1		2A2		2B3		2C4		2D5		2E6	
Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight
01	35.0	21	30.0	41	36.0	61	36.0	81	33.0	101	39.0
02	34.0	22	33.0	42	34.0	62	35.0	82	35.0	102	38.0
03	38.0	23	33.0	43	33.0	63	32.0	83	35.0	103	33.0
04	32.0	24	30.0	44	33.0	64	32.0	84	35.0	104	36.0
05	35.0	25	31.0	45	34.0	65		85	34.0	105	24.0
06	34.7	26	31.5	46	35.1	66	34.2	86	35.7	106	36.5
07	35.6	27	34.1	47	35.8	67	38.7	87	30.6	107	32.9
08	34.6	28	37.2	48	32.1	68	34.3	88	33.5	108	34.1
09	32.0	29	31.9	49	34.1	69	34.0	89	33.2	109	35.1
10	33.6	30	32.9	50	39.1	70	38.4	90	34.2	110	36.6
Avg. B.Wt.	34.4		32.5		34.6		34.9		33.9		34.5
B.Wt. Gain	+8.2		+8.5		+9.6		+8.8		+8.6		+7.2
%			+3.66		+17.1		+7.32		+4.88		-12.19

Table 2c
INDIVIDUAL BODY WEIGHT IN GRAMS - FEMALES
Chemical - Decabromodiphenyl Oxide C552B7

976-615
Mice

At Start

Group No. 2Ø1		2A2		2B3		2C4		2D5		2E6	
Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight
11	19.8	31	18.6	51	20.3	71	19.5	91	18.4	111	19.9
12	19.4	32	19.9	52	21.3	72	19.2	92	19.8	112	19.0
13	18.6	33	19.8	53	17.2	73	18.5	93	19.7	113	20.2
14	19.2	34	23.5	54	20.3	74	20.8	93	18.7	114	18.0
15	19.1	35	19.0	55	19.1	75	19.0	95	19.0	115	18.4
16	17.7	36	18.2	56	18.8	76	19.8	96	20.1	116	21.6
17	19.5	37	19.0	57	19.2	77	21.1	97	19.4	117	19.0
18	20.2	38	19.6	58	18.4	78	18.6	98	21.0	118	19.4
19	20.6	39	20.3	59	20.1	79	18.2	99	20.7	119	19.2
20	20.1	40	20.8	60	20.8	80	19.8	100	20.4	120	18.9
Avg. B.Wt.	19.4		19.9		19.5		19.4		19.7		19.4

At Termination

Group No. 2Ø1		2A2		2B3		2C4		2D5		2E6	
Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight	Animal No.	Body Weight
11	28.0	31	28.0	51	31.0	71	26.0	91	27.0	111	28.0
12	30.0	32	27.0	52	34.0	72	24.0	92	30.0	112	28.0
13	26.0	33	32.0	53	23.0	73	26.0	93	29.0	113	27.0
14	27.0	34	30.0	54	32.0	74	29.0	94	25.0	114	25.0
15	27.0	35	26.0	55	28.0	75	26.0	95	26.0	115	27.0
16	23.6	36	23.8	56	27.9	76	20.5	96	28.0	116	28.4
17	25.1	37	25.3	57	30.0	77	28.0	97	24.8	117	25.1
18	26.5	38	26.1	58	24.2	78		98	32.3	118	27.2
19	31.6	39	28.3	59	26.7	79	25.7	99	28.6	119	26.3
20	28.8	40	27.7	60	28.4	80	26.2	100	27.6	120	24.5
Avg. B.Wt.	27.4		27.4		28.5		25.7		27.8		26.6
B.Wt. Gain	+8.0		+7.5		+9.0		+6.3		8.1		+7.2
%			-6.25		+12.5		-21.25		+1.25		-10.0

Table 3

MALE MICE

976-615

Clinical Signs, Gross Observations and Pathology

Dose %	Mortality	Weight Gain in Grams	Clinical Signs	Gross Observations	Pathology
Control	0/10		10/10 Areas of Alopecia on body	Liver Pale 2/10	Preputial Glands Ductular ectasia 1/10 Hypertrophy 1/10
				Body Alopecia 8/10	
				Sores 3/10	Liver: Focus of cell alteration 1/10
				Preputial Gland enlarged 2/10	
				Anus Small Yellow nodule 1/10	
				Lung Red foci 1/10	
				Stomach serosal surface Red foci 1/10	
				Thoracic cavity Clear fluid 1/10	
				Lumbar lymph node enlarged	
				No gross observation 1/10	
5.0%	0/10		10/10 Areas of Alopecia	Body Alopecia 9/10	Lung Focal minimal chronic inflammation 1/10
				Liver Red areas 1/10	Preputial Gland Ductular ectasia
				Preputial Gland	

