

MANUFACTURING CHEMISTS ASSOCIATION

1825 CONNECTICUT AVENUE, N.W. WASHINGTON, D.C. 20009 (202) 483-6126

7/12/74

September 18, 1974

To: Technical Task Group on Vinyl Chloride Research

Subject: EPA News Release on Vinyl Chloride Emission Controls

Gentlemen:

Distributed herewith are copies of the subject release and Mr. Train's statement at the press conference at which the EPA Task Force report on vinyl chloride was announced. Although his statement does not identify the authority EPA proposes to act under, in his oral comments he did specify that the proposed controls would be promulgated pursuant to section 112 of the Clean Air Act.

Copies of the Task Force Report are being provided MCA, and will be forwarded to members of the TTGVCR as quickly as feasible.

Sincerely,



Kenneth D. Johnson, Ph.D.
Secretary

Technical Task Group on
Vinyl Chloride Research

KDJ/mb

Enclosures

ASI 000010780

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Environmental News

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EPA TO SET VINYL CHLORIDE EMISSIONS STANDARD

Environmental Protection Agency Administrator Russell E. Train announced today that the Agency will establish an air pollution emission standard for vinyl chloride. Development of an air standard was one of nineteen recommendations submitted to the Administrator last week by EPA's vinyl chloride task force.

The air standard would apply to emissions from the Nation's 15 vinyl chloride monomer and the 37 polyvinyl chloride resin manufacturing plants. The Agency is still investigating the possible need for a standard applicable to the roughly 8,000 polyvinyl chloride fabricating facilities. (The monomer and resin manufacturing plants account for more than 95 percent of vinyl chloride emissions.)

Train formed the task force last February when it was learned that several workers at vinyl chloride production plants had died from angiosarcoma of the liver, a rare but fatal form of cancer, and that there was an estimated material loss of vinyl chloride and polyvinyl chloride of six percent during the polymerization process. Vinyl chloride, a

(more)

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EPA FORM 1510-1 (REV. 8-72)

R-575

ASI 000010781

gaseous chemical, has been strongly implicated as a cause of this form of cancer and may increase the risk from other cancers as well.

In accepting the task force recommendations, Train said that EPA would immediately begin "the additional analysis and monitoring necessary for establishing appropriate emission controls."

Train said the process of setting an air emission standard under the Clean Air Act would probably require several months of monitoring and other investigations, data collection, public hearings and other required regulatory steps as required by the Act. He also said an environmental impact statement would be prepared, and public hearings held, to "insure full public participation in the development of this standard."

"I intend to expedite these procedures as much as possible," Train said, "but it's extremely important that our standards and decisions be based on the best scientific data available in order to ensure that the health of our citizens is protected."

The Task Force report released today estimates that "substantial amounts of vinyl chloride -- probably exceeding 200 million pounds annually -- and large quantities of polyvinyl chloride -- probably exceeding 50 million pounds -- are being discharged into the environment during the polyvinyl chloride polymerization process. Most of the vinyl chloride escapes directly into the atmosphere, with lesser amounts dissolved in water effluent streams and entrapped in sludge and solid wastes."

Initial estimates indicate that emissions could be reduced by about 75 percent from polyvinyl chloride resin plants and 90 percent from vinyl chloride plants with a concomitant cumulative increase in the cost of polyvinyl chloride of about four percent. It is estimated that the available control technology, which includes a variety of control measures applicable to the multiple emission points within the plants, could be in place from within several months to two years after promulgation of appropriate regulations.

In addition to the air standard, eighteen recommendations for EPA action have been made by the task force, including:

- Additional ambient air monitoring at selected sites to support regulatory action under the Clean Air Act;

- More detailed material balance studies, in cooperation with industry, to more clearly identify leakage points in the manufacturing process;

(more)

--Monitoring of drinking water supplies which could be contaminated from vinyl chloride discharges from nearby polyvinyl chloride plants;

--Studies around industrial storage and disposal sites and municipal disposal sites to determine the types and quantities of toxic substances leached or discharged out of (a) semi-solid wastes generated by vinyl chloride/polyvinyl chloride facilities or (b) polyvinyl chloride products discarded by consumers.

