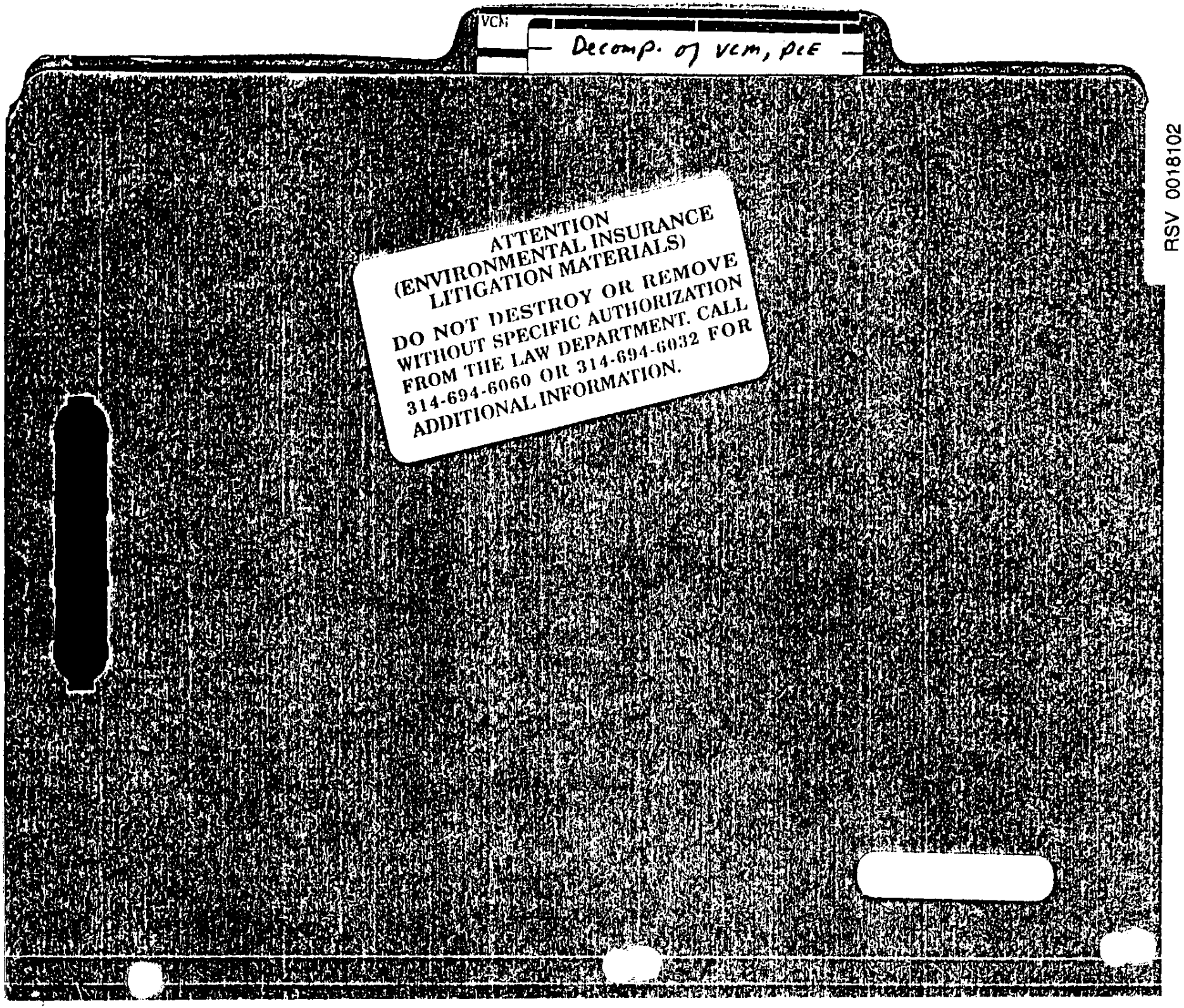
LIST OF ATTACHMENTS

1/30/74	Chemical Week, p. 15, "Probing Cancer Deaths"
2/18/74	Chem. & Eng. News, p. 6, "Evidence Mounts Linking Vinyl Chloride and Cancer"
2/23/74	Business Week, p. 100, "Industry's Latest Cancer Scare"
2/25/74	Chem. & Eng. News, p. 16, "Battle Lines Drawn on Vinyl Chloride Issue"
3/3/74	Newspaper article, "Plant Yields 7th Cancer Victim"
3/6/74	Newspaper article, "2 Plants in Houston Area in Survey for Rare Cancer"
3/13/74	Newspaper article, "Plastics Workers Screened for Ill Effects of Vinyl Chloride"
3/13/74	Newspaper article, "VCM Exposure Should be Cut to Unmeasurable Levels, Officials Urge"
3/29/74	Newspaper article, "Vinyl Chloride Ban in Pesticide Sprays Requested by EPA"
3/11/74	Report by the Bureau of National Affairs, "NIOSH Recommended Occupational Health Standard for the Manufacture of Synthetic Polymer from Vinyl Chloride"
ca. 3/15/74	Reports by the Bureau of National Affairs, (1) "OSHA Will Adopt 50 ppm Exposure Limit in Emergency Vinyl Chloride Rule", (2) "NIOSH Issues Medical Surveillance Supplement to Vinyl Chlorides Document"
3/22/74	Report from Manufacturing Chemists Association, "OSHA Standards for Vinyl Chloride Monomer"
April 1974	OSHA Bulletin, "Emergency Temporary Standard for Exposure to Vinyl Chloride"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RSV 0018102

Monsanto

FROM (NAME & LOCATION) R. L. Grantom
Chocolate Bayou Plant

F & VCM TARS $30.00

DATE August 1, 1973

cc J. H. Bordelon
W. G. Juhl
H. H. Nelson - Texas City
J. L. Young
Central File

SUBJECT Pyrolysis of Perchloro Ethylene

REFERENCE

TO J. D. Robinson

Through Herb Nelson at Texas City, Scientific Design Company was contacted concerning thermal stability of perchloro ethylene (PCE) and methods of removing small amounts of it from a hydrocarbon stream like DSB. They felt that PCE is too thermally stable to decompose at temperatures up to 1200°F. Because of the symmetry of the PCE molecule, they felt there would be little chance of removal with charcoal, molecular sieves, etc. They recommend distillation. PCE boils at 250°F, toluene at 231°F. Ortho, meta, and para-xylene boil at 291°F, 280°F, and 281°F, respectively. Ethylbenzene boils at 277°F. It appears that by two distillations, most of the aromatics of interest in this contaminated material could be recovered.

Scientific Design's feeling regarding the thermal stability of PCE is confirmed by articles in the literature. At 932°F, Krynitsky and Carhart(1) found no pyrolysis products from PCE. Schmeisser, Schrötter, and Schilder(2) were able to decompose PCE to dichloro acetylene, hexachloro butadiene, hexachloro ethane, and hexachloro benzene. Carbon and chlorine were also produced. They operated under vacuum and at 2200-2460°F in the presence of activated carbon.

Based on these observations, I do not think we would do much to the PCE in our material by processing it through our cracking furnaces.

R. L. Grantom

RSV 0018103

jal
8/1/73

(1) Krynitsky, J. A., and Carhart, H. W., JACS, 71, 816-823 (1949).

(2) Schmeisser, M., Schrötter, H., and Schilder, H., Chem. Ber, 95, 1648-1656 (1962).

VINYL CHLORIDE

Vinyl chloride (chloroethylene, monochloroethylene), $CH_2{=}CHCl$, at ordinary temperature and normal pressure, is a colorless gas with an irritant action on the eyes and an odor reminiscent of that of ethyl chloride. Industrially, vinyl chloride is handled as the liquid (bp, −13.9°C). To prevent its polymerization during storage or transport, stabilizers may be added. It is readily flammable, has a very low flash point, and forms explosive mixtures with air. Vinyl chloride is very slightly soluble in water, and soluble in most of the common industrial solvents. Its toxicity is less than that of carbon tetrachloride or chloroform, and it has a narcotic effect similar to that of ethyl chloride. By far, the most important use of vinyl chloride is in the manufacture of polyvinyl chloride (PVC) and related plastics. It is used to a small extent as a special solvent, a refrigerant, and in chemical synthesis.

Vinyl chloride was first prepared and described by Regnault, in 1835. He obtained it by reacting dichloroethane with alcoholic potash. Regnault observed that on prolonged exposure to sunlight in a sealed tube the liquid deposited white flakes of solid. In the state of organic chemical theory and knowledge at that date, he could only record, without explanation, this liquid-to-solid change. Regnault's white solid was studied in 1872 by Baumann without its nature being fully elucidated; he described the material as "Kaupreuchlorid" and gave it the empirical formula $(C_2H_3Cl)_n$. In 1911, Klatte and Rollett investigated the reaction between hydrogen chloride and acetylene, and two years later, Griesheim-Elektron obtained a patent for the use of mercuric chloride as a catalyst in this reaction, thus establishing an effective industrial route to vinyl chloride.

The low price and ready availability of natural rubber and absence of technical interest in the type of plastic product produced from vinyl chloride limited development of vinyl chloride manufacture prior to the outbreak of World War II. When that war cut off the Western powers from their natural rubber sources, production of vinyl chloride for PVC, as a rubber substitute, was established on a large scale in the United States and the United Kingdom. Vinyl chloride is now one of the most important starting materials of the plastics industry.

Physical and Chemical Properties

The physical properties of vinyl chloride are given in Table 1.

At 25°C, 0.11 g vinyl chloride dissolves in 100 g water, and at −15°C, 0.03 g water dissolves in 100 g vinyl chloride. Vinyl chloride is soluble in mineral oil, alcohol, the industrial chlorinated solvents, and a number of common organic liquids. No azeotropes have been reported.

Reactions. In its chemical behavior, vinyl chloride obeys the general rule that the simple unsaturated chlorohydrocarbons are more stable than saturated ones. At about 450°C, vinyl chloride begins to decompose, forming small amounts of acetylene (2). In the presence of a copper, lead, tin, or cadmium catalyst, at 400°C, vinyl chloride forms 2-chloro-1,3-butadiene (3). When vinyl chloride is dry, no decomposition takes place in contact with metals at temperatures below those just indicated. Wet vinyl chloride, at elevated temperature, corrodes iron and steel. The thermal and photochemical decompositions of vinyl chloride, in contact with air, do not appear to have been systematically studied. The decomposition products (peroxygen com-

International newsletter

Dow Chemical and Mitsubishi are considering a site in South Australia for a petrochemical complex. Australian sources say the project, which could involve expenditures of more than $300 million, will be built at Redcliffs, 17 miles south of Port Augusta. Other companies involved in the preliminary planning are Delhi International Oil Corp. and Santos Ltd., developers of the Cooper Basin gas field in South Australia. These companies are also said to have salt reserves available at nearby Lake Torrens. Using ethane from the natural gas and chlorine from the salt, the complex will probably produce ethylene dichloride for shipment to Far East markets. Caustic soda, which would also be produced, is in heavy demand by Australian alumina refineries. Dow Chemical says its negotiations on location of a petrochemical plant in South Australia are proceeding satisfactorily and that a decision is expected shortly. Mitsubishi Corp., a trading firm, says it is being consulted by Australian government planners about a petrochemical project in South Australia, adds that discussions are in a preliminary stage.

Look for a Japanese-Saudi Arabian petrochemical complex. Basic agreement is reported to have been reached between King Faisal's government and Japanese officials for a joint venture to produce 500,000 tons/year of ethylene and other petrochemicals in Saudi Arabia. Tokyo sources say Japan's Mitsubishi group will invest up to $500 million in the project, to be matched by the Saudis. The Japanese investment is believed to be linked to a deal to supply Japan with 200 millions bbls. of crude oil.

Nigeria is seeking partners for petrochemical projects. The government has budgeted more than $42 million for establishment of a petrochemical industry as part of new national development plan. Among the materials slated for production: fertilizers, polyvinyl chloride, polyethylene, chlorine and caustic soda. One project envisioned by the Nigerian government—a $75-million ammonia-urea plant—would use natural gas as raw material. Another would be a phosphatic fertilizer unit, with minimum capacity of about 80,000-tons/year, according to government officials. They say that although imports are now less than 50,000 tons/year, potential demand is much greater.

French warning against premature fiber buildup. Acknowledging the increased demand for some synthetic fibers in Europe, Jean de Precigout, president of France's Synthetic Textile Trade Assn., says the improved sales seemed to be only temporary, resulting primarily from the exceptionally high price of wool. He cautioned at the annual meeting of the association in Paris that the recent pickup in demand is not likely to bring a permanent solution to the imbalance between production and consumption growth. A resumption of fiber plant building now would only accentuate this imbalance in the medium term, he added.

Federal arbitrators will try to head off a West German chemical strike. They'll take over deadlocked negotiations with a labor unit representing one-third of Germany's 660,000 chemical workers who are seeking an 11.5% hike.

Vinyl Chloride

RSV 0018106

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Mortality Study of Workers in the Manufacture of Vinyl Chloride and its Polymers*

Irving R. Tabershaw, M.D. and William R. Gaffey, Ph.D.

Animal studies have shown that inhalation of vinyl chloride produces in rats angiosarcoma of the liver as well as cancers of the lung, kidney, skin and other sites. Although workers in occupations involving exposure to vinyl chloride have been found to have an increased risk of hemangiosarcoma, no excess of other cancers has so far been reported.

This historical prospective mortality study of 8384 men who had at least one year of occupational exposure to vinyl chloride before December 31, 1972, demonstrated that cancers of the digestive system (primarily angiosarcoma), respiratory system, brain, and cancers of unknown site, as well as lymphomas, occurred more often than expected in those members of the study population with the greatest estimated exposure. The mortality from other cancers was lower than that of the general male population, with the exception of cancers of the buccal cavity and pharynx. There was an excess of these cancers, which however was inversely related to estimated exposure. The explanation for the latter finding is not apparent.

The other major findings of the study are: (1) The overall mortality of the study population was approximately 75% of what would be expected in a comparable population of U.S. males; (2) No cause of death showed a statistically significant excess over what would be expected in a comparable U.S. male population; and, (3) No deaths identified as angiosarcoma of the liver were found other than those previously identified.

This is the first epidemiological study which suggests that in humans vinyl chloride may also be associated with cancer of multiple sites.

Drs. Tabershaw and Gaffey are from Tabershaw-Cooper Associates, Inc., Suite 308, 6000 Executive Blvd., Rockville, MD 20852.

*The research on which this report is based was supported by a group of companies engaged in the synthesis and/or the polymerization of vinyl chloride, and administered on their behalf by the Manufacturing Chemists Association.

Vinyl chloride in its manufacture and polymerization has been identified as a narcotizing agent,[1] as a liver toxin,[2,3] and as a vasospastic agent producing a specific occupational disease, acroosteolysis.[4] Recently, vinyl chloride has been incriminated as a carcinogen producing in a group of workers engaged in the manufacture of polyvinyl chloride a rare fatal liver tumor, hemangiosarcoma.[5] Large doses of the chemical in rats reportedly produced cancer of the skin, lung and other organs.[6] Unpublished but public information[7] indicates that inhalation experiments with rats in doses easily reached in manufacturing operations produces in addition to angiosarcoma of the liver, skin, kidney and other malignant lesions.

The present study, however, was not restricted to the conditions and sites suggested by the above investigations, but concerned itself with the entire spectrum of causes of death, to the extent permitted by the size of the study group. The objectives of the study were: (1) To compare the mortality of individuals who have worked in vinyl chloride plants with that of the general population; (2) To compare mortality patterns within the population of vinyl chloride workers, based upon estimated occupational exposure; and (3) To compare mortality among vinyl chloride workers with the mortality of other occupational groups.

The study population consisted of individuals from 33 plants who had worked for at least one year in a job involving exposure to vinyl chloride before December 31, 1972, and included retired and terminated as well as active workers. For each such worker the date of birth and an employment history were obtained, and the vital status of the worker as of December 31, 1972, was ascertained. For those found to have died, those death certificates that were available were obtained and the cause of death determined. The observed mortality was compared with that of the United States male population.

Data Collection

In each plant, data were collected for each worker stated by the plant management to have been employed for at least one year in a job involving exposure to vinyl chloride. In some plants, particularly those producing the monomer, this determination could be made on the basis of job titles. Usually, however, exposure was a function of both job title and the location of the job in the plant, so that the assessment of exposure had to be made on a case-by-case basis by plant officials.

Data were collected for as far back in time as complete records were kept. In most cases this covered the entire history of the plant. In others, records were kept for a fixed period such as a decade. In a few, records were kept for different periods, depending on whether the worker had died on the job or had left employment.

In most plants it was impossible to quantify exposure. However, industrial hygiene and safety personnel in each plant were able to identify certain jobs and locations as involving the highest exposures in the plant, and to classify other exposures as medium or low relative to the "high" represented by the jobs with the greatest exposure. Consequently, each exposed job in a worker's history was scored 1, 2, or 3 to indicate low, medium or high estimated exposure.

This gross classification has two major failings, as a result of the subjective nature of the estimates. The first is that the scores represent estimated relative exposure within a given plant. It is therefore possible that, in objective terms, a "high" score in one plant corresponds to a "medium" or even "low" score in another. The second is that the scores usually do not take into account changes in exposure over time. A worker with long service may therefore have had jobs in the remote past which involved "low" exposure relative to other jobs at that time, but which might be "high" in comparison with current exposures in the same job. This subjective classification is therefore of questionable validity in characterizing the exposure of a given worker. For epidemiological purposes, however, those who have high scores can reasonably be expected, on the average, to have had the greatest exposure, while those with low scores will have had the least, even though the true exposure in each group may vary considerably from person to person.

The estimated exposure history of each worker was summarized by calculating an Exposure Index (EI). This was done by multiplying the number of months on each job by the exposure score, totalling these overall exposed jobs, and dividing by the total number of months of exposure.

Follow-up of Study Population

A follow-up procedure was instituted for those who had left employment and whose vital status could not be determined at the local plant, using direct mail follow-up and retail credit bureau investigations. Table 1 shows the vital status of the population as of December 31, 1972. Follow-up is 85% complete. Those who were not found were born (and began their exposure) about ten years before the group on which follow-up was complete, and had about half the duration of employment in exposed jobs with a slightly higher EI. Although there appears to be nothing very unusual about this group in terms of work history and exposure, it is nevertheless true that their exposures took place further back in time than that of the group successfully traced. It is therefore possible that their mortality, after a substantial latent period, might show a somewhat different pattern from that of the traced group.

All of the subsequent analysis is concerned with the 7128 workers on whom follow-up was complete. Table 2 shows their distribution by duration of exposed employment and the year in which that employment began. Although almost half the study group first entered exposed employment in 1960 or later, there are nevertheless 854 workers with 20 years or more exposure, and 1640 with 15 years or more. Table 3 shows the relationship between duration of exposure and EI. There does not appear to be a close relationship between the EI

Table 1. — Follow-up Status of 8384 Vinyl Chloride Workers.

	Total	Alive	Dead	Unknown	Death Certificates	
					Rec'd.	Not Rec'd.
Number	8384	6776	352	1256	328	24
Percent	100.0	80.8	4.2	15.0	93.2	7.3

and the duration of exposure, that is workers with a higher EI do not differ substantially in duration of exposure from those with a lower EI. One implication is that in assessing the relationship between mortality and exposure, both duration and level of exposure can be examined separately, as well as in combination.

Table 2. — Distribution of Months in Exposed Employment by Year in Which Exposure Began, for 7128 Vinyl Chloride Workers with Completed Follow-up.

Year Exp. Started	Total	Months of Exposure							
		<60	60-119	120-179	180-239	240-299	300-359	360-419	Unknown
1970 39	35	2	4	1	4	6	13	5	
1940 49	1048	135	93	119	151	277	237	34	2
1950 59	1967	389	257	383	631	282			20
1960 69	3368	1714	1442	195					17
1970 71	715	715							
Total	7128	2955	1796	698	786	565	254	39	39

Calculation of Risk of Death

The risk of death is expressed as a Standardized Mortality Ratio (SMR), which is the ratio of the number of observed deaths in the study population to the number of deaths to be expected in a comparable population of U.S. males. SMR's were calculated for overall mortality and for 33 major cause groups.

Table 4 shows observed and expected deaths, and the SMR, for each of these causes for the total study group. In calculating the SMR's for specific causes, the 24 deaths for which no certificates were found were assumed to have the same cause distribution as those for which certificates were available.

In the standard population, each SMR would be equal to 100. Therefore, the statistical significance of the deviation of each SMR in the study population from the expected value of 100 was tested.[8] A single dagger indicates those SMR's which differed significantly from 100 at the 5% level, that is, which had a probability of .05 or less of occurring by chance. A double dagger indicates those which were significant at the 1% level. SMR's based on fewer than five observed cases were not tested for significance.

Table 5 shows the same SMR's for workers with an Exposure Index below 1.5 versus those at 1.5 or above. The dividing point of 1.5 represents a level halfway between "low" and "medium." Table 6 shows similar results for workers with less than five years exposure versus those with five years or more.

In order to examine the possible interaction between duration and level of exposure, the study population was divided into four groups on the basis of both EI (low vs high) and duration of exposure (short vs long) using the same dichotomization as Tables 5 and 6.

Table 7 shows the results for short versus long exposure in the low EI group, and Table 8 shows the same comparison in the high EI group.

In each of the above tables, deaths for which certificates had not been received were assumed to be distributed as a uniform percentage of all causes. The cause specific SMR's were therefore adjusted upward by a percentage which varied in each subgroup.

Results of Analysis

The overall mortality of the study population is statistically significantly lower than that of the U.S. male population. There were 352 observed deaths compared with 467 expected, for an SMR of 75.

Table 4 shows that no specific cause of death was statistically significantly greater than expected. Several, particularly heart disease, accidents and other diseases not detailed in the tables, were significantly below their expected values.

When the study population is divided according to intensity and duration of exposure (Tables 5 and 6) and combinations of these measurements (Tables 7 and 8) three major patterns emerge.

For malignant neoplasms as a whole, the SMR increases with increasing exposure, whether measured by level, duration, or both. In the high exposure group with 5 years or more exposure (Table 8) there are 36 observed cases and 26.11 expected.

For cardiovascular — renal diseases as a group, there are also increases in the SMR with increasing exposure, but the numbers of observed cases remain less than expected, the differences being statistically significant in all groups except the high exposure, long duration group in Table 8.

For all other causes, there are no consistent relationships with exposure.

Within the malignant neoplasms, the largest (although not statistically) significant SMR is in cancers of the buccal cavity and pharynx, with five observed, 2.84 expected, and an SMR of 189. However, Tables 5 to 8 show that all these cases have Exposure Indexes below 1.5 and four out of the five have less than five years exposure. Table 10 is a listing of these deaths with age at death, duration of exposure, and cause as stated on the death certificate.

Cancer of the digestive system shows

Table 3. — No. and % of 7128 Vinyl Chloride Workers by Months of Exposed Employment and Exposure Index.

Exposure Index	Total	Months of Exposure							
	No. %	<60 No. %	60-119 No. %	120-179 No. %	180-123 No. %	240-299 No. %	300-359 No. %	360-419 No. %	Unknown
1.0-1.4	4032 (100)	1715 (43)	1125 (28)	402 (10)	396 (10)	247 (7)	92 (2)	18 (0)	
1.5+	3057 (100)	1240 (41)	671 (22)	295 (10)	390 (12)	291 (10)	159 (5)	21 (1)	
Unknown	39								39
Total	7128 (100)	2955 (41)	1796 (25)	697 (10)	786 (11)	565 (8)	251 (4)	39 (1)	39 (1)

Table 4. — Observed Deaths Expected Deaths and Standardized Mortality Ratios in Vinyl Chloride Workers

Cause of Death with I.C.D. Number	Obs/Exp	SMR*
All causes	352/467.28	75 †
Tuberculosis (001-019)	3/5.71	19
Tuberculosis of respiratory system (001-008)	1/5.34	20
Malignant neoplasms (140-205)	79/77.16	110
Malignant neoplasms, buccal cavity and pharynx (140-148)	5/2.84	189
Malignant neoplasms, digestive organs and peritoneum (150-159)	19/21.67	94
Malignant neoplasms, respiratory system (160-164)	25/23.93	112
Malignant neoplasms, genital organs (170-179)	3/3.55	91
Malignant neoplasms, urinary organs (180-181)	3/5.60	30
Malignant neoplasms, other and unspecified sites (190-199)	17/11.75	155
Leukemia and aleukemia (204)	3/3.77	85
Lymphomas (200 201 205)	6/5.06	106
Diabetes mellitus (260)	7/6.31	120
Major cardiovascular and renal diseases (330-334, 400-468, 592-594)	155/207.46	80 †
Vascular lesions affecting CNS (330-334)	13/24.48	57 †
Rheumatic fever & chronic rheumatic heart dis. (400-402, 410-416)	5/6.87	78
Arteriosclerotic heart disease (420)	121/137.33	95
Nonrheumatic endocarditis (421, 422)	1/6.58	16
Hypertensive heart disease (440-443)	3/8.33	35
Other hypertensive disease (444-447)	3/2.60	124
Chronic & unspecified nephritis & renal sclerosis (592-594)	0/4.27	0
Influenza and pneumonia (480-493)	5/9.96	54 †
Ulcer of stomach and duodenum (540, 541)	2/3.83	56
Appendicitis (550-553)	0/0.66	0
Hernia and intestinal obstruction (560, 561, 570)	1/1.51	71
Gastritis, duodenitis, enteritis and colitis (543, 571, 572)	1/1.31	82
Cirrhosis of liver (581)	3/15.60	21
Hyperplasia of prostate (610)	0/0.39	0
Symptoms, senility and ill-defined conditions (780-795)	1/7.34	15
All other diseases (residual)	21/45.78	45 †
Motor vehicle accidents (810-835)	17/33.70	56 †
Other accidents (800-802, 840-962)	18/30.64	83 †
Suicide (963, 970-979)	16/16.83	102
Homicide (964, 980-985)	1/11.98	8
No. of years	[illegible]	[illegible]
Person-years	[illegible]	[illegible]

*SMR's adjusted for deaths with cause unknown.
†Significant at 5% level.
‡Significant at 1% level.

no excess in the study population as a whole. However, in those workers with an EI of 1.5 or higher, there are 12 observed cases where 9.14 are expected (Table 5). In the subgroup of the above workers with five years or more exposure, there are 11 observed cases and 7.47 expected.

Respiratory cancer shows a slight excess in the total group, and a similar pattern for different exposure categories, with 13 observed versus 10.28 expected when the Exposure Index is 1.5 or higher, and 12 observed versus 8.50 expected when, in addition, the duration of exposure is five years or more.

Malignant neoplasms of other and unspecified sites show an excess in the total group, and an increase with both level and duration of exposure (Tables 5 and 6). The relationship with exposure is more pronounced, since those with exposures of less than four years have fewer cases than expected.

The lymphomas, although occurring at about the expected rate when the whole group is considered, are concentrated almost entirely in the high exposure long duration group. In that category there are four cases observed and 1.84 expected.

Cancers of the genital and urinary organs, and leukemia, have fewer cases than expected. The number of cases is too small to examine any trends.

Discussion

The favorable overall mortality of the study population is a phenomenon commonly observed in working populations. Standardized Mortality Ratios in the low 80's and below have been found.[9] Even in occupations with well-demonstrated hazards which cause an increased risk from a specific cause, the overall mortality may still be favorable because of the low risk from other major causes of death, frequently in the cardiovascular — renal category.[11]

Table 5. — Observed Deaths, Expected Deaths and Standardized Mortality Ratios in Vinyl Chloride Workers, by Estimated Level of Exposure

Cause of Death with I.C.D. No.	EI < 1.5		EI ≥ 1.5	
	Obs/Exp	SMR*	Obs/Exp	SMR*
All Causes	188/278.33	70 *	157/195.68	80 *
Tuberculosis (001-019)	0/3.38	0	0/2.33	0
Tuberculosis of respiratory system (001-008)	0/3.16	0	0/2.18	0
Malignant neoplasms (140-205)	37/44.28	90	41/32.67	134
Malignant neoplasms, buccal cavity and pharynx (140-148)	5/1.62	330	0/1.21	0
Malignant neoplasms, digestive organs and peritoneum (150-159)	7/12.50	60 *	12/9.14	141
Malignant neoplasms, respiratory system (160-164)	11/13.56	86	13/10.28	135
Malignant neoplasms, genital organs (170-179)	2/2.30	93	1/1.43	75
Malignant neoplasms, urinary organs (180-181)	1/2.07	51	0/1.52	0
Malignant neoplasms, other and unspecified sites (190-199)	9/6.57	146	8/4.52	190
Leukemia and aleukemia (204)	1/2.18	49	2/1.57	136
Lymphomas (200-203, 205)	1/3.48	31	3/2.54	212
Diabetes mellitus (260)	5/3.65	146	2/2.65	81
Major cardiovascular and renal disease (330-334, 400-468, 592-594)	84/120.11	75 *	69/86.99	85 *
Vascular lesions affecting CNS (330-334)	7/14.42	52 *	6/10.06	64
Rheumatic fever & chronic rheumatic heart dis. (400-402, 410-416)	3/3.58	80	2/2.85	75
Arteriosclerotic heart disease (420)	68/78.94	92	51/58.05	95
Nonrheumatic endocarditis (421, 422)	0/4.20	0	1/2.89	38
Hypertensive heart disease (440-443)	1/5.48	19	2/3.86	56
Other hypertensive disease (444-447)	1/1.52	70	2/1.07	201
Chronic & unspecified nephritis & renal sclerosis (592-594)	0/2.50	0	0/1.77	0
Influenza and pneumonia (480-493)	5/5.80	92	0/4.13	0
Ulcer of stomach and duodenum (540-541)	1/2.21	48	1/1.60	68
Appendicitis (550-553)	0/0.39	0	0/0.27	0
Hernia and intestinal obstruction (560, 561, 570)	0/0.88	0	1/0.63	171
Gastritis, duodenitis, enteritis and colitis (543, 571-572)	0/0.76	0	1/0.55	196
Cirrhosis of liver (581)	2/8.90	23	1/6.64	16
Hyperplasia of prostate (610)	0/0.25	0	0/0.14	0
Symptoms, senility and ill-defined conditions (780-795)	0/4.22	0	1/3.09	34
All other diseases (residual)	14/21.90	68 *	6/15.89	41 *
Motor vehicle accidents (810-835)	8/19.08	45 *	9/13.46	72
Other accidents (800-802, 840-962)	11/17.83	66 *	6/12.67	50 *
Suicide (952, 970-979)	9/9.73	98	7/7.02	107
Homicide (964, 980-985)	0/6.98	0	1/4.94	21
No. of workers	4032		3057	
Person-years	45354		32108	

*SMR's adjusted for deaths with cause unknown

†Significant at 5% level.

‡Significant at 1% level.

In view of these facts, SMR's which are higher than expected may be worthy of attention even if they are not statistically significant. This is especially true in the present study since the number of deaths from many causes is quite small, and even a relatively high SMR may not reach statistical significance.

If, in addition, a particular cause shows a consistent pattern of increase with exposure or estimated exposure, the findings are particularly interesting. By these criteria, mortality from digestive cancer, respiratory cancer, cancer of other and unspecified sites, and lymphomas, appear to be related to exposure as defined in this study.

In view of the association between vinyl chloride exposure and angiosarcoma of the liver, the digestive cancers were examined further to see what contribution angiosarcoma made to the observed mortality pattern.