976-615
Clinical Signs, Gross Observations
and Pathology

Table 3

MALE MICE

Dose %	Mortality	Weight Gain in Grams	Clinical Signs	Gross Observations	Pathology
0.31	0/10		10/10 Areas of Alopecia on body	Fluid in Abdominal Cavity 1/10	
				Preputial Gland Slightly enlarged 2/10	
				Testis: Right is small left not present, in its place is a small uterine horne and a small ovary. Penis present Seminal vesicals small 1/10	
				Lung Red area 1/10	
				U. Bladder Distended 1/10	
				No Gross Lesion 3/10	
0.62	0/10		10/10 Alopecia on nose	Liver: 2 mm yellow foci on median lobe 1/10	
				Preputial Gland - enlarged 2/10	
				Clear fluid in abdominal cavity 1/10	
1.25	1/10		5/9 Appeared normal	No Gross lesion 7/10	
			4/9 Aopecia	Lung: Red areas 1/9	
			2/9 Sores on back and anus	U. Bladder distended 1/9	
				Preputial Gland enlarged 1/9	
				Anus sores 1/9	
				Dead animal see attached 1A DR.	
				No gross lesion 5/9	

Table 3

MALE MICE

/-615

Clinical Signs, Gross Observations and Pathology

Dose %	Mortality	Weight Gain in Grams	Clinical Signs	Gross Observations	Pathology
.5	0/10		10/10 Areas of alopecia	Preputial Gland Cystic 1/10 enlarged 3/10	
			1/10 Sores on back	Lung	
				Red areas 1/10	
				Spleen slightly enlarged 1/10	
				U. Bladder Distended 1/10	
				Cecum Red area injection site 1/10	
				No Gross Lesions 4/10	

Table 3a

FEMALE MICE

976-615

Clinical Signs, Gross Observations and Pathology

Dose %	Mortality	Weight Gain in Grams	Clinical Signs	Gross Observations	Pathology
Control	0/10		10/10 Areas of Alopecia	Body (Nose, head, back, legs) Alopecia 7/10	Lung Minimal lymphoid hyperplasia 1/10
				Mandibular lymph node red 1/10	Minimal peribronchial lymphoid hyperplasia 2/10
				No Gross observation 3/10	
5.0	0/10		9/10 Areas of Alopecia	Body (Nose, head) Alopecia 9/10	Lung Minimal peribronchial hyperplasia 1/10
			1/10 Appeared normal	U. Bladder Surface appeares milky 1/10	Liver Diffuse slight fatty metamorphosis 1/10

976-615
Clinical Signs, Gross Observations and Pathology

Table 3a
FEMALE MICE

Dose %	Mortality	Weight Gain in Grams	Clinical Signs	Gross Observations	Pathology
0.31	0/10		10/10 Alopecia on nose and head	Left uterine horne small 1/10 No Gross Lesion 9/10	
0.62	0/10		10/10 Alopecia on nose	Uterus: Vascular 1/10 distended 1/10 Lung: Red areas 1/10 U. Bladder Vessels prominent 1/10 Mesenteri fat. 1 mm red tissue 1/10 No Gross Lesion 5/10	
1.25	1/10		2/9 Appeared normal	Lung Red areas 1/9	
			7/9 Alopecia on nose	No Gross Lesion 8/9	
				One accidentally killed See 1ADR.	
2.5	0/10		1/10 Appeared normal	Uterus: Vascular 1/10	
			9/10 Alopecia on head and nose	No Gross Lesion 9/10	

KEY TO DETAILED HISTOPATHOLOGY INCIDENCE TABLE

TYPE OF FINDING

0 = Tissue Absent

X = Tissue Examined and Not Remarkable

A = Autolysis

P = Finding Present

GRADING OR DEGREE OF FINDING

1 = Minimal

2 = Slight

3 = Moderate

4 = Moderately Severe

5 = Severe

TABLE 4

MICE - MALES

INDIVIDUAL PATHOLOGY FINDINGS

ORGANS	R2-201M Control										R2-2E6M 5.[illegible]									
	01	02	03	04	05	06	07	08	09	10	101	102	103	104	105	106	107	108	109	110
MESENTERIC LYMPH NODE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
URINARY BLADDER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GALLBLADDER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BONE MARROW	X	X	X	X	X	X	0	X	X	X	X	X	X	X	X	X	X	X	X	X
MAMMARY GLAND		X												X						
PARATHYROID	0	X	0	0	X	X	X	X	X	0	0	0	0	0	X	X	X	X	0	0
THYMUS:	X	X	X	X	X	X	X	0	X	X	X	X	X	X	X	X	X			
Thyroglossal duct cyst																				P
TRACHEA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ESOPHAGUS	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
SKIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MANDIBULAR LYMPH NODE/CERV.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE 4