Recommendations for action by industry encourage all possible steps to (a) tighten up operating and maintenance procedures to reduce emissions from vinyl chloride and polyvinyl chloride facilities and (b) expand research, testing and monitoring activities to improve the base for assessing the risks associated with vinyl chloride.

The task force report also emphasizes a need for the Toxic Substances Control Act. The proposed legislation, under which EPA would set requirements for industry to make pre-market tests of possible dangerous new chemical products, is now before Congress.

The report points out that "many of the considerations and uncertainties that have punctuated the vinyl chloride/polyvinyl chloride deliberations undoubtedly characterize a far broader swath of concerns over high volume industrial chemicals in general, and plastics in particular." The task force report adds that the Toxic Substances Control Act "would provide a mechanism for addressing those products using vinyl chloride not now subject to regulation under other laws." *called products*

To date, 25 cases of liver angiosarcoma have been identified worldwide in workers exposed to vinyl chloride. In most, but not all of these cases, the workers had been repeatedly exposed to high levels of the gas over a substantial number of years. It has also been suggested that vinyl chloride may be implicated in several non-worker deaths from this liver cancer. Whether vinyl chloride is the cause of these deaths is still being investigated.

The Occupational Health and Safety Administration is currently considering vinyl chloride standards to protect workers inside the plants.

The task force report is available from EPA, Room 335W, 401 M Street, SW., Washington, D.C. 20460.

VINYL CHLORIDE STATEMENT BY THE ADMINISTRATOR

Today's press conference is to announce that I have received the recommendations of our vinyl chloride task force, which was established last February, and that I have directed the Agency to proceed to establish an air pollution emission standard for vinyl chloride under the Clean Air Act.

The air standard will apply to emissions from vinyl chloride monomer plants and polyvinyl chloride resin manufacturing plants. These account for more than 95 percent of the known emissions of vinyl chloride.

The air standard is just one of several recommendations made by the task force. I have directed that work begin immediately to implement the initial stages of all of the recommendations. Before getting into these actions, let me briefly summarize our vinyl chloride activities to date.

Beginning last January it was learned that several workers at vinyl chloride production plants had died from angiosarcoma of the liver, a rare but fatal form of cancer. The gaseous chemical vinyl chloride has been strongly implicated as a cause of this form of cancer and may increase the risk from other cancers as well. It was also reported that during the manufacturing process, more than 200 million pounds of the vinyl chloride used was lost each year into the environment.

I immediately formed an internal task force to assess the overall environmental impact of this chemical and to determine any appropriate regulatory actions. We also took a number of other specific actions to define the problem and protect public health.

--On April 15, EPA notified the producers of all pesticides with aerosols containing vinyl chloride of the need to substitute another propellant.

--Later that month our Regional Administrators were asked to assess the extent to which vinyl chloride is escaping beyond the confines of the polyvinyl chloride production facilities in their regions; and we released the brand names of pesticides containing vinyl chloride as an aerosol propellant. In May and July additional brand names were released.

--At the end of April we suspended from sale and requested a recall of all pesticide aerosols for indoor use containing vinyl chloride.

--On May 31, under Section 114 of the Clean Air Act, we requested emission control technology and cost data from manufacturers of vinyl chloride and polyvinyl chloride.

On June 11, I met with leaders of the chemical industry to urge that they take prompt steps to reduce vinyl chloride emissions pending possible establishment of an emission standard. They informed me of significant actions already taken or underway.

Data from the manufacturers has been received and reviewed. The manufacturers have been very cooperative with us.

The task force report, which you have copies of, contains nineteen recommendations. In addition to the air standard, the recommendations include:

- Development of a standardized method for monitoring levels of vinyl chloride.

- Additional ambient air monitoring including intensive sampling at selected manufacturing sites including fabrication plants;

- More detailed material balance studies to identify all leakage points in the manufacturing process;

- Monitoring of drinking water supplies which could be contaminated from vinyl chloride discharges from nearby polyvinyl chloride plants;

- Studies around industrial storage and disposal sites and municipal disposal sites to determine the types and quantities of toxic substances leached or discharged out of
 - (a) semi-solid wastes generated by VCM/PVC facilities or
 - (b) PVC products discarded by consumers.