Of the 19 digestive cancers, seven were liver cancers, of which two were angiosarcomas according to the death certificate. However, among angiosarcoma deaths in vinyl chloride workers identified by other investigators, there were six which occurred in the present study population during the study period. They were all found in the course of the study. Table 11 shows these cases with the cause of death as given on the death certificate. Note that one case was certified as cirrhosis, and was so considered throughout this study, since the validity of comparisons with population data required that cause of death be determined only from information on the death certificate. The other five were correctly classified as

Table 6. — Observed Deaths Expected Deaths and Standardized Mortality Ratios in Vinyl Chloride Workers by Duration of Exposed Employment

Cause of Death with I.C.D. No.	< 60 months		≥ 60 months	
	Obs./Exp.	SMR*	Obs./Exp.	SMR*
All causes	94/140.53	67 °	251/321.30	78 °
Tuberculosis (001-019)	0/2.23	0	0/3.55	0
Tuberculosis of respiratory system (001-008)	0/2.07	0	0/3.33	0
Malignant neoplasms (140-205)	13/19.96	78	65/57.61	116
Malignant neoplasms, buccal cavity and pharynx (140-148)	4/6.78	688	1/2.16	47
Malignant neoplasms, digestive organs and peritoneum (150-159)	2/5.26	46	17/16.56	106
Malignant neoplasms, respiratory system (160-164)	3/5.52	65	21/18.51	116
Malignant neoplasms, genital organs (170-179)	0/0.99	0	3/2.76	112
Malignant neoplasms, urinary organs (180-181)	0/0.83	0	1/2.79	37
Malignant neoplasms, other and unspecified sites (190-199)	2/3.40	71	15/8.23	187
Leukaemia and aleukaemia (204)	1/1.25	96	2/2.53	81
Lymphomas (200 203 205)	1/2.01	60	5/4.07	125
Diabetes mellitus (260)	2/1.80	134	5/4.54	117
Major cardiovascular and renal diseases (330-334, 400-468, 592-594)	28/51.45	85 °	125/157.39	81 °
Vascular lesions affecting CNS (330 334)	4/5.97	91	9/18.71	69 °
Rheumatic fever & chronic rheumatic heart dis. (400-402, 410-416)	2/2.39	101	3/4.53	68
Arteriosclerotic heart disease (420)	21/32.54	70 °	90/105.39	96
Nonrheumatic endocarditis (421, 422)	0/1.79	0	1/5.35	20
Hypertensive heart disease (440-443)	1/2.42	69	2/7.01	30
Other hypertensive disease (444-447)	0/0.39	0	3/1.82	170
Chronic & unspecified nephritis & renal sclerosis (592-594)	0/1.55	0	0/2.76	0
Influenza and pneumonia (480-493)	3/2.93	123	2/7.09	29
Ulcer of stomach and duodenum (540, 541)	1/1.07	112	1/2.78	37
Appendicitis (550-553)	0/0.24	0	0/0.63	0
Hernia and intestinal obstruction (560, 561, 570)	0/0.42	0	1/1.10	93
Gastritis, duodenitis, enteritis and colitis (543, 571, 572)	1/0.40	101	0/0.92	0
Cirrhosis of liver (581)	1/4.49	26	2/11.18	18
Hyperplasia of prostate (610)	0/0.07	0	0/0.33	0
Symptoms, senility and ill-defined conditions (780-795)	1/2.28	53	0/5.09	0
All other diseases (residual)	6/11.97	60	15/26.34	63
Motor vehicle accidents (810-835)	10/16.14	75	7/16.65	43 °
Other accidents (800-802, 840-962)	7/12.94	65 °	10/17.82	58 °
Suicide (963, 970-979)	6/6.34	114	10/10.28	100
Homicide (964, 980-985)	1/5.00	20	0/6.20	0
No. of Workers	2905		4134	
Person-years	34281		41248	

* SMR's adjusted for deaths with cause unknown.
° Significant at 5% level.
° Significant at 1% level.

Table 7. — Observed Deaths Expected Deaths and Standardized Mortality Ratios in Vinyl Chloride Workers with Exposure Indices Below 1.5, by Duration of Exposed Employment.

Cause of Death with I.C.D. No.	< 60 Months Exposure		≥ 60 Months Exposure	
	Obs/Exp	SMR*	Obs/Exp	SMR*
All Causes	56.99/73	63*	132.78/178	73*
Tuberculosis (001-019)	0/1.41	0	0/1.97	0
Tuberculosis of respiratory system (non-pul)	0/1.31	0	0/1.85	0
Malignant neoplasms (140-205)	8/12.86	73	29/31.46	95
Malignant neoplasms, buccal cavity and pharynx (140-148)	4/8.45	1036	1/1.17	88
Malignant neoplasms, digestive organs and peritoneum (150-159)	1/3.43	34	6/9.08	68
Malignant neoplasms, respiratory system (160-164)	2/3.58	65	9/10.00	93
Malignant neoplasms, genital organs (170-179)	0/0.68	0	2/1.62	127
Malignant neoplasms, urinary organs (180-181)	0/0.55	0	1/1.53	67
Malignant neoplasms, other and unspecified sites (190-199)	1/0.97	120	8/4.43	187
Leukemia and aleukemia (204)	0/0.79	0	1/1.40	73
Lymphomas (200-203, 205)	0/1.26	0	1/2.23	46
Diabetes mellitus (260)	2/1.15	203	3/2.50	124
Major cardiovascular and renal diseases (330-334, 400-468, 592-594)	21/33.38	73	63/86.82	75*
Vascular lesions affecting CNS (330-334)	2/3.93	59	5/10.51	49*
Rheumatic fever & chronic rheumatic heart dis. (400-402, 410-416)	2/1.50	155	1/2.49	41
Arteriosclerotic heart disease (420)	16/21.14	88	52/57.87	93
Nonrheumatic endocarditis (421,422)	0/1.18	0	0/3.02	0
Hypertensive heart disease (440-443)	1/1.38	74	0/3.90	0
Other hypertensive disease (444-447)	0/0.50	0	1/1.02	101
Chronic & unspecified nephritis & renal sclerosis (592-594)	0/0.97	0	0/1.53	0
Influenza and pneumonia (480-493)	3/1.86	188	2/3.95	53
Ulcer of stomach and duodenum (540-541)	0/0.68	0	1/1.53	67
Appendicitis (550-553)	0/0.15	0	0/0.24	0
Hernia and intestinal obstruction (560, 561, 570)	0/0.27	0	0/0.61	0
Gastritis, duodenitis, enteritis and colitis (543, 571, 572)	0/0.26	0	0/0.51	0
Cirrhosis of liver (581)	1/2.80	42	1/6.09	16
Hyperplasia of prostate (610)	0/0.05	0	0/0.20	0
Symptoms, senility and ill-defined conditions (780-795)	0/1.43	0	0/2.79	0
All other diseases (residual)	4/7.65	63	10/12.92	79
Motor vehicle accidents (810-835)	3/9.87	35	5/9.22	56
Other accidents (800-802, 840-962)	3/7.98	44	8/9.85	83
Suicide (963, 970-979)	3/4.08	86	4/5.66	109
Homicide (964, 980-985)	0/1.55	0	0/3.43	0
No. of Workers	1719		2317	
Person-years	22418		23020	

*SMR's adjusted for deaths with cause unknown.
†Significant at 5% level.
‡Significant at 1% level.

Table 8. — Observed Deaths-Expected Deaths and Standardized Mortality Ratios in Vinyl Chloride Workers with Exposure Indices of 1.5 or Greater, by Duration of Exposed Employment.

Cause of Death with I.C.D. No.	< 60 Months Exposure		≥ 60 Months Exposure	
	Obs/Exp	SMR*	Obs/Exp	SMR*
All Causes	38/47.93	79	119/147.81	81
Tuberculosis (001-019)	0/0.76	0	0/1.57	0
Tuberculosis of respiratory system (001-008)	0/0.71	0	0/1.48	0
Malignant neoplasms (140-205)	5/6.57	96	36/26.11	141
Malignant neoplasms, buccal cavity and pharynx (140-148)	0/0.23	0	0/0.95	0
Malignant neoplasms, digestive organs and peritoneum (150-159)	1/1.67	76	11/7.47	151
Malignant neoplasms, respiratory system (160-164)	1/1.79	71	12/8.58	144
Malignant neoplasms, genital organs (170-179)	0/0.29	0	1/1.41	73
Malignant neoplasms, urinary organs (180-181)	0/0.26	0	0/1.26	0
Malignant neoplasms, other and unspecified sites (190-199)	1/1.18	107	7/3.51	204
Leukemia and aleukemia (204)	1/0.44	228	1/1.13	90
Lymphomas (200 203, 205)	1/0.71	178	4/1.84	222
Diabetes mellitus (260)	0/0.61	0	2/2.04	100
Major cardiovascular and renal diseases (330-334, 400-468, 592-594)	7/16.54	54	62/70.46	90
Vascular lesions affecting CNS (330-334)	2/1.87	135	4/8.19	50
Rheumatic fever & chronic rheumatic heart dis. (400-402, 410-416)	0/0.32	0	2/2.04	100
Arteriosclerotic heart disease (420)	5/10.41	61	46/47.65	98
Nonrheumatic endocarditis (421, 422)	0/0.57	0	1/2.32	44
Hypertensive heart disease (440-443)	0/0.76	0	2/3.16	86
Other hypertensive disease (444-447)	0/0.27	0	2/0.81	253
Chronic & unspecified nephritis & renal sclerosis (592-594)	0/0.54	0	0/1.23	0
Influenza and pneumonia (480-493)	0/0.99	0	0/3.13	0
Ulcer of stomach and duodenum (540-541)	1/0.35	362	0/1.25	0
Appendicitis (550-553)	0/0.08	0	0/0.19	0
Hernia and intestinal obstruction (560, 561, 570)	0/0.14	0	1/0.49	209
Gastritis, duodenitis, enteritis and colitis (543, 571, 572)	1/0.14	904	0/0.41	0
Cirrhosis of liver (581)	0/1.56	0	1/5.08	20
Hyperplasia of prostate (610)	0/0.01	0	0/0.13	0
Symptoms, senility and ill-defined conditions (780-795)	1/0.80	158	0/2.30	0
All other diseases (residual)	0/4.02	0	6/11.85	51
Motor vehicle accidents (810-835)	2/0.05	146	2/7.43	28
Other accidents (800-802, 840-962)	4/3.73	107	2/7.96	25
Suicide (963, 970-979)	1/2.40	158	4/4.62	86
Homicide (964, 980-985)	1/2.18	58	0/2.76	0
No. of Workers	1240		1817	
Person-Years	23028		29385	

*SMR's adjusted for deaths with cause unknown.
†Significant at 5% level.
‡Significant at 1% level.

Table 9. — Other Malignancies (190-199, I.C.D.) in VDM Epidemiology Study Population.

Study No.	Age at Death	Mos. Exposed	Cause as Given	Autopsy
2744	38	186	Widespread metastatic melanoma (1 yr.) Malignant melanoma of back	yes
3700	48	50	Malignant melanoma with widespread metastases	no
2096	67	69	Brain tumor (carcinoma) (8 mos.)	
3946	43	64	Meningitis and pneumonitis (5 wks.) Ependymoma, fourth ventricle brain (2 mos. post-op craniotomy)	no
4433	54	81	Astrocytoma, malignant-left cerebral hemisphere (1 yr.)	yes
4800	61	51	Carcinoma of the brain Arteriosclerosis Pneumonia due to static congestion	no
7279	57	271	Brain tumor, glioblastoma multiforme (18 mos.)	
7300	44	211	Brain tumor, malignant (2 mos.)	
7371	58	249	Brain tumor, malignant	no
7306	53	216	Thyroid carcinoma with metastases	no
5769	52	239	Carcinomatosis Carcinoma of vertebral body	yes
5246	67	201	Liposarcoma with metastases (3 mos.)	yes
2850	64	133	Carcinomatosis, primary region not known (Past history, rheumatoid arthritis, myocardial infarction)	no
4778	54	300	Cardiac arrest (1 hr.) Respiratory arrest and cerebral hypoxia (2 days) Widespread metastatic carcinoma (2 mos.)	
4786	61	118	Generalized metastasis undifferentiated (7 mos.) Squamous cell carcinoma, primary site undetermined	yes
5783	68	166	Metastatic carcinoma of abdomen Cricoid site undetermined (Pulmonary emphysema)	
7381	55	133	Carcinomatosis (4 mos.) Primary site undetermined	no

liver cancer, but only two were specified as angiosarcoma.

If there had been no angiosarcomas, the number of deaths classified as cirrhosis in this study would have decreased by one, and the number classified as digestive cancer would have decreased by five. The pattern of duration and intensity of exposure in these five cases was such that if they had not been present there would have been no relationship between exposure and digestive cancer. The mortality pattern in this cause group is therefore attributable to angiosarcomas of the liver.

The other cause group worth further investigation is cancer of other and unspecified sites, both because it is a heterogeneous category and because it seems, unlike the other cancers, to be more related to duration than to level of exposures.

Table 9 shows a list of the specific causes included in this category, which is essentially brain cancer and generalized cancer with primary site unknown. About 40% of the observed deaths were due to brain cancer. In the general male population, about 22% of this category is due to brain cancer, so that not only is the mortality from cancer of other and unspecified sites excessive, but brain cancer is overrepresented within the category.

The possibility exists based on the lack of specificity of some of the listed causes that some of the brain cancers were not primary, but metastases from another unidentified site such as the lung.

The cancers of the buccal cavity and pharynx are difficult to explain because of their occurrence in the low exposure, short-exposure group. It is possible that this is a chance occurrence, that exposures to other substances were involved, or that the mouth and pharynx may be peculiarly susceptible because of the gaseous nature of the chemical.

Possible Biases in the Calculation of Risk

There are two major potential sources of bias in the study. The first is that the follow-up rate is lower than is desirable. The second is that observations of workers with long exposures followed by a long latent period are not adequately represented, so that the power of the study to detect causes of death associated with long exposure and long latency is impaired. Populations with such characteristics exist and should be investigated.

Table 10. — Malignant Neoplasms of Buccal Cavity and Pharynx (140-148, I.C.D.) in VCM Epidemiology Study Population.

Study No.	Age at Death	Mos. Exposed	Cause as Given	Autopsy
3003	31	49	Carcinoma of lip with metastases to lung and neck (5 yrs.)	no
3431	56	30	Pulmonary edema (50 mos.) Pulmonary metastases (Carcinoma, epidermoid, tongue and mandible)	no
3001	57	71	Metastatic squamous cell ca. primary lesion palate	yes
7365	54	40	Abstetrics due to metastases to mediastinum (4 mos.) Multiple malignant metastases to brain, liver & mediastinum (1 yr.) Adeno-carcinoma of nasal pharynx (2 yrs.)	yes
3354	63	26	Massive hemorrhage into trachea-tree Status post laryngo-pharyngectomy, left radical neck dissection Well-differentiated keratinizing squamous cell carcinoma of left pyriform sinus (mets.)	yes

Table 11. — Angiosarcoma Deaths in VCM Epidemiology Study Population.

Study No.	Age at Death	Mos. Exposed	Cause as Given	Autopsy
4250	54	203	Cirrhosis of liver (sev. years)	yes
4255	66	281	Bleeding from hepatoma (3 days) (Laennecs cirrhosis)	yes
5765	45	167	Angiosarcoma rt. lobe of liver (10 mos.)	yes
7303	38	174	Liver failure (1 mo.) Cancer of liver - primary (15 mos.)	
7376	52	238	Cardiac tamponade and massive left hemothorax (mets.) Widely metastatic angiosarcoma of liver (4 mos.)	
7385	43	314	Hepatic failure Primary carcinoma liver	yes

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Special Communication

Angiosarcoma of Liver in the Manufacture of Polyvinyl Chloride

Three reported cases of angiosarcoma of the liver serve as an alert to the probability that this condition may, in some instances, be causally related to employment in the manufacture of polyvinyl chloride resins.

J. L. Creech, Jr., M.D. and M. N. Johnson, M.D.

On January 22-23, 1974, a manufacturer of polyvinyl chloride and copolymers notified it's employees, the National Institute of Occupational Safety and Health, the Kentucky State Department of Labor, and the public, that three workers had died of angiosarcomas of the liver. These cases had as a common denominator employment in the manufacture of polyvinyl chloride resins.

A patient of one of the authors (J.L.C., Jr.) died on September 27, 1971 from an angiosarcoma of the liver. At that time the potential causal relation to the manufacture of polyvinyl chloride resins was not realized. Although other clinical manifestations of exposure to VCM were known (acroosteolysis), only one experimental paper[1] indicated that vinyl chloride may be a carcinogen. The tumors in rats that he described occurred primarily in the skin and were epidermoid in origin.

Eighteen months later on March 3, 1973, a second former employee in the Louisville plant died. Since he was not under our care, no connection was made that the two cases may have had a common origin. When a third patient died on December 19, 1973, the pathologist on gross examination diagnosed an angiosarcoma of the liver. Since all three patients were treated by different physicians, no relationship to exposure to polyvinyl chloride was surmised until the authors, recognizing the rarity of the tumor, and learning that all three had worked in the PVC plant, brought the matter to the attention of the company. Further search indicates that a fourth death from angiosarcoma may have occurred five years earlier (1968), but the death certificate shows primary liver tumor as the cause of death. (Clinical, epidemiologic, toxicological and occupational investigations are being vigorously pursued with regard to other employees who may have been similarly exposed.)

A brief resume of the first case under our care is presented. The history, clinical course, and pathologic findings are consistent with the others who died of angiosarcoma. These cases will be presented in a group and in more detail at a future date.

Case Report

Patient one, a 36-year old white male, was hospitalized January 5, 1970 because of tarry stools.

Occupational History.— The patient had been employed from November 1955 until his illness, except for two lay-offs of nine months in 1958 and six months in 1959, as a chemical helper and operator in the Louisville plant of B. F. Goodrich Chemical Company in the manufacture of polyvinyl chloride resins.

Present Illness.— At the time of admission the patient had no complaints except passage of tarry stools. Past history was negative except for an operation for hemorrhoids four years earlier. Physical examination showed pallor, and black stool on rectal examination. Liver and spleen were not palpable. Although upper G-I series was interpreted as normal, a tentative diagnosis was made of bleeding duodenal ulcer.

On diet and medication, the patient had no recurrence of

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the three provisions, which occurred last fall. While OSHA agreed to reopen the rule and proposed a variety of minor modifications to the expanded standard to satisfy OMB, it stood by its original intent and its justifications for the provisions, saying additional information "has, by and large, not convinced OSHA that significant changes are warranted" (17 OSHR 1499, 1548).

While various industry interests had urged OMB to suspend application of the expanded rule to certain industry sectors, or to the entire non-manufacturing sector until the disputes were resolved and new rulemaking completed, OMB said it was moved to make the "regrettable" decision that the majority of the standard should move ahead while the remainder is resolved.

"[T]he confusion and potential paperwork duplication resulting from the delayed agency rulemaking, while regrettable and avoidable, do not, on balance, outweigh the value of putting into effect the key components of the standard," OMB said.

OSH Act Vs. Paperwork Act

The disapproved portions of the rule first appeared as parts of OSHA's expanded standard, which was published in August 1987 with a May 23 effective date (17 OSHR 507, 520). The budget office, using its authority under the Paperwork Reduction Act, reviewed the revised rule and disapproved the three provisions in an Oct. 23, 1987, decision. In addition, OMB instructed OSHA to reconsider its definition of "article," as used in the standard (17 OSHR 907, 918).

OMB argued that OSHA's public record did not support the additional "information collection" provisions, and that comments submitted to the budget office from the regulated community indicated that the provisions would prove costly and burdensome to employers.

OMB's reaffirmation of that decision April 13 was in response to OSHA's request March 7 for extension of OMB's paperwork collection approval of the provisions of the standard not contested last fall. OMB extended its approval "of all collection of information requirements in the [standard] through April 1991, except the three provisions that we disapproved on October 23, 1987."

In addition, OMB approved the agency's definition of an "article" as used in an exemption to the standard, with the understanding that OSHA's intent is to exempt unlikely hazardous chemical exposure risks to workers from what it considers to be articles. OMB accepted an explanation tendered by OSHA Administrator John A. Pendergrass in a Jan. 14 letter to the budget office, which was appended to the agency's March 7 extension request. Pendergrass clarified that "absent evidence that releases of such very small quantities could present a health hazard to employees, the article exception to the rule's requirements would apply" (17 OSHR 1331, 1360).

OMB Response To Proposal Pending

In accepting this proviso from OSHA, the budget office did not acknowledge or discuss OSHA's formal rulemaking proposal to respond to OMB's paperwork concerns about the hazard standard, which currently is under review (17 OSHR 1499, 1546). In that revision, OSHA made minimal accommodations to address OMB's objections, including an adjustment to the article definition to exclude fluids and particles and exempt "minute quantities," described as trace amounts or molecules.

OMB is expected to respond separately to the additional rulemaking proposed by OSHA to address MSDSs on multi-employer work sites, as well as consumer products and drugs. OSHA has stated that it does not anticipate concluding such rulemaking—provided it satisfies OMB—until late this year, or at least four or five months after the rest of the expanded rule goes into effect.

The hazard communication standard, which currently covers manufacturers, distributors, and importers, is designed to protect workers from exposure to hazardous substances through the use of written programs, information and training, labeling of chemical containers, and distribution and maintenance of material safety data sheets about chemical substances in the workplace.

Research

HIGH DEATH RATES FROM LIVER CANCER, LYMPHOMAS FOUND IN WEST VIRGINIA WORKERS

Employees at three Union Carbide Co. chemical plants in West Virginia have died from liver cancer and malignancies of the lymphatic system at significantly higher rates than normal, according to newly published results of a study by a team of researchers from Union Carbide and the National Institute for Occupational Safety and Health.

The researchers identified what they said could have been a possible work-related cause for the high rate of liver cancers: occupational exposure to vinyl chloride, a known liver carcinogen no longer used at any of the plants.

However, they said they were unable to determine, one way or the other, whether similar chemical exposures may have been responsible for the higher-than-expected mortality rate from malignant lymphomas, or whether the abnormally high number of deaths was just "a matter of chance." But by the same token, they said they could not conclusively rule out possible workplace factors in those cases.

NIOSH and Union Carbide have begun a series of more closely focused follow-up investigations that they hope will clarify those questions, one of the researchers told BNA April 18.

Although preliminary results from the study were released in 1986—and efforts were undertaken at that time to warn Union Carbide workers found to be potentially at high risk—the publication of the report in the latest issue of the *American Journal of Industrial Medicine* marks the first detailed public release of the data, BNA was told.

Triggered By Brain Cancer Findings

The study, which began in 1979, looked at deaths up through 1978 among 29,139 men who had worked from 1940 through 1978 at three Union Carbide facilities located just outside Charleston, the state capital, in West Virginia's Kanawha Valley.

The researchers noted that the study was prompted by several factors—among them, the fact that an earlier Union Carbide investigation showed a high mortality rate from brain cancer among several hundred former employees of the company (16 OSHR 827).

The joint study, however, found that workers from the three Kanawha Valley facilities suffered fewer deaths from brain cancer than would be expected from looking at comparable deaths in the general U.S. white male population. Twenty-eight deaths from malignant neoplasms of the brain were found in the study group, compared with 41.2 deaths expected, the researchers said.

In fact, the study found fewer deaths from cancer in general than expected, as well as fewer overall deaths than anticipated. The researchers ascribed these general findings to the so-called healthy worker effect: the hypothesis that

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workers, as a category, are healthier on the average than the general population.

But the number of liver cancer deaths, 17, was significantly higher than the 9.7 expected, the study said, as was the number of deaths from malignant lymphomas: 48 observed versus 34 expected.

Most of the liver cancer deaths occurred in workers who were employed for more than 10 years in operations where vinyl chloride resins were produced, the study said. The high rate of such deaths in this group "could very well be the cause of the excess liver cancer deaths seen in the overall cohort," according to the researchers.

No Apparent Trend For Lymphomas

The study failed to find similar associations for the malignant lymphomas, which were sub-categorized as either lymphosarcomas or reticulosarcomas. According to the report, those cases failed to show any "apparent pattern or trend" when the researchers looked at two factors important for drawing a connection between cancer cases and possible workplace causes: the length of time the victims worked at the plants, and the length of time between their initial exposure to chemicals at the plants and their deaths.

Also, the fact that vinyl chloride is a recognized liver carcinogen made it an "obvious hypothesis" from the outset that the liver cancers might be traced to departments where the chemical was used, NIOSH investigator Elizabeth Ward told BNA. No similar hypothesis was present for the lymphoma cases, she said.

The higher-than-expected number of lymphoma deaths "could conceivably be a matter of chance," the report said. It added, however: "We do not consider the absence of trends by latency or duration of employment to be evidence against an occupational association, since such trends could have been obscured by the larger cohort."

Follow-Up Investigations

Ward told BNA that the institute and Union Carbide will follow up on the study in two ways. As one initiative, they will conduct a series of studies examining death rates among workers exposed to particular chemicals. Simultaneously, they will conduct "case control studies" focusing on specific deaths found in the three-plant cohort, to look at factors surrounding those deaths.

Two of the studies already have begun, Ward said. In one, researchers are trying to determine which of the 29,000-plus workers in the study cohort were exposed to ethylene oxide, and how many of those workers have died. In the other, researchers are looking more closely at the malignant lymphoma deaths.

Union Carbide officials said that workers at the three plants were informed of the findings of the study early in 1986, when preliminary data became available. Results were posted at the plants, and two sets of letters were sent directly to employees: one set to all current employees and retirees at the plants, and another to those employees who had worked with vinyl chloride, the officials said.

Dr. Don Teter, medical director at one of the plants, Union Carbide's South Charleston facility, said that the letters to the "high-risk," vinyl chloride-exposed workers discussed the liver cancer findings, advised the workers to pass the information on to their personal physicians as well, and suggested that the workers have medical examinations annually. The letters also included Teter's phone number for further information, and Teter told BNA that he "got responses from a number of [the recipients]."

Regulatory Reform

AGENCIES SHOULD STATE HOW MUCH RULES COST PER LIFE SAVED, DRAFT RECOMMENDATION SAYS

When federal agencies such as the Occupational Safety and Health Administration issue regulations designed to save human lives, they should state explicitly how many dollars the rule will cost to implement per life saved, according to a draft recommendation that an Administrative Conference of the United States committee revised April 15.

The Committee on Regulation soon will send the draft to federal agencies for comment, according to Jeffrey Lubbers, research director for the Administrative Conference. If necessary, the committee will again revise the draft to reflect agencies' comments, and will present the recommendation to the Administrative Conference's plenary session in June, he said.

The recommendation is based on a report by an American University economics professor and a Boston University law school professor (17 OSHR 1506).

One part of the recommendation would require agencies to state how much rules would cost to implement, expressed in dollars per life saved. This suggestion would apply to "agencies that adopt regulations on the justification that the number of lives subsequently saved warrants incurring the associated compliance costs," according to the draft language developed by the committee April 15.

Noting Imprecisions

If an agency is unable to determine a dollar amount because a regulation's costs or benefits are based on conjecture, or where the price tag is not obvious—such as rules designed to protect or enhance aesthetic gains—the agency should try to describe what part of its calculation is imprecise, the draft said.

The rest of the draft recommendation revolves around how agencies should go about stating the dollar value of regulations per life saved.

The committee suggested that the Office of Management and Budget create a central clearinghouse for research data on how agencies value human life. Additionally, OMB each year should update its discussion of how different agencies conduct this valuation, the committee said in its draft.

The draft noted that OMB began this discussion in its 1987-88 edition of the government's annual regulatory program, a Reagan administration innovation that spells out, with timetables, every agency's rulemaking intentions (17 OSHR 20).

The draft said agencies should also continue developing appropriate methods in placing values on human life, recognizing that current methods do not incorporate all variables affecting social valuations of human life.

The Administrative Conference was chartered to identify the causes of delay, inefficiency, and unfairness in administrative procedures. Composed of presidential appointees from the public and private sectors, the conference makes non-binding recommendations to the president, Congress, government agencies, and courts on administrative law issues.

Right-To-Know

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NRDC v. EPA

U.S. Court of Appeals
District of Columbia Circuit

NATURAL RESOURCES DEFENSE COUNCIL, INC., Petitioner v. U.S. ENVIRONMENTAL PROTECTION AGENCY and LEE THOMAS, ADMINISTRATOR, U.S. ENVIRONMENTAL PROTECTION AGENCY, Respondents, No. 85-1150, November 4, 1986

AIR

Federal, state, and local regulation — Hazardous emission standards (§48.27)

Court jurisdiction and procedure — Subject matter jurisdiction (§58.05)

[1] U.S. Court of Appeals has jurisdiction to review challenge by citizen group to Environmental Protection Agency's withdrawal of proposed vinyl chloride standards under Clean Air Act, even though group is challenging both original 1976 standards and EPA's 1985 decision to withdraw proposal for stricter standards, because: (1) challenge is directed to agency reliance on allegedly improper factors in 1985 decision, and (2) court's invalidation of withdrawal decision would not invalidate 1976 standards.

Federal, state, and local regulation — Hazardous emission standards (§48.27)

Court jurisdiction and procedure — Exhaustion of administrative remedies (§58.25)

[2] Citizen group properly exhausted administrative remedies before challenging Environmental Protection Agency's withdrawal of proposed vinyl chloride standards under Clean Air Act, even though group did not participate in public comment process for proposed standards, because: (1) EPA considered issues raised in court challenge when withdrawing proposed standards; (2) group is not required to exhaust administrative remedies if agency considered same issues during rulemaking process; and (3) Air Act does not require that group must participate in regulatory action before bringing court challenge.

Federal, state, and local regulation — Hazardous emission standards (§48.27)

Federal, state, and local regulation — Administrative agencies — Procedure before agencies (§48.621)

[3] Environmental Protection Agency may consider factors other than public health in issuing vinyl chloride standards under Section 112 of Clean Air Act, because: (1) Act requires agency to issue standards with "ample margin of safety" to protect public health; (2) EPA has discretion to determine ample margin of safety; (3) Congress recognized uncertainty exists in determining margin of safety, and did not prohibit emissions of hazardous air pollutants; and (4) Act is ambiguous concerning factors agency may consider in setting standards. However, Act does not allow agency to limit consideration to cost and feasibility factors.

Federal, state, and local regulation — Hazardous emission standards (§48.27)

Federal, state, and local regulation — Administrative agencies — Procedure before agencies (§48.621)

[4] Environmental Protection Agency may consider factors other than public health in preparing standards for vinyl chloride emissions under Clean Air Act, because: (1) Congress did not intend to preclude agency from considering other factors in issuing standards; (2) "margin of safety" for public health included in Section 112 allows agency discretion in dealing with scientific uncertainty; and (3) agency's review of economic and technological feasibility factors was reasonable in absence of congressional direction.

STATUTES

Federal — Clean Air Act — Hazardous emission standards (§95.0315)

Construed.

On petition for review of Environmental Protection Agency withdrawal of proposed standards for vinyl chloride under Clean Air Act; petition denied.

David Doniger, Washington, D.C. for petitioner Natural Resources Defense Council Inc.

Earl Salo, EPA, and Margaret N. Strand, U.S. Dept. of Justice, Washington, D.C., for respondent EPA.

Robert Brager, Washington, D.C. for intervenor Vinyl Institute.

Frederic P. Andes, Martha Beauchamp, Arnold Block, Neil King, Stark Ritchie, Arthur F. Sampson III, and David F. Zoll, Washington, D.C. for *amici curiae* American Petroleum Institute and Chemical Manufacturers Association.