MICE - MALES

INDIVIDUAL PATHOLOGY FINDINGS

ORGANS	R2-201M Control										R2-2E6M 5.%									
	01	02	03	04	05	06	07	08	09	10	101	102	103	104	105	106	107	108	109	110
BRAIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PITUITARY	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
THYROID	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ADRENAL	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HEART	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LUNG:	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
Focal minimal chronic inflammation												P								
SPLEEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LIVER:	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Focus of cell alteration							P													
KIDNEY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STOMACH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SMALL INTESTINE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LARGE INTESTINE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X
PANCREAS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TESTES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PROSTATE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SEMINAL VESICLES	X																			
PREPUTIAL GLAND:									X											
Ductular ectasia		P													P					
Hypertrophy		P																		
SALIVARY GLAND	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE 4a

MICE - FEMALES

INDIVIDUAL PATHOLOGY FINDINGS

ORGANS	M3-201F Control										M3-2E6F 5.%									
	11	12	13	14	15	16	17	18	19	20	111	112	113	114	115	116	117	118	119	120
BRAIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PITUITARY	X	X	X	X	X	X	X	X	X	X	X	X	0	0	X	X	X	X	X	X
THYROID	X	X	X	X	0	X	X	X	X	X	X	0	X	X	X	X	X	0	X	X
ADRENAL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HEART	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LUNG:		X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X
Minimal lymphoid hyperplasia	1																			
Minimal peribronchial lymphoid hyperplasia								1	1		1									
SPLEEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LIVER:	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Diffuse slight fatty metamorphosis																2				
KIDNEY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STOMACH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SMALL INTESTINE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LARGE INTESTINE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PANCREAS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OVARY	X	X	X	X	X	X	X	X	X	X	X	X	0	X	X	X	X	X	X	X
UTERUS	X	X	X	X	X	X	X	X	X	X	X	X	0	X	X	X	X	X	X	X
SALIVARY GLAND	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MESENTERIC LYMPH NODES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0
URINARY BLADDER	X	X	X	X	0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE 4a

MICE - FEMALES

INDIVIDUAL PATHOLOGY FINDINGS

ORGANS	M3-201F Control										M3-2F6F 5.[illegible]									
	11	12	13	14	15	16	17	18	19	20	111	112	113	114	115	116	117	118	119	120
GALLBLADDER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BONEMARROW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MAMMARY GLAND	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PARATHYROID	0	X	X	0	0	X	X	0	X	X	0	0	0	0	0	X	X	0	0	X
THYMUS	0	X	0	X	X	0	X	X	0	X	X	X	X	X	X	X	X	X	X	X
TRACHEA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ESOPHAGUS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0	X	X
SKIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

HAZLETON
LABORATORIES AMERICA, INC.

Decabromodiphenyl Oxide Requirements

Dose Level	No. of Animals male	No. of Animals female	kg diet mix/week	comp/1 kg gm	comp/1 week gm		kg comp/103 wk
rat							
5.0%	50	50	25	50	1250		129
2.5%	50	50	25	25	625		64.53
						Total	193.53
mice							
5.0%	50	50	5	50	250		25.75
2.5%	50	50	5	25	125		12.87
						Total	38.62
					Rats & Mice total comp.		232.15 kg

Compound received	15.558 kg
After Prechronic Studies	5 480
Compound to be ordered	226.67 kg

Submitted by Henry A. Rutter Jr.
HENRY A. RUTTER, Jr., Ph.D.
Principal Investigator

Microbiological Associates

5221 RIVER ROAD • BETHESDA, MARYLAND 20016
TELEPHONE: (301) 654-3400

DIAGNOSITC SERVICES TEST REPORT

Our Code A 4326
Contract N01-CM-67069 -SN

TO: Henry Rutter
Hazelton Labs
9200 Leesburg Pike
Vienna, VA

FROM: Michael J. Collins, Jr., Ph.D.
DATE: June 11, 1979
TEST: Murine virus antibody determination
SPECIMEN: 10 rat and 9 mouse sera
RECEIVED: June 1, 1979

Sample #	Hemagglutination Inhibition								Complement Fixation				
	PVM	Reo3	GDVII	Poly	MVM	KRV	H-1	Ectro	Send	M.Ad	MHV	LCM	RCV
71616-71620	-					-	-		≥80				-
71626-71630	-					-	-		≥80				-
976-614001	-	-	-	-	-			-	-	-	10	-	
976-614002	-	-	-	-	-			-	-	-	AC	-	
976-614003	-	-	-	-	-			-	-	-	AC	-	
976-614004	-	-	-	-	-			-	-	-	10	-	
976-614008	-	-	-	-	-			-	20	AC	AC	-	
976-614012	-	-	-	-	-			-	-	-	-	-	
976-614014	-	-	-	-	-			-	-	-	-	-	
976-614019	-	-	-	-	-			-	-	-	-	-	
976-614020	-	320	-	-	-			-	-	-	-	-	
Significant Titer	20	20	20	20	20	20	20	20	10	10	10	10	10