I have asked that work begin in all of these areas. I'm certain that as implementation moves forward we may make some alterations or shifts in emphasis, but I believe that the objectives are sound and the recommended programs well

planned. We'll keep you informed as these efforts progress so that you'll know the various activities underway.

Also, I concur with the task force recommendation which urges industry to expand research, testing, and monitoring activities to improve assessments of the risks associated with vinyl chloride.

Development and formal proposal of a specific air emission standard will take several months due to the need for additional monitoring and research, collection and analysis of data on control technology and the other statutorily required regulatory procedures. It is my intention to ensure full public participation in the development of this standard including the preparation of an environmental impact statement and public hearings.

Our initial estimates indicate that emissions could be reduced by about 75 percent from polyvinyl chloride resin plants and 90 percent from vinyl chloride plants with a resulting increase in the cost of polyvinyl chloride of about 4 percent. It is estimated that the best available control technology could be in place from within several months to two years after promulgation of the regulations. Some of it will be installed even sooner because of voluntary industry efforts and the establishment of a worker protection standard by Labor's Occupational Safety and Health Administration (OSHA). Our standard and OSHA's probably will require a number of the same control measures.

I want to conclude by repeating my statement of Jun 11 that there is no scientific evidence to indicate that vinyl chloride emissions into the atmosphere pose an imminent hazard to people living near the plants. It is clear, however, that some hazard does exist and that our population deserves the protection afforded by regulatory action. The public health implications of this chemical and others like it present us with a grave responsibility. We intend to develop our regulations and to conduct the continuing research with full public awareness.

I have tried to highlight the task force recommendations today and to emphasize my decision to establish an air standard. Obviously, there are many details left for further discussion. I have asked members of our staff representing the three principal areas of participation in today's recommendation to join me in today's briefing. I would like to introduce Mr. Glenn Schweitzer, Director of the Office of Toxic Substances, Dr. Bernard Steigerwald, Deputy Assistant Administrator for Air Quality Planning and Standards, and Dr. Kenneth Bridboard, Medical Officer with EPA's Special Studies Staff.



MANUFACTURING CHEMISTS ASSOCIATION

1825 CONNECTICUT AVENUE, N.W. WASHINGTON, D.C. 20009 (202) 483-6126

WAK 9/22/74

September 18, 1974

W. A. K.

SEP 20 1974

To: Technical Task Group on Vinyl Chloride Research

Subject: OSHA Economic Impact Study Report on Vinyl Chloride

Gentlemen:

Distributed herewith are copies of the announcement of the availability of the subject report, appearing in the Federal Register for Friday, September 13. Note that comments on this report will be accepted through Wednesday, September 25.

Sincerely,

Kenneth D. Johnson, Ph.D.
Secretary
Technical Task Group on
Vinyl Chloride Research

KDJ/mb

Enclosure

ASI 000010789

draft" because the independent consultant may subsequently make minor editorial corrections, will be treated as the final economic impact report for purposes of this rulemaking proceeding.

All comments regarding the preliminary and final economic impact study should be mailed to the Docket Officer, Docket OSH-36, at the above address, and must be received no later than September 25, 1974.

Signed at Washington, D.C., this 12th day of September 1974.

JOHN STENDER,
Assistant Secretary of Labor.
[F.Doc.74-21398 Filed 9-12-74; 10:42 am]

DEPARTMENT OF LABOR

Occupational Safety and Health
Administration

[29 CFR Part 1910]

[Docket No. OSH-36]

VINYL CHLORIDE

Availability of Final Economic Impact Study

On May 10, 1974, pursuant to sections 6(b), 6(c), and 8(c) of the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1593, 1596, 1599 (29 U.S.C. 655, 657)) Secretary of Labor's Order No. 12-71 (36 FR 8754), and 29 CFR 1911, a proposed standard concerning occupational exposure to vinyl chloride was published in the FEDERAL REGISTER (39 FR 16896). On June 25-28 and July 8-11, 1974, an informal rule-making hearing was held on the proposal pursuant to section 6(b)(3) of the Act.