Robert V. Percival, Washington, D.C., for *amicus curiae* Environmental Defense Fund.

Before Robert H. Bork, Harry T. Edwards, and J. Skelly Wright, Circuit Judges.

Full Text of Opinion

BORK, *Circuit Judge:* — Petitioner Natural Resources Defense Council ("NRDC") challenges the Environmental Protection Agency's ("EPA" or "agency") withdrawal of proposed regulations governing the emissions of vinyl chloride. The NRDC claims that section 112 of the Clean Air Act, 42 U.S.C. §7412 (1982), pursuant to which the EPA regulates hazardous pollutants such as vinyl chloride, allows consideration of no factors other than health in setting the level of regulation. Because the Administrator relied on economic and technological factors in withdrawing the proposed regulations, the NRDC contends that the withdrawal was arbitrary and capricious and asks that we vacate the agency's action and remand for further proceedings. We believe, however, that the statute vests the Administrator with some discretion in setting regulations under section 112, but does not specify precisely how that discretion is to be exercised. Accordingly, under *Chevron U.S.A. v. Natural Resources Defense Council*, 467 U.S. 837 [21 ERC 1049] (1984), we must uphold the agency's selection of factors to employ in fleshing out its authority if we find the agency's choice a reasonable one. Because we believe that the agency's choice of economic and technological feasibility was reasonable, we affirm the agency's action.

I.

Section 112 of the Clean Air Act provides for regulation of hazardous air pollutants, which the statute defines as "air pu[llutant[s] to which no ambient air quality standard is applicable and which in the judgmen[t of the Administrator cause[], or contribute[] to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." 42 U.S.C. §7412(a)(1) (1982). The statute requires the Administrator to publish a list containing each hazardous pollutant for which he intends to adopt an emission standard to publish proposed regulations and a notice of public hearing for each such pollutant, and then, within a specified period, either promulgate an emission standard or make a finding that the particular agent does not amount to a hazardous air pollutant. *See* 42 U.S.C. §7412(b) (1982). The statute directs the Administrator to set any emission standard promulgated under section 112 "at the level which in his judgment provides an ample margin of safety to protect the public health." 42 U.S.C. §7412(b)(1)(B) (1982). The question before us is whether this standard permits the Administrator to consider economic and technological feasibility.

This case concerns vinyl chloride regulations. Vinyl chloride is a gaseous synthetic chemical used in the manufacture of plastics and is a strong carcinogen. In late 1975, the Administrator issued a notice of proposed rule-making to establish an emission standard for vinyl chloride. 40 Fed. Reg. 59,532 (1975). In the notice, the EPA asserted that available data linked vinyl chloride to carcinogenic, as well as some noncarcinogenic, disorders and that "[r]easonable extrapolations" from these data suggested "that present ambient levels of vinyl chloride may cause or contribute to . . . [such] disorders." *Id.* at 59,533. In so deciding, the agency noted that vinyl chloride was "an apparent non-threshold pollutant," which means that it appeared to create a risk to health at all non-zero levels of emissions, but that scientific uncertainty, due to the unavailability of does-response data, made it impossible to establish any definite threshold level of adverse effects to human health. *Id.* at 59,534. In the face of this uncertainty, the EPA decided that setting emissions at the level achievable by the best available technology would substantially reduce emissions and provide stringent regulation that satisfied the command of providing "an ample margin of safety." *Id.*

On October 21, 1976, the EPA promulgated final rules for vinyl chloride, expected to reduce emissions to 5% of unregulated levels. 41 Fed. Reg. 46,560 (1976). In promulgating these standards, the EPA stated that the "purpose of the standard is to minimize vinyl chloride emissions . . . to the level attainable with best available control technology." *Id.* The EPA also noted that it believed section 112 permits the Administrator to "assure that the costs of control technology are not grossly disproportionate to the level of emission reduction achieved." *Id.* at 46,562. The Environmental Defense Fund ("EDF") filed suit challenging the rules on the basis that section 112 required the Administrator to rely exclusively on health, and not at all on technological, considerations in standard setting. The EDF and EPA settled the suit, however, upon EPA's agreement to propose new and more stringent rules for vinyl chloride and to establish an ultimate goal of zero emissions.

The EPA satisfied its obligations under the settlement agreement by proposing new regulations on June 2, 1977. While the proposal sought to impose more strict regulation and establish an aspirational goal of zero emissions, the EPA made it clear that it considered its previous regulations valid and reemphasized its view that the inability scientifically to identify a threshold of adverse effects did not require prohibition of all emissions, but rather permitted regulation at the level of best available technology, 42 Fed. Reg. 28,154 (1977). The EPA received comments on the proposal, but for over seven years took no final action. On January 9, 1985, the EPA withdrew the proposal. Noting that certain aspects of the proposed regulations imposed "unreasonable" costs and that no control technology "has been demonstrated to significantly and consistently reduce emissions to a level below that required by the current standard," 50 Fed.Reg. 1182, 1184 (1985), the EPA concluded that it should abandon the 1977 proposals and propose in their place only minor revisions to the 1976 regulations.

This appeal followed.

II.

We must address at the outset two procedural challenges to the NRDC's bringing this petition for review. First, an industry intervenor, the Vinyl Institute, argues that the petition for review is not timely filed. Second, the EPA argues that NRDC has failed to exhaust its administrative remedies and that we must, therefore, dismiss its petition for review. We address these contentions in turn.

A.

The Vinyl Institute argues that this court has no jurisdiction in this case because the statute provides that "[a]ny petition for review . . . must be filed within sixty days from the date notice of [the] promulgation, approval or action appears in the Federal Register, except that if the petition is based on grounds arising after such sixtieth days, then any petition for review . . . shall be filed within sixty days after such grounds arise." 42 U.S.C. §7607(b)(1) (1982). According to the intervenor, the NRDC seeks to review in this case not the 1985 withdrawal of the proposed amendments, but the 1976 standards themselves. Because that statutory issue did not arise within sixty days before the filing of review, the intervenor claims the petition is untimely. Under *Montana v. Clark*, 749 F.2d 740, 744 (D.C. Cir. 1984), *cert. denied*, 106 S.Ct. 246 (1985), "an agency decision not to amend long-standing rules after a notice and comment period is reviewable agency action." Thus, if the petition for review, filed within sixty days of the withdrawal of the proposed amendments, amounts to a genuine challenge to the withdrawal of the proposed regulations, it was timely filed. If, by contrast, Vinyl Institute is correct in asserting that this appeal in fact constitutes a substantive attack on the 1976 regulations, we must dismiss the suit as untimely filed. *See Professional Drivers Council v. Bureau of Motor Carrier Safety*, 706 F.2d 1216, 1217-18 n.2 (D.C. Cir. 1983). We believe the former is the more accurate characterization of this lawsuit.

[1] The contention that this case amounts to a back-door challenge to the 1976 regulations is refuted by the substance of petitioner's brief and the relief requested. The petitioner states that "[i]n withdrawing the proposed amendments EPA violated the law by employing cost-benefit and technological feasibility tests that are prohibited by the Clean Air Act." Brief for NRDC at 3. Indeed, the brief makes explicit that the petitioner is specifically challenging the EPA's reliance on cost and technological feasibility tests in its withdrawal of the proposed amendments. *Id.* at 12–13. Most importantly, the petitioner does not seek to have us overturn the 1976 standards, but rather seeks to have us vacate the EPA's decision to withdraw the amendments and order agency action consistent with our opinion. *See* Brief for NRDC at 36–37. While, if we were to agree with the NRDC that the

statute prohibits any cost or technological considerations in standard setting, our rationale might indicate the invalidity of the 1976 regulations, our decision would not of itself invalidate those regulations. We think it clear, therefore, that the NRDC has challenged the 1985 withdrawal of the proposed amendments. The petition for review is timely.

B.

The EPA argues that the petitioner has failed to exhaust available administrative remedies and asks us to dismiss the petition for that reason. Congress included in section 307(d) of the Clean Air Act a statutory requirement of exhaustion, providing that "[o]nly an objection to a rule or procedure that was raised with reasonable specificity during the period for public comment (including any public hearing) may be raised during judicial review." 42 U.S.C. §7607(d)(7)(B) (1982). This statutory requirement of exhaustion, however, does not apply here. The statute states that "[t]he requirements of . . . subsection [307(d) of the Act] shall take effect with respect to any rule the proposal of which occurs after ninety days after August 7, 1977." 42 U.S.C. §7607(d)(1) (1982). The withdrawal of the proposed amendments now before us constitutes final agency action on the notice of proposed rulemaking that came out on June 2, 1977. *See* 42 Fed.Reg. 28,154 (1977). Thus, even if we assume that the action of withdrawing a proposed rule amounts to a "rule" for the purposes of section 307(d)'s timing provision, the proposal withdrawn here was issued before the date section 307(d) took effect. Accordingly, we must look to the common law doctrine of exhaustion of remedies. *See Safir v. Krept*, 551 F.2d 447, 452 (D.C. Cir.), *cert. denied*, 434 U.S. 820 (1977). The result, however, is the same.

Courts have long required that a party seeking review of agency action exhaust its administrative remedies before seeking judicial relief. *See, e.g., Myers v. Bethlehem Shipbuilding Corp.*, 303 U.S. 41, 50-51 (1938). In the case before us, the administrative remedy was participation in the rulemaking proceedings during the comment period. Indeed, this court generally requires such participation as a prerequisite to petitioning for direct review of the resulting regulations. *See Environmental Defense Fund v. EPA*, 598 F.2d 62, 91 [12 ERC 1353] (D.C. Cir. 1978).

The NRDC did not participate in the rulemaking proceedings in this case, but argues that we should not dismiss its petition for review because the agency in fact considered the statutory issue pressed on appeal. The NRDC is correct. This court has excused litigants from their exhaustion obligations as to a particular issue so long as the agency in fact considered the issue. *See Washington Association for Television & Children v. FCC*, 712 F.2d 677, 682 n.10 (D.C. Cir. 1983); *Ethyon v. Office of Personnel Management*, 684 F.2d 918, 923 (D.C. Cir. 1982); *ASARCO, Inc. v. EPA*, 578 F.2d 319, 320-21 n.1 (D.C. Cir. 1978); *Safir v. Krept*, 551 F.2d at 452. Thus, courts have waived exhaustion if the agency "has had an opportunity to consider the identical issues [presented to the court] . . . but which were raised by other parties," *see Buckeye Cablevision, Inc. v. United States*, 438 F.2d 948, 951 (6th Cir. 1971), or if the agency's decision, or even a dissenting opinion, makes it clear that the agency had "the opportunity to consider" "the very argument pressed" by the petitioner on judicial review. *Office of Communication of the United Church of Christ v. FCC*, 465 F.2d 519, 523 (D.C. Cir. 1972).

In this case, the issue whether the clear meaning of section 112 precluded the consideration of cost or technological feasibility in standard setting was adequately raised before the agency. First, the 1977 proposed amendments were the product of the settlement of a lawsuit challenging the previous vinyl chloride standards as having impermissibly taken consideration of feasibility into account. This demonstrates that the agency had notice of the argument that the statute precluded such considerations, and that the agency did or should have taken this into account in reaching a final decision on the proposed amendments. Indeed, in its notice of proposed rulemaking, the EPA remarked that "[t]he [1976] vinyl chloride standard has been criticized for allegedly placing unwarranted emphasis on technological rather than health considerations." 42 Fed. Reg. 28,154 (1977). The notice then continued by discussing the "ample margin of safety" language, the potential problem, under this standard, of having to shut down an entire industry that produces a non-threshold pollutant, and the way the proposed amendments resolved the problem by moving toward zero emissions without banning vinyl chloride. *Id.* Thus, it is clear that the EPA considered the question whether the language of section 112 requires a purely health-based standard.

Moreover, EDF explicitly raised the issue before the EPA in its comments on the proposed amendments. In this respect, the EDF stated:

> The proposed amendments represent a true compromise between what EDF could have pressed for in court and the existing standard. Section 112 of the Clean Air Act requires that emission standards for hazardous air pollutants be set "at a level which in the judgment of the Administrator provides an ample margin of safety to protect the public health from such hazardous air pollutants." It clearly requires a health-linked, not a technology-based standard. Yet, inconsistent with the statutory requirement, the original standards were based on what EPA believed industry could accomplish with best available technology. . . . EPA recognized that vinyl chloride is "an apparent non-threshold pollutant" which creates a risk to public health at all levels. Had the case gone to trial, EDF would have taken the position that §112 required a zero emission standard, the only standard adequate to provide the required margin of safety for a non-threshold pollutant. Instead, EDF settled for a compromise which establishes a goal of zero emissions and requires industry to move one step closer to that goal.

J.A. at 72-73. EDF's comments contain other, similar references, such as the assertion, in response to cost arguments raised by the industry, that "the statute EPA operates under requires regulations based on protection of health and not cost and technology concerns." *Id.* at 83. Thus, the EPA had before it the question whether the statute permits considerations of cost and technology in setting standards, and it had the opportunity to consider that question in deciding to withdraw the proposed amendments. Accordingly, we may not dismiss on the grounds of failure to exhaust.

[2] The EPA also suggests, however, that we should be "especially" loath to allow this petition for review because the "NRDC chose not to participate *at all* in *any* of the administrative proceddings on vinyl chloride." Brief for EPA at 12 (emphasis in original). This merely restates the proposition that the NRDC has failed to exhaust its administrative remedies. None of the cases relied upon by the EPA suggests that exceptions to exhaustion have any less applicability in the case of a wholly absent party than in other exhaustion contexts. *See Environmental Defense Fund v. EPA*, 598 F.2d 62, 91 (D.C. Cir. 1978); *Nader v. Nuclear Regulatory Commission*, 513 F.2d 1045, 1054-55 [7 ERC 2059] (D.C. Cir. 1975). This is not a case in which the statute conditions a party's ability to obtain judicial review upon its participation in the rulemaking proceedings. *See Gage v. Atomic Energy Commission*, 479 F.2d 1214, 1218 [5 ERC 1402] (D.C. Cir. 1973). The jurisdictional provision of the Clean Air Act imposes no such prerequisite, and, in fact, employes rather permissive language not specifying who may bring review. *See* 42 U.S.C. §7607(b) (1982) ("A petition for review of action of the Administrator in promulgating . . . any emission standard or requirement under section 7412 . . . may be filed . . . in the United States Court of Appeals for the District of Columbia."). The NRDC's total abstention from participating in the rulemaking proceedings does not make the exhaustion requirement more compelling or negate the valid exception to that requirement asserted by the NRDC.

III.

The NRDC mounts only a narrow challenge: that the statute adopts an exclusive focus on health-based considerations and that the EPA, therefore, relies on statutorily impermissible factors in using cost and technological feasibility as the basis for withdrawing the 1977 proposed amendments. According to petitioner, the EPA's action was "arbitrary and capricious" under *Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29, 43 (1983). *See* Brief for NRDC at 17-18 & n.32. We turn then to the question whether the NRDC has met its burden of making this showing. *See San Luis Obispo Mothers for Peace v. United States Nuclear Regulatory Commission*, 789 F.2 26, 37 (D.C. Cir. 1986) (en banc), *cert. denied*, 55 U.S.L.W. 3250 (U.S. Oct. 21, 1986). We think it has not.

A.

This being a question of statutory interpretation, the inquiry of course begins with "the language employed by Congress." *Reiter v. Sonotone corp.*, 442 U.S. 330, 337 (1979). The statute commands the Administrator to set an "emission standard" for a particular "hazardous air

pollutant" so as to "provide[] an ample margin of safety to protect the public health." Petitioner argues that these terms are plain and direct the Administrator to consider only factors relating to health. We find the statute less clear than does the petitioner. The mandate "to protect the public health" unambiguously evinces a health-based goal as the primary aim of section 112 of the Act. The complementary standard of providing an "ample margin of safety," however, contemplates some discretion in the regulatory process, thus raising the possibility that the Administrator may properly consider non-health-based factors in deciding upon an appropriate level of regulation.

The statute nowhere defines "ample margin of safety." The Senate Report, however, in discussing a similar requirement in the context of setting ambient air standards under section 109 of the Act, explained the purpose of the "margin of safety" standard as one of affording "a *reasonable* degree of protection . . . against hazards which research has not yet identified." S. Rep. No. 1196, 91st Cong., 2d Sess. 10 (1970) (emphasis added). This view comports with the historical use of the term in engineering as "a safety factor . . . meant to compensate for uncertainties and variabilities." *See* Hall, *The Control of Toxic Pollutants Under the Federal Water Pollution Control Act Amendments of 1972*, 63 Iowa L. Rev. 609, 629 (1978). In a discussion of the use of identical language in the Federal Water Pollution Control Act, this court has recognized that, in discharging the responsibility to assure "an ample margin of safety," the Administrator faces "a difficult task, indeed, a veritable paradox — calling as it does for knowledge of that which is unknown — [but] . . . the term 'margin of safety' is Congress's directive that means be found to carry out the task and to reconcile the paradox." *Environmental Defense Fund v. EPA*, 598 F.2d 62, 81 (D.C. Cir. 1978). And while Congress used the modifier "ample" to exhort the Administrator not to allow "the public [or] the environment . . . to be exposed to anything resembling the maximum risk" and, therefore, to set a margin "greater than 'normal' or 'adequate,'" Congress still left the EPA "great latitude in meeting its responsibility." *See id.*

Petitioner's assertion that health-based factors constitute the only permissible factors to consider in standard-setting under section 112 appears implausible precisely because the statute brings the Administrator's discretion, and judgment to bear on scientific uncertainty. If health were the only permissible consideration, no such discretion would be necessary, for deciding how much uncertainty to allow from a strictly health-based perspective would always lead to the same answer — none whenever *any* scientific uncertainty existed about the ill effects of a non-zero level of hazardous air pollutants — and we find it unthinkable that science may ever yield *absolute* certainty of safety in an area so complicated and replete with problems of measurement, modeling, long latency, and the like — any decision informed solely by health, but no other, values would require a prohibition of any emissions. Had Congress intended that result, it could very easily have said so by writing a statute that states that no level of emissions shall be allowed as to which there is any uncertainty. But Congress chose instead to deal with the pervasive nature of scientific uncertainty and the inherent limitations of scientific knowledge by vesting in the Administrator the discretion to deal with uncertainty in each case.

B.

Petitioner also argues that the legislative history makes clear Congress' intent to foreclose reliance on non-health-based considerations in standard setting under section 112. The NRDC directs us to the hazardous air pollutants provision of the House bill, which states that "[i]f . . . emissions [from any class of new stationary sources] are extremely hazardous to health, no new source of such emissions shall be constructed or operated, except where (and subject to such conditions as he deems necessary and appropriate) the [administrator] makes a specific exemption with respect to such construction or operation." *See* H.R. 17255, 91st Cong., 2d Sess. §5(a), 116 Cong. Rec. 19,226 (1970). Thus, as to extremely hazardous emissions, the House bill granted the Administrator a rather open-ended power to exempt a source from the regulation imposed, a power that petitioner presumes to have allowed for exemptions on the basis of non-health considerations.[1] By contrast, petitioner notes, the Senate bill had a tight focus on health, prohibiting emissions "hazardous to the health of persons" and allowing only health-based exceptions to that prohibition. *See* S. 4358, 91st Cong., 2d Sess. §6(b), 116 Cong. Rec. 32,375 (1970). Because the final version that emerged from conference more closely resembled the Senate than the House bill, and because no express provision for any "specific exemption" survived, the NRDC argues that any feasibility considerations must have been deliberately eliminated. We find this reading of the legislative history strained.

While the original Senate bill is closer than the House bill to the final legislation, neither the House nor the Senate version closely resembles in the aspect relevant here the compromise that emerged from conference. H.R. 17255 dealt only with new stationary sources and, with respect to those, only half of the regulatory scheme dealt with emissions considered "extremely hazardous to health." *See* H.R. 17255, 91st Cong., 2d Sess. §5(a), 116 Cong. Rec. 19,225-26 (1970). The bill also dealt with new sources the emissions of which could "contribute substantially to endangerment of the public health or welfare," but which were not "extremely hazardous to health," providing for control of such emissions "to the fullest extent compatible with the available technology and economic feasibility." *Id.* In effect, therefore, the House bill amounted to a comprehensive measure generically aimed at dealing with new sources, and only incidentally treated the problem of "extremely hazardous" agents.

Unlike the House bill, the Senate version dealt only with hazardous air pollutants and did so with respect to all stationary sources. The bill proposed a relavtively narrow definition of hazardous agents, restricting this category to pollutants "whose presence, chronically or intermittently, in trace concentrations in the ambient air, either alone or in combination with other agents, causes or will cause, or contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible damage to health." S. 4358, 91st Cong., 2d Sess. §6 (b), 116 Cong. Rec. 32,375 (1970). Under the scheme set up by the bill the Administrator was to publish a list of hazardous agents, and follow it by a "proposed prohibition of emissions of each such agent or combination of agents from any stationary source." *Id.* The bill then provided for a hearing, after which the Administrator had to promulgate the prohibition unless a preponderance of evidence demonstrated either "that such agent is not hazardous to the health of persons" or "that departure from prohibition for [a] stationary source will not be hazardous to the health of persons." *Id.* If the Administrator found either such condition to exist, he would then implement an emission standard in lieu of a prohibition. *Id.*

Given these starting points, the inference the petitioner draws from the changes made at conference appears tenuous at best. The final version defines a "hazardous air pollutant" as

> an air pollutant to which no ambient air quality standard is applicable and which in the judgment of the Administrator may cause, or contribute to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness.

Clean Air Amendments of 1970, Pub. L. No. 91-604, §4(a), 84 Stat. 1676, 1685.[2]

[1] Petitioner's assumption seems correct. The bill prohibited new sources if and because they emitted extremely hazardous pollutants. Allowing exemptions to such prohibitions without specifying the permissible bases for exemption seems to invite consideration of non-health factors, for it would be strange indeed to construct a scheme under which both a prohibition and an exemption from prohibition were available on the basis of the same criterion. To be sure, the Senate bill did set up a system under which the agency was to propose a prohibition of hazardous pollutants, and could refuse to promulgate that prohibition only for health-based reasons, *see infra* pp. 15-16, but this does not make any more plausible the notion that the House bill set up a prohibition and exemption on the sole basis of health. The Senate provision did not set up a system of prohibitions and exemptions, but rather a procedural system to guide the agency. *See* S. 4358, 91st Cong., 2d Sess. §6(b), 116 Cong. Rec. 32,375 (1970). The agency was to publish a list of hazardous pollutants on the basis of "available material evidence." This list would amount to a proposed prohibition of emissions of the substances on the list. The agency was then to provide notice and a public hearing for each agent or combination of agents included on the list and could refuse to promulgate the prohibition only if a preponderance of the evidence at the hearing refuted the initial basis for the substance's inclusion. Under the House bill, the exemption applied to something still considered "extremely hazardous." We do not see how such an exemption could rest on exclusively health-based considerations.

[2] Congress in the Clean Air Act Amendments of 1977 made a minor alteration in the definition of a "hazardous air pollutant," re-

The statute instructs the Administrator to publish a list of such pollutants, to conduct hearings, and, unless the hearings show a particular agent not to be a "hazardous air pollutant," to promulgate emissions standards. *Id.* The Administrator must "establish any such standard at the level which in his judgment provides an ample margin of safety to protect the public health from such hazardous air pollutant." *Id.* Petitioner has correctly observed that the law enacted has a closer structural resemblance to the Senate bill, but this offers little, if any, support to petitioners' claim because the Senate bill and the final legislation both were measures to deal with the problem of hazardous air pollutants from all sources. That they would resemble each other more than a House bill meant to deal generically with the problem of all pollution from new sources seems a natural outcome for that reason alone and thus sheds no light on the intent to adopt particular aspects of the Senate version in the final bill.

Nor do we accept petitioner's contention that the final legislation's failure to allow for "specific exemptions" foreloses consideration of non-health factors. The House bill made such "specific exemptions" available only where the bill *prohibited* the construction or operation of *new* sources. Because the final version enacted contains no prohibitory provision of any kind, failure to include the power to exempt a source from a non-existent blanket prohibition tells us little. It seems more likely that the power to exempt was omitted because the considerations that might have gone into deciding whether and under what conditions to exempt a source, which we think did relate to cost and technology, *see infra* p. 26-27, were now to be taken into account in deciding on the margin of safety to provide.

Moreover, we believe that the petitioner's reliance on the Senate bill to support its claim about the exclusivity of health-based considerations is misplaced. The emphasis on factors of health in the Senate bill, to the extent that it reveals anything, seems actually to cut against the petitioner's argument. The Senate bill sought to prohibit emissions which were hazardous even in "trace" concentrations and allowed the imposition of emissions standards in other cases. An "emission standard" "*limits* the quantity, rate, or concentration of emissions of air pollutants on a continuous basis." 42 U.S.C. §7602 (k) (1982) (emphasis added). And the definition of "hazardous air pollutants" in the final legislation is clearly broad enough to include substances hazardous to health even in "trace" concentrations. One might conclude, therefore, that Congress was aware of the distinction between a "prohibition" and an "emission standard," and that the ultimate abandonment of the former in the final version of the state may evince an intent not to prohibit emissions of even those hazardous pollutants known to pose a danger to public health in trace amounts. Such a conclusion, of course, would flatly contradict the petitioner's position by indicating a retreat in the final legislation from the exclusive concern with health in the Senate bill.

We do not believe that the final bill precludes a flat prohibition of emissions of a hazardous pollutant. A summary of the provisions of the conference agreement presented by Senator Muskie, the principal Senate sponsor of the Clean Air Amendments of 1970 and the chairman of the Senate conferees, made it clear that the "ample margin of safety" standard might require "a plant . . . to close" or "could include emission standards which allowed for no measurable emissions." 116 Cong. Rec. 42,385 (1970). This suggests that, rather than backing away from the protection provided in the Senate bill, the "ample margin of safety" standard provided the flexibility to provide for such protection. A hazardous pollutant demonstrated to have ill effects at trace concentrations may clearly be prohibited under this standard. Absent the explanatory statement by a reliable source about what the conferees intended, however, we have no way of knowing the meaning of the change from specific regulatory commands to a different and more general pattern.

[3] And so it is with the House bill. At conference, the specific provisions of the House bill gave way to a more amorphous standard in which the sources and types of pollution covered were different and the Administrator was given the power to regulate in his sound judgment to protect the public health with a reasonable degree of caution for scientific unknowns. We know of no statement, nor has petitioner directed us to any, that reliably indicates what the conferees intended in replacing the specific regulatory scheme for new sources with the broad standard covering all hazardous pollutants in the final bill. At most, therefore, we find the legislative history of the 1970 Clean Air Amendments ambiguous with respect to what the Administrator may consider in setting standards for hazardous air pollutants. Some of the history supports an inference that factors other than health might appropriately be taken into account at the Administrator's discretion. Petitioner has not met its burden of showing that section 112(b) permits only the consideration of health.

C.

On the other side of this controversy, the EPA argues that the 1977 amendments of the Clean Air Act, in the light of Congress' awareness of the 1976 vinyl chloride regulations, amounts to a ratification of the use of cost and technological feasibility considerations in standard setting under section 112. We think this overstates the significance of the legislative history leading up to the Clean Air Act Amendments of 1977. To understand why this is the case, and to appreciate what significance, if any, the 1977 amendments have, we turn to an examination of the history of those amendments.

In 1976, both houses of Congress passed bills purporting to amend the Clean Air Act. The first section of the House bill sought to spur the EPA to take action with respect to specified unregulated pollutants, including vinyl chloride. Within one year of the enactment of the amendments unless the Administrator found after notice and a hearing that the enumerated "substance [would] not cause or contribute to air pollution which [could] reasonably be anticipated to endanger public health," he was to include such substance on the list of pollutants subject to regulation under an ambient air standard pursuant to sections 108 through 110 or under the hazardous air pollutant provisions of section 112, or to include sources of such pollutants on the list of stationary sources governed by section 111's new source performance standards, or to implement some combination of such regulation. H.R. 10498, 94th Cong., 2d Sess. §101(a), 122 Cong. Rec. 29,219 (1976).

In addressing this section of the bill, the Report of the Committee on Interstate and Foreign Commerce discussed the vinyl chloride problem in some detail, emphasizing the dangerous nature of the substance. H.R. Rep. No. 1175, 94th Cong., 2d Sess. 23 (1976). During the development of the bill, the Report noted, the EPA had "proposed emission standards for vinyl chlorides under section 112 of the Act for major sources in the plastics industry," but the Committee retained vinyl chlorides in the proposed legislation to underscore "the Committee's concern that the standards be promulgated for any other significant sources of vinyl chlorides which may exist." *Id.* at 23-24. The Committee also noted, however, that it "did not intend to specify the degree of emission reduction which should be required," but that "the Administrator should apply the appropriate means and extent of regulation under the existing statutory criteria." *Id.* at 26. The House passed the bill, leaving section 101 intact.

The Senate bill contained nothing similar. The Conference Committee, however, decided to adopt the House provision regarding unregulated pollutants in relevant part. *See* H.R. Rep. No. 1742, 94th Cong., 2d Sess. 25-26 (1976). The threat of a total filibuster, however, prevented the Senate from voting on the recommendations of the conferees, and the bill died.

In 1977, both houses reintroduced legislation to amend the Clean Air Act. In the interim between the abandonment of the 1976 amendments and the introduction of the new legislation, the EPA promulgated emission standards for vinyl chloride under section 112 of the Act. *See* 48 Fed. Reg. 46,560 (1976). In so doing, the EPA had clearly articulated that the regulations adopted reduced vinyl chloride emissions "to the level attainable with best available technology" and that, while "section 112 does not explicitly provide for consideration of costs," the agency believed it could take them into account for the limited purpose of "assur[ing] that the costs of control technology are not grossly disproportionate to the amount of emission reduction achieved." *Id.* at 46,560, 46,562. The 1977 House bill contained a provision "nearly identical" to section 101 of the 1976 House bill, differing primarily in its inclusion of radioactive materials and deletion of vinyl chloride from the unregulated pollutants specified. H.R. Rep. No. 294, 95th Cong., 1st Sess. 3 (1977). The Committee explained the deletion of vinyl chloride on

placing "may cause, or contribute to" with "causes, or contributes to." Pub. L. No. 95-95, §401(a), 91 Stat. 685, 791 (1977). This change does not affect the outcome of this case.

the ground that "[d]uring the past year the Administrator [had] promulgated final regulations for the control of vinyl chloride." *Id.*

The bill passed the House with the unregulated pollutants provision intact. Once again, the Senate bill had no such provision, and, at conference, the House's provision was adopted in relevant part. *See* H.R. Rep. No. 564, 95th Cong., 1st Sess. 141-42 (1977). The conference recommendations regarding unregulated pollutants passed both houses intact, and President Carter signed the Clean Air Act Amendments into law on August 7, 1977. *See* Pub. L. No. 95-95, 91 Stat. 685 (1977).

The 1977 legislation comprehensively amended the Clean Air Act, and, in fact, amended the very section that is the subject of this lawsuit. Indeed, that amendment added a further subsection employing substantially the language that EPA had construed in the vinyl chloride regulations to allow consideration of economic and technological feasibility. The relevant amendment to section 112 empowered the Administrator under certain circumstances to forgo use of an emission standard and instead to "promulgate a design, equipment, work practice, or operational standard, or combination thereof, which in his judgment is adequate *to protect the public health . . . with an ample margin of safety*." 42 U.S.C. §7412(e)(1) (1982) (emphasis added); *see also* Pub. L. No. 95-95, 91 Stat. 685, 703 (1977).[3] Thus, at the time of the 1977 amendments, Congress expressly considered the kind of regulation the EPA should apply to hazardous air pollutants, once identified, and, in so doing, reenacted the standard construed by the EPA in the vinyl chloride regulations.