AC = Anticomplementary serum

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ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Project 976-605 Date 3/2/79

Chemical Name Dechromodiphenyl oxide C#

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: Arbitrary by analyst

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:
   See addendum attached

   c. Storage temperature of mixture before analysis: -20°C

2. Results: (continued)

Sample	Data Mixed	Data Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
Group 1 (Control)	2/6/79	2/22/79	0.00%	0.00%	0.00%	0.00%	0.00%
Group 2 (Top [illegible])	2/6/79	2/22/79	0.31%	0.31%	0.29%	0.30%	0.285 (7)%
Group #2 (Top [illegible])	2/6/79	2/22/79	0.31%	0.28%	0.32%	0.30%	0.285 %
Group #2 (Bottom)	2/6/79	2/22/79	0.31%	0.33%	0.33%	0.33%	0.314 %
Rmk.			(continued on attached)				

3. Conclusions:
   Group 3 and Group 4 were not within the ± 10% limit, and will be remixed and reanalyzed.

4. Actions taken as a result:
   Another mixture of group 3 was prepared for reanalysis and is included as a separate report. The results from Group 4 will follow at a later date.

[signature]
Signature of Responsible Chemist

HLA Notebook No.

[illegible] (rev.)

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name [illegible] Date [illegible]

Chemical Name [illegible] CF

Vehicle (or Feed) [illegible]

1. Methods:

   a. Method of sample selection: [illegible]

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results: (continued)

	Sample	Date Mixed	Date Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
[illegible]	# 3	[illegible]	2/22/74	0.63%	0.57%	0.51%	0.540%	0.544%
[illegible]	# 4	[illegible]	2/22/74	1.25%	1.40%	1.34%	1.370%	1.413%
[illegible]	# 5	[illegible]	2/22/74	2.50%	2.67%	2.65%	2.665%	2.759%
[illegible]	# 6	[illegible]	2/22/74	5.00%	5.45%	5.40%	5.425%	5.298%
	#							
	#							

3. Conclusions:

4. Actions taken as a result:

[illegible]

Signature of Responsible Chemist

HLA Notebook No.

[illegible] (rev.)

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ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name [illegible] Date [illegible]

Chemical Name [illegible] C# _____

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: [illegible]

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results: (continued)

Sample	Data Mixed	Data Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
[illegible] 2 6 (Top right)	2/6/79	2/22/79	5.00%	5.30%	5.45%	5.375%	5.249%
2							
[illegible] 6 (Bottom)	2/6/79	2/22/79	5.00%	5.40%	5.25%	5.325%	5.200%
6							
6							
Ref.							

3. Conclusions:

4. Actions taken as a result:

[illegible]
Signature of Responsible Chemist

HLA Notebook No.
2/79 (rev.)

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ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name [illegible] Date [illegible]

Chemical Name [illegible] Cf

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: Same

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: −20°C

2. Results:

Ref.	Sample	Data Mixed	Data Analyzed	Theor. Conc. (Ng)	Concentration Found #1 (Ng)	#2 (Ng)	#3 (Ng)	Average (Ng)	Corrected (% Recovery)
[illegible] 0%	1	3/1/79	3/1/79	0.00	0.00	0.00	0.00	0.00	100%
[illegible]	2	3/1/79	3/1/79	1616.67	1800	1700	1600	1700	105 %
[illegible]	3	3/1/79	3/1/79	3150	3125	3125	—	3125	99.2 %
[illegible]	4	3/1/79	3/1/79	6318.3	6100	6000	6200	6100	96.6 %
[illegible]	5	3/1/79	3/1/79	25,150	26,750	25,500	25,000	25,750	102.4 %

3. Conclusions:
All the recoveries were ± 5% and were used to correct all the feed samples.

4. Actions taken as a result:

[illegible]
Signature of Responsible Chemist

HLA Notebook No.
[illegible] (rev.)

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March 2, 1979

Project 976-605

1. Methods

(b) Detailed description of extraction or other workup procedure and analytical method used:

A 5.00 gm sample in a 50 ml test tube was extracted with 40 ml of tetrahydrofuran for 10 minutes on a horizontal shaker. The sample was centrifuged at 2500 rpm for 15 minutes, and the supernatant transferred to a 125 ml erlenmeyer flask. The feed residue was reextracted again with 40 ml of tetrahydrofuran. The combined extracts were filtered through Whatman #1 filter paper into a 100 ml vilumetric flask. The solutions were brought up to volume with tetrahydrofuran. Dilutions from 1:2 to 1:10 were made in order to inject 10 µl aliquots on the high pressure liquid chromotograph under the following conditions:

Instrument:	Waters - Model 6000A high pressure liquid chromotograph with absorbance detector model 440 and WISP sample processor model 710A equipped with a Houston Instrument recorder.
Column:	µ Bondapak C18 300 mm x ~~25~~ 3.9 mm
Mobile phase:	10% water: 90% acetonitrite
Flow rate:	1.0 ml/min.
Detector:	Ultraviolet 254 nm
Chart speed:	0.5in/min
Attentuation:	0.1
Retention time:	19.5 min for major peak

All feed samples are processed in duplicate, including control feed. Samples were quantitated against a standard curve prepared by injecting known amounts of decabromodiphenyl oxide. A series of spiked samples were processed simultaneously with the feed samples to adjust for average recovery losses.

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Project 976 - 605 Date [illegible]

Chemical Name Dicadromodiphenyl oxide Cf

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: [illegible]

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results:

Sample	Date Mixed	Date Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
Group 3 - 1	2/27/74	3/1/74	0.63%	0.668%	0.700%	0.684%	0.684(5)%
Group 3 - 2	2/27/74	3/1/74	0.63%	0.680%	0.600%	0.640%	0.645 %
3							
4							
5							
Ref.	3/1/74	3/1/74	0.63%	0.625%	0.625%	0.625%	0.630 (99.2% recovery)

3. Conclusions: The repeated samples were within the ± 10% limit, therefore the mixtures were correctly prepared.

4. Actions taken as a result:

None

[illegible]

Signature of Responsible Chemist

HLA Notebook No.

[illegible]

0030

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Dose # 976-605 Date 3/7/79

Chemical Name Dichromodiphenyl oxide CF 55297

Vehicle (or Feed) Feed LH 19102B LOT-012478 Batch-02

1. Methods:

   a. Method of sample selection: Arbitrary by analyst

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:
   same as reported on 3/2/79

   c. Storage temperature of mixture before analysis: -20°C

2. Results: 90 Day subchronic toxicity - rats
   weeks on study - Day 0 and week 2

Sample	Date Mixed	Date Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected *
Group 4-(1)	2/27/79	3/7/79	1.25%	1.16	1.16	1.16	1.25%
Group 4-(2)	2/27/79	3/7/79	1.25%	1.16	1.16	1.16	1.25%
3							
4							
5							
Fortification Rec. @ 1.25%	3/7/79	3/7/79	1.25%	1.16	1.16	1.16%	93% recovery

3. Conclusions: * - Corrected for 93% recovery from fortification.
   The remix group 4 samples were right on target.

4. Actions taken as a result:

[signature]
Signature of Responsible Chemist

HLA Notebook No.
2/79 (rev.)

0031

LABORATORIES AMERICA, INC.
9200 LEESBURG TURNPIKE, VIENNA VIRGINIA 22180, U.S.A.

Rodent Laboratory Chow®
5001

Guaranteed Analysis/ Ingredients

Crude protein, min.	23.0%
Crude fat, min.	4.5%
Crude fiber, max.	6.0%
Ash, max.	8.0%
Added minerals, max.	2.5%

Ground extruded corn, soybean meal, ground oat groats, dried beet pulp, wheat germ meal, fish meal, brewers' dried yeast, dehydrated alfalfa meal, cane molasses, dried milk products, meat and bone meal, wheat middlings, animal fat preserved with BHA, calcium carbonate, dicalcium phosphate, salt, animal liver meal, calcium iodate, vitamin B_{12} supplement, methionine hydroxy analogue calcium, calcium pantothenate, choline chloride, folic acid, riboflavin supplement, thiamin, niacin, pyridoxine hydrochloride, ferrous sulfate, vitamin A supplement, D activated animal sterol, vitamin E supplement, iron oxide, manganous oxide, cobalt carbonate, copper oxide, zinc oxide.