At the close of the hearing, the presiding Administrative Law Judge, Gordon J. Myatt, ruled, in accordance with the authority granted him under 29 CFR 1911.16(g), that the record would remain open until August 23, 1974 for the receipt of general comments and an additional period after that date solely for the submission of written comments on the economic impact study being conducted for OSHA by an independent consultant.

On August 26, 1974, a notice was published in the FEDERAL REGISTER (39 FR 30844) announcing the availability of the preliminary report, which examines the economic and technological feasibility of compliance with the proposed standard in the monomer, polymer and copolymer producing industries, and inviting comments to be submitted no later than September 6, 1974.

Several persons requested additional time to comment on the preliminary report and also asked for an opportunity to comment on the final economic impact study when available. Since certain portions to be included in the final report were not contained in the preliminary report, the request for additional time to comment on the preliminary report and for an opportunity to comment on the final report is granted.

The final economic impact report will be available for examination and copying beginning at 10 a.m. on September 16, 1974, in Room 230, 1726 M Street NW., Occupational Safety and Health Administration, Washington, D.C. 20210. This report, although labeled "final



MANUFACTURING CHEMISTS ASSOCIATION

1825 CONNECTICUT AVENUE, N.W. WASHINGTON, D.C. 20009 (202) 483-6126

W. A. K.
AUG 22 1974

August 21, 1974

To: Technical Task Group on Vinyl Chloride Research

Subject: Interim Report from IBT Laboratories

Gentlemen:

Distributed herewith are copies of the subject report. Note that the 50 and 200 ppm hamsters are now the only groups for which at least tentative identification of tumors have not been made. Also noteworthy is the absence of Zymbal gland tumors in our rats.

Sincerely,

Kenneth D. Johnson, Ph.D.

Secretary

Technical Task Group on
Vinyl Chloride Research

KDJ/mb

Enclosure

cc: Dr. D. P. Duffield
Mr. A. W. Barnes
Dr. Tiziano Garlanda

ASI 000010791

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MEDICAL SCIENCES

August 16, 1974

W. A. K.
AUG 22 1974

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TELEPHONE 877-9254

Dr. Kenneth D. Johnson
Manufacturing Chemists Association
1825 Connecticut Avenue
N. W. Washington, D. C. 20009

Dear Dr. Johnson:

Enclosed are tables summarizing mortality, body weight and gross pathologic findings through the eleventh month of inhalation exposures on the chronic inhalation toxicity study with Vinyl Chloride. I've also included a table giving daily concentration data from the seven-month point to the end of the eleventh month.

Preceding each table is a brief discussion of the data. A complete and formal eleven-month status summary with full evaluation of this data plus histopathologic data will be submitted shortly.

Sincerely,

Ken Schadeberg

Ken Schadeberg, B.S.
Senior Group Leader
Inhalation Toxicity

KS/dm
enc.

cc - Dr. T. R. Torkelson
J. W. Goode
M. L. Keplinger

ASI 000010792

I. Analytical Concentration Data

The daily range and mean of the Vinyl Chloride concentrations in each chamber from exposure 153 (data previous to this exposure given in seven-month status report) through the end of the eleventh testing month are reported in Table I. The overall average daily vapor concentrations were calculated to be 49.9, 198, 2501 and 2489 ppm for the T-I through T-IV chambers, respectively.