The House knew of the 1976 regulations,[4] and the failure to clarify the "ample margin of safety" requirement when adopting that language anew in the amendment adding section 112(e) may, therefore, indicate that the EPA has correctly discerned legislative intent. *See United States v. Rutherford*, 442 U.S. 544, 554 n.10 (1979). Indeed, if the House's and the House Committee's awareness of what was taking place could confidently be attributed to the entire Congress, the history recited of reactions in 1976 and 1977 would make a considerable case for ratification. But we cannot be certain that Congress was aware of the content of the vinyl chloride regulations,[5] and, therefore, we give the failure to repudiate the EPA's substantive interpretation of section 112 in those regulations only "modest weight," *see National Wildlife Federation v. Gorsuch*, 693 F.2d 156, 167 [18 ERC 1105] (D.C. Cir. 1982), and we certainly cannot construe Congress' failure to act in these circumstances as amounting to ratification of the EPA's construction.[6] Con-

[3] The Administrator could employ this alternative kind of regulation when an emission standard proved infeasible because "(A) a hazardous pollutant or pollutants cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State, or local law, or (B) the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations." 42 U.S.C. §7412(e)(2) (1982), Pub. L. No. 95-95, §110, 91 Stat. 685, 703 (1977).

[4] The NRDC argues that because the EPA had promulgated its 1977 Notice of Proposed Rulemaking to amend the vinyl chloride standard, it becomes unclear whether the EPA's cost and technological feasibility interpretation was well-established at the time of the 1977 amendments. We think it was. Although embracing a zero emission goal, the notice explicitly disagreed with criticism that the 1976 regulations placed unwarranted emphasis on technological, rather than health-based goals. 42 Fed. Reg. 28,154 (1977). More importantly, the proposed rules mandated only "more efficient use of existing control technology at existing plants and more effective controls at new plants." *Id.* The proposal encouraged new technology but *refused* to ban vinyl chloride because of the drastic implications such a measure would hold for the industry. *Id.* Thus, while more stringent, the proposed regulations did not by any means abandon the EPA's earlier position.

[5] The EPA also argues that asbestos regulations based on feasibility considerations had been promulgated pursuant to §112 prior to the 1977 amendments. We give this no weight because the EPA has given to us no indication that Congress had any awareness of the existence of, let alone the content of, those regulations.

[6] A court must only sparingly accept arguments based on acquiescence or ratification, for "the Framers of our Constitution deliberately made the passage of legislation difficult — more difficult, for instance, than in parliamentary democracies — [and] Congress simply cannot be obliged affirmatively to correct subsequent administrative interpretations inconsistent with original legislative intent; that is the responsibility of the courts." Coalition to Preserve the Integrity of American Trademarks v. United States, 790 F.2d 903, 917 (D.C. Cir. 1986). Congressional inaction on a particular point may "betoken[] unawareness, preoccupation, or paralysis," rather than tacit assent. *See* Zuber v. Allen, 396 U.S. 168, 185-86 n.21 (1969). Of course, in the case before us there was more than mere congressional silence; there was affirmative evidence that members of the House knew what EPA was doing and failed to object and that the House Committee employed language that showed a desire to achieve a reduction, but not necessarily the total elimination, of emissions. This is something more than mere failure to enact corrective legislation.

gress, in confronting the problem of unregulated pollutants, sought only to provoke some action by the EPA, and in no way aimed to specify the appropriate degree of emission control. That the House knew of the existence of the 1976 standard for vinyl chloride and decided to remove it from the unregulated pollutants list does not, therefore, tell us whether the House examined and became aware of the content of those regulations or the theory or level of the controls imposed. The history of the 1977 amendments may give a scintilla of evidence in support of the agency position here, but it is far short of legislative ratification of the EPA's construction.

D.

Because the statute does not seem to restrict the Administrator to health-based considerations, and furthermore is ambiguous in that it does not specify what additional factors the Administrator may permissibly take into account in "provid[ing] an ample margin of safety to protect the public health," we may not "simply impose [our] own construction on the statute." *Chevron U.S.A. v. Natural Resources Defense Council*, 467 U.S. 837, 843 (1984). As the Supreme Court said, "if the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on permissible construction of the statute." *Id.* Accordingly, we must uphold the Administrator's construction of the section if it is "a reasonable one," that is, if the Administrator's decision represents "a reasonable policy choice for the agency to make." *Id.* at 845.

We believe that the agency in this case has made a reasonable interpretation. Contrary to the Dissent's view of what is at issue here, *see* Dissent at 15-16, the EPA has not taken the position that it may consider cost and technological feasibility to set a standard that allows a level of emission at or above which evidence has indicated adverse health effects to occur. Perhaps if the evidence positively demonstrated that a given substance had ill effects and endangered the public health in trace amounts, the EPA could permit no emissions of that pollutant. Only when an area of uncertainty exists does the Administrator "reconcile the paradox" of having to protect against dangers he cannot know by setting standards as strict as possible given both available technology and the requirement that the cost of reduction not be grossly disproportionate to the level achieved. That the area of uncertainty, as with vinyl chloride, covers all non-zero levels of emission does not alter our conclusion.[7]

[7] Petitioner suggests that a deferential approach may not be appropriate in this case because vinyl chloride is "an apparent non-threshold pollutant," and the legislative history makes clear that in such a case Congress intended to allow no measurable emissions. We disagree. Petitioner confuses a "non-threshold pollutant" with an "apparent non-threshold pollutant." The former poses a known hazard at all non-zero levels. The latter may appear to pose a risk at all levels, but, by definition, sufficient data are not available to establish the hazard to public health. We believe that this is precisely the type of uncertainty for which the Administrator was vested with discretion, and even though the Administrator may assume that some risk to health is probable at all concentrations, it is still up to him to decide what constitutes a reasonable degree of protection given that uncertainty does exist.

The Dissent's conclusion that our explanation of the distinction between "non-threshold pollutants" and "apparent non-threshold pollutants" is "odd" reflects the Dissent's misunderstanding of the definition of "apparent non-threshold pollutant." The Dissent claims that because the EPA recognized that "any atmospheric concentration of VC poses some public health risk," it has also effectively recognized that vinyl chloride is a non-threshold pollutant. *See* Dissent at 16 [25 ERC 1126]. This is simply incorrect. The EPA explicitly stated that vinyl chloride was an apparent non-threshold pollutant because it appeared to create a risk to health at all non-zero levels of emissions, but scientific uncertainty made it impossible to establish any definite threshold level of adverse effects to human health. 40 Fed. Reg. at 59,534. Because of the uncertainty as to the threshold level, the EPA "assumed . . . that there is no atmospheric concentration that poses absolutely no public health risk." *Id.* It did not conclude that vinyl chloride was a non-threshold pollutant.

Since the Administrator has no way of knowing health effects in the range of uncertainty, such considerations as technological and economic feasibility seem natural, perhaps inevitable, choices to inform the Administrator's decision whether he has amply provided for a reasonable degree of safety from the unknown. By emphasizing available technology, the EPA has ensured the maximum regulation against uncertainty without the economic and social displacements that would accompany the closing of an industry or any substantial part of an industry. By ensuring that costs do not become grossly disproportionate to the level of reduction achieved, the EPA guarantees that the consuming public does not pay an excessive price for the marginal benefits of increasing increments of protection against the unknown. We cannot say that this represents an unreasonable weighing of values, especially when no other value readily suggest itself and petitioner supplies none apart from health effects, which in the range of uncertainty are by definition unknowable.

The statute, moreover, explicitly endorses economic values, suggesting that the use of such values to inform ambiguous provisions is not unreasonable. Section 112(e) specifically allows for the use of design, equipment, work practice, and operational standards in lieu of emissions standards where "the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations." 42 U.S.C. §7412(e)(1) & (2) (1982). Where measurement is impractical because of technological or economic factors, uncertainty as to health effects necessarily exists. It is significant both that uncertainty need not be dissipated if the cost is prohibitive and that requirements other than emissions limits may then be imposed. Congress has thus explicitly expressed its belief that technological and economic values have a place in the regulation of hazardous pollutants.* We believe, therefore, that the EPA has acted reasonably in relying on economic and technological feasibility, and we cannot overturn the withdrawal of the proposed regulations on the basis that the EPA so relied.

E.

[4] We think this analysis of the statute demonstrates that Congress did not preclude consideration of economic and technological considerations in the range of emissions where health effects are uncertain. The language Congress used is quite inappropriate to support any such conclusion. Had that result been desired, Congress could easily have stated that where health effects at any level are unknown there shall be zero emissions. That does not even remotely resemble the statute we have before us.

IV.

The cases cited by petitioner in support of its claim do not alter our conclusion. No case has squarely addressed what the Administrator may consider in the context of section 112(b)'s command to "provide an ample margin of safety to protect the public health." While some cases have construed similar or identical language to foreclose consideration of technological and economic feasibility, we do not find the reasoning of those cases compelling. Nor do the various dicta petitioner pulls from other, related cases persuade us that we have reached the wrong conclusion. It must be remembered that each statute and provision has its own structure and legislative history so that a decision about one cannot be considered to control the interpretation of another. Both similarities and dissimilarities must be considered in deciding how persuasive the analogy is.

Petitioner's strongest case is *Lead Industries Association v. EPA*, 647 F.2d 1130 [14 ERC 1906] (D.C. Cir.), *cert. denied*, 449 U.S. 1042 (1980). In *Lead Industries* this court reviewed a challenge by representatives and members of the regulated industry to the promulgation of primary air quality standards for lead under section 109 of the Clean Air Act.* Petitioners in that case argued that the Administrator must consider economic impact and technological feasibility in determining the appropriate margin of safety to set under statutory language requiring that the standards "allow[] an adequate margin of safety . . . to protect the public health," 42 U.S.C. §7409(b)(1) (1982). *See* 647 F.2d at 1148. The court not only rejected this argument, but also went on to state that section 109 of the Act affirmatively precluded consideration of feasibility in standard setting. The NRDC argues, therefore, that *Lead Industries*, which involved the more permissive language of "adequate," rather than "ample," "margin of safety," compels the conclusion that section 112 precludes consideration of economic and technological feasibility. We think not.

The dicta in *Lead Industries* on which petitioner relies rest upon statutory premises and legislative history inapposite to this case. The court, significantly, did not assert that the statutory *language* precluded consideration of feasibility. In this respect, the opinion stated merely that "[n]othing in its language suggests that the Administrator is to consider economic or technological feasibility in setting ambient air quality standards." 647 F.2d at 1148–49. This says only that the "margin of safety" language does not demand consideration of such factors, something that no party in the case before us disputes.

The *Lead Industries* court did state that the statute on its face does not allow consideration of technological or economic feasibility, but the court based its conclusion on structural aspects of the ambient air pollution provisions not germane here. The court relied on sections of the Act closely related to section 109 in reaching its determination. First, besides "allowing an adequate margin of safety," ambient air standards set under section 109(b) must be based on so-called "air quality criteria," which section 108 defines as comprising several elements, all related to health. *See* U.S.C. §7408(a)(2)(A), (B), & (C) (1982). The court reasoned that the exclusion of economic and technological feasibility considerations from air quality criteria also foreclosed reliance on such factors in setting the ambient air quality standards based on those criteria. 647 F.2d at 1149 n.37. The court also relied on the fact that state implementation plans, the means of enforcement of ambient air standards, could not take into account economic and technological feasibility if such consideration interfered with the timely attainment of ambient air standards, and that the Administrator could not consider such feasibility factors in deciding whether to approve the state plans. *Id.*; *see* 42 U.S.C. §7410 (1982). This provided further grounds for the court to believe that Congress simply did not want the economics of pollution control considered in the scheme of ambient air regulations. *See* 647 F.2d at 1149 n.37.

Moreover, the relevant Senate Report stated flatly that "existing sources of pollutants either should meet the standard of the law or be closed down." 647 F.2d at 1149. This is a far clearer statement than

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*We do not accept the NRDC's argument that Congress' explicitly accounting for economic and technological feasibility in this context suggests a congressional intent that the Administrator consider these values only in deciding what type of regulatory standard to use and not in deciding the level of regulation to apply. Petitioner in effect asserts that Congress knew how to designate such factors and did so expressly where it intended their application. This argument falls short. Congress had very specific notions about when the Administrator could employ design, equipment, work practice, and operational, rather than emission, standards under §112 and it expressed itself very specifically. *See supra* note 2. That Congress has explicitly provided for certain specific considerations in one detailed subsection does not seem to us a persuasive reason to conclude that failure to specify such considerations when employing a generalized standard in a different subsection forecloses reliance on those factors in fleshing out that standard. If, elsewhere in the statute, Congress had exhorted the Administrator "to provide an ample margin of safety to protect the public health" and then specifically noted that he could or should consider economic or technological feasibility in making his determination, the failure so to specify in §112(b)(1) would seem persuasively to foreclose consideration of such factors.

Petitioner makes a similar argument with respect to the provision giving the Administrator the power to grant a two-year waiver for installation of controls imposed under §112. See 42 U.S.C. §7412(c)(1)(B)(ii) (1982). This argument has no merit. The provision relied on merely tells the outside limit that the Administrator may allow, if necessary, for the imposition of controls; it says nothing about economic or technological feasibility and can in no way be construed as an exclusive avenue for consideration of such factors, as petitioner suggests.

*The statutory scheme involved in *Lead Industries* regulates air pollutants the "emissions of which, in [the Administrator's] judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. . . [and] the presence of which in the ambient air results from numerous or diverse mobile or stationary sources." 42 U.S.C. §7408(a)(1) (1982). The Administrator must then publish "air quality criteria" for the pollutants thus listed. *Id.* §7408(a)(2). Having done this, the Administrator prescribes primary and secondary ambient air standards based on these criteria. *See* 42 U.S.C. §7409 (1982). Finally, states must adopt state implementation plans to meet these ambient air standards and must submit their plans to the EPA for approval. *See* 42 U.S.C. §7410 (1982). The scheme under review in this case, regulation of hazardous air pollutants, complements the ambient air quality standard is applicable." *See* 42 U.S.C. §7412 (1982).

anything in the present case that Congress considered the alternatives and chose closing down sources or even industries rather than allow risks to health.

The substantive standard imposed under the hazardous air pollutants provisions of section 112, by contrast, is not based on criteria that enumerate specific factors to consider, yet pointedly exclude feasibility. Section 112(b)(1)'s command "to provide an ample margin of safety to protect the public health" is self-contained, and the absence of enumerated criteria may well evince a congressional intent for the Administrator to supply reasonable ones. And while the hazardous pollutants provision does all for state implementation plans, section 112, in marked contrast to the regime of ambient air standards, operates through nationally enforced standards; the state plans are permissive and may not interfere with national enforcement of any hazardous pollutant standard. 42 U.S.C. §7412(d) (1982). No detailed provisions preclusive of technological and economic considerations govern the state plans allowed under section 112; indeed, the Administrator must delegate enforcement and implementation authority to the state (subject to his continuing ability to enforce national standards) if he finds the state plan "adequate." *Id.* Thus, nothing in the scheme of state implementation plans under section 112 demonstrates disfavor for feasibility considerations, and this further distinguishes section 112 from the *Lead Industries* court's interpretation of section 109.

Before turning from *Lead Industries*, we must also address another aspect of that opinion. The *Lead Industries* court did not "discern" in the margin of safety requirement "any congressional intent to require, or even permit, the Administrator to consider economic or technological factors in promulgating air quality standards." 647 F.2d at 1150. In so concluding, the court was fully aware of the nature of the margin of safety standard and, indeed, quoted the Senate Report's description of its purpose as one of providing "a reasonable degree of protection" from the unknown. *Id.* Thus, at first blush, the reasoning of *Lead Industries* may seem at odds with our conclusion that the margin of safety requirement is what allows for such consideration.

Closer examination reveals that our conclusion stands. First, the *Lead Industries* court faced the argument that "margin of safety" required feasibility considerations, and, to the extent that it said the language and history of this requirement did not "even permit" such considerations, the court's statement was not part of the rationale by which it decided the contention before it but amounted only to dicta. Second, these dicta must be understood in the context of where they appear in the *Lead Industries* opinion. The court's discussion of "margin of safety" immediately followed a thoughtful and comprehensive analysis of the legislative history of the ambient air pollution scheme found in sections 108 through 110. This analysis concluded that Congress meant ambient air standards to be affirmatively technology-forcing, and, therefore, consciously excluded any feasibility considerations from their formulation. *See* 647 F.2d at 1149. Accordingly, we read the court's "margin of safety" discussion to mean that, in the light of overwhelming evidence that Congress did not want feasibility considered in setting ambient air standards, the court would not read feasibility considerations into whatever discretion the Administrator may have been given under the "margin of safety" requirement. In other words, the court could not discern any intent to permit such consideration in the face of other strong evidence to the contrary. No evidence of preclusion of economic and technological considerations has emerged in our examination of section 112 and its history. For that reason, *Lead Industries* does not control this case. Here, for the reasons given, we believe the Administrator is not foreclosed from including these considerations in the exercise of his discretion under the margin of safety requirement of section 112.

Petitioner also cites *Hercules, Inc. v. EPA*, 598 F.2d 91 [12 ERC 1376] (D.C. Cir. 1978), in support of its claim that the "ample margin of safety" language prohibits consideration of cost and technological factors. *Hercules* involved section 307(a)(4) of the Federal Water Pollution Control Act, which directs the EPA to set standards for toxic water pollutants to provide "an ample margin of safety," *see* 33 U.S.C. §1317(a)(4) (1982). In relevant part, the decision dealt with an industry petitioner's claim that certain regulations promulgated by the EPA under section 307(a) failed adequately to take feasibility into account. The EPA responded that section 307(a) does not require consideration of any such factor.

The court agreed with the EPA, principally on the ground that section 307(a)(2) enumerated six specific factors to take into account in setting standards for toxic water pollutants, and none involved economic or technological criteria. 598 F.2d at 111. Reinforcing this interpretation was the fact that "[s]ection 307(a)(4) directs EPA to set standards providing 'an ample margin of safety' without any mention of feasibility criteria." *Id.* This, however, does not support the NRDC's position in this case, for *Hercules* merely stands for the proposition that the unadorned appearance of "ample margin of safety" does not *require* economic and technological considerations; the case says nothing about what such language may *permit*.

Nor do we find persuasive the dicta from *Hercules* that the NRDC cites on the subject of section 112 of the Clean Air Act. The *Hercules* court noted similarities between the Federal Water Pollution Control Act Amendments and the Clean Air Amendments of 1970. 598 F.2d at 112. The court then discerned a distinction applicable to both statutes positing "health-based" regulation for toxic water and hazardous air pollutants and "technology-based" regulation for other water and air pollutants. *See id.* The court also noted that "Congress enacted section 112 . . . without provision for considerations of feasibility." *Id.* All this is beside the point.

We may accept the health-based/technology-based distinction put forth by the *Hercules* court and still accept the EPA's use of economic and technological feasibility in standard setting under section 112. Health, not technology, is both the starting point and the overriding consideration under the EPA's construction of section 112. The EPA must set its standard at a level which eliminates known adverse health effects of the hazardous substance. It is only when those health effects become unknowable that the EPA turns to economic and technological feasibility to decide the level of emissions to permit. We do not think that this incidental consideration of non-health factors makes the withdrawal of the proposed standards pursuant to the EPA's construction of section 112 technology-based, rather than health-based.

Nor do we believe that the *Hercules* court's casual observation that section 112 makes no provision for feasibility changes the analysis. Section 112 provides discretion in standard-setting, does not affirmatively preclude feasibility considerations, and may, we believe, reasonably accommodate such considerations. In these circumstances, the EPA's construction of section 112 to allow for feasibility considerations is permissible.

In this vein, petitioner sets forth one final argument that we address. Petitioner attempts to erect a policy of clear statement in environmental statutes, such that economic and technological considerations may not enter the calculus of environmental regulation unless the statute expressly so provides. In support of this thesis, petitioner first cites *American Textile Manufacturers Institute* v. *Donovan*, 452 U.S. 490, 510 (1981), which states: "When Congress has intended that an agency engage in cost-benefit analysis, it has clearly indicated such intent on the face of the statute." Petitioner's reliance on this statement is misplaced.

The Court in *American Textile* made the statement quoted in response to an argument that a statute exhorting the Secretary of Labor to consider "feasib[ility]" *required* cost-benefit analysis. In this light, the Court's statement appears to mean that Congress has clearly stated when it has sought to *require* an agency to engage in cost-benefit analysis. Moreover, the EPA has not engaged in that form of analysis here. Cost-benefit analysis means weighing the marginal gain against the marginal cost of each increment of further regulation and then setting the level of regulation at the point at which the latter exceeds the former. In this case, to the extent that the Administrator considers cost at all, he does so only to ensure that costs are not grossly disproportionate to benefits and only when health effects are uncertain. So even if *American Textile* does mean that Congress must clearly announce when it intends to permit cost-benefit analysis, that limitation has no application here.

Petitioner also brings to our notice *Union Electric Co. v. EPA*, 427 U.S. 246 [8 ERC 2143] (1976), a case under the Clean Air Amendments of 1970 in which the Supreme Court stated: "Where Congress intended the Administrator to be concerned about economic and technological infeasibility, it expressly so provided." *Id.* at 257 n.5; *see also Lead Industries*, 647 F.2d at 1148. Be that as it may, it does not alter our conclusion in this case. The EPA does not contend that Congress intended to require the Administrator to consider economic and technological feasibility in setting standards under section 112. But this does not mean that Congress intended to preclude the Administrator from employing such considerations. It is enough that Congress vested the Administrator with discretion to deal with scientific uncertainty under the "ample margin of

safety" standard, and, that, in the absence of congressional direction as to the values the agency should use in guiding that discretion, the Administrator's choice of economic and technological feasibility amounted to a reasonable one. *Chevron* requires no more for us to affirm the agency's construction of the statute.

Accordingly, the decision of the EPA withdrawing the 1977 proposed regulations for vinyl chloride is

Affirmed

Full Text of Dissenting Opinion

Wright, *Senior Circuit Judge, concurring in part and dissenting in part:* Our legal system assigns to the courts the task of saying what the law is, even in those cases where administrative agencies have arrived at interpretations of their own. *See Marbury v. Madison*, 5 U.S. (1 Cranch) 137, 177 (1803); *Chevron U.S.A. v. Natural Resources Defense Council*, 476 U.S. 837, 842-43 [21 ERC 1049] (1984); *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Ins. Co.*, 463 U.S. 29, 43 (1983). Although the Supreme Court has made clear that the federal courts must give agency interpretations substantial deference, *Chevron*, 467 U.S. at 844, agencies must follow the clear intent of Congress, and the courts must enforce it. The unsupported assertion that a congressional command is in some respect ambiguous is not sufficient, and should not be sufficient, to block all significant judicial review. In the case before the court today, the Environmental Protection Agency has withdrawn a proposed regulation under §112 of the Clean Air Act on the basis of technological and economic factors Congress clearly removed from the scope of proper deliberation. *See* 42 U.S.C. §7412(b)(1) (1982); 50 Fed. Reg. at 1184 (Jan. 9, 1985), *reproduced* in Joint Appendix (JA) 48. It is the responsibility of this court, despite EPA's interpretation, to uphold Congress' clear decision that §112 emission standards should reflect public health considerations alone.

I concur in Judge Bork's succinct rejection of the statute of limitations and exhaustion arguments made by the intervenor and the agency respectively. But I must respectfully dissent from that portion of the majority opinion that would defer to EPA's consideration of economic feasibility and available technology in its rationale for the withdrawal.

The provision under review here is fairly simple. Section 112 of the Clean Air Act creates an administrative procedure for regulation of "hazardous air pollutants." 42 U.S.C. §7412. The central language of the provision directs the EPA Administrator to establish an emission standard "at the level which in his judgment provides an ample margin of safety to protect the public health from such hazardous air pollutant." *Id.* §7412(b)(1)(B). The provision contains no language authorizing the Administrator to consider technological and economic factors. On the contrary, the language on its face clearly makes the Administrator's decision dependent only on health considerations. The majority argues that the term "judgment" implies that the Administrator has discretion to consider feasibility. But the statute is clear: "judgment" applies only to an "ample margin of safety to protect the public health," and does not make any reference to feasibility considerations, either technological or economic.

Despite this, EPA withdrew its 1977 proposed vinyl chloride standard on feasibility grounds. 50 Fed. Reg. at 1185, JA 49. The new standard is "based on judgments concerning the costs and benefits of the standard to society. The [new] standard is not designed to eliminate V[inyl] C[hloride] exposure risk entirely. Rather, it strikes a balance between public health protection and the cost of that protection." *Id.* at 1183, JA 47. This approach is impermissible for several reasons, each of which I will address in turn.

First, though it may seem reasonable to consider feasibility here, the face of the statute unambiguously precludes it. In §112 Congress had the public health first, foremost, and apparently *exclusively* in mind. *See* 116 Cong. Rec. 42385 (1970) (comments of Sen. Muskie). Second, the legislative history of the Act is not so ambiguous as to obscure the intent of Congress in §112, the majority's claim to the contrary notwithstanding. The history of §112 supports the clear meaning of its language. Finally, EPA's rationale for the withdrawal of the 1977 proposals is not as modest as the majority claims. Accordingly to the majority, EPA evaluated economic and technological feasibility in this case only as a last resort, when faced with chronic scientific uncertainty as to the extent of harmful effects of a particular hazardous pollutant. The majority would uphold this use of feasibility considerations. But EPA itself does not limit its consideration of technological and economic feasibility to such an extent, and argues that §112 gives the Administrator discretion to consider feasibility in all cases. *See Brief for Respondents* at 12-14; 50 Fed. Reg. at 1185, JA 49. By withdrawing the 1977 proposed regulations as infeasible, EPA has contravened the mandate of the Clean Air Act. The proposed vinyl chloride standard should be remanded to the agency for reconsideration and reexamination consistent with the intent of Congress.

I. CONGRESSIONAL INTENT AND SECTION 112

The Supreme Court's *Chevron* opinion, of course, guides our decision here. In that case the Supreme Court upheld an EPA interpretation of the Clean Air Act, 467 U.S. at 839-40, and found that, in the absence of clear congressional intent on a particular issue, the courts may only reverse an agency's interpretation of a provision if it is "impermissible" or "unreasonable." *Id.* at 843-44. But the Court stressed that, if "the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress." *Id.* at 842-43. In the case before this court, the language of the Clean Air Act and its structure clearly show that Congress intended to make §112 a "health-based" rather than a "technology-based" provision. The majority's discovery of ambiguity in the provision is not borne out by a review of precedent on closely related portions of the Clean Air Act, or by examination of the structure of the Act.

The Clean Air Act of 1970 was largely the result of public concern over the growing destruction of our air quality. *See* Schoenbrod, *Goals Statutes or Rules Statutes: The Case of the Clean Air Act*, 30 U.C.L.A. L. Rev. 740, 744 (1983); 116 Cong. Rec. 42381-82 (remarks of Sen. Muskie). The Air Quality Act of 1967 had failed to improve air quality to any significant extent, Schoenbrod, *supra*, at 745, and in 1970 Congress responded to the problem by enacting a series of substantial amendments to the Act. *Id. See* Clean Air Act Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676, *codified at* 42 U.S.C. §§7401-7626 (1982). In that legislation Congress attempted to stiffen the spines of state clean air administrators, *see* Schoenbrod, *supra*, at 744-47, and to institute a policy of "technology-forcing." The latter policy imposes air quality standards that are unattainable under present technology in order to force industry to produce the equipment necessary for effective control of airborne pollutants. *Train v. Natural Resources Defense Council, Inc.*, 421 U.S. 60, 91 [7 ERC 1735] (1974); *see also* Note, *Forcing Technology: The Clean Air Act Experience*, 88 Yale L. J. 1713, 1713-15 (1979). Although "technology forcing" necessarily involves imposition of standards that at present seem unreasonable, Congress clearly made the "hard choice" to follow this policy in search of cleaner air. *Union Electric Co. v. EPA*, 427 U.S. 246, 257 [8 ERC 2143] (1976); 116 Cong. Rec. 42381 (comments of Sen Muskie).

The statute implements the "technology-forcing" policy by refusing to allow the agency to consider technological and economic feasibility in the establishment of most emissions and ambient air standards. Section 108(a)(2), which sets out the grounds for establishment of air quality standards, does not mention technological or economic factors. 42 U.S.C. §7408(a)(2) (1982). Section 109(b)(1), which directs the EPA Administrator to establish ambient air quality standards "the attainment and maintenance of which in the judgment of the Administrator, based on [criteria not including feasibility] and allowing an adequate margin of safety, are requisite to protect the public health," does not mention technological or economic feasibility. 42 U.S.C. §7409(b)(1) (1982). This court has held that §109(b)(1) not only does not *require* the Administrator to consider technological and economic feasibility, but actually *bars* him from doing so. *Lead Industries Ass'n, Inc. v. EPA*, 647 F.2d 1130, 1150 (D.C. Cir. 1979), *cert. denied*, 449 U.S. 1042 (1980).[1] Section 110(a)(2), which directs the EPA Administrator to review state ambient air quality standards, does

[1] The majority argues that the *Lead Industries* court's language barring consideration of technological or economic feasibility was unnecessary to the judgment in that case, and is therefore nonbinding dicta. Maj. op. at 32. I must disagree. Although it is *formally* distinguishable from the holding, the language barring consideration of feasibility under §109 is an integral part of the opinion's rationale, as demonstrated by its repeated appearance. *Lead Industries*, 647 F.2d at 1148, 1149, 1150. Furthermore, EPA is clearly bound by this language in the §109 context. For practical purposes, and certainly for purposes of interpreting parallel provisions of the Clean Air Act, the language barring consideration of *feasibility is not* dicta.

not mention technological or economic feasibility either. 42 U.S.C. §7410(a)(2) (1982). The Supreme Court itself has held that §110(a)(2) does not allow the EPA Administrator to consider economic and technological feasibility when reviewing state ambient air quality standards. *Union Electric*, 427 U.S. at 257-58, 266.

Although the intent of Congress to bar consideration of feasibility in the establishment of air quality standards is clear in §§108, 109 and 110, none of the three sections does so explicitly. Neither does the provision under review here, §112. 42 U.S.C. §7412. Section 112 addresses the problem of particularly hazardous pollutants, and merely directs the Administrator to "establish any such standard at the level which in his judgment provides an ample margin of safety to protect the public health." 42 U.S.C. §7412 (b)(1). Congress did not mention feasibility considerations.

The absence of language that embraces feasibility factors in any of these sections, however, is enormously significant when juxtaposed with other provisions of the Act that explicitly allow evaluation of technological and economic feasibility. When Congress wanted feasibility to be a factor in the Administrator's decisions, it knew how to say so. Section 111, for example, explicitly directs the Administrator to base standards of performance for new stationary pollution sources on the best technology available, and fully envisions consideration of technological and economic feasibility in making this determination. 42 U.S.C. §7411 (1982); *Lead Industries*, 647 F.2d at 649 n.37.