PHONE (703) 893-5400. TELEX 899438 (HAZLABS VINA). CABLE HAZLABS WASH DC

Figure = 12 Fe Mole % CC

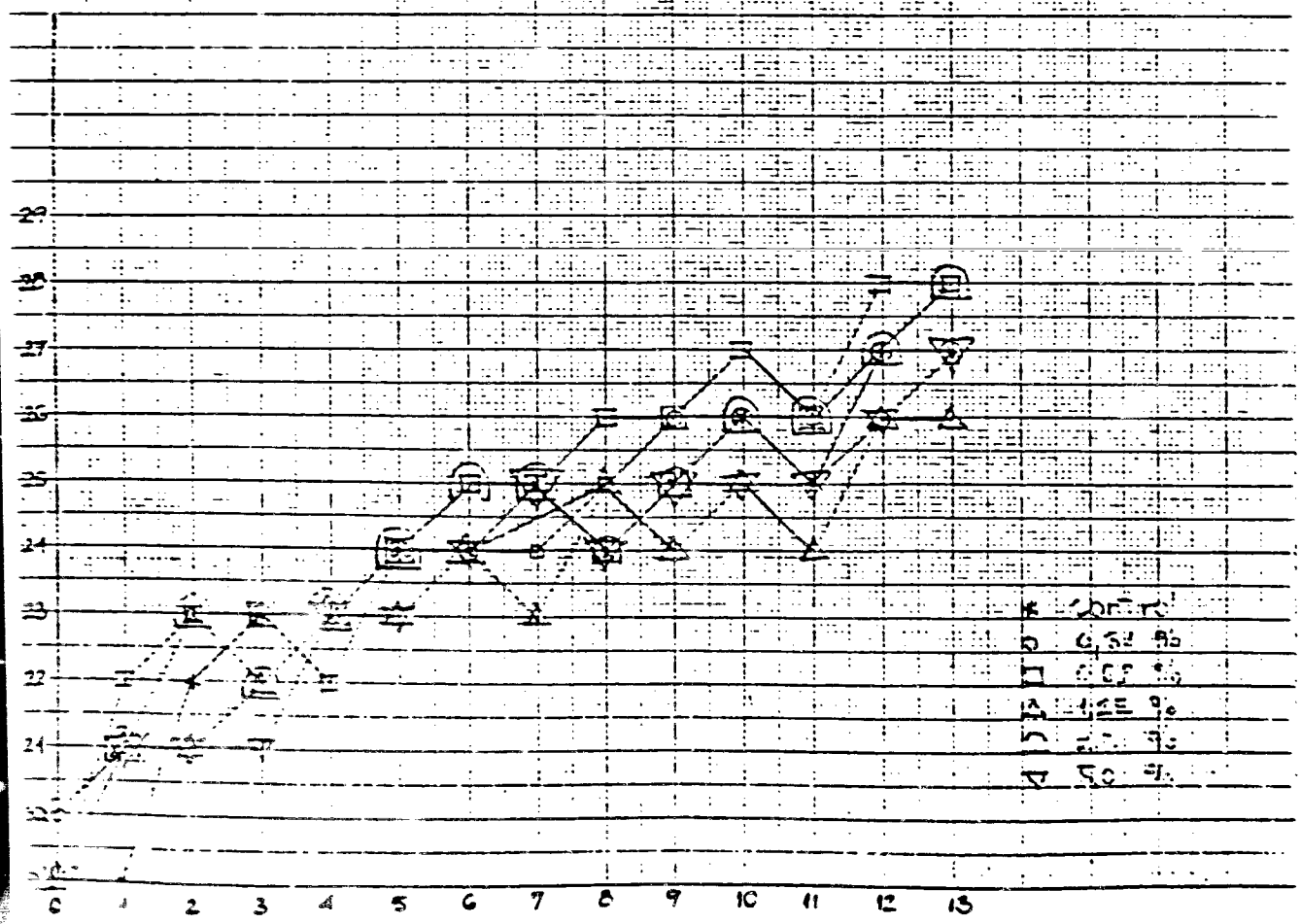
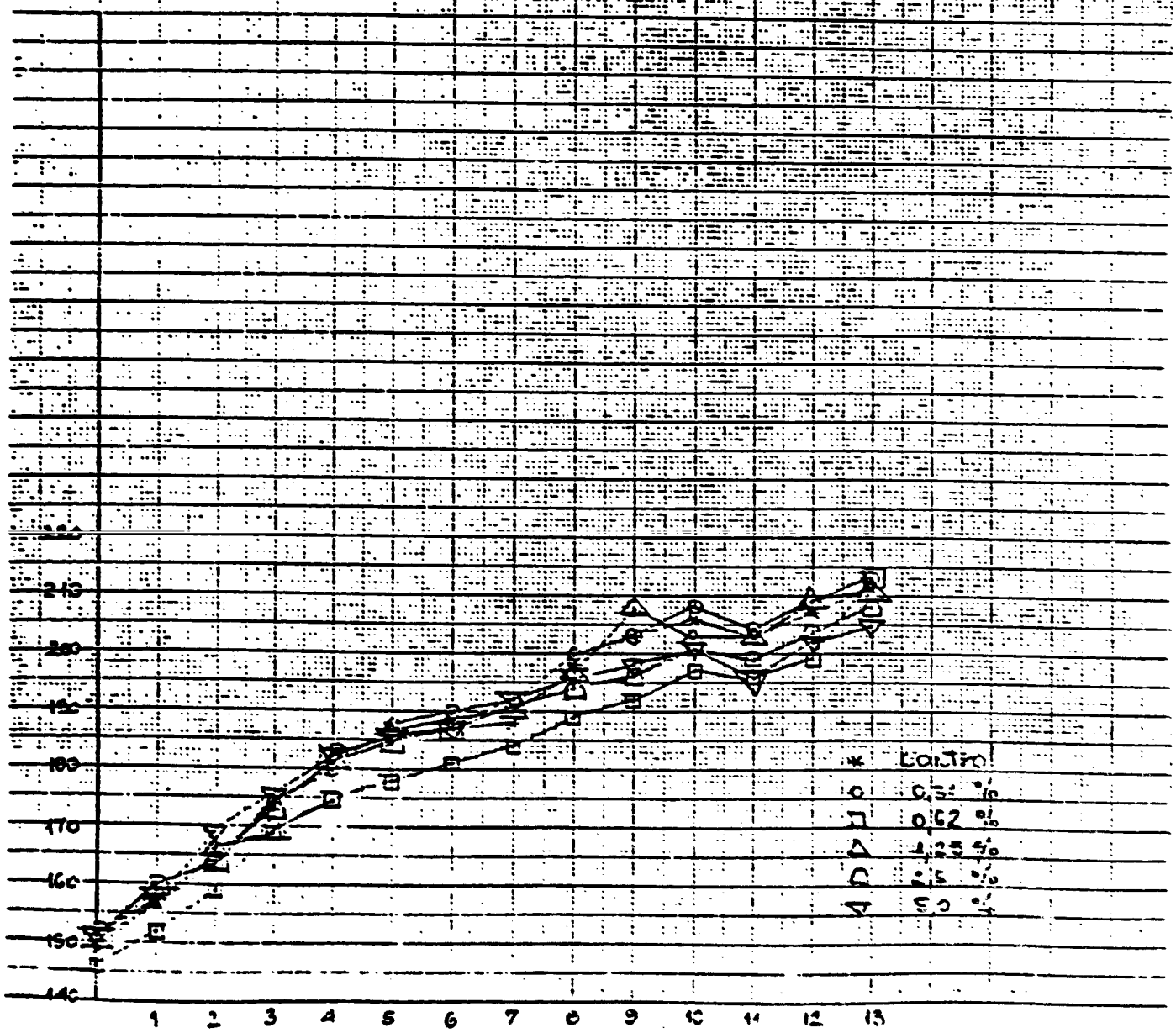