TABLE I

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Chamber Concentration Data

Day Number	Exposure Number	Chamber Concentration (ppm)											
		T-I			T-II			T-III			T-IV		
		Range	Mean		Range	Mean		Range	Mean		Range	Mean	
13	153	45.5	48.5	47.5	176	214	197	1820	2680	2467	2340	2500	2409
14	154	50.5	55.0	51.5	180	242	206	2300	2820	2459	2400	2640	2493
15	155	Holiday, no exposures											
16	156	43.5	53.5	46.5	180	242	202	2180	3000	2554	2140	2380	2231
17	157	46.5	52.5	50.4	154	194	184	2320	2600	2457	2160	2400	2294
18	158	36.5	52.5	45.0	138	250	192	1440	2600	2240	2500	3020	2760
19	159	44.5	55.0	49.2	130	138	134	2460	2620	2540	2600		2600
20	160	38.0	67.5	45.1	124	260	196	2000	3120	2687	1100	2510	2264
21	161	47.0	61.0	53.1	130	200	179	2380	2920	2384	2500	3000	2664
22	162	47.5	53.0	57.8	150	232	181	2380	2700	2484	2340	2700	2456
23	163	50.0	53.5	51.5	180	210	195	2440	2800	2580	2740	3040	2815
24	164	47.0	53.0	52.1	184	202	187	2200	2660	2488	2600	2900	2669
25	165	46.5	56.0	49.4	190	216	200	2420	2800	2583	2660	2800	2755
26	166	47.0	71.0	52.3	184	228	201	2100	2820	2520	2160	2500	2353
27	167	42.5	53.0	47.9	180	204	199	2300	2740	2479	2480	2940	2667
28	168	38.0	55.5	49.4	180	226	193	2160	2800	2472	2200*	2800	2545
29	169	44.0	51.0	47.6	196	215	207	2440	3710	2932	2500	2900	2729
30	170	48.0	56.5	53.6	184	216	205	2120	3100	2528	2460	2980	2668
31	171	46.0	51.5	49.3	186	198	191	2260	2620	2487	2400	2580	2488
32	172	47.0	50.5	48.5	202	214	209	2180	2600	2478	2140	2460	2339

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TABLE I continued

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Chamber Concentration Data

Day Number	Exposure Number	Chamber Concentration (ppm)											
		T-I			T-II			T-III			T-IV		
		Range		Mean	Range		Mean	Range		Mean	Range		Mean
1	173	44.5	55.5	50.4	154	220	197	1500	3340	2468	2340	2760	2532
2	174	46.5	53.0	47.9	180	222	194	2100	2560	2367	2480	2600	2512
3	175	48.5	52.5	50.5	194	206	199	2380	2780	2487	2460	2520	2496
4	176	45.0	54.5	48.8	182	210	198	2320	2760	2534	2320	2660	2536
5	177*	47.5	55.0	51.0	-	-	-	2440	2780	2618	2560	2820	2673
6	178	47.5	52.5	51.2	186	222	203	2420	2700	2573**	2580	2700	2640
7	179	44.0	56.0	49.4	164	236	201	2560	2740	2645	-	-	-
8	180	Equipment malfunction, no exposures											
9	181***	45.5	57.0	51.4	188	218	204	1900	2760	2347	1900	2760	2347
10	182	44.0	51.5	50.0	184	212	193	2320	2500	2396	2420	2500	2464
11	183	43.0	75.0	57.4	88	222	171	2000	2640	2364	2100	2620	2280
12	184	47.0	55.0	50.9	172	230	203	2300	2720	2501	2040	2460	2355
13	185	39.0	57.5	48.0	180	214	199	2140	2400	2328	2280	2500	2380
14	186	35.0	66.0	48.6	182	250	209	2140	2888	2397	2200	2600	2392
15	187	38.0	75.5	49.9	170	266	202	2140	3240	2537	2500	2560	2545**
16	188	43.0	50.0	47.4	196	224	205	2160	2560	2400	2460	2560	2524
17	189	Holiday, no exposures											
18	190	41.0	50.5	47.5	192	210	198	2300	2620	2431	-	-	-
19	191	45.5	58.5	50.2	192	251	196	2160	2540	2350	2240	2320	2272
20	192	46.0	57.0	50.5	182	214	200	2320	2620	2452	2380	2440	2400
21	193	41.0	55.5	50.5	186	234	215	2380	2880	2633	2420	2760	2540