In fact, §112 itself contains two subsections that allow for consideration of technological feasibility under certain *special* circumstances. Section 112(e) gives the Administrator discretion to promulgate a "design, equipment, work practice, or operational standard, or combination thereof" when "it is not feasible to prescribe or enforce an emission standard for control of a hazardous air pollutant." 42 U.S.C. §7412(e)(1).[3] More importantly, §112(e)(2) allows the President to grant stationary sources two-year waivers from enforcement of a hazardous pollutant standard "if he finds that the technology to implement such standards is not available *and* the operation of such source is required for reasons of national security." 42 U.S.C. §7412(e)(2) (emphasis added). The existence of these two subsections makes little sense unless the section as a whole does not allow the Administrator to consider feasibility. The two provisions set out narrow exceptions to the otherwise strict command of §112 that the Administrator may only consider *health* factors in setting standards for hazardous pollutants.

Despite the clarity of this scheme, the agency has gone far beyond either of the two §112 exceptions in its treatment of the vinyl chloride standard. In its 1985 notice withdrawing the proposed 1977 regulations the agency repeatedly states that, because available technology will not suffice to implement such a strict standard, the proposed standard must be withdrawn entirely. 50 Fed. Reg. at 1184 (1st col., 3d col.), 1185 (1st col., 3d col.), 1186 (1st col.), JA 48, 49, 50. The agency is not merely granting a two-year waiver of enforcement to a source critical to national security that is unable to achieve the emission standard due to lack of technology. *See* §112(c)(2). Nor has the agency found that "it is not feasible to prescribe or enforce" an emission standard for vinyl chloride. *See* §112(e)(1). The lack of available technology is used to justify the waiver of a strict standard *itself*, across the board.

This action robs §112(e)(2) of any meaning whatever and sidesteps the narrow provisions of §112(e)(1). If best available technology could always be considered, as EPA asserts, Congress would have had little reason to place a special "best available technology" exemption in the statute for national security industries. *See* W. Rodgers, Environmental Law 277 (1977) ("The occasion for existing sources to argue economics and technology [under §112] is in a waiver request to the Administrator."). Similarly, Congress must have believed feasibility was not a permissible consideration when it enacted §112(e)(1) as an amendment to the Act in 1977. If feasibility were generally a permissible consideration, congressional concerns over the feasibility of standards for some types of pollutants would have been unnecessary. *See* 42 U.S.C. §7412(e)(1); Pub. L. No. 95-95, 91 Stat. 685, 703 (1977). In short, the structure of the Act and of §112 clearly deny the Administrator discretion to consider technological and economic feasibility in establishing hazardous pollutant emission standards.

[3] Section 112(e)(2) defines "not feasible to prescribe or enforce an emissions standard" to include situations in which (A) control techniques are not available or (B) measurement methodology is impracticable "due to technological or economic limitations." 42 U.S.C. §7412 (e)(2).

But the structural evidence against the agency's interpretation does not end even with these strong indications of contrary legislative intent. Congress established national ambient air quality standards under §§108-110 of the Clean Air Act, and "hazardous air pollutant" emission controls under §112. As noted above, the courts have consistently read §108, §109, and §110 to preclude the Administrator from considering technological and economic feasibility in setting ambient air quality standards. It makes no sense to allow the Administrator greater latitude in the establishment of standards for pollutants Congress explicitly recognized as highly dangerous than he is allowed in the regulation of less dangerous pollutants. In fact, §112's language directing the Adminstrator to establish regulations which "in his judgment provide an ample margin of safety to protect the public health" appears on its face to be *more* strict than §109's language *"adequate* margin of safety." 42 U.S.C. §§7412(b)(1), 7409(b)(1); *Environmental Defense Fund v. EPA*, 598 F.2d 62, 81 (D.C. Cir. 1978) (noting that "ample" is more than "adequate" in these provisions of the Clean Air Act).

The majority makes reference to this fact, but fails to explain it. Maj. op. at 30-32. Instead, the majority points out that §109 explicitly refers to criteria to be considered in setting ambient air quality standards, and specifically fails to mention feasibility, whereas §112 contains no such list. Maj. op. at 31. While this is certainly true, it does not distinguish Congressional intent in §109 from the intent behind §112. Section 112 mentions feasibility as a permissible consideration *no more* than does §109. Granted, unlike §109, §112 does not contain a list of criteria to be used by the Administrator. But the absence of a detailed list does not mean §112 allows the Administrator to consider any factor he pleases. On the contrary, §112 lists only one proper consideration — the public health. If anything, this focus on a single factor seems to indicate an even stronger bias against feasibility considerations than exists under §109. Moreover, the language in the two sections is so clearly parallel that if §109 forbids consideration of feasibility, §112, absent strong evidence to the contrary, presumptively precludes consideration of feasibility, as well. *See Japan Whaling Ass'n v. American Cetacean Society*, 106 S.Ct. 2860, 2870 (1986); *Sedima, S.P.R.L. v. Imrex Co.*, 105 S.Ct. 3275, 3281 (1985).

The majority's interpretation muddles what has been a remarkably coherent body of law addressing the proper place of technological and economic feasibility considerations under the Clean Air Act. The role of §112 within the Clean Air Act as a whole, as well as the internal structure of §112 itself, make abundantly clear that EPA's evaluation of technological and economic feasibility in its decision to withdraw the 1977 standard was impermissible under the Act.

This is not my view alone. Virtually every commentator to examine the question agrees that Congress prohibited the Administrator from considering technological and economic feasibility in the establishment of §112 hazardous pollutant emission standards. *See* D. Currie, Air Pollution: Federal Law and Analysis 3-90 (1984) ("While Congress ought to have allowed costs to be taken into account [in §112], the EPA has taken excessive liberties [in reading cost considerations into the statute]; the difference between health standards and technology standards is too obvious to be explained away as accidental"); F. Anderson, D. Mandelker & A. Tarlock, Environmental Protection: Law & Policy 511, 513 (1984) ("[Section] 112 appears to direct EPA to set a highly protective standard that eliminates possible serious risks without regard to cost. * * * [T]echnical and economic feasibility apparently cannot be taken into account * * *."); R. Findley & D. Farber, Environmental Law 456 (1985) ("[Under §112] [t]here is no provision for EPA consideration of the cost or difficulty of compliance in determining the emission standards. * * * Section 112 seems to require EPA to set standards which will completely eliminate emissions * * *."); W. Rodgers, Environmental Law 277 (1977) ("[T]he administrative judgment on an emission standard for a hazardous pollutant should be dictated solely by public health considerations without regard to the costs, or feasibility of control."); Graham, *The Failure of Agency-Forcing: The Regulation of Airborne Carcinogens Under Section 112 of the Clean Air Act*, 1985 Duke L.J. 100, 134 ("[T]he EPA has attempted to convert section 112 from a health-based statute to a technology-based statute. * * * The Agency's departure from health-based emission standards is highly questionable * * *"); Schroeder, *Foreword: A Decade of Change in*

Regulating the Chemical Industry, 46 Law and Contemp. Prob. 1, 30-36 (Summer 1983) ("EPA rewrote the statute," EPA's "approach is totally unjustified" and "textually implausible," EPA's interpretation is "dead wrong"). Even a General Accounting Office report "finds little support for EPA's position," and comments that EPA seems to be "at odds with section 112." Comptr. Gen. of the U.S., Delays in EPA's Regulation of Hazardous Air Pollutants 44, 51 (1983). And in *Hercules, Inc. v. EPA*, 598 F.2d 91 (D.C. Cir. 1978), this court itself stated in dicta that "Congress enacted section 112 * * * without provision for considerations of feasibility." *Id.* at 112.

Obviously, none of these comments has any *binding* effect on this court. We are free to ignore them if we wish, and the majority has done so. Nevertheless, the commentators' unanimity on the meaning of §112 is a powerful indication of the clarity of Congress' intent on this issue. Despite the majority's attempt to show otherwise, Congress made §112 an unambiguously health-based standard. We need not consider the legislative history of the provision in any great detail, nor need we consider whether EPA's interpretation is "reasonable" under the second tier of the *Chevron* deference test. Our only duty is to vindicate the clear intention of Congress.

But even if some ambiguity actually surrounded §112, the EPA's construction of that section still should be invalidated. If Congress had no clear intent on a particular question, and did not explicitly delegate the interpretation to the agency — as the majority claims is the case here — this court has specifically held that a petitioner need only show that the agency's interpretation of the statute is *unreasonable* or *impermissible* in order to prevail. *State of Montana v. Clark*, 749 F.2d 740, 745 [21 ERC 2090] (D.C. Cir. 1984), *cert. denied*, 106 S.Ct. 246 (1985); *American Cetacean Society v. Baldrige*, 768 F.2d 426, 433 (D.C. Cir. 1985), *overruled on other grounds sub. nom. Japan Whaling Ass'n v. American Cetacean Society*, 106 S.Ct. 2860 (1986); *Chevron*, 467 U.S. at 843-44. Given the structure of the Clean Air Act and the existence of closely parallel precedent on other provisions within the Act, EPA's interpretation of §112 simply cannot stand as "permissible."

II. THE LEGISLATIVE HISTORY OF SECTION 112

The majority, confronted with the clarity of §112's language in light of the Clean Air Act's overall structure, searches for ambiguity in the voluminous legislative history of the 1970 Clean Air Act Amendments. At the outset, it is important to note that the majority does not find that the legislative history clearly indicates the face of the statute is misleading and that Congress intended economic and technological feasibility to be considered by the Administrator in setting §112 emission standards. If the legislative history clearly contradicted the language of the statute, perhaps the intent of Congress could legitimately be called "ambiguous," and *Chevron's* "reasonableness" review of EPA's interpretation would become appropriate. *See* 467 U.S. at 844. The majority, however, stops far short of this evaluation of the legislative history. Indeed, it finds that "*[a]t most* * * * the legislative history of the 1970 Clean Air Amendments [is] ambiguous with respect to what the Administrator may consider* * *." Maj. op. at 19 (emphasis added).[1]

The majority uses "ambiguous" legislative history, therefore, to indict a provision that is otherwise clear on its face. This is a contorted approach to statutory interpretation. The words of a statute are presumptively conclusive of legislative intent. *State of Montana*, 749 F.2d at 747. Ambiguous legislative history alone cannot overcome that presumption. The majority effectively suggests that judicial deference to administrative agencies is due whenever any ambiguity can be found in the legislative history of a provision, regardless of ambiguity or lack thereof in the actual language and structure of the statute. This approach comes perilously close to establishing an absolute rule of judicial deference to agency interpretations. Virtually all legislative histories of

[1] Similarly, the majority discusses whether Congress implicitly ratified EPA's consideration of technological and economic feasibility in its 1977 amendments to the Clean Air Act, and concludes that the history of the 1977 amendments "is far short of legislative ratification of the EPA's construction." Maj. op. 24. Although this evaluation seems reasonable, it does not obscure the clear congressional intent that underlies §112, and certainly does not make the language and structure of the Act ambiguous.

any size are plagued with some degree of contradiction and ambiguity. The majority would impose upon Congress a duty to be clear that goes far beyond what that body, or any human drafter, could possibly hope to achieve on a consistent basis in an age of complex statutory schemes. In our caution not to rob the Executive Branch of its proper role in the constitutional system, we must be extremely careful not to deprive Congress of effective legislative control over agency action.

In any event, the legislative history is not ambiguous. On the contrary, the history of §112 supports its otherwise clear meaning. Section 112 had its origins in §115 of the Senate bill S. 4358 and §112 of House bill H.R. 17255. The Senate bill contained stiff provisions that prohibited non-threshold hazardous pollutants, that is, hazardous pollutants for which no safe level of exposure exists. Only health factors were to be considered. *See* S. 4358, 91st Cong., 2d Sess. §6(b), 116 Cong. Rec. 32375 (1970). The House bill, in contrast, explicitly called for consideration of feasibility in setting emission standards for all new sources of hazardous pollutants. The House version did not attempt to handle existing sources. *See* H.R. 17255, 91st Cong., 2d Sess. §5(a), 116 Cong. Rec. 19225-26 (1970). The conference committee arrived at a compromise between the two versions, and it is that compromise that is at issue here.

First of all, the final version of §112 clearly resembles the Senate bill. Like the Senate bill, §112 regulates *all* emissions, not simply those from new sources. Like the Senate bill, the final version does not include a provision that would give the Administrator broad discretion to grant exceptions from emissions standards. The House bill contained such a provision. *See* H.R. 17255, 91st Cong., 2d Sess. §5 (1970). The majority denies that the similarity between the Senate bill and the final Act says anything as to whether Congress intended to allow the Administrator to consider economic and technological feasibility in setting the standards. Maj. op. at 16-17. This overstates the case. If the final bill more closely resembles the Senate bill, then that fact should be taken at face value. The Senate version seems to have substantially prevailed in the conference committee deliberations. As the Senate version forbade consideration of feasibility, we can draw the cautious inference, absent evidence to the contrary, that the final bill does so as well. It would be odd to discover a "rule" of statutory construction that indicated that final bills resembling the version of one house are to be evaluated according to the legislative history of the *other* house's version.

This analysis alone, however, does not illuminate every dim corner of the compromise reached between House and Senate on §112. Conceivably, the House conferees allowed the Senate to retain its regulation of all sources, both new and existing, in exchange for an implicit agreement to allow the Administrator to consider feasibility in setting emission standards. The insertion of the language "ample margin of safety" into the final provision weakly supports this hypothesis, though it is important to reemphasize that this language on its face speaks only to health considerations, and conspicuously fails to make any mention of feasibility. *See* Conference Report, H.R., Rep. No. 1783, 91st Cong., 2d Sess. 195-96 (1970).

But the conference committee added other language to §112 as well. The committee, after wrangling over the scope of the regulation and the precise language of the command to the Administrator, made a point of inserting §112(c), the presidential waiver provision. *See* Conference Report, H.R. Rep. No. 1783, 91st Cong., 2d Sess. 197 (1970). This, it seems to me, is the heart of the compromise between House and Senate. The waiver provision, as previously noted, *see* pages 6-7 *supra*, allows for temporary waiver of emission standards if available technology cannot implement the standards at a source of importance to national security. This provision is unnecessary unless the "ample margin of safety" language otherwise bars consideration of available technology. The conference committee added both pieces of language at approximately the same time, a fact that makes it difficult to believe the committee was unaware of the interaction of the two phrases.

Given the resemblance of the final bill to the Senate bill, and the fairly clear evidence of the nature of the compromise between the two houses of Congress provided by the changes made in conference, the legislative history tips toward petitioner's position. As noted above, however, it is far from clear that even an *ambiguous* legislative history would require us to find for respondents. On the contrary, petitioner's position is amply supported by the face of the statute, which makes resort to the legislative history a subsidiary endeavor. In any event, however, the ambiguity the majority seeks in

§112 can no more be found in its legislative history than in its actual language.

III. The Majority's "Uncertainty" Rationale

To explain its inference of broad discretion for the Administrator to consider economic and technological feasibility under §112, the majority relies heavily on what it regards as the inevitable discretion of the EPA Administrator when faced with "scientific uncertainty." In essence, the majority would create an "uncertainty" exception to the "health-based" character of §112. The questions raised by the majority's discovery of this exception to the general rule that feasibility is not to be considered in areas where Congress has not authorized such an approach, *American Textile Manufacturers Institute v. Donovan*, 452 U.S. 490, 510 (1981) (when Congress intends cost-benefit analysis to be used, it says so); *Union Electric*, 427 U.S. at 257 n.5 (same), are sufficiently important to warrant separate discussion.

As a threshold matter, the majority's characterization of EPA's rationale for withdrawing the proposed vinyl chloride standard is misleading. Throughout its opinion the majority attempts to narrow EPA's position to more tenable grounds by limiting EPA's claims to the special "uncertainty" question posed by carcinogen regulation. EPA itself has not been so neat. In its notice of proposed regulation, in its briefs, and in its oral argument to this court, EPA never raises the "scientific uncertainty" problem in any significant manner. And with good reason, because it is not EPA's position that only scientific uncertainty justifies consideration of feasibility under §112. EPA argues that it may engage in cost-benefit analysis, including consideration of technological and economic feasibility, any time it promulgates regulations under §112. *See* 50 Fed. Reg. at 1183, JA 47 (cost-benefit analysis used to arrive at vinyl chloride standard, because elimination of risk would require prohibition of emissions); Brief of Respondents at 12-14.

EPA's expansive position on its discretion to consider feasibility flows in part, no doubt, from the fact that the uncertainty as to vinyl chloride's low-concentration health effects seems relatively small. *See* 50 Fed. Reg. at 1182, JA 46. In fact, EPA has decided to a *substantial degree of certainty* that the number of lives saved by regulation below the level of the 1976 standards would not be justified by the costs of such regulation. *Id.* (setting out specific, though estimated, figures on risk). As a consequence, the majority's attempt to distinguish between "apparent non-threshold toxics" and "non-threshold toxics" is rather odd. Maj. op. at 25-26 n.7. EPA does not focus on any such distinction. On the contrary, EPA explicitly recognizes that "any atmospheric concentration of VC poses some public health risk." 50 Fed. Reg. at 1183, JA 47; *compare* maj. op. at 24-25 (EPA not refusing to regulate known health risk). In other words, EPA recognizes that vinyl chloride is effectively a non-threshold pollutant.[4] EPA's decision to withdraw its proposed regulations did not spring from concern over uncertainty, but rather rested on the determination that the costs of regulation exceeded its benefits. When Congress enacted §112 of the Clean Air Act as a health-based provision, it forbade the use of precisely this rationale.

[4] The majority, not surprisingly, denies this, and insists that EPA has made a point of distinguishing between "apparent non-threshold" pollutants and "non-threshold" pollutants. Maj. op. at 25-26 n.7. I agree with the majority that such a distinction can be made as an intellectual matter. I do not see, however, that EPA has rested its decision in this case on any such distinction. On the contrary, EPA quite clearly states that it believes vinyl chloride, for all practical purposes, is always hazardous, even though it concedes that at some very low level of exposure adverse health effects might not accrue. Moreover, it seems to me that the majority's distinction is one without a difference. Science may never be able to prove definitively that any given pollutant is harmless at some low concentration. See text at 20 *infra*; maj. op. at 13. To do so would be to prove a negative. *See, e.g., Ethyl Corp. v. EPA*, 541 F.2d 1, 25 n.52 [8 ERC 1735] (D.C. cir. 1975) *(en banc), cert. denied*, 426 U.S. 941 (1976) (ultimately *all* scientific "fact" is uncertain at some level). Thus, if we adhere to the majority's definitions of "apparent non-threshold" pollutant and "non-threshold" pollutant, we soon discover that the second category is an empty set. As a consequence, the distinction between the two does not offer any particular insight into EPA's approach to vinyl chloride regulation or, more importantly, into Congress' intent on non-threshold pollutant regulation. On the contrary, it tends to obscure the otherwise obvious fact that EPA has decided, with only a very small degree of uncertainty, that the costs of this regulation exceed its benefits. As EPA is confident enough to make decisions on the assumption that vinyl chloride is for all practical purposes a non-threshold pollutant, we should not hesitate to do so as well.

The majority argues that the word "judgment" in §112(b)(1) implicitly grants the Administrator discretion to consider feasibility in setting emissions standards when the level of harms from pollutant exposure is uncertain. Maj. op. 12-13. If health were the only factor to be considered, the majority submits, the statute would effectively require that the Administrator ban outright any emissions of pollutants with no safe level of emissions, that is, any "non-threshold" pollutants. If this were the case the Administrator could make only one decision, his discretion would disappear, and the word "judgment" would have no meaning. This would also be true, says the majority, if any uncertainty whatever existed as to the health risks posed by a pollutant. Three responses to this line of reasoning come to mind. I will explain each in turn. First, "no-threhold" pollutants are not the only pollutants §112 regulates. A substantial part of the Administrator's "judgment" lies in classifying pollutants as threshold or non-threshold, and in establishing specific threshold levels. Second, the Administrator has some discretion to refuse to regulate "insignificant" health risks. Finally, this court has no authority to allow the agency to ignore clear congressional commands, regardless of our opinion of their wisdom.

Congress did not enact §112(b)(1) to regulate "non-threshold" pollutants alone. The Senate report explicitly adverted to "threshold" pollutants, that is, pollutants safe at some low level of emissions, in its explanation of the scope of the Administrator's discretion. If the Administrator found "that a greater than zero emission [of a hazardous pollutant] could be permitted without presenting a hazard to health," he would be free not to prohibit emissions of that pollutant. S. Rep. No. 1196, 91st Cong., 2d Sess. 20 (1970). Senator Muskie, reflecting back on the legislative process, has said that the Act is based on the assumption that thresholds of safety exist for some hazardous pollutants. See Clean Air Act Amendments of 1977, Hearing Before the Subcomm. on Environmental Pollution of the Senate Comm. on Environment and Public Works (pt. 3), 95th Cong., 1st Sess. 8 (1977).

Despite the majority's assertions to the contrary, therefore, the word "judgment" simply does not require a technological and economic feasibility overlay to make sense in this provision. The term "judgment" in §112(b)(1) gives the Administrator discretion to determine the existence and level of "thresholds" for various pollutants, consistent with the public health. *See Lead Industries*, 647 F.2d at 1152 (EPA position stresses that Administrator's "judgment" regards scientific and technical questions). It does not grant discretion to make wide-open evaluations of technological and economic feasibility. The existence of uncertainty in the determination of threshold levels not only fails to undercut this interpretation of congressional intent, but actually supports it. Congress was aware that safe emissions levels might always be scientifically uncertain to some extent, and therefore gave the Administrator discretion to make the final determination of the threshold levels of various pollutants by evaluating existing scientific evidence. *Id.* at 1152-53.

The majority worries that interpretations of §112 that do not allow for considerations of feasibility might require the EPA to prohibit all emissions of non-threshold pollutants. This could lead, says the majority, to the elimination of entire industries for the sake of negligible and uncertain improvements in the public health. The majority's picture of the calamities that could befall the nation if this court obeys the will of Congress is greatly exaggerated. Though the statute might be read to ban emissions of non-threshold pollutants in every case, I am unconvinced that this would be proper. Congress clearly banned consideration of feasibility under §112, but it did not clearly require an *absolute* ban on non-threshold pollutant emissions. At times EPA may in fact be bound for health reasons to ban outright all emissions of a given non-threshold pollutant. But it is well established that agencies have some limited discretion to refuse to regulate "insignificant" harms. In *Alabama Power Co. v. Costle*, 636 F.2d 323 [13 ERC 1993] (D.C. Cir. 1979), for example, Judge Leventhal noted that "[c]ourts should be reluctant to apply the literal terms of a statute to mandate pointless expenditures of effort," *id.* at 360, and that "there is likely a basis for an implication of *de minimis* authority to provide exemption when the burdens of regulation yield a gain of trivial or no value." *Id.* at 360-61; *see also Ethyl Corp. v. EPA*, F.2d 1, 13-14 (D.C. Cir. 1975) *(en banc), cert. denied*, 426 U.S. 941 (1976). If, in the judgment of the Administrator, health harms from some low level of emissions are trivial or nonexistent, §112 does not require a ban.

But that is not the situation presented by this case. Discretion to allow "*de minimis*" emissions of toxic pollutants if harm to the public health would be truly insignificant is a far cry from the EPA's claimed discretion to examine technological and economic feasibility under *all* circumstances, or from the majority's attempt to give EPA license to consider feasibility factors in the face of any scientific uncertainty whatever. The majority highlights just how sweeping an approach it takes by stating that even if "the area of uncertainty [of harms associated with a toxic], as with vinyl chloride, covers all non-zero levels of emission[, that] does not alter our conclusion [that cost-benefit analysis can be applied when any uncertainty exists]." Maj. op. at 25. Trivial and insignificant harms are not the only harms encompassed by this language.

Finally, even if the statute did require an outright ban on non-threshold pollutant emissions, this court should not set about "correcting" perceived deficiencies in that policy. If Congress has made the decision to impose such costs on society, that is the prerogative of Congress. The Supreme Court made this absolutely clear not long ago, in a situation in some respects not very different from that before us today. *See TVA v. Hill*, 437 U.S. 153, 194 (1978). Though we owe the agency here substantial deference, *see Chevron*, 467 U.S. at 844, that deference pales by comparison with that we owe Congress. Congress has spoken clearly in §112, and we must obey its command.

The extent to which the majority's grant of wide discretion to the EPA to consider feasibility in the face of "uncertainty" is at loggerheads with congressional intent becomes even more clear if we consider the practical effect of this exception. As has become all too apparent in the last fifteen years, the *degree* of risk posed by carcinogens is virtually always a matter of some uncertainty. *See, e.g., Industrial Union Dep't, AFL-CIO v. American Petroleum Institute*, 448 U.S. 607, 613 (1980). The majority itself recognizes this fact admitting that science may never eliminate uncertainty in the evaluation of carcinogenic risk. Maj. op. at 13. The existence of a hazard may be absolutely clear, as in the present case but the magnitude of that hazard is likely to be imprecise.

Many of the pollutants regulated under §112, or being considered for regulation under that section, are carcinogens. Comptr. Gen. of the U.S., Delays in EPA's Regulation of Hazardous Air Pollutants 8-11 (1983); Summary of Data on Specific Pollutants and Cancer Risk Estimates Excerpted from EPA Draft Study, 15 Env't Rep. (BNA) 616, 616-18 (Aug. 10, 1981). As a consequence, if the majority's interpretation of §112 prevails, many pollutants regulated under this provision will be regulated under a "technology-based" feasibility standard. This would be perverse. Granted, Congress may not have realized the full extent to which carcinogenic risk is subject to intrinsic uncertainty. Nevertheless, Congress was clearly aware that some toxics pose a danger to health at any concentration, requiring the strictest regulation without regard to cost, even if the extent of that danger might be unclear at the third decimal point. *See* 116 Cong. Rec. 16091 (1970) (comments of Sen. Muskie). Congress did not include any language whatever that indicates it embraced a broad "uncertainty" exception of the sort proposed by the majority. After all, the judgment of the Administrator under §112 is judgment as to an "ample margin of safety necessary to protect the public health," not judgment as to "a reasonable degree of safety in light of the availability of technology and the costs to be imposed on industry."

Moreover, the majority's willingness to allow for consideration of feasibility if harms are uncertain runs afoul of its own logic. The majority feels that if the exact scope of harm from a hazardous pollutant is not certain, even though the existence of harm may be clear, then "such considerations as technological and economic feasibility seem natural." Maj. op. at 26. EPA should be allowed to weigh these factors against the harms caused by the toxic, argues the majority. If the harms that stem from emission of a hazardous pollutant are uncertain, however, how can they be "weighed" against technological and economic feasibility? The majority proposes an exception to Congress' ban on cost-benefit analysis under §112 that covers precisely the circumstance where cost-benefit analysis is of no real assistance to the Administrator. Let us be clear about what the majority would do: Discretion to weigh cost and technology against uncertain levels of harm — even though these harms may be certain at *some* level — is broad discretion not to regulate low-level hazardous pollutants at all. Without solid statistics for harm, the costs of regulation will always dominate the equation. Perhaps this approach can be justified if Congress has explicitly used the language of "reasonableness," *see, e.g., Industrial Union Department*, 448 U.S. at 642, but it is hardly acceptable if Congress has gone to considerable lengths to *avoid* such language, as in the case before us.

III. Conclusion

This court should not read the Supreme Court's *Chevron* opinion and general principles of administrative law to allow the insertion of cost-benefit analysis or its equivalent into every statute where Congress makes any technical delegation to an agency. It is the legislature's right, and at times its duty, to vindicate public values even if they are not cost-justified. *See, e.g., TVA v. Hill*, 437 U.S. at 194-95; Kelman, *An Ethical Critique of Cost-Benefit Analysis*, 1981 Regulation 33 (Jan./Feb.). In §112 of the Clean Air Act Congress sought to make "the hard choices" necessary to improve our air quality and to eliminate hazardous pollutants from our air. *Union Electric*, 427 U.S. at 457. Congress refused to compromise on matters of public health, and denied the EPA Administrator the discretion to consider technological and economic feasibility in setting hazardous pollutant emissions standards. Simply because the majority feels lack of compromise is unreasonable does not mean the court should enforce its own conceptions of proper policy. *TVA v. Hill*, 437 U.S. at 185 ("It is not for us to speculate, much less act, on whether Congress would have altered its stance had the specific events of this case been anticipated.").

This analysis is in no way at odds with the *Chevron* decision. The Supreme Court has directed the lower federal courts to consider the reasonableness of an agency's interpretation of a statute carefully and deferentially if the intent of Congress on the issue is not clear. 467 U.S. at 844. As I have argued above, §112 is as devoid of ambiguity on the permissibility of cost-benefit analysis, given the overall structure of the Clean Air Act, as any statutory provision probably could be. But even accepting, for the sake of argument, the majority's claim that §112 is somehow unclear, the agency here should still be directed to reconsider its decision. The "reasonableness" of an agency interpretation must be determined in light of the statutory scheme under examination. *Id.* at 845. *Chevron*'s "reasonableness" review does not give the courts — and agencies — power to apply "laws" of efficiency and cost-benefit optimality to legislative schemes if the structure and history of those schemes indicate that Congress intended otherwise.

Congress did not enact the Clean Air Act in order to reach a "reasonable" accommodation between air free of hazardous pollutants and economic considerations. Congress moved with grim determination to clear the skies of these toxics, and imposed upon the country a policy of stringent "technology-forcing" regulation as "a drastic remedy to what was perceived as a serious and otherwise uncheckable problem of air pollution." *Union Electric*, 427 U.S. at 256; *Train v. NRDC*, 421 U.S. at 91. Today, in diluting the effectiveness of that remedy, this court ignores both the letter of the Act and the uncompromising spirit behind it.

In refusing to read the clear intent of Congress in §112 of the Clean Air Act, the majority overemphasizes the *Chevron* deference principle and effectively converts the unambiguously "health-based" §112 into a "technology-based" provision. This metamorphosis not only contravenes congressional intent but flies in the face of an entire line of this court's precedent, as well as precedent of the Supreme Court. When Congress intended EPA to consider technological and economic feasibility under the Clean Air Act, it clearly stated that fact. I cannot agree with the majority's refusal to overturn EPA's unjustified and unreasonable contrary position, and therefore

I respectfully dissent.

NRDC v. THOMAS

U.S. Court of Appeals
District of Columbia Circuit

Natural Resources Defense Council, et al., Petitioners, v. Lee M. Thomas, Administrator, Environmental Protection Agency, et al., Respondents, Engine Manufacturers Association, Motor Vehicle Manufacturers Association, et al., International Harvester Company, People of the State of California, Intervenors, No. 85-1294; Engine Manufacturers Association on behalf of Caterpillar Tractor

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Federal Register

Wednesday
January 9, 1985

Part V

Environmental Protection Agency

40 CFR Part 61

National Emission Standards for Hazardous Air Pollutants; Vinyl Chloride; Proposed Rule and Notice of Public Hearing

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 61

[AD-FRL-2707-4]

National Emission Standards for Hazardous Air Pollutants; Vinyl Chloride

AGENCY: Envoronmental Protection Agency (EPA).

ACTION: Proposed rule and notice of public hearing.

SUMMARY: The current emission standard for vinyl chloride (VC) was promulgated under Section 112 of the Clean Air Act in 1976. A review of the technological basis and administrative aspects of the standard has been completed, and the conclusions of the review are presented in this notice The conclusions are the basis for this action which (1) proposes administrative and clarifying revisions to the standard and (2) announces decisions pertaining to other aspects of the current standard. This notice also withdraws proposed revisions to the current standard which were published in the Federal Register on June 2, 1977 (42 FR 28154).