Figure # 4.9 Tensile Rots



ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Project 976-605 Date 3/6/79

Chemical Name Decabromodiphenyl oxide C#

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: Arbitrary by analyst

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:
   See addendum attached

   c. Storage temperature of mixture before analysis: -20°C

2. Results: (continued)

Sample	Data Mixed	Data Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
Group 1 (Control)	2/6/79	2/22/79	0.00%	0.00%	0.00%	0.00%	0.00%
Group 2 (Top left)	2/6/79	2/22/79	0.31%	0.31%	0.29%	0.30%	0.285 (7)%
Group #2 (Top right)	2/6/79	2/22/79	0.31%	0.28%	0.32%	0.30%	0.285 %
Group #2 (Bottom)	2/6/79	2/22/79	0.31%	0.33%	0.33%	0.33%	0.314 %
~~Rec.~~			(continued on attached)				

3. Conclusions:
Group 3 and Group 4 were not within the ± 10% limit, and will be remixed and reanalyzed.

4. Actions taken as a result:
Another mixture of group 3 was prepared for reanalysis and is included as a separate report. The results from Group 4 will follow at a later date.

[signature]
Signature of Responsible Chemist

HLA Notebook No.

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Project 976-605 Date 3/3/79

Chemical Name Decabromodiphenyl oxide C#

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: same

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results: (continued)

Sample	Data Mixed	Data Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
Temp @ 3	2/6/79	2/22/79	0.63%	0.57%	0.51%	0.540%	0.544%
Temp @ 4	2/6/79	2/22/79	1.25%	1.40%	1.34%	1.370%	1.418%
Temp @ 5	2/6/79	2/22/79	2.50%	2.68%	2.65%	2.665%	2.759%
Temp @ 6 (Excipient)	2/6/79	2/22/79	5.00%	5.45%	5.40%	5.425%	5.298%
6							
REF.							

3. Conclusions:

4. Actions taken as a result:

[signature]

Signature of Responsible Chemist

HLA Notebook No.

2/79 (rev.)

0036

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Project 97-105 Date 3/2/79

Chemical Name Dechromodiphenyl oxide C#

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: Same

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results: (continued)

Sample	Data Mixed	Data Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
Group 2 6 (Top right)	2/6/79	2/22/79	5.00%	5.30%	5.45%	5.375%	5.249%
Group 6 (Bottom)	2/6/79	2/22/79	5.00%	5.40%	5.25%	5.325%	5.200%
Ref.							

3. Conclusions:

4. Actions taken as a result:

[signature]
Signature of Responsible Chemist

HLA Notebook No.