ASI 000010795

TABLE I continued

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Chamber Concentration Data

Day Number	Exposure Number	Chamber Concentration (ppm)											
		T-I		T-II		T-III		T-IV					
		Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
270	194	48.0	54.5	50.1	172	214	204	2260	2660	2447	2140	2400	2270
271	195	43.5	50.5	47.3	190	208	200	2140	2560	2439	2380	2500	2408
274	196	44.5	51.0	47.9	188	216	202	2180	2580	2377	2400	2460	2440
275	197	38.0	56.0	49.5	174	242	198	2160	2640	2386	2440	2440	2440
276	198	45.5	52.5	48.9	188	214	199	2320	2720	2457	2340	2740	2564
277	199	47.0	56.0	50.3	170	220	201	2280	2860	2585	2300	2920	2656
278	200	37.0	52.5	48.3	176	226	200	2220	2700	2473	2580	2900	2672
281	201	40.0	56.0	47.5	168	232	204	2360	2740	2515	2520	2720	2600
282	202	43.5	54.0	48.2	176	236	202	2120	2940	2459	2280	2520	2413
283	203	43.0	54.0	49.7	188	216	206	2340	2920	2550	2540	2780	2640
284	204	47.0	57.0	52.5	144	220	194	1400	3420	2620	2210	2600	2478
285	205	43.0	58.5	50.3	154	224	199	2100	2980	2504	2140	2560	2397
288	206	Equipment malfunction, but animals were exposed											
289	207	42.5	59.0	48.5	194	206	200	2360	2820	2593	2480	2620	2528
290	208	40.0	53.5	45.9	204	218	209	2280	2820	2482	2280	2560	2424
291	209	45.5	51.5	49.3	166	220	203	2380	2680	2521	2440	2560	2516
292	210	Equipment malfunction, no exposure											
295	211	46.5	54.5	47.6	186	230	207	2280	3200	2577	2280	2520	2428
296	212	43.5	53.0	49.3	200	210	205	2480	2660	2613	2520	2680	2585
297	213	Vinyl Chloride gas regulator broken, no exposures											

ASI 000010796

TABLE 1 continued

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Chamber Concentration Data

Day Number	Exposure Number	Chamber Concentration (ppm)											
		T-I		T-II		T-III		T-IV					
		Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean		
298	214	Holiday, no exposures											
299	215	Holiday, no exposures											
302	216	Vinyl Chloride gas regulator broken, no exposures											
303	217	Vinyl Chloride gas regulator broken, no exposures											
304	218	45.5	50.5	48.2	202	226	218	2140	2460	2288	2400	2500	2480
305	219	44.5	52.5	48.6	186	210	204	2280	2740	2565	2400	2520	2445
306	220	45.0	57.5	42.3	190	218	203	2360	2660	2481	2400	2500	2440
309	221	41.5	49.5	45.9	168	192	185	2080	2500	2258	2360	2500	2410
310	222	47.5	55.0	51.0	186	196	193	2280	2500	2380	2280	2500	2364
311	223	44.5	57.5	51.3	160	226	184	1 sample only		2280	1 sample only		2440
312	224	39.0	46.0	42.8	148	172	160	1800	2040	1920	2640	2960	2800
315	225	37.0	52.5	44.2	146	196	174	1800	2440	2073	2500	3100	2680
316	226	46.0	55.0	54.0	182	220	208	2080	2500	2473	2400	2620	2480
317	227*	46.5	55.5	50.6	152	242	205	2040	2800	2558	-	-	-
318	228	46.5	52.0	49.2	170	280	192	1960	2380	2022	2240	2580	2400
319	229	44.5	52.0	49.1	192	222	201	2440	2620	2542	2500	2720	2640
322	230	49.5	56.5	52.0	198	222	210	2500	2680	2699	2300	2620	2460
323	231	49.5	62.0	54.9	176	250	208	2160	2840	2475	2260	2380	2333
324	232	49.5	54.5	50.7	200	208	204	2220	2620	2405	2200	2460	2348
325	233	45.5	56.5	49.7	190	206	196	2400	2840	2597	2220	2500	2370

ASI 000010797

TABLE I continued

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Chamber Concentration Data

Day Number	Exposure Number	Chamber Concentration (ppm)											
		T-I			T-II			T-III		T-IV			
		Range		Mean	Range		Mean	Range	Mean	Range		Mean	
326	234	48.0	62.0	54.0	170	238	202	2300	2760	2576	2520	2760	2576
329	235	Equipment malfunction, but animals exposed											
330	236*	-	-	58.0	200	204	202	2500	2580	2540	-	-	-
331	237*	53.5	58.5	55.5	186	198	191	2220	2500	2376	-	-	-
332	238	56.0	56.0	56.0	206	208	208	2260	2380	2300	1 sample only		2420
333	239	47.5	55.0	51.3	185	210	202	2160	2600	2556	1700	2300	2084

* No exposure in group indicated; animal cages repaired.

** Exposures cut to 5½ hours; animal cages repaired.

*** Exposures cut to 4½ hours; gas chromatograph repaired.

Note: In exposures noted above, the equipment malfunction is referring to a breakdown in the gas chromatograph or sequential sampler valve system-chamber concentrations were believed to be near targets.

II. Mortality Data

The cumulative monthly mortality data are presented in Table II.

Below is a brief discussion of the data for each species.

Rats: With the exception of the T-IV rats (composed of females only and permitted food ad libitum) there is a dose related mortality effect in both sexes at the eleven month point. Although the total number of rats which died in the T-IV group is not as great as in the T-III female group, there was a rapid increase in mortality during the eleventh month in the T-IV group.

Mice: Dose related mortality effects were observed in both male and female mice at the eleven month point.

Hamsters: A significant increase in mortality rate was observed among male and female T-III hamsters during the eleventh month of the investigation. There were no other significant mortality findings.

TABLE II

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats,
Albino Mice and Golden Hamsters

Summary of Mortality Data - Albino Rats

Month Number	Accumulative Number of Mortalities at End of Month								
	Control		T-I ♂		T-II ♂		T-III ♂		T-IV ♂
	M	F	M	F	M	F	M	F	F
1	0	0	0	0	0	0	0	0	0
2	0	0	2	0	1	0	0	0	0
3	0	1	2	0	1	0	1	4	0
4	0	2	4	1	3	0	1	4	0
5	2	3	5	1	6	1	3	4	0
6	3	4	6	2	6	1	5	4	0
7	4	4	8	6	6	2	6	5	0
8	4	5	9	7	10	5	10	8	1
9	4	6	10	8	11	5	16	15	4
10	5	7	11	11	12	9	24	28	7
11	7	8	13	13	14	19	34	52	17

TABLE II continued

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats,
Albino Mice and Golden Hamsters

Summary of Mortality Data - Albino Mice

Month Number	Accumulative Number of Mortalities at End of Month							
	Control		T-I		T-II		T-III	
	M	F	M	F	M	F	M	F
1	0	0	0	0	0	0	0	0
2	0	0	0	3	0	0	0	0
3	2	0	6	4	3	0	1	0
4	5	1	19	5	4	1	4	7
5	8	2	26	6	4	2	8	7
6	12	2	30	6	8	3	10	9
7	18	5	31	11	9	12	13	23
8	18	5	32	14	16	30	30	46
9	23	8	38	24	37	58	56	75
10	28	10	42	31	78	82	76	98
11	30	15	54	46	96	94	100*	100*

* All surviving mice sacrificed

TABLE II continued

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats,
Albino Mice and Golden Hamsters

Summary of Mortality Data - Golden Hamsters

Month Number	Accumulative Number of Mortalities at End of Month							
	Control		T-I		T-II		T-III	
	M	F	M	F	M	F	M	F
1	5	4	4	4	7	5	2	5
2	8	11	10	12	9	16	10	11
3	8	13	12	14	12	18	14	13
4	9	15	16	16	15	19	15	13
5	9	18	16	16	16	20	15	15
6	13	18	16	16	20	21	16	16
7	13	28	24	19	22	33	18	26
8	14	28	24	19	23	35	19	28
9	14	29	24	20	25	36	20	28
10	14	30	26	20	26	37	23	29
11	15	31	28	21	26	38	28	36

III. Body Weight Data

The mean body weight and weight gain data are presented in Tables III through V. Below is a brief discussion of the data for each species.

Rats: There are no dose related findings.

Mice: There appeared to be a drop in body weights of both the males and females of the T-III group during the tenth month of testing. These mice were sacrificed during the eleventh testing month. The other test levels do not indicate any definite adverse effects.

Hamsters: Except for the T-III female hamsters, which revealed a low mean body weight for the eleventh month, there are no significant findings.

TABLE III

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Summary of Mean Body Weights - Albino Rats

		Mean Body Weights (grams)												
		Month Number:												
SEX	Group	0	1	2	3	4	5	6	7	8	9*	10	11	Gain
Male	Control	205	363	456	498	517	537	543	550	559	697	677	689	484
	T-I	209	346	448	491	526	545	554	567	593	651	640	670	461
	T-II	201	360	457	490	522	549	567	565	585	681	663	696	495
	T-III	200	351	453	499	529	550	567	576	581	627	629	680	480
Female	Control	160	235	275	299	315	320	326	344	356	392	366	380	220
	T-I	168	232	274	297	310	308	323	348	367	357	363	374	206
	T-II	171	242	289	302	313	316	329	342	358	368	362	386	215
	T-III	165	240	287	303	312	321	329	346	359	359	356	374	209
	T-IV	181	251	282	288	291	314	324	338	348	363	363	384	203

Apparent malfunction of animal weighing machine during month indicated.

TABLE IV

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Summary of Mean Body Weights - Albino Mice

Sex	Group	Mean Body Weights (grams)												Gain
		Month Number:												
		0	1	2	3	4	5	6	7	8	9*	10	11	
Male	Control	35	40	41	43	46	43	46	52	49	47	43	47	12
	T-I	33	39	39	43	44	42	47	45	47	47	38	48	15
	T-II	36	40	38	42	44	42	45	43	44	46	37	44	8
	T-III	36	38	40	43	44	38	45	41	41	43	31	**	**
Female	Control	29	32	33	35	36	35	38	37	41	40	37	40	11
	T-I	30	34	34	37	39	38	40	41	40	40	42	43	13
	T-II	28	31	34	35	37	36	38	36	40	39	30	40	12
	T-III	28	31	34	35	36	37	37	34	37	39	27	**	**

* Exposures were terminated for all mice at the end of the ninth month of the investigation.

* All surviving T-III mice were sacrificed during the eleventh month of the investigation.

TABLE V

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats, Albino Mice and Golden Hamsters

Summary of Mean Body Weights - Golden Hamsters

		Mean Body Weights (grams)												
		Month Number:												
Sex	Group	0	1	2	3	4	5	6	7	8	9	10	11	Gain
Male	Control	73	98	110	120	129	130	133	130	138	141	129	126	53
	T-I	71	90	101	114	120	121	122	128	126	118	115	110	39
	T-II	63	89	94	99	119	108	120	118	122	117	115	115	52
	T-III	60	87	91	93	91	88	112	110	115	115	115	114	54
Female	Control	77	104	108	118	120	121	124	125	128	133	119	116	39
	T-I	78	95	102	112	118	118	122	130	126	125	118	110	32
	T-II	74	94	99	108	107	106	114	112	116	118	112	112	38
	T-III	69	92	100	106	106	104	110	118	105	107	103	99	30

IV. Gross Pathology

A summary of tumor data based on gross pathologic findings among all species is presented in Table VI. This table does not take into account animals that died and postmortem autolysis or cannibalism precluded gross pathologic examination.

TABLE VI

TEST MATERIAL: Vinyl Chloride (Ethylene Derived)

Chronic Vapor Inhalation Toxicity Study - Albino Rats,
Albino Mice and Golden HamstersSummary of Tumor Data
Based on Gross Pathologic Findings
Among All Species Through 8/14/74

Species	Group	Number of Animals			Tissue Involved (Male/Female)			
		Total	Male	Female	Liver	Lung	Skin*	Kidney
Mice	Control	4	3	1	0/0	1/1	0/0	0/0
	T-I	36	12	24	4/9	5/16	2/7	0/1
	T-II	133	67	66	45/57	52/39	7/26	5/9
	T-III	121	58	63	48/47	44/45	4/20	7/3
Rats	Control	0	0	0	0/0	0/0	0/0	0/0
	T-I	3	3	0	2/0	2/0	0/0	0/0
	T-II	11	4	7	0/5	0/4	0/1	0/0
	T-III	52	18	34	7/24	0/6	0/8	0/2
	T-IV	7	0	7	0/5	0/0	0/5	0/0
Hamsters	Control	0	0	0	0/0	0/0	0/0	0/0
	T-I	0	0	0	0/0	0/0	0/0	0/0
	T-II	0	0	0	0/0	0/0	0/0	0/0
	T-III	10	7	3	2/2	4/1	1/0	0/0

* Mammary Tumors