If requested, a public hearing will be held to provide interested persons an opportunity for oral presentations of data, views, or arguments concerning the proposed revisions to the current standard.

DATES: *Comments.* Comments must be received on or before March 25, 1985.

Public Hearing. If anyone contacts the EPA requesting to speak at a public hearing by January 30 1985, a public hearing will be held on February 28, 1985 beginning at 9:00 a.m. Persons interested in attending the hearing should call Ms. Shelby Journigan at (919) 541-5578 to verify that a hearing will occur.

Request to Speak at Hearing. Persons wishing to present oral testimony must contact EPA by January 30, 1985.

Incorporation by Reference. The incorporation by reference of certain publications in these standards will be approved by the Director of the Federal Register as of the date of the final rule.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate if possible) to: Central Docket Section (A-130). Attention Docket Number A-81-21, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

Public Hearing. If anyone contacts the EPA requesting to speak at a public hearing by January 30, 1985, the public hearing will be held at EPA Auditorium, corner of Highway 54 and Alexander Drive, Research Triangle Park, North Carolina. Persons interested in attending the hearing should call Ms. Shelby Journigan at (919) 541-5578 to verify that a hearing will occur. Persons wishing to present oral testimony should notify Ms. Shelby Journigan, Standards Development Branch (MD-13), U.S. Enviromental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5578.

Background Information Document. The general findings of the review study are documented in "Vinyl Chloride—A Review of National Emission Standards", EPA-450/3-82-003 (NTIS-PB 84-114354), available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. The major technical analysis for the review study is contained in a separate document which may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, North Carolina 27711, telephone number (919) 541-2777. Please refer to "Vinyl Chloride: Relief Valve Discharge Standard," EPA-450/3-85-002, for the technical document.

Docket. Docket No. A-81-21, containing supporting information used in developing the proposed standard, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, SW., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FUTHER INFORMATION CONTACT: Mr. Robert E. Rosensteel or Mr. Leslie B. Evans, (919) 541-5671, concerning technical aspects of the industry and control technologies, and Mr. Fred Dimmick or Mr. Glibert H. Wood, (919) 541-5578, concerning regulatory decisions. The address for these contacts is Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

SUPPLEMENTARY INFORMATION:

Summary of Revisions to Current Standard

Revisions. Several administrative changes are being proposed as a result of a review of the national emission standard for VC. No major revisions are being proposed to the standard. As with the current standard for VC, the revisions are being established under Section 112 of the Clean Air Act. The significant administrative revisions include: (1) Reformatting the emission limit for relief valve discharges, (2) providing a compliance test procedure and a specific emission limit for operators who perform stripping operations in reactors, and (3) specifying requirements for leak detection and repair programs for certain equipment in VC service. Additional minor administrative changes to the standard are being proposed and are explained later in this premable.

Summary of Health, Environmental, Energy, and Economic Impacts. Since no major revisions to the standard are being proposed, the impacts resulting from the current standard remain generally unchanged. In 1975, it was estimated that emissions of VC from plants producing ethylene dichloride (EDC), VC monomer and polyvinyl chloride (PVC) would be reduced from 96,000 Mg/yr to 4,910 Mg/yr under the current standard, representing an emission reduction of 91,000 Mg/yr of VC (or 95 percent of VC emissions). Emissions of volatile organic compounds (VOC) and EDC are also reduced under the standard.

The estimated risks attributed to exposure to VC from EDC/VC and PVC plants in operation prior to the current standard were 5.5 cases per year for liver angiosarcoma and 11 cases per year for all cancers. The risks attributed to exposure to VC from sources under the current standard have been estimated to be 0.28 cases per year for liver angiosarcoma and 0.55 cases per year for all cancers.

In 1975, the estimated capital cost for existing plants to meet the VC standard was $198 million, of which $15 million was for EDC and VC monomer plants and $183 million was for PVC plants. The EPA estimated that the annualized cost (including capital amortization, etc.) to these plants to maintain the required emission levels would be $70 million per year.

Background

The VC standard was proposed on December 24, 1975 (40 Fr 59532), and promulgated on October 21, 1976 (41 Fr 46559). It is applicable to plants producing EDC by the reaction of oxygen and hydrogen chloride with ethylene, plants producing VC by any process, and plants producting one or more polymers containing any fraction of VC. These plants are subject to different requirements at numerous VC emission points in the manufacturing process. These requirements include numerical emission limits, equipment specifications, and work practices.

The standard was designed to minimize the health risks associated

with VC by requiring reasonable control measures. As stated in the preamble to the proposed standard (40 Fr 59532, December 24, 1975), there is no known threshold level of effects for VC. Therefore, the only approach that would eliminate health risks associated with VC would ban its production and use. This approach was not selected. Rather, an approach was selected to minimize the health risks associated with VC by use of reasonable control measure.

On November 19, 1976, the Environmental Defense Fund (EDF) petitioned the United States Court of Appeals for the District of Columbia Circuit to review the standard. On March 24, 1977, the EDF and the EPA moved to dismiss the proceedings on the basis of a settlement agreement requiring the EPA to propose amendments which would require increased efficiency of existing control equipment, require more stringent control of new sources, and prohibit increases in emissions within the vicinity of an existing source due to new construction. The preamble to the proposed amendments was to state that the EPA's policy for regulating carcinogens under Section 112 of the Clean Air Act would include a general goal of eliminating emissions of carcinogens and that the EPA would initiate a review of the VC standard 3 years after the promulgation of the amendments.

On June 2, 1977, the amendments were proposed (42 FR 28154). Many comments pertaining to policy, technological feasibility, and procedural aspects of the proposed amendments were received. Review of these comments indicated that additional technical data and cost information were required before the proposed amendments, or revisions of the proposed amendments, could be promulgated.

Meanwhile, the EDF filed a petition with the EPA requesting the establishment of a comprehensive program for regulating airborne carcinogens under Section 112 of the Clean Air Act. The aspects of the EDF's petition concerning the development of standards under Section 112 were similar to those proposed in the June 2, 1977, amendments to the VC standard. Based on the similarity of the proposed amendments and the EDF's requested comprehensive program for regulating airborne carcinogens, the EPA believed that it should not take final action on the proposed VC amendments until after it had acted on the EDF's petition.

On October 10, 1979 (44 FR 58642), the EPA proposed "Policy and Procedures for Identifying, Assessing, and Regulating Airborne Substances Posing a Risk of Cancer." This proposal addressed several issues which were central to the proposed VC amendments. It also articulated the EPA's conclusion that Section 112 does not express an intent to eliminate totally all risks from emissions of airborne carcinogens. The EPA's selection of the level of control for a hazardous air pollutant emission standard would not be based on a policy that requires zero emissions of carcinogens. This policy is consistent with the basis for other recent actions under Section 112. For example, standards for benzene from coke ovens and leaks from equipment components in benzene service are not based on a zero emissions policy but rather on a reasonable level of control, which considers emissions and health risks.

The EPA believes it is not appropriate to leave the proposed amendments to the VC standard in effect or to promulgate amendments based on the proposed amendments. Therefore, the June 2, 1977, proposal is withdrawn. As described in the following section of this notice, the EPA began a review study to obtain additional technical data and cost information and to determie whether other amendments to the standard are needed. New amendments developed as a result of the review study are proposed in this notice.

Review of VC Standard

Early in 1980 the EPA began a review of the VC standard. The primary purpose of the review was to investigate the adequacy and appropriateness of the standard in light of policy decisions, health studies, control technology developments, and enforcement and compliance experience which have occurred since the standard was first promulgated. The review consisted of a screening study of: (1) Existing and new control technologies, (2) sources not regulated by the standard, and (3) enforcement and compliance experience since promulgation of the standard. Information and data evaluated during this study were obtained through literature searches, plant visits, and interviews with industrial representatives and EPA regional personnel involved in enforcement and surveillance of the VC-emitting industries. The information and data are presented in a document that may be obtained as described in the **ADDRESSES** section of this preamble. Decisions based on this review are summarized in the next two sections of this preamble.

As another aspect of the review of the VC standard, the EPA's Carcinogen Assessment Group reviewed new health studies that have become available since the standard was promulgated. This review included a study of the estimated carcinogenic strength of VC (the VC unit risk number) and focused on whether this number should be changed to reflect new informaton. Since the current standard was promulgated, new occupational studies have confirmed qualitatively that liver and brain cancer incidence are asociated with population exposure to atmospheric VC. However, none of these new studies have sufficient exposure information to warrant a refinement of the quantitative cancer risk estimate.

Findings and Conclusions of the Review Study

The findings and conclusions of the VC review study are presented in the following subsections. The first subsection discusses the need and basis for the current standard. The second subsection addresses the level of control required by the current standard. The third subsection identifies source categories not covered by the current standard and evaluates the appropriateness of regulating these sources.

(1) Need and Basis for Current Standard

The current VC standard was established based on judgments concerning the costs and benefits of the standard to society. The standard is not designed to eliminate VC exposure risk entirely. Rather, it strikes a balance between public health protection and the cost of that protection. Data (evaluated before the current standard was established) strongly indicate that VC causes or contributes to the development of angiosarcoma, other cancers, and various noncarcinogenic disorders in people with occupational exposure and in animals with experimental exposure to VC. Although no dose-response data are available at the concentrations of VC found in the ambient air, the EPA concluded when the standard was established that any atmospheric concentration of VC poses some public heath risk. To eliminate the risk of VC exposure entirely, a complete prohibition of all VC emissions would be necessary. This would require the closure of the entire industry and result in serious, adverse economic impacts. Furthermore, the EPA concluded at the time the current standard was established that a complete prohibition of all VC emissions would not be desirable or necessary. The EPA

concluded this in view of (1) the beneficial uses of VC products for which desirable substitutes are not readily available; (2) the potential adverse health and environmental impacts associated with VC substitutes that have not been throughly studied; (3) the number of employees, particularly in fabrication industries, who would become at least temporarily unemployed; and (4) the availability of control technology that is capable of substantially reducing emissions of VC into the atmosphere.

Although all EDC, VC and PVC plants have now incorporated VC emission controls, the maintenance of a Federal standard for VC is still considered necessary. The VC standard contains requirements for the proper operation and maintenance of control devices and the proper implementation of work practices. These requirements reflect an appropriate balance between the need to minimize health risks and the avoidance of unreasonable economic and community impacts which would result from standards designed to reduce risks to zero. Relative to the initial control costs, the additional cost of maintaining and implementing the Federal VC standard is small. Nevertheless, if the Federal standard is discontinued, these small costs may be sufficient to provide the industry with an economic incentive for discontinuing the use of proper control measures. Thus, the continued maintenance of Federal standards for the control of VC is necessary to ensure a continuation of the current level of control. Additionally, the standard is important for the control of VC emissions from plants built in the future. The consequence of not maintaining a Federal standard would be to increase the carcinogenic risk to large segments of the population. (In 1975 when the standard was originally proposed, approximately 4.6 million people lived within a 5-mile radius of EDC, VC and PVC plants.) Accordingly, the EPA has concluded that the maintenance of the Federal standard for VC, or reasonable revision of the standard, is appropriate.

(2) Review of Technology-Based Level of Control

This subsection describes the status of the technology-based level of control for sources covered by the current standard. The present status of emissions from sources covered by the current VC standard is presented in Table 1.

TABLE 1. STATUS OF CURRENT EMISSION LEVELS FROM SOURCES COVERED BY THE VINYL CHLORIDE NESHAP

Emission source	Standard	Emissions (mg/yr)	
		Uncontrolled[a] (prior to 1975)	Controlled[b] (current levels)
Emissions from a model 316,000 mg/yr EDC/VC facility			
Primary control	10 ppmv	916	3.2
Oxychlorination vent	0.2 g/kg EDC product	114	50
Fugitives	Work practice and equipment standards	379	38
Relief valve	Nonpreventable discharge only	Not Available[c]	2.1
Emissions from a model 68,000 mg/yr PVC facility			
Primary control	10 ppmv	236	0.7
Reactor opening	0.002 kg/100 kg PVC product	313	1.4
Combined sources after resin stripping	400 ppm suspension[d]	850	27
Fugitives	Work practice and equipment standards	1,040	108
Relief valve	Nonpreventable discharge only	136	2.4

[a] Based on the EPA emissions estimates developed from data submitted by industrial sources prior to promulgation of the 1975 VC standard.
[b] Represents estimated emissions from EDC/VC and PVC plants meeting current standard.
[c] Data were not collected on relief valve discharges from EDC/VC plants prior to 1975.
[d] Based on the EPA emissions estimates for a typical suspension plant. Emission estimates for bulk, latex, and dispersion plants are not presented here.

10 ppmv Standard. Emission sources covered by this standard include EDC purification and VC monomer formation and purification equipment, monomer recovery systems and other equipment at PVC plants, and vents from fugitive emission capture systems. The standard is based primarily on the control of these emissions by incineration or other primary control devices and specifies an emission limit of 10 parts per million by volume (ppmv) of VC averaged over a 3-hour period. The 10 ppmv standard applies to control device bypass streams.

One of the amendments proposed in 1977 would have required reduction of the emission limit from 10 to 5 ppmv. The goal of the proposed 5 ppmv limit was to ensure that the standard continued to approach a "zero emission goal" by requiring owners and operators both to maximize the effectiveness of existing control systems and to design improved new control systems at the time of construction. The 5 ppmv limit was not based on data for control technology different from that analyzed at the time of the promulgation of the 10 ppmv limit.

Comments received on the proposed 1977 amendments stated that in order to meet a limit of 5 ppmv, a control device would have to be capable of control at a level even lower than 5 ppmv to offset emission fluctuations. Commenters also stated that a change from 10 to 5 ppmv would result in little reduction in mass emissions of VC. Finaly, commenters questioned the rationale of the "zero emission goal" policy.

Because the proposed 5 ppmv emission limit was not based on data from a control technology different from that analyzed for the current standard and because 10 ppmv represents the lowest level of control which has been consistently achieved, the EPA withdraws the proposed 5 ppmv limit and affirms the original 10 ppmv limit. If such a technology had been identified, it could have been the basis of a revised standard. However, during the review study no more advanced technology was identified, even though additional data on incinerators, carbon adsorbers, and solvent absorption control systems on existing plants were obtained. Although these data indicate that incinerators are capable of reducing emissions below 10 ppmv, 10 ppmv represents the lowest level of control which has been consistently achieved. Based on this information, the EPA has concluded that there is no improved or new control technology that has been demonstrated to significantly and consistently reduce emissions to a level below that required by the current standard. Therefore, no further technological investigation of the 10 ppmv standard is planned.

Oxychlorination Vent Standard—0.2 g/kg EDC. The current oxychlorination vent standard of 0.2 g of VC per kg of EDC does not require an add-on control device. Instead, the limit can be achieved at most plants by controlling operating conditions and at the remaining plants through process modifications. At the time the original standard was written, incineration of oxychlorination vent emissions was investigated. Because of expected high energy costs associated with supplemental fuel requirements for combustion, incineration was determined not to be a reasonable method of control for this source.

The amendments proposed in 1977 specified a level of 5 ppm for the oxychlorination vent. The proposed requirement was based on installation of an oxygen feed system with an incinerator or equipment control device. The use of oxygen feed in the EDC oxychlorinaton process decreases the

volume of inert substances in the vent stream and, consequently, the cost for supplemental fuel required for incineration. Comments received on this proposed amendment focused primarily on the high expense and large energy requirements associated with the production of oxygen.

The review study identified no control technology for oxychlorination vents at EDC/VC plants that had not been considered during the development of the original standard. Additionally, the EPA reevaluated the cost of retrofit incinerator controls and reached the same conclusion drawn in the development of the original standard. As before, the high cost associated with incinerating oxychlorination vents at existing EDC/VC plants makes this level of control unreasonable. Thus, the current standard of 0.2 g/kg EDC is considered still to be the most reasonable level of control for existing oxychlorination vents. In addition, the review study concluded that significant new construction or modification of EDC/VC plants is not expected. At this time, only one new EDC/VC facility is reportedly planned. (BF Goodrich has plans to construct an EDC/VC facility in Convent, Louisiana.) Oxychlorination vents at new EDC/VC plants will be regulated by the proposed standards of performance for air oxidation processes (40 CFR Part 60 Subpart III) or by the BACT or LAER requirements of new source review regulations applicable in specific locations to a level comparable to that achievable through the use of incineration. Because the technologically achievable level of control is assured through the current requirements, the EPA concluded that investigation of additional control (i.e., incineration) was not required for oxychlorination vents.

Reactor Opening—0.02 g/kg PVC Product. The current VC standard restricts emissions during polymerization reactor openings. The standard was based on reactor purging and on a reduction in the frequency of reactor openings. An increased level of control was not proposed in the 1977 amendments. (The level of control provided by the current standard, 0.02 g/kg of PVC product, reduces VC emissions to about 1.36 Mg per year for a model PVC plant.) During the review of the standard, no technology was identified that would provide additional VC reductions beyond the level of the current standard. Therefore, the EPA is not investigating further the control of reactor openings.

Combined Sources After Resin Stripping. The sources of VC emissions covered under the current standard include blend tanks, dryers, centrifuges, storage silos, bagging operations, and any sources following the stripper. Control of these emissions is based on either stripping the PVC resin to a specified (based on resin type) residual VC level (i.e., 400 ppm for suspension, bulk, solution, and latex resins; and 2,000 ppm for dispersion resins) or controlling the emissions from all sources following the stripper with a control device. The 1977 proposed amendments would have required "new resins" to be stripped to lower levels (i.e., 100 ppm for suspension, bulk, solution, and latex resins; and 500 ppm for dispersion resins). When the amendments were proposed, the EPA believed that some resins could meet the proposed limits; whereas, for other resins the manufacturer would have been required to develop improved stripping technology or not to produce the resin.

Industry comments stated that most dispersion, copolymer, and bulk resins would suffer degradation if more stringent emission limits were imposed. Additionally, the commenters noted the inherent difficulties in defining a "new resin." Information submitted by commenters indicated that minor adjustments to resin compositions are made routinely, and completely new resins are rarely, if ever, made. As a result of these comments, the EPA concluded that it is impossible in many cases to distinguish between new and existing resins and still have any resins covered by the proposed amendments. Further, the proposed amendments did not address what levels of control could be achieved by improved stripping technology. For these reasons, the EPA chose to evaluate whether higher levels of control are achievable for all resins, or only for some special classes of resins.

The review study found that resin stripping technology has improved since the current standard was promulgated, and that some processors can achieve lower resin residual VC levels than those required in the original standard. In certain cases, some resins can meet the more stringent levels specified in the previously proposed amendments. However, other processors manufacturing resins of differing grades and characteristics can only marginally comply with the original standard. Because of the wide variation in resin grades and characteristics, it cannot be concluded that, even though a particular resin made by one company can meet a particular level, any other resin or similar resins produced by another company could also meet that level. Furthermore, in some cases these processors meeting the more stringent limits proposed previously are stripping these resins to this low level to offset emissions from those resins which are more difficult to strip. Without this ability to average the emissions and reductions among resins, these processors might not achieve the current standard. Exempting resin grades known to be difficult to strip is not feasible because these resins cannot readily be defined. For the foregoing reasons, the EPA has concluded that there is no demonstrated level of control which could significantly and consistently reduce residual VC levels in resins to levels below that required by the current standard. Therefore, the EPA is not investigating further the control of the combined sources after stripping.

Equipment Leaks. Because little was known about leak detection and elimination programs for control of equipment leaks from components in VC service, specific requirements for these programs were not included in the current standard. Instead, each plant was required to institute and implement a formalized leak detection and elimination program incorporating both a fixed-point monitor and a portable monitor. Plant-specific programs were subject to approval by the Administrator. Consequently, due to site-specific differences among plants, as well as variations in leak definitions and monitoring practices, differences in control of equipment leaks among the plants have resulted. Since the standard was promulgated, the EPA has obtained more information pertaining to the control of equipment leaks from components in VC service. With the information obtained form the development of other standards, an effective leak detection and repair program based on use of a portable monitor can now be specified for equipment covered by this program. The specific leak detection and repair requirements are discussed in the Administrative Revisions section of this preamble.

Relief Valve Discharge Standard. Sources of VC emissions covered by this standard include discharges from relief valves on pressure vessels, transfer lines, and other equipment in EDC/VC and PVC plants. The standard is based on emission control by a combination of equipment and process modifications, and operational procedures, found in plants during development of the standard. An exact combination of modifications and operational procedures was not specified. Instead, a performance standard (i.e., an emission

standard) was established because it was believed that different combinations could be equally effective in controlling relief valve discharges. The current format of the standard prohibits all relief valve discharges except emergency discharges. Emergency discharges are described as those which could not have been avoided by taking measures to prevent the discharge (i.e., those that are "nonpreventable"). Since the standard was promulgated, all plants have experienced some releases. Many of these releases are considered preventable by the EPA. Based on visits to plants with good compliance histories, the EPA concluded that a level of performance reflecting compliance with the current format of the standard through the combined effects of equipment, process modifications and operational procedures remains reasonable. during the review, no technological level of control was found that would provide for a more stringent standard. Therefore, the standard is still considered to reflect the appropriate level of control for these sources. However, as discussed in the **Administrative Revisions** section of the preamble, the EPA is proposing to revise the standard by setting limits for relief valve discharges in a different format.

Administrative Aspects of the Standard. Even though the EPA decided not to revise the level of control associated with the current VC standard, the EPA identified revisions to several administrative aspects of the standard. These revisions as well as those identified above, are discussed in the **Administrative Revisions** section of the preamble.

(3) Review of Sources Not Previously Covered

This subsection discusses the status of VC sources not covered by the current standard that were identified in the review study. For these sources, the EPA assessed whether a Federal standard was warranted. The EPA's assessment of these sources was based primarily on a quantitative analysis of VC emissions from these sources combined with a qualitative analysis of risks associated with exposure to VC from these sources. The EPA considers these analyses to be adequate in place of a thorough quantitative risk assessment for purposes of determining whether a Federal standard is warranted for these sources. Because these sources are already relatively well-controlled and the quantity of VC emission, and consequently, the risks associated with exposure to VC from these sources, are small in comparison to sources covered by the VC standard, the EPA concluded that none of the additional sources identified in the review study warrant a Federal standard.

Miscellaneous Sources of VC Emissions. Miscellaneous sources are plants other than PVC and EDC/VC plants that use VC as a raw material or produce VC as an intermediate or by-product. The EPA has identified four such plants. two of these plants produce 1,1,1-trichloroethane, one produces perchloroethylene and trichloroethylene and the fourth plant produces pesticides. (An additional 1,1,1-trichloroethane unit was constructed at a fourth location but has reportedly never operated. There are no plans to operate in the furture.) Review of VC emission sources at the identified plants showed them to be well controlled. Emissions of VC from these plants are primarily from fugitive sources and range from less than 1 Mg/yr to 14 Mg/yr per plant. In general, the VC NESHAP requirements for process vents and equipment in VC service are being met at the miscellaneous sources due to company policy considerations and State and local regulatory requirements. In addition, many of the equipment components in VC service would be covered by standards of performance for new sources and standards for sources in nonattainment areas. Based on the investigation of these sources, the EPA concluded that they are already relatively well-controlled and do not contribute significantly to VC exposure. For these reasons, additional requirements for miscellaneous sources of VC are not being proposed at this time.

PVC Fabrication Plants. There are about 6,000 fabrication plants which take the resin produced by PVC plants and fashion it into intermediate or final products. Emissions from these plants are estimated to be about 0.0035 Mg/yr per plant. In comparison to VC production plants (which typically emit about 92 Mg/yr), PVC fabrication plants are small emitters of VC. If standards were developed for this category they would not result in reduced emissions because the best control for these plants is to reduce the VC levels in the resins being processed by the fabricators. Resin stripping beyond the level that process economics would dictate is already being done as a result of the EPA's current standard and OSHA's VC standard. based on the EPA's assessment of these sources, the EPA concluded that they do not contribute significantly to VC exposure. Therefore, the EPA believes that the evaluation of controls for PVC fabrication plants is unnecessary and that the current level of control resulting from the EPA's standard and OSHA's standard is still reasonable.

Landfills. Off-specification resins containing VC has been taken to landfills where the gaseous VC can be released. However, the current EPA standard intends that all resins, including off-specification resins, be stripped to reduce the VC emissions from sources downstream from the stripper. In order to clarify that stripping requirements also apply to the off-specification resins before removal of landfills, these requirements are being restated to explicity address off-specification resins. The EPA believes that the level of control resulting from the stripping requirements is reasonable: thus, VC emission requirements for landfills are not being proposed today. However, the EPA recognizes that VC may be emitted from hazardous waste landfills and is evaluating and may regulate under the Resource Conservation and Recovery Act (RCRA) volatile emissions (including VC) from landfills at hazardous waste disposal facilities. The EPA also recognizes that VC has been detected in municipal landfills. Therefore, in addition to assessing VC emissions from hazardous waste disposal facilities, a (RCRA) Subtitle D TASK FORCE has been formed which will assess all environmental releases including air emissions from Subtitle D facilities (a category which includes municipal landfills).

Administrative Revisions

As discussed in the **Findings and Conclusions of the Review Study** section of this preamble, the EPA identified several administrative revisions that are appropriate as a result of the review study. The rationale for the proposed administrative revisions is presented in this section of the preamble. These revisions include: (1) Reformatting the emission limit for relief valve discharges, (2) providing a compliance test procedure and a specific emission limit for operators who strip in the reactors, (3) specifying requirements for leak detection and repair program for equipment components in VC service, and (4) miscellaneous revisions.

Relief Valve Discharges

Background. The current format of the standard for relief valve discharges allows only "emergency" discharges (i.e., discharges that could not be avoided by taking preventive measures). The standard applies to all pressure relief devices on pressure vessels.

transfer lines. and other equipment in EDC/VC and PVC plants. The control techniques considered as the basis of the standard involve a combination of equipment modifications. process modifications. and operational procedures. An exact combination of modifications and operational procedures was not specified in the current standard; rather. a performance standard (i.e., an emission standard) was established because different combinations of the modifications and procedures were expected to be equally effective in controlling relief valve discharges.

Based on 6 years of enforcement and compliance experience. the EPA has concluded that the relief discharge standard has resulted in: (1) Significant reductions in the frequency and quantity of VC discharges from relief valves. (2) significant use of agency resources to evaluate individual discharges for preventability. and (3) uncertainty on the part of producers regarding whether they comply with the standard. Additionally. the EPA learned some of VC and PVC believe that this part of the current standard applies only to discharges through safety relief valves and that discharges through other pressure relief devices. such as rupture disks or manual or automatic vent valves. are not covered. This interpretation is not compatible with the intent behind the current standard. To provide more efficient enforcement by decreasing the burden of individual preventability assessments on the EPA. and to provide a better understanding to plant operators of the goal of the standard. the EPA is proposing to reformat the standard for relief valve discharges and to define the emission points covered by this standard to include appropriately all pressure relief devices. As discussed more completely in the following sections. the EPA is proposing to change the format of the numerical limits in the standard to reflect the number of discharges that occur from those plants complying with the format of the current standard.

The EPA found in the review study that efforts by all EDC/VC and PVC producers to comply with the standard are reflected in their preformance (in terms of size and frequency of discharges) since the standard went into effect. In general, a reduction in the reported frequency and size of relief valve discharges by PVC producers has occurred since 1978. A further decrease in relief valve discharges by the PVC industry occurred between 1980 and 1981. Performance by the EDC/VC industry exhibited a less marked trend of decreased discharges over the compliance period. Following an initial drop in relief valve discharges after the standard went into effect. the frequency and quantity of relief valve discharges by EDC/VC plants have decreased slightly or remained relatively constant.

General Basis for Numerical Limits. In selecting the proposed numerical limits, EPA first evaluated in detail the recent performance (1981 to 1983) of five PVC plants and one EDC/VC plant. These plants were chosen based on discussions with EPA Regional Office personnel and industry and were intended to represent plants with good relief valve discharge records. In general, the EPA's evaluation of these plants indicates that each has adopted the combination of equipment. operational procedures and attitude toward prevention of relief discharges intended by the current standard. and that their resulting performance is consistent with compliance with the current standard. The EPA's evaluation found that a few discharges may continue to occur from some plants that comply with the standard. This observation is consistent with the expectation held by the EPA when the standard was written.

In order to revise the standard in terms of numerical limits representing compliance with the current format of the standard. this evaluation separated PVC and EDC/VC plants. For plants, relief valve discharge performance data were further separated by source (reactor vs. nonreactor) and by resin type The EPA then reviewed the performance of 25 additional PVC plants and 12 additional EDC/VC plants. The EPA reviewed this large set of plants to ensure that the level of performance demonstrated by the evaluated plants could be achieved by all PVC and EDC/VC plants.

The numerical limits presented in the Findings section of this preamble are based on an evaluation of the number of discharges representing the demonstrated performance level associated with compliance with the provisions of the existing standard.

Format for Numerical Limits. The EPA visited the five PVC plants evaluated in detail. As expected. the EPA found differences in the combinations of hardware and operational procedures associated with control of relief valve discharges of each of the plants. Furthermore, no exact relationship was found between the effectiveness of specific hardware items and operational procedures and prevention of discharges. In the EPA's judgment. the various combinations of hardware and operational procedures implemented by each of the plants along with the attitudes adopted toward preventing relief valve discharges represent the types of control measures that the standard intended. In particular. the EPA concluded that the low frequency of discharges by the visited plants was indicative of their degree of effort to prevent relief valve discharges. Consistent with the goal of this proposed revision. the EPA decided that an alternative numerical emission limit based on performance resulting under the current standard could be revised in a format that would be easier to understand by enforcement and industry personnel.

The EPA investigated two basic ways of expressing relief valve discharge performance for PVC plants. One format is based on mass emissions. for example. the pounds of VC discharged per million pounds of PVC produced (lb VC/MM lb PVC). Based on a review of methods used by industry to determine the amount of VC discharged from relief valves. the EPA was unable to identify a sufficiently accurate method for measuring discharge quantities from relief valves. At present. producers are required only to estimate discharge quantities for reporting purposes. Demonstration of compliance with a lb VC/MM lb PVC limit would require producers to measure the amount of VC discharged during an incident. Because a suitable measurement method was not identified. the EPA decided not to redefine relief valve discharge performance by PVC plants in a lb VC/MM lb PVC format.

Another format is based on the frequency (i.e., number per unit time) of discharge from occurrences. No method for measuring the amount of VC discharged from relief valves is needed because only the occurrence of a release is required for this format. The occurrence of a discharge can be determined by monitoring process parameters as well as inspecting relief valve performance reports. Thus. of the two basis ways of expressing relief valve performance that were considered. the EPA selected a format based on the frequency of discharges.

Based on this decision. the EPA then considered how the format would be applied to PVC and EDC/VC plants. At PVC plants. the frequency of discharges from polymerization reactors and associated process equipment may be related to the fact that a batch process is used to produce most types of PVC. For batch PVC production processes. the opportunity for discharges is related to the number of times a new

polymerization batch is initiated. Expressing relief valve discharge performance for these plants with a discharge-per-batch format accounts for variations among plants in the number of batches produced. The EPA selected 100 polymerization batches as a convenient basis for expressing relief valve discharge performance by PVC plants with batch production processes in a discharge frequency format.

Further, the EPA noted that the ability of batch PVC producers to limit the discharge frequency may be different for reactor and nonreactor discharges and that reactor discharges may vary by resin type at any plant. Consequently, relief valve discharges by individual PVC plants (except for continuous solution process plants) were classified according to type of discharge (i.e., reactor vs. nonreactor) and the reactor discharges were separated by resin type. Nonreactor discharge sources at PVC plants include blowdown tanks, transfer lines, and storage vessels. Because usage of this equipment is also related to some extent to the frequency of batch polymerization operations, the relief valve discharge performance by nonreactor sources in PVC plants with batch production processes was also examined on the basis of number of discharges/100 batches.

Unlike the batch process used to produce other PVC resin types, the solution PVC process is continuous. Thus relief valve discharge performance for the solution PVC process cannot be expressed on a frequency per batch basis. Instead, the relief valve discharge performance associated with the solution production process can only be expressed in terms of the total number of discharges (reactor and nonreactor) per year.

Similarly, the EDC/VC production process is not a batch process, but is continuous. Thus, relief valve discharge performance by EDC/VC plants also cannot be expressed on a frequency per batch basis. Moreover, the EPA was unable to detect a direct relationship between discharge frequency and VC production at EDC/VC plants. Thus, the EPA decided to define releif valve discharge performance for EDC/VC plants on the basis of a total number of annual discharges.

Findings. PVC Reactor Discharges. Suspension resins account for the highest percentage of total PVC production. The remaining PVC production is in the form of bulk, dispersion and solution resins. (A small amount of latex resin is produced by a process closely related to the dispersion process.) Examination of relief valve discharge performance associated with production of suspension and bulk resins indicates that reactor discharge frequency generally is either less than 0.035 discharges/100 batches or is much greater. (Recent reactor discharge frequencies for suspension resin plants with poorer performance levels ranged between 0.059 and 0.101 discharges/100 batches.) Further examination of relief valve discharge performance by suspension resin producers indicates that only one plant experienced more than 4 discharges per year during the period from 1981 to 1983. Performance by this plant also exceeded 0.035 discharges/100 batches.

The reactor discharge frequency associated with dispersion and latex production is typically zero. However, for a typical dispersion or latex resin process with a low production rate (i.e., number of polymerization batches per year), a single emergency reactor discharge in a given year would be equivalent to a discharge frequency of about 0.035 discharges/100 batches.

Nonreactor Discharges. Nonreactor discharge frequencies by PVC plants typically were either less than 0.025 discharges/100 batches or were much greater. (Recent nonreactor discharge frequencies reflecting poorer performance than the 0.025 level ranged between 0.046 and 0.225 discharges/100 batches.) Furthermore, with the exception of two producers, no more than three discharges per year were reported from nonreactor sources in PVC plants during the period from 1981 to 1983.

Each of the five PVC plants that the EPA evaluated in detail was among those achieving 0.035 discharges/100 batches or less in each of the reactor discharge categories and 0.025 discharges/100 batches or less in the nonreactor discharge category. The EPA examined individual discharge incidents for the PVC producers whose recent performance has exceeded 0.035 discharges/100 batches in one or more of the reactor discharge categories or who exceeded 0.025 discharges/100 batches and 3 discharges per year from nonreactor sources. In every case, the EPA identified one or more discharges that were preventable. Elimination of these preventable discharges indicates that these producers should have achieved discharge frequencies comparable to the five PVC plants that the EPA evaluated in detail.

Solution PVC Process. Discharge frequency from both reactor and nonreactor sources by the single plant producing PVC by the solution process was zero during the period 1981 to 1983. Previously, this plant experienced as many as two discharges in a 12-month period. Recent performance suggests that preventable discharges have been eliminated at this plant. With the exception of a potential emergency discharge occurrence, future discharges at this plant are not anticipated.

EDC/VC Discharges. During the review study, the EPA evaluated performance by one EDC/VC plant in detail. This plant experienced about four discharges that could be considered emergencies. Recent (1981 to 1983) relief valve discharge performance data for other EDC/VC producers indicates an industry range of 0 to 7 discharges/yr. Information obtained from plants during the review indicated that, where applicable, similar types of equipment, process modifications and operational procedures used to control relief valve discharges from PVC plants also are used at EDC/VC pants. The EPA examined discharges by the EDC/VC producers who exceeded four discharges in one or more years since 1981 and found that one or more of the discharges at each plant were preventable. Elimination of the preventable discharges would allow each of these plants to reduce their annual discharge frequency to four or fewer.

Summary of Numerical Limits. Based on the study of current relief valve discharge performance by PVC and EDC/VC plants, the EPA is proposing that the following numerical limits for relief valve discharges be added to the standard. Each discharge causing an exceedence of any numerical limit presented below would be considered a violation without regard to whether any individual discharge was preventable.

Category	Numerical limit
(1) Discharges from PVC plants (suspension, dispersion, latex, bulk processes):	
(a) Reactors:	
—suspension resin process	0.035 discharges/100 batches, not exceeding 4 discharges/yr.
—dispersion resin process (including latex resin).	0.035 discharges/100 batches.
—bulk resin process	0.035 discharges/100 batches.
(B) Nonreactor sources	0.025 discharges/100 batches, not exceeding 3 discharges/yr.
(2) Discharges from PVC plants (solution and other continuous processes).	1 discharge/yr.
(3) Discharges from EDC/VC plants.	4 discharges/yr.

Compliance Provisions. The EPA recognizes that all plants may experience an unavoidable relief valve discharge incident at some time. Examination of relief valve discharge performance by PVC plants with low

discharge frequencies indicated that plants with the lowest polymerization batch frequencies typically experience about one discharge in a 12-month period. The EPA concluded that for most plants a 12-month reporting period (rolling every 6-months) was both suitable and appropriate for determining compliance with the proposed numerical limits. For plants producing only a small amount of a particular resin (i.e., low number of polymerization batches), an apparent violation of the standard may result from a single discharge occurrence during a 12-month compliance period as described below.

For a PVC plant producing a single resin type to meet the numerical limit for reactor discharges (i.e., 0.035 discharges/100 batches), it must experience and average of no more than one discharge per 2.858 polymerization batches over the preceding 12-month period. An average reactor discharge frequency exceeding one discharge per 2.858 batches would be a violation of the standard. However, if the plant made less than 2.858 polymerization batches over the 12-month compliance period, a single discharge occurrence would be an apparent violation of the standard (i.e., the discharge frequency per 100 batches would exceed 0.035). Because insufficient batches were made, the reported discharge frequency per 100 batches would not correctly reflect the performance by that plant in comparison to other plants complying with the standard. In rectifying the undue compliance burden posed on plants with small numbers of batches by the discharge/100 batch format and the selected 12-month compliance period, the EPA is proposing to add additional provisions affecting the number of batches used to calculate the discharge frequency. For PVC plants producing less than 2.858 batches of a particular resin, the minimum number of 2.858 batches will be used when determining compliance with the numerical limits.

PVC plants producing more than one resin type must demonstrate compliance separately for reactor discharges occurring from different resin production processes. Only the relief valve discharges and polymerization batches specific to each resin type are considered for determining compliance. However, for determining compliance with the standard for nonreactor discharges, the total number of polymerization batches (regardless of resin type) are counted.

To determine the number of polymerization batches produced for purposes of assessing compliance, the following guidelines apply. A "polymerization batch" consists of each sequence of charging VC and other materials to the reactor, heating reactor contents, polymerization of reactor contents, and removal (i.e., blowdown) of reactor contents. Any batch that is aborted following charging of VC to the reactor is nonetheless counted as a polymerization batch in assessing compliance. For PVC plants producing bulk resin, a single "polymerization batch" includes both prepolymerization and postpolymerization reactor operations.

Discharge frequency can be recorded in two ways. Discharge frequency can be recorded on the basis of discharge events (involving discharges from one or more relief valves) or on individual relief valve discharges. In most cases, plants currently report discharges individually when they occur from relief valves on separate equipment. However, certain equipment such as polymerization reactors that are equipped with multiple relief valves may experience discharges simultaneously from more than one relief valve. Most plants currently report such multiple discharges from a single piece of equipment as a single discharge. Thus, the performance levels serving as the basis for the numerical limits represent individual discharges and not multiple discharge events except when they occur from a single piece of equipment. For determining compliance with the numerical limits, discharge frequency is to be recorded on the basis of individual discharges except when simultaneous discharges occur from relief valves on the same piece of equipment.

A relief valve discharge in considered to be any venting through a pressure relief device to prevent or relieve an overpressure condition from equipment in VC service that results in emissions of VC directly or indirectly to the atmosphere. In determining whether or not a relief valve discharge results in emissions to the atmosphere, the controlling factor is the ultimate disposition of the gases. Venting to a manifold or header system that ultimately discharges to the atomsphere constitutes a relief valve discharge. If the manifold or header discharges gases through a control device meeting the 10 ppmv VC emission limit, the venting does not constitute a relief valve discharge.

For purposes of reporting compliance status with the limits, plants will be required to calculate their discharge per batch frequencies with sufficient precision to demonstrate that performance is either equal to, below of in excess of the limits. Based on operating history, relief valve discharge performance by certain plants is expected to be much better than the respective limits. For example, some new suspension resin PVC plants produce about 5, 000 batches during a 12-month compliance period. One and two discharges at one of these plants during a compliance period would result in a discharge performance of 0.02 and 0.05 discharges per 100 batches, respectively. The second discharge during the compliance period would be a violation of the proposed 0.035 discharges per 100 batches limit despite the fact that the first discharge would result in performance well below the limit. These types of plants were considered in selecting the proposed limits and reporting procedures for relief valve discharges. The result that plants of this type must perform well below the limits in the standard in order to be in compliance is consistent with the proposed limits, which were selected to represent an upper boundary on the number of allowable discharges intended by the standard. The EPA expects that plants using the best technology and procedures should be able to perform better than the proposed limits.

Reporting Requirements. The current standard for relief valve discharges requires producers to report discharges within 10 days of the incident. The EPA is proposing to eliminate the 10 day reporting requirements and to require reporting of all discharges on a quarterly basis. Although compliance is to be determined on a semiannual basis, quarterly reporting of discharges is appropriate because violations of the standard may occur well before the end of the 6-month period. Quarterly reporting notifies enforcement personnel of potential violations and violations that have already occurred prior to the end of the compliance period so that corrective actions can take place sooner following the end of the compliance period. Information to be included in the semiannual report for individual relief valve discharges is to be reduced to include only the date, time, source, cause and estimated amount of each discharge occurrence. The semiannual report will also inlcude information on compliance status.

In addition, plants will now be required to maintain relief valve discharge records for 3 years, because of the potentially significant increase in the time period between a discharge occurrence and reporting of the discharge.

Effective Date of Revision. The current standard as written will remain

in effect for relief valve discharges until the proposed revisions are promulgated. The proposed administrative revisions do not change the standard's original intent and are intended only to set limits to facilitate compliance and enforcement efforts. Thus, the current standard will continue to be enforced until the revisions are promulgated.

Stripping-in-Reactor Compliance Test Procedure

The test method for measuring reactor opening losses was developed for resin stripping operations that take place in vessels separate from the reactor. Some PVC plants, including all bulk resin manufacturers, however, do not use separate strippers to remove residual VC from the resin produced. Instead, these plants strip VC from the product resin in the reactor (postpolymerization reactor in the case of bulk resin producers). For plants with reactor resin stripping operations, the concentration of VC in the reactor vapor space, as measured in accordance with the current standard, exceeds the 0.02g/kg of PVC requirement. The high concentrations result form VC monomer diffusing from the resin into the vapor space during the period following completion of the stripping operation (normally occurring under a vacuum that must be broken before the reactor can be emptied) and before the reactor is completely emptied of PVC resin. According to the Federal Register notice of promulgation of the current VC standard [40 FR 46563, October 21, 1976], any VC escaping from the resin after it has been stripped to acceptable levels is not intended to be counted as part of the reactor opening loss. However, the current standard did not include in the measurement method an acceptable method for determining what part of the VC in the vapor space has escaped from the resin after stripping is completed.

The current standard allows bulk resin producers to calculate reactor opening loss emissions from the postpolymerization reactor based on the number of reactor evacuations, the vacuum invloved and the volume of gas in the reactors. For nonbulk resin producers with reactor resin stripping operations, calculation of reactor opening loss emissions is more complicated due to the presence of water vapor in the reactor vapor space. Currently, waivers of testing for producers with nonbulk resin stripping operations in the reactor have been granted on a case-by-case basis by the EPA Regions, typically with the provision that residual VC samples are anlayzed on each batch. A variety of calculation methods are then used to establish the reactor opening loss.

Based on experience of the EPA Regional offices, a method for determining the reactor opening loss that accounts for stripping in the reactor has been developed for use by all nonbulk resin producers with reactor resin stripping operations and is included in the proposed revisions to the current VC standard. Limitations for resin residual and reactor opening loss are added together to give a total allowable VC content from these two sources. The measured resin residual VC and the calculated reactor opening loss would then be added together, and averaged over a 24-hour period according to resin type. If the 24-hour average meets the combined standard, the plant would be considered to be in compliance with both the stripping and the reactor opening loss requirements.

Leak Detection and Repair

Background. The current standard requires implementation of a formalized program for detection of leaks from equipment in VC service and elimination of these leaks. The formalized program includes a multipoint VC detector and a portable volatile organic compound (VOC) analyzer. The fixed-point monitoring system continuously monitors VC concentrations in the work area around equipment in VC service and sounds an alarm when concentrations exceed a prescribed level. The portable monitor is used independently to screen individual equipment components for leaks. Rather than specifying the number of points to be monitored, the sensitivities of the multipoint detector, the VC concentration that indicates a leak, and the actions to be taken to repair leaks, the current standard requires each plant owner or operator to prepare a program plan containing these specifications and to submit the plan to the EPA for approval. Plant owners or operators are required to submit data on background concentrations of VC in different areas of the plant to use in determining the VC concentration that should be designated as indicating a leak. Plans, therefore, were tailored by each plant and reviewed by the the EPA Regional Offices.

The EPA found in the review study that differences in leak detection and elimination programs exist among PVC and EDC/VC production plants and miscellaneous sources and that site-specific differences include variations in leak definitions and monitoring practices. The definition and monitoring practices, along with repair practices, are primary influences on the control effectiveness of leak detection and repair programs. Some plants implemented rigorous programs and others implemented programs lacking specific procedures or requirements. Accordingly, the effectiveness of leak detection and elimination programs varies among the plants.

Since the current standard was promulgated, the EPA has obtained more information pertaining to the control of emission from equipment leaks. Based on this information and the review of the leak detection and elimination plans being implemented to control emissions of VC, the EPA decided to specify leak detection and repair requirements for certain equipment components in VC service. Although information obtained from development of other standards indicates that a routine leak detection and repair program with a portable monitor can be an effective emission reduction technique without the requirement of a fixed point monitoring system, the EPA concluded that fixed-point monitoring systems already in place have uses that justify their retention in the current standard. In particular, fixed-point monitors allow for quick detection of certain large VC leaks that might otherwise go undetected until the next routine portable monitor screening. The EPA recognizes that existing fixed-point monitoring plans will need to be reviewed in light of the leak detection and repair requirements being specified at this time. The complexity of existing fixed-point monitoring plans, in terms of number and distribution of monitoring points, varies greatly among plants. Consequently, some plant owners or operators may want to alter the number of points that are monitored and the distribution of monitoring locations to better complement the specified portable monitoring requirements. Such changes to existing fixed-point monitoring plans will be allowed providing they do not alter the plant's ability to detect large VC leaks.

The proposed revisions are primarily intended to standardize control of VC emissions from equipment leaks. In doing this, the EPA is concerned that existing effective plans not be inappropriately changed. The proposed revisions include provisions that allow plants with existing effective plans to periodically demonstrate the effectiveness of their plans without additional requirements. Accordingly, the EPA requests comments from industry representatives concerning the specific effects of specifying leak

detection and repair requirements on effective existing plans.

Leak Detection and Repair Requirements. The EPA established leak detection and repair requirements (40 CFR Part 61 Subpart V) for certain equipment in volatile hazardous air pollutant (VHAP) service on June 6, 1984. These requirements were established in conjunction with the final standard for benzene equipment leaks. The requirements of Subpart V generally apply to pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, flanges and other connectors, and product accumulator vessels. These requirements reflect the level of control that the EPA considers reasonable for equipment covered by developing standards for VHAP. The EPA is therefore proposing to add VC to the list of substances covered by Subpart V.

Subpart V would substantively affect only valves and flanges in VC service within this industry. All other equipment in VC service are already required by the VC standard to comply with equipment and work practice standards consistent with those in Subpart V. For example, pumps and compressors meeting the dual mechanical seal requirements of the current VC standard will be in compliance with the Subpart V requirements. In addition, the sampling connection systems requirements of Subpart V are essentially the same as the current standard. The use of rupture discs for controlling leaks from pressure relief devices, as required by the VC standard, is consistent with the "no detectable emissions" requirement included in Subpart V. Requirements for controlling leaks from pressure relief devices are described in more detail later in this section. Thus, Subpart V will affect primarily valves and flanges in VC service by requiring a specific monitoring schedule, leak definition and repair provisions.

Compliance with the provisions of Subpart V will be used to determine compliance with the portable monitor leak detection and elimination requirements in the current VC standard (40 CFR 61.65(b)(8)(ii)), and therefore, the current standard is being revised to reflect this change. However, process units within VC and PVC plants in which the percentage of leaking valves is equal to or less than 2.0 percent are considered by the EPA to be effectively controlling VC emissions from leaking valves. For these process units, the existing leak detection and elimination program will continue to be allowed while the percentage of leaking valves is 2.0 percent or less. Any process unit in which the percentage of leaking valves is found to exceed 2.0 percent will be required to comply with the provisions of Subpart V.

The Subpart V requirements for valves are based on a leak detection and repair program that requires (1) monthly monitoring for valves in gas/vapor and light liquid service, (2) an initial attempt at repairing these valves within 5 days after detection of a leak, (3) repair of leaking valves within 15 days after detection of the leak unless repair would require a process unit shutdown, and (4) repair of valves during the next process unit shutdown after repair is delayed until a process unit shutdown. Valves found not to leak for 2 successive months can be monitored quarterly until leaks are detected. Monitoring of equipment to detect leaks is conducted in accordance with Method 21 and a leak is defined as a measured organic concentration equal to or greater than 10,000 parts per million by volume (ppvm). For a complete description of the leak detection and repair requirements, see Subpart V (49 FR 23498, June 6, 1984).

In addition, Subpart V contains standards for other types of equipment (e.g., flanges, and open ended valves or lines). Standards for flanges include monitoring with a portable instrument under prescribed procedures within 5 days of observing evidence of a potential leak by visual, audible or other means. Open-ended valves or lines are required to be capped, blinded or fitted with a second valve. These provisions are not expected to significantly affect producers with these types of equipment in VC service. The equipment and procedures employed as normal practice by these producers or as a result of the current VC standard are expected generally to ensure compliance with Subpart V.

Pressure Relief Devices. The EPA proposed and promulgated the work practices, equipment, design and operational standards in the current standard before explicit legal authority existed in Section 112. These requirements are found in § 61.65(b). In August of 1977, Congress amended Section 112 to allow the use of these requirements. Section 112 of the Clean Air Act requires that an emission standard (i.e., a performance standard) be established for control of a hazardous air pollutant unless, in the judgment of the EPA, it is not feasible to prescribe or enforce such a standard. An emission standard allows for some flexibility in complying with the standard, since any control technique that achieves that standard may be applied. Section 112(e)(2) defines the following conditions under which it is not feasible to prescribe or enforce an emission standard: (1) If the pollutants cannot be emitted through a conveyance designed and constructed to emit or capture the pollutant; or (2) if the application of measurement methodology is not practicable due to technological or economic limitations. Section 112(e)(1) allows that if an emission standard is not feasible to prescribe or endorce, then the EPA may istead promulgate a design, equipment, work practice, or operational standard, or combination thereof.

The EPA has reviewed the design, equipment, work practice and operational requirements contained in the current VC standard. The only sources covered by the current standard with one of the requirements for which a performance standard (i.e., an emission standard) is feasible are pressure relief devices. As discussed below, the EPA is setting a "no detectable emissions" limit for these sources. For the other sources, the EPA is reinstating those requirements as set forth in the current standard.

The EPA selected the use of rupture disks as the basis for the current standard for pressure relief devices. When the integrity of ruptures disks is maintained, equipment leaks through the relief device are eliminated. Rupture disks normally maintain their integrity unless an overpressure occurs. After the occurrence of an overpressure, replacement of the rupture disk once again eliminates equipment leaks of VC through the pressure relief device.

For emission control techniques that eliminate equipment leaks, such as the use of rupture disks, a "no detectable emissions" limit is feasible. An instrument reading of less than 500 parts per million by volume (ppmv) above a background concentration based on Reference Method 21 can be used to indicate whether equipment leaks have been eliminated; that is, that the equipment has "no detectable emissions."

The "no detectable emission" limit would not apply to discharges through the pressure relief device during overpressure relief. (These releases are covered under §§ 61.64(a) and 61.65(a).) The standard would specify, however, that the relief device be returned to a state of "no detectable emissions" within 5 days after such a discharge. The standard would further require an annual test to verify the "no detectable emissions" status of the pressure relief devices and a test after each over

pressure relief. This administrative change implements the basis of this standard consistent with the requirements of Section 112(e).

Miscellaneous Revisions

Based on discussions with the EPA regional personnel regarding their experience in administering the current VC standard, the EPA is proposing several additional administrative revisions that would facilitate compliance and enforcement efforts associated with the current standard. These revisions represent minor changes to the standard. A brief description of these administrative revisions and the basis for making them follows.

Definition of Leak, Exhaust Gas and Relief Valve Discharge. Functional definitions of "leak", "exhaust gas" and "relief valve discharge" are being added to the standard to clarify the applicability of the standard to each of these types of VC emissions. During their review of enforcement and compliance experience since the standard was promulgated, the EPA discovered several cases of confusion over the intended meaning of "leak", "exhaust gas" and "relief valve discharge." These three distinct categories of VC emissions are being defined in the revised standard to provide compliance and industry personnel with a clear understanding of which part of the standard applies to any given discharge of VC emissions to the atmosphere.

Definition of EDC and VC Purification. In the past, some plants have misinterpreted which equipment components are included in EDC purification and VC purification processes with the result that emissions from certain equipment intended to be covered by the standard may not have been controlled. The definitions of "EDC purification" and "VC purification" are being revised to clarify that all purification equipment following EDC and VC formation were subject to regulation under the current standard.

10 ppmv Standard. Two clarifying revisions are being made to the 10 ppmv regulations to improve understanding of the applicability of this part of the standard. First, although the test method for determining compliance with the 10 ppmv standard specifies that the average results from three 1-hour sampling runs be used, this 3-hour averaging period is not specified in the 10 ppmv requirements. Specifying that emissions may not exceed 10 ppmv over a 3-hour averaging period clarifies that instantaneous compliance with the 10 ppmv standard is not an intended requirement. Moreover, specification of the 3-hour averaging period is intended to clarify that the 10 ppmv standard applies to VC emissions in all exhaust gas streams covered by the 10 ppmv requirements, including any control device bypass streams. Requirements for calculating the VC content in bypassed emissions for purposes of reporting VC emissions in excess of the 10 ppmv standard are being added to the regulation. The EPA may use these calculations along with continuous emission monitoring results as indications of noncompliance if they show clearly that emissions in excess of the 10 ppmv requirements occurred.

The second clarifying revision to the 10 ppmv standard involves the specification that the 10 ppmv requirements apply to each exhaust gas stream from the covered equipment. The purpose of this revision is to clearly prohibit plants from using dilution with other exhaust gas streams as a technique for meeting the 10 ppmv requirement. This revision is not intended to prohibit the common practice of combining two or more exhaust gas streams in a common header leading to a control device. According to the revised 10 ppmv requirements, combining an exhaust gas stream containing more than 10 ppmv VC with another exhaust gas stream containing less than 10 ppmv VC is allowed only when the combined stream is ducted to the control device.

Relief Valve Definition. The current standard for relief valve discharges was intended to apply not only to safety relief valves but to all types of pressure relief devices. A definition of "relief valve" is being proposed under the revised standard to clarify that the current relief valve discharge standard also applied to rupture discs, manual vents and other pressure relief devices that vent to the atmosphere to protect process equipment from unsafe overpressure conditions. The definition of relief valve in the proposed standard is not intended to include pressure control valves used to control flow to an incinerator or other control device. However, the current relief valve discharge standard did cover emissions from pressure control valves. Also not included in the definition of relief valve are pressure control systems such as polymerization reaction shortstop systems or refrigerated water systems which act to reduce pressure by means other than venting.

Reactor Opening Loss Requirements for Bulk PVC Resin Producers. Bulk PVC resin production differs from production of other types of PVC resin in that the polymerization reaction is carried out in two separate vessels. The reaction is initiated in the "prepolymerization" reactor and the reactor contents are then transferred to the "postpolymerization" reactor where the reaction is completed. Stripping of residual VC in bulk resin is performed following the postpolymerization step in the reactor vessel. The postpolymerization reactor generally is opened after every batch and must comply with the reactor opening loss limits specified in the standard. Because the prepolymerization reactor is opened less frequently and because determination of gross product (for reactor opening loss estimation) is difficult, the EPA has allowed plants to meet the equipment opening requirements for minimizing VC emissions from polymerization reactor openings. The reactor opening loss requirements are being revised at this time to specifically exclude prepolymerization reactors. Accordingly, VC emissions from all opening of prepolymerization reactors will be subject to the equipment opening requirements. This revision is intended to clarify and improve the consistency of the equirements of the revised standard as they apply to bulk PVC resin producers in light of actual, industry practice. No reduction in VC emission control stringency will result from the change in requirements for prepolymerization reactors.

Inprocess Wastewater Requirements for Gasholder Seals. Under the current standards, the VC content of inprocess wastewater must be reduced to less than 10 ppm exposure of the wastewater to the atmosphere. In the case of gasholder water seals, the VC content in the exposed water seal may exceed 10 ppm during normal operation of the gasholder. Experience since the standard was promulgated indicates that compliance with the atmospheric exposure limit is not practicable for this particular inprocess wastewater source. Consequently, the definition of inprocess wastewater is being revised to exclude the exposed water seal of gasholders. The inprocess wastewater stripping requirements will continue to apply to wastewater after removal from the gasholder seal.

Elimination of 30-Day Limit on Equivalency Requests. The current standard specifies a 30-day limit for existing sources to submit requests for use of equivalent methods. Because such a limit poses a restriction on initiative by industry to develop alternative, and potentially more effective, control measures, the 30-day limitation is being eliminated.

Other. In addition to the revisions described above, a review of the recordkeeping and reporting requirements of the current standard was performed to identify ways to ease recordkeeping and reporting burden on plants and to identify any additional recordkeeping and/or reporting needs. The EPA identified two areas where the reporting burden on plants could be reduced. The current reporting requirements for residual VC monomer specifications and reactor opening measurements require that results of all compliance tests be reported in semiannual reports. The EPA is proposing to allow plants to report only test results that show exceedences of the respective standards. If no exceedences occur, plants will be required to indicate that fact in the semiannual report. This type of exception reporting is currently allowed for demonstration of compliance with the 10 ppmv standard for process vents. The second area is the requirement to report relief valve discharges within 10 days of their occurrence. The EPA is proposing to allow plants to report relief valve discharge occurrences on a quarterly basis rather than within 10 days of their occurrence. Furthermore, the reporting requirements for relief valve discharges have been streamlined by dropping the need to report actions taken and implemented preventive measures for each discharge. Information on the date, time, source, cause and estimated amount of individual relief valve discharge will be included with the semiannual reports along with information on compliance status.

Additional semiannual reporting requirements being added for PVC producers are the number of reactor openings and the design capacity number of polymerization batches for each resin type. This requirement will provide general information to facilitate review of industry-wide compliance status during past reporting periods.

Specific recordkeeping and reporting requirements are included as part of the revisions to the leak detection and repair requirements. The recordkeeping requirements include preparation of an initial log to record equipment component identification, physical tagging of equipment components which leak, and maintaining a record of equipment leaks and repair action. Included in the reporting requirements are the number of equipment leaks and the repair status of leaking components. Depending on the particular leak detection and repair program in place, these requirements may represent an increase or decrease in the overall recordkeeping and reporting currently practiced by individual plants.

The EPA concluded that the current recordkeeping requirements, as specified in 40 CFR 61.71, are still appropriate. However, the EPA is proposing to extend the current recordkeeping requirements for all reporting activities from 2 to 3 years.

The net impact of the revised recordkeeping and reporting requirements proposed by the EPA is estimated to be a decrease in a paperwork burden of about 2.8 person-years.

It should be noted that all Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 101(14) hazardous substances such as vinyl chloride are subject to reporting requirements under Section 103(a) of CERCLA. CERCLA requires that persons in charge of vessels or facilities from which hazardous substances have been released in quantities (RQs) immediately notify the National Response Center (NRC) of the release. The toll-free 24-hour telephone number of the NRC is 800-424-8802 and in Washington, D.C. metropolitan area it is (202) 426-2675. (See CERCLA Section 103 and 48 FR 23552, May 25, 1983.)

Vinyl chloride was assigned a statutory 1 pound reportable quantity under Section 101(14) until adjusted by regulation, and is presently undergoing assessment for both chronic toxicity and carcinogenicity. Its RQ will be adjusted pending the outcome of these reviews by the Office of Emergency and Remedial Response. Federally permitted releases under CERCLA (See CERCLA Section 101(1) and 48 FR 23552) are not subject to CERLA notification requirements or liabilities. However, releases of hazardous substances that are not subject to a permit or control regulation must be reported.

Regulatory Flexibility Analysis

The Regulatory Flexibility Act of 1980 requires that adverse effects of all Federal regulations upon small businesses be identified. According to the current guidelines of the Small Business Administration (SBA), a small business that produces or processes VC is one that has 500 employees or less. Currently, none of the existing producers or processors that are affected by the standard are estimated to be small by this definition. Since none of the companies meets the SBA definition of small business, no regulatory flexibility analysis is required. Even if an analysis were required, the proposed administrative revisions do not increase the cost of compliance with the standard.

Public Hearing

If requested, a public hearing will be held to discuss the proposed revisions to the VC standard in accordance with sections 112(b)(1)(B) and 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations on the proposed revisions should contact the EPA at the address given in the **ADDRESSES** section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement before, during, or within 30 days after the hearing. Written statements should be addressed to the Central Docket Section address given in the **ADDRESSES** section of this preamble.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at the EPA's Central Docket Section in Washington, D.C. (see **ADDRESSES** section of this preamble).

Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered by the EPA in the development of this proposed rulemaking. The principal purposes of the docket are: (1) To allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review (except for interagency review materials [§ 307(d)(7)(A)]).

Miscellaneous

In accordance with section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. The Administrator will welcome comments on all aspects of the proposed regulation, including health and economic and technological issues.

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* Comments on these requirements should be submitted to the Office of Information and Regulatory Affairs of OMB, marked "Attention: Desk Officer for EPA", as well as to the EPA docket described above. The final rule will respond to any OMB or public comments on the information collection requirements.

Under Executive Order 12291, the EPA must judge whether a regulation is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. This regulation is not major because: (1) The national annualized compliance costs, including capital charges resulting from the standards total less than $100 million; (2) the standards do not cause a major increase in prices or production costs; and (3) the standards do not cause significant adverse effects on domestic competition, employment, investment, productivity, innovation or competition in foreign markets.

This regulation was submitted to the Office of Management and Budget for review as required by Executive Order 12291. Any comments from OMB to EPA and any EPA response to those comments are included in Docket Number A-81-21. The docket is available for public inspection at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, SW., Washington, D.C. 20460.

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this rule, if promulgated, will not have a significant economic impact on a substantial number of small entities because no small entities are affected.

List of Subjects in 40 CFR Part 61

Air pollution control, Asbestos, Beryllium, Hazardous materials, Mercury, Vinyl chloride.

Dated: Dated December 31, 1984.

Alvin L. Alm,

Acting Administrator.

PART 61—[AMENDED]

It is proposed to amend 40 CFR Part 61 as follows:

1. The proposed changes to 40 CFR Part 61 proposed at 42 FR 28154, June 2, 1977 are withdrawn.

2. By revising the definitions in existing § 61.61(j), (l), (o) and (p) for "in process wastewater", "in vinyl chloride service", "ethylene dichloride purification" and "vinyl chloride purification" and by adding definitions for the terms "relief value", "leak", "exhaust gas", "relief valve discharge and "3-hour period" in new paragraphs (v), (w), (x), (y) and (z).

§ 61.61 Definitions.

* * * * *

(j) "Inprocess wasterwater" means any water which, during manufacturing or processing, comes into direct contact with vinyl chloride or polyvinyl chloride or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product containing vinyl chloride or polyvinyl chloride but which has not been discharged to a wastewater treatment process or discharged untreated as wastewater. Gas-holder seal water is not inprocess wastewater until it is removed from the gasholder.

* * * * *

(l) "In vinyl chloride service" means that a piece of equipment either contains or contacts a liquid that is at least 10 percent vinyl chloride by weight or a gas that is at least 10 percent by volume vinyl chloride as determined according to the provisions of § 61.67(h). The provisions of § 61.67(h) also specify how to determine that a piece of equipment is not in vinyl chloride service. This definition must be used in place of the definition of "VHAP service" in Subpart V of this part.

* * * * *

(o) "Ethylene dichloride purification" includes any part of the process of ethylene dichloride production which follows ethylene dichloride formation.

(p) "Vinyl chloride purification" includes any part of the process of vinyl chloride production which follows vinyl chloride formation.

* * * * *

(v) "Relief valve" means each pressure relief device including pressure relief valves, rupture disks, manual vents and other pressure relief systems used to protect process components from overpressure conditions. "Relief valve" does not include control valves used to control flow to an incinerator or other air pollution control device.

(w) "Leak" means any of several events that indicate interruption of confinement of vinyl chloride within process equipment. Leaks include events regulated under Subpart V of this part such as: (1) An instrument reading of 10,000 ppm or greater; (2) indications of liquid dripping; (3) a sensor detection of failure of a seal system, failure of a barrier fluid system, or both; and (4) detectable emissions as indicated by an instrument reading of greater than 500 ppm above background. Leaks also include events regulated under § 61.65(b)(8)(i) of detection of ambient concentrations in excess of background concentration. Emissions of vinyl chloride not regulated under § 61.61 (a) and (b); § 61.63(a); § 61.64 (a), (b), (c), (d), (e) and (f); and § 61.65 (a) and (b)(1), (b)(2), (b)(3), (b)(4), (b)(5), (b)(6), (b)(7) and (b)(9) shall be considered a leak. A relief valve discharge is not a leak.

(x) "Exhaust gas" means any offgas discharged directly or ultimately to the atmosphere that was initially contained in or was in direct contact with the equipment for which 10 ppm emission limits are prescribed in § 61.62 (a) and (b); § 61.63(a); § 61.64 (a)(1), (a)(2), (b), (c) and (d); § 61.65 (b)(1)(ii), (b)(2), (b)(3), (b)(6)(ii) and (b)(9)(ii). A leak as defined in paragraph (w) of this section is not an exhaust gas.

(y) "Relief valve discharge".means any nonleak discharge through a relief valve.

(z) "3-hour period" means any three consecutive 1-hour periods (each hour commencing on the hour).

3. By changing " all exhaust gases" to "each exhaust gas stream" and making other minor clarifying revisions in § 61.62(a), § 61.63(a), and § 61.64 (a)(1), (b), (c) and (d) as follows:

§ 61.62 Emission standard for ethylene dichloride plants.

(a) Ethylene dichloride purification: The concentration of vinyl chloride in each exhaust gas stream from any equipment used in ethylene dichloride purification is not to exceed 10 ppm (average for 3-hour period or as determined in accordance with § 61.67(g)(1)), except as provided in § 61.65(a). This requirement does not preclude combining of exhaust gas streams provided the combined steam is ducted through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm, or equivalent as provided in § 61.66. This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

* * * * *

§ 61.63 Emission standard for vinyl chloride plants.

An owner or operator of a vinyl chloride plant shall comply with the requirements of this section and § 61.65

(a) Vinyl chloride formation and purification: The concentration of vinyl chloride in each exhaust gas stream from any equipment used in vinyl chloride formation and/or purification is not to exceed 10 ppm (average for 3-hour period or as determined in accordance with § 61.67(g)(1)), except as provided in § 61.65(a). This requirement does not preclude combining of exhaust gas streams provided the combined steam is ducted through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm, or equivalent as provided in § 61.66. This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

* * * * *

§ 61.64 Emission standard for polyvinyl chloride plants.

An owner or operator of a polyvinyl chloride plant shall comply with the requirements of this section and § 61.65.

(a) *Reactor.* The following requirements apply to reactors:

(1) The concentration of vinyl chloride in each exhaust gas stream from each reactor is not to exceed 10 ppm (average for 3-hour period or as determined in accordance with § 61.67(g)(1)), except as provided in paragraph (a)(2) of this section and § 61.65(a).

* * * * *

(b) *Stripper.* The concentration of vinyl chloride in each exhaust gas stream from each stripper is not to exceed 10 ppm (average for 3-hour period or as determined in accordance with § 61.67(g)(1)), except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

(c) *Mixing, weighing, and holding containers.* The concentration of vinyl chloride in each exhaust gas stream from each mixing, weighing, or holding container in vinyl chloride service which precedes the stripper (or the reactor if the plant has no stripper) in the plant process flow is not to exceed 10 ppm (average for 3-hour period or as determined in accordance with § 61.67(g)(1)), except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

(d) *Monomer recovery system.* The concentration of vinyl chloride in each exahust gas stream from each monomer recovery system is not to exceed 10 ppm (average for 3-hour period or as determined in accordance with § 61.67(g)(1)), except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

* * * * *

4. By revising existing paragraphs § 61.64(a)(2) and by removing (a)(3) as follows:

§ 61.64 Emission standard for polyvinyl chloride plants.

An owner or operator of a polyvinyl chloride plant shall comply with the requirements of this section and § 61.65.

(a) *Reactor.* The following requirements apply to reactors:

* * * * *

(2) The reactor opening loss from each reactor is not to exceed 0.02 g vinyl chloride/kg (0.00002 lb vinyl chloride/lb) of poly vinyl chloride product, except as provided in paragraphs (f)(1) and (f)(2) of this section, with the product determined on a dry solids basis. This requirement does not apply to prepolymerization reactors in the bulk process. This requirement does apply to postpolymerization reactors in the bulk process, where the product means the gross product of prepolymerization and postpolymerization.

* * * * *

5. By revising paragraph (e) introductory text and adding paragraph (e)(3) to § 61.64 as follows:

§ 61.64 Emission standard for polyvinyl chloride plants.

* * * * *

(e) *Sources following the stripper(s).* The following requirements apply to emissions of vinyl chloride to the atmosphere from the combination of all sources following the stripper(s) [or the reactor(s) is the plant has no stripper(s)] in the plant process flow including but not limited to, centrifuges, concentrators, blend tanks, filters, dryers, conveyor air discharges, baggers, storage containers, and inprocess wastewater, except as provided in paragraph (f) of this section:

* * * * *

(3) The provisions of this paragraph apply at all times including when off-specification or other types of resins are made.

6. By adding paragraph (f) to § 61.64 as follows:

§ 61.64 Emission standard for polyvinyl chloride plants

* * * * *

(f) *Reactor used as stripper.* When a nonbulk resin reactor is used as a stripper this paragraph may be applied in lieu of § 61.64 (a)(2) and (e)(1):

(1) The weighted average emissions of vinyl chloride from reactor opening loss and all sources following the reactor used as a stripper from all grades of polyvinyl chloride resin stripped in the reactor on each calendar day may not exceed:

(i) 202 g/kg (0.00202 lb/lb) of polyvinyl chloride product for dispersion polyvinyl chloride resins, excluding latex resins, with the product determined on a dry solids basis.

(ii) 0.42 g/kg (0.00042 lb/lb) of polyvinyl chloride product for all other polyvinyl chloride resins, including latex resins, with the product determined on a dry solids basis.

7. By revising paragraph (a) to § 61.65 as follows:

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants

An owner or operator of an ethylene dichloride, vinyl chloride, and/or polyvinyl chloride plant shall comply with the requirements of this section.

(a) *Relief valve discharges.* (1) Polyvinyl chloride plants (suspension, dispersion, latex, and bulk processes).

(i) *Reactor.* The number of discharges to the atmosphere from relief valves on polyvinyl chloride reactors in vinyl chloride service is not to exceed the following limits except as provided in paragraph (a)(1)(iii) of this section. For all reactors producing suspension resins within a PVC plant, the number of relief valve discharges is not to exceed 0.035 discharges per 100 polymerization batches nor 4 discharges per year. For all reactors producing dispersion and latex resins within a PVC plant, the number of relief valve discharges is not to exceed 0.035 discharges per 100 polymerization batches. For all reactors including prepolymerization and postpolymerization reactors, producing bulk resins within a PVC plant the number of relief valve discharges is not to exceed 0.035 discharges per 100 polymerization batches.

(ii) The number of discharges to the atmosphere from relief valves on equipment (excluding polyvinyl chloride reactors) in vinyl chloride service is not to exceed 0.025 discharges per 100 polymerization batches nor 3 discharges per year except as provided in paragarph (a)(1)(iii) of this section.

(iii) The limits specified in paragraphs (a)(1)(i) and (a)(1)(ii) of this section may be exceeded when only one relief valve discharge to the atmosphere occurs during the 12-month period preceding the close of the 6-month reporting period.

(2) Polyvinyl chloride plants (solution and other continuous PVC production processes). The number of discharges to the atmosphere from relief valves on all equipment in vinyl chloride service is not to exceed 1 discharge per year.

(3) *Ethylene dichloride and vinyl chloride plants.* The number of discharges to the atmosphere from relief valves on equipment in vinyl chloride service is not to exceed 4 discharges per year.

(4) Each relief valve discharge that contributes to a relief valve discharge frequency in excess of any limit prescribed in paragarphs (a)(1), (a)(2) and (a)(3) of this paragraph constitutes

an individual violation of the respective limit.

(5) For every relief valve discharge to the atmosphere, the owner or operator shall record the identity of the source, the date and time of the discharge, the cause of the discharge, the approximate total vinyl chloride loss during the discharge, and the method used for determining the vinyl chloride loss. This information shall be submitted in writing to the Administrator as part of the reporting requirements of paragraph § 61.70. This information shall be retained and made available for inspection by the Administrator for a minimum of 3 years.

8. By revising paragraphs (b)(3), (b)(8)(i), (b)(8)(iii), (b)(8)(iv) and (b)(8)(vi) to § 61.65 as follows:

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants.

An owner or operator of an ethylene dichloride, vinyl chloride, and/or polyvinyl chloride plant shall comply with the requirements of this section.

(a) * * *

(b) *Fugitive emission sources*

(1) * * *

(2) * * *

(3) Leakage from pump, compressor, and agitator seals: (i) *Rotating pumps.* Vinyl chloride emissions from seals on all rotating pumps in vinyl chloride service are to be minimized by installing sealless pumps, pumps with double mechanical seals or equivalent as provided in § 61.66. If double mechanical seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the pump; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(ii) *Reciprocating pumps.* Vinyl chloride emissions from seals on all reciprocating pumps in vinyl chloride service are to be minimized by installing double outboard seals, or equivalent as provided in § 61.66. If double outboard seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the pump; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(iii) *Rotating compressor.* Vinyl chloride emissions from seals on all rotating compressors in vinyl chloride service are to be minimized by installing compressors with double mechanical seals, or equivalent as provided in § 61.66. If double mechanical seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the compressor; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(iv) *Reciprocating compressors.* Vinyl chloride emissions from seals on all reciprocating compressors in vinyl chloride service are to be minimized by installing double outboard seals, or equivalent as provided in § 61.66. If double outboard seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the compressor; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66

(v) *Agitator.* Vinyl chloride emissions from seals on all agitators in vinyl chloride service are to be minimized by installing agitators with double mechanical seals, or equivalent as provided in § 61.66. If double mechanical seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the agitated vessel; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

* * * * *

(8) *Leak detection and elimination.*

(i) It includes a reliable and accurate vinyl chloride monitoring system for detection of major leaks and identification of the general area of the plant where a leak is located. A vinyl chloride monitoring system means a device which obtains air samples from one or more points on a continuous sequential basis and analyzes the samples with gas chromatography or, if the owner or operator assumes that all hydrocarbons measured are vinyl chloride, with infrared spectrophotometry, flame ion detection, or an equivalent or alternative method.

* * * * *

(iii) It provides for an acceptable calibration and maintenance schedule for the vinyl chloride monitoring system and portable hydrocarbon detector. For the vinyl chloride monitoring system, a daily span check is to be conducted with a concentration of vinyl chloride equal to the concentration defined as a leak according to paragraph (b)(8)(vi) of this section. The calibration is to be done with either:

(A) A calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.2 of Test Method 106 and in accordance with section 7.1 of test Method 106, or

(B) A calibration gas cylinder standard containing the appropriate concentration of vinyl chloride. The gas composition of the calibration gas cylinder standard is to have been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer. If a gas chromatograph is used as the vinyl chloride monitoring system, these gas mixtures may be directly used to prepare a chromatograph calibration curve as described in section 7.3 of Test Method 106. The requirements in section 5.2.3.1 and 5.2.3.2 of Test Method 106 for certification of cylinder standards and for establishment and verification of calibration standards are to be followed.

(iv) The location and number of points to be monitored and the frequency of monitoring provided for in the program are acceptable when they are compared with the number of pieces of equipment in vinyl chloride service and the size and physical layout of the plant.

* * * * *

(vi) It contains a definition of leak which is acceptable when compared with the background concentrations of vinyl chloride in the areas of the plant to be monitored by the vinyl chloride monitoring system. Measurements of background concentrations of vinyl chloride in the areas of the plant to be monitored by the vinyl chloride monitoring system are to be included with the description of the program. The definition of leak for a given plant may vary among the different areas within the plant and is also to change over time as background concentrations in the plant are reduced.

* * * * *

9. By revising paragraph (b)(4) to § 61.65 as follows:

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants

* * * * *

(b) *Fugitive emission sources.*

* * * * *

(4) *Leaks from relief valves.* Vinyl chloride emissions due to leaks from each relief valve on equipment in vinyl chloride service shall comply with § 61.242–4 of Subpart V of this part.

* * * * *

10. By revising paragraph (b)(7) of § 61.65 as follows:

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants.

* * * * *

(b) *Fugitive emission sources.*

* * * * *

(7) *Samples.* Unused portions of samples containing at least 10 percent by weight vinyl chloride are to be returned to the process or destroyed in a control device from which the concentration of vinyl chloride in the exhaust gas does not exceed 10 ppm. Sampling techniques are to be such that sample containers in vinyl chloride are purged into a closed process system.

11. By revising paragraphs (b)(8) introductory text, (b)(8)(ii), and (b)(8)(v) to § 61.65 as follows:

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants.

* * * * *

(b) *Fugitive emission sources.*

* * * * *

(8) *Leak detection and elimination.* Vinyl chloride emissions due to leaks from equipment in vinyl chloride service are to be minimized by instituting and implementing a lead detection and repair program consistent with the provisions of Subpart V of this part. The program is to be implemented within 90 days of the effective date of these regulations, unless a waiver of compliance is granted under § 61.11. Approval of a program will be granted by the Administrator provided he finds:

(i) * * *

(ii) It includes a reliable and accurate portable hydrocarbon detector to be used consistent with the provisions of Subpart V of this part. An owner or operator is exempt from § 61.242–1(d), §§ 61.242–7 (a), (b) and (c), § 61.246 and § 61.247 of Subpart V of this part for any process unit in which the percentage of leaking valves is demonstrated to be equal to or less than 2.0 percent, as determined in accordance with the following:

(A) A performance test as specified in paragraph (b)(8)(ii)(C) of this section shall be conducted initially within 90 days of the effective date of these regulations, annully and at times requested by the Administrator.

(B) For each performance test, a minimum of 200 or 90 percent of the total valves in VOC service (as defined in § 60.481 of Subpart VV of Part 60) within the process unit shall be randomly selected and monitored within 1 week by the methods specified in § 61.245(d) of Subpart V of this part. If an instrument reading of 10,000 ppm or greater is measured, a leak is detected. The leak percentage shall be determined by dividing the number of valves in VOC service for which leaks are detected by the number of tested valves in VOC service.

(C) If a leak is detected, it shall be repaired in accordance with § 61.242–7 (d) and (e) of Subpart V of this part.

(D) The results of the performance test shall be submitted in writing to the Administrator in the first semiannual report following the performance test as part of the reporting requirements of § 61.70.

(E) Any process unit in which the percentage of leaking valves is found to be greater than 2.0 percent must comply with all provisions of Subpart V of this part within 90 days.

* * * * *

(v) It contains a plan of action to be taken when a leak is detected consistent with Subpart V of this part.

12. By revising § 61.66 as follows:

§ 61.66 Equivalent equipment and procedures.

Upon written application from an owner or operator, the Administrator may approve use of equipment or procedures which have been demonstrated to his satisfaction to be equivalent in terms of reducing vinyl chloride emissions to the atmosphere to those prescribed for compliance with a specific paragraph of this subpart.

13. By revising paragraph (f) of § 61.67 as follows:

§ 61.67 Emission tests.

* * * * *

(f) The owner or operator shall retain at the plant and make available, upon request, for inspection by the Administrator, for a minimum of 3 years, records of emission test results and other data needed to determine emissions.

14. By revising paragraphs (g)(3) introductory text, (g)(3)(i), and (g)(3)(iii) of § 61.67 as follows:

§ 61.67 Emission tests.

* * * * *

(g) * * *

(3) When a stripping operation is used to attain the emission limits in § 61.64 (e) and (f), emissions are to be determined using Test Method 107 as follows:

(i) The number of strippers (or reactors using as strippers) and samples and the types and grades of resin to be sampled are to be determined by the Administrator for each individual plant at the time of the test based on the plant's operation.

(ii) * * *

(iii) The corresponding quantity of material processed by each stripper (or reactor used as a stripper) is to be determined on a dry solids basis and by a method submitted to and approved by the Administrator.

* * * * *

15. By revising paragraph (g)(5) introductory text and adding paragraph (g)(6) to § 61.67 as follows:

§ 61.67 Emission tests.

* * * * *

(g) * * *

(5) The reactor opening loss for which an emission limit is prescribed in § 61.64(a)(2) is to be determined. The number of reactors for which the determination is to be specified by the Administrator for each individual plant at the time of the determination based on the plant's operation.

* * * * *

(6) For a reactor that is used as a stripper, the emissions of vinyl chloride from reactor opening loss and all sources following the reactor used as a stripper for which an emission limit is prescribed in § 61.64(f) are to be determined. The number of reactors for which the determination is to be made is to be specified by the Administrator for each individual plant at the time of the determination based on the plant's operation.

(i) For each batch stripped in the reactor, the following measurements are to be made:

(A) The concentration (ppm) of vinyl chloride in resin after stripping, measured according to paragraph (g)(3) of this section;

(B) The reactor vacuum (mm Hg) at end of strip from plant instrument; and

(C) The reactor temperature (°C) at end of strip from plant instrument.

(ii) For each batch stripped in the reactor, the following information is to be determined:

(A) The vapor pressure (mm Hg) of water in the reactor at end of strip from the following table:

Reactor vapor temperature (°C)	H_2O vapor pressure (mm Hg)	Reactor vapor temperature (°C)	H_2O vapor pressure (mm Hg)	Reactor vapor temperature (°C)	H_2O vapor pressure (mm Hg)
40	55.3	61	156.4	82	384.9
41	58.3	62	163.8	83	400.9
42	61.5	63	171.4	84	416.6
43	64.8	64	179.3	85	433.6
44	68.3	65	187.5	86	450.9
45	71.9	66	196.1	87	468.7
46	75.6	67	205.0	88	487.1
47	79.6	68	214.2	89	506.1
48	83.7	69	223.7	90	525.8
49	88.0	70	233.7	91	546.0
50	92.5	71	243.9	92	567.0
51	97.2	72	254.6	93	588.6
52	102.1	73	265.7	94	610.9
53	107.2	74	277.2	95	633.9
54	112.5	75	289.1	96	657.6
55	118.0	76	301.4	97	682.1
56	123.8	77	314.1	98	707.3
57	129.8	78	327.3	99	733.2
58	136.1	79	341.0	100	760.0
59	142.6	80	355.1		
60	149.4	81	369.7		

(B) The partial pressure (mm Hg) of vinyl chloride in reactor at end of strip from the following equation:

$$PPVA = 760 - RV - VPW$$

Where:

PPVC = partial pressure of vinyl chloride, in mm Hg
760 = atmospheric pressure at 0°C, in mm Hg
RV = absolute value of reactor vacuum, in mm Hg
VPW = vapor pressure of water, in mm Hg

(C) The reactor vapor space volume (m^3) at end of strip from the following equation:

$$RVSV = RC - WV - \frac{PVCW}{833}$$

where:

RVSV = reactor vapor space volume, in m^3
RC = reactor capacity, in m^3
WV = volume of water in reactor from recipe, in m^3
PVCW = dry weight of polyvinyl chloride in reactor from recipe, in kg
833 = typical density of polyvinyl chloride, in kg/m^3

(iii) For each batch stripped in the reactor, the combined reactor opening loss and emissions from all sources following the reactor used as a stripper is to be determined using the following equation:

$$C = (PPMVC)(10^{-3}) + \frac{(PPVC)(RVSV)(1.002)}{(PVCW)(273 + RT)}$$

where:

C = g vinyl chloride/kg polyvinyl chloride product
PPMVC = concentration of vinyl chloride in resin after stripping, in ppm
10^{-3} = conversion factor for ppm
PPVC = partial pressure of vinyl chloride determined according to paragraph (g)(6)(ii)(B) of this section, in mm Hg
RVSV = reactor vapor space volume determined according to paragraph (g)(6)(ii)(C) of this section, in m^3
1.002 = ideal gas constant in $g—°K/mm\ Hg—m^3$ for vinyl chloride
PVCW = dry weight of polyvinyl chloride in reactor from recipe, in kg
273 = conversion factor for °C to °K
RT = reactor temperature, in °C

16. By adding paragraph (h) to § 61.67 as follows:

* * * * *

(h)(1) Each piece of equipment within a process unit that can reasonably contain equipment in vinyl chloride service is presumed to be in vinyl chloride service unless an owner or operator demonstrates that the piece of equipment is not in vinyl chloride service. For a piece of equipment to be considered not in vinyl chloride service, it must be determined that the percent vinyl chloride content can be reasonably expected not to exceed 10 percent by weight for liquid streams and 10 percent by volume for gas streams. For purposes of determining the percent vinyl chloride content of the process fluid that is contained in or contacts equipment, procedures that conform to the methods described in ASTM Method D–2267 (incorporated by reference as specified in § 61.18) shall be used.

(2)(i) An owner or operator may use engineering judgment rather than the procedures in paragraph (h)(1) of this section to demonstrate that the percent vinyl chloride content does not exceed 10 percent by weight for liquid streams and 10 percent by volume for gas streams, provided that the engineering judgment demonstrates that the vinyl chloride content clearly does not exceed 10 percent. When an owner or operator and the Administrator do not agree on whether a piece of equipment is not in vinyl chloride service, however, the procedures in paragraph (h)(1) of this section shall be used to resolve the disagreement.

(ii) If an owner or operator determines that a piece of equipment is in vinyl chloride service, the determination can be revised only after following the procedures in paragraph (h)(1) of this section.

(3) Samples used in determining the percent vinyl chloride content shall be representative of the process fluid that is contained in or contacts the equipment.

17. By adding paragraphs (d), (e) and (f) to § 61.68 as follows:

§ 61.68 Emission monitoring.

* * * * *

(d) When exhaust gas(es), having emission limits that are subject to the requirement of paragraph (a) of this section, are emitted to the atmosphere around the control system and required vinyl chloride monitoring system, the vinyl chloride content of the emission shall be calculated (in units of each applicable emission limit) by best practical engineering judgment based on the discharge duration and known VC concentrations in the effected equipment as determined in accordance with § 61.67(h) or other acceptable method.

(e) For each 3-hour period, the vinyl chloride content of emissions subject to the requirements of paragraphs (a) and (d) of this section shall be averaged (weighted according to the proportion of time that emissions were continuously monitored and that emissions bypassed the continuous monitor) for purposes of reporting excess emissions under § 61.70(c)(1).

(f) For each vinyl chloride emission to the atmosphere determined in accordance with paragraph (e) of this section to be in excess of the applicable emission limits, the owner or operator shall record the identity of the source(s), the date, time, and duration of the excess emission, the cause of the emission, the approximate total vinyl chloride loss during the excess emission, and the method used for determining the vinyl chloride loss. This information shall be retained and made available for inspection by the Administrator as required by § 61.71(a).

18. By changing the title from "Semiannual report" to "Reporting" and by revising paragraph (a) of § 61.70 as follows:

§ 61.70 Reporting.

(a)(1) The owner or operator of any source to which this subpart applies shall submit to the Administrator on September 15 and March 15 of each year a report in writing containing the information required in paragraphs (c), (d) and (e) of this section and on December 15 and June 15 of each year a report in writing containing the information required in paragraph (e) of this section, except as provided in paragraph (a)(2).

(2) In the case of an existing source that submits semiannual reports on an approved fixed schedule other than September 15 and March 15, the approved semiannual reporting schedule shall be used to report the information required in paragraphs (c), (d) and (e) of this section. In addition, the information required in paragraph (e) of this section will be reported exactly 3 months following the semiannual reporting dates.

(3) The first report is to be submitted following the first full 3 month reporting period after the initial report is submitted.

19. By revising paragraph (c)(1) of § 61.70 as follows:

§ 61.70 Reporting.

* * * * *

(c) * * *

(1) The owner or operator shall include in the report a record of the vinyl chloride content of emissions for each 3-hour period during which average emissions are in excess of the emission limits in § 61.62 (a) or (b), § 61.63(a), or § 61.64 (a)(1), (b), (c), or (d), or during which average emissions are in excess of the emission limits specified for any control system to which reactor emissions are required to be ducted in § 61.64(a)(2) or to which fugitive emissions are required to be ducted in § 61.65 (b)(i)(ii), (b)(2), (b)(5), (b)(6)(ii), or (b)(9)(ii). If emissions in excess of the emission limits are not detected, the report shall contain a statement that no excess emissions have been detected. The emissions are to be determined in accordance with § 61.68(e).

20. By revising paragraph (c)(2) introductory text, removing paragraphs (c)(2)(iv), revising paragraph (c)(2)(iii) and revising (c)(2)(v) and (c)(2)(vi) introductory text to § 61.70 as follows:

§ 61.70 Reporting.

* * * * *

(c) * * *

(2) In polyvinyl chloride plants for which a stripping operation is used to attain the emission level prescribed in § 61.64(e), the owner or operator shall include in the report a record of the vinyl chloride content in the polyvinyl chloride resin.

(i) * * *

(ii) * * *

(iii) The vinyl chloride content in each sample is to be determined by Test Method 107 as prescribed in § 61.67(g)(3).

(iv) [Reserved]

(v) The report to the Administrator by the owner or operator is to include a record of any 24-hour average resin vinyl chloride concentration, as determined in this paragraph, in excess of the limits prescribed in § 61.64(e). The vinyl chloride content found in each sample required by paragraphs (c)(2)(i) and (c)(2)(ii) of this section shall be averaged separately for each type of resin, over each calendar day and weighted according to the quantity of each grade of resin processed by the stripper(s) that calendar day, according to the following equation:

$$A_{r_i} = \frac{\sum_{j=1}^{n} P_{e_j} M_{e_j}}{Q_{r_i}} = \frac{P_{e_1} M_{e_1} + P_{e_2} M_{e_2} + \cdots + P_{e_n} M_{e_n}}{Q_{r_i}}$$

where:

A = 24-hour average concentration of type T_i resin in ppm (dry weight basis).

Q = Total production of type T_i resin over the 24-hour period, in kg.

T_i = Type of resin: $i = 1, 2 \ldots m$ where m is total number of resin types produced during the 24-hour period.

M = Concentration of vinyl chloride in one sample of grade G_i resin, in ppm.

P = Production of grade G_i resin represented by the sample, in kg.

G_e = Grade of resin: e.g., G_1, G_2, and G_3.

n = Total number of grades of resin produced during the 24-hour period.

If no 24-hour average resin vinyl chloride concentrations in excess of the limits prescribed in § 61.64(e) are measured, the report shall state that no excess resin vinyl chloride concentrations were measured.

(vi) The owner or operator shall retain at the source and make available for inspection by the Administrator for a minimum of 3 years records of all data needed to furnish the information required by paragraph (c)(2)(v) of this section. The records are to contain the following information:

(A) * * *

(B) * * *

* * * * *

21. By revising paragraph (c)(3) of § 61.70 as follows:

§ 61.70 Reporting.

* * * * *

(C) * * *

(3) The owner or operator shall include in the report a record of any emissions from each reactor opening in excess of the emission limits prescribed in § 61.64(a)(2). Emissions are to be determined in accordance with § 61.67(g)(5), except that emissions for each reactor are to be determined. If emissions in excess of the emission limits are not detected, the report shall include a statement that excess emissions have not been detected.

* * * * *

22. By adding paragraph (c)(4) to § 61.70 as follows:

§ 61.70 Reporting

* * * * *

(c) * * *

(4) In polyvinyl chloride plants for which stripping in the reactor is used to attain the emission level prescribed in § 61.64(f), the owner or operator shall include in the report a record of the vinyl chloride emissions from reactor opening loss and all sources following the reactor used as a stripper.

(i) One representative sample of polyvinyl chloride resin is to be taken from each batch of each grade of resin immediately following the completion of the stripping operation, and identified by resin type and grade and the date and time the batch is completed. The corresponding quantity of material processed in each stripper batch is to be recorded and identified by resin type and grade and the date and time the batch is completed.

(ii) The vinyl chloride content in each sample is to be determined by Test Method 107 as prescribed in § 61.67(g)(3).

(iii) The combined emission from reactor opening loss and all sources following the reactor used as a stripper are to be determined for each batch stripped in a reactor according to the procedure prescribed in § 61.67(g)(6).

(iv) The report to the Administrator by the owner or operator is to include a record of any 24-hour average combined reactor opening loss and emissions from all sources following the reactor used as a stripper as determined in this paragraph, in excess of the limits prescribed in § 61.64(f). The combined reactor opening loss and emissions from

all sources following the reactor used as a stripper associated with each batch are to be averaged separately for each type of resin, over each calendar day and weighted according to the quantity of each grade of resin stripped in reactors that calendar day as follows:

For each type of resin (suspension, dispersion, latex, bulk, other), the following calculation is to be performed:

$$A = \frac{\sum_{i=1}^{n} P_{G_i} C_{G_i}}{Q} = \frac{P_{G_1} C_{G_1} + P_