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name [illegible] 996-105 Date 3/1/79

Chemical Name Dec [illegible] oxide CF

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: Same

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results:

Sample	Data Mixed	Data Analyzed	Theor. Conc. (Ng)	Concentration Found #1 (Ng)	#2 (Ng)	#3 (Ng)	Average (Ng)	Corrected (% Recovery)
Ref. Control 0% -1	3/1/79	3/1/79	0.00	0.00	0.00	0.00	0.00	100%
0.31% -2	3/1/79	3/1/79	1616.67	1700	1700	1600	1700	105 %
0.63% -3	3/1/79	3/1/79	3150	3125	3125	—	3125	99.2 %
1.25% -4	3/1/79	3/1/79	6318.3	6100	6000	6200	6100	96.6 %
5.00% -5	3/1/79	3/1/79	25,150	25,750	25,500	25,000	25,750	102.4 %

3. Conclusions:
All the recoveries were ± 5% and were used to correct all the feed samples.

4. Actions taken as a result:

[illegible]
Signature of Responsible Chemist

HLA Notebook No.
[illegible]

March 2, 1979

Project 976-605

1. Methods

(b) Detailed description of extraction or other workup procedure and analytical method used:

A 5.00 gm sample in a 50 ml test tube was extracted with 40 ml of tetrahydrofuran for 10 minutes on a horizontal shaker. The sample was centrifuged at 2500 rpm for 15 minutes, and the supernatant transferred to a 125 ml erlenmeyer flask. The feed residue was reextracted again with 40 ml of tetrahydrofuran. The combined extracts were filtered through Whatman #1 filter paper into a 100 ml vilumetric flask. The solutions were brought up to volume with tetrahydrofuran. Dilutions from 1:2 to 1:10 were made in order to inject 10 µl aliquots on the high pressure liquid chromotograph under the following conditions:

Instrument:	Waters - Model 6000A high pressure liquid chromotograph with absorbance detector model 440 and WISP sample processor model 710A equipped with a Houston Instrument recorder.
Column:	µ Bondapak C18 300 mm x ~~25~~ 3.9 mm
Mobile phase:	10% water: 90% acetonitrite
Flow rate:	1.0 ml/min.
Detector:	Ultraviolet 254 nm
Chart speed:	0.5in/min
Attentuation:	0.1
Retention time:	19.5 min for major peak

All feed samples are processed in duplicate, including control feed. Samples were quantitated against a standard curve prepared by injecting known amounts of decabromodiphenyl oxide. A series of spiked samples were processed simultaneously with the feed samples to adjust for average recovery losses.

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Project 976 - 605 Date [illegible]

Chemical Name [illegible] Cf

Vehicle (or Feed) Feed

1. Methods:

   a. Method of sample selection: [illegible]

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:

   c. Storage temperature of mixture before analysis: -20°C

2. Results:

Sample	Date Mixed	Date Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected
Group 3 - 1	2/27/74	3/1/74	0.63%	0.668%	0.700%	0.684%	0.689(5)%
Group 3 - 2	2/27/74	3/1/74	0.63%	0.680%	0.600%	0.640%	0.645 %
3							
4							
5							
Ref.	3/1/74	3/1/74	0.63%	0.625%	0.625%	0.625%	0.630 (99.2% recovery)

3. Conclusions: The repeated samples were within the ± 10% limit, therefore the mixtures were correctly prepared.

4. Actions taken as a result:

None

[illegible]

Signature of Responsible Chemist

HLA Notebook No.

ANALYSIS OF DOSAGE MIXTURE

Subcontractor Name Dose # 976-605 Date 3/7/79

Chemical Name Dicarbomodiphenyl oxide Cf 55297

Vehicle (or Feed) Feed LH 18102B LT-012478 Batch-02

1. Methods:

   a. Method of sample selection: Arbitrary by analyst

   b. Detailed description of extraction or other workup procedure and analytical method(s) used:
   same as reported on 3/2/79

   c. Storage temperature of mixture before analysis: -20°C

2. Results: 90 Day subchronic toxicity --- rats
   weeks on study — Day 0 and week 2

Sample	Date Mixed	Date Analyzed	Theor. Conc.	Concentration Found #1	#2	Average	Corrected *
Group 4-(1)	2/27/79	3/7/79	1.25%	1.16	1.16	1.16	1.25%
Group 4-(2)	2/27/79	3/7/79	1.25%	1.16	1.16	1.16	1.25%
3							
4							
5							
Fortified Ref. at 1.25%	3/7/79	3/7/79	1.25%	1.16	1.16	1.16%	93% recovery

3. Conclusions: * - Corrected for 93% recovery from fortification
   The remix Group 4 samples were right on target.

4. Actions taken as a result:

[signature]
Signature of Responsible Chemist

HLA Notebook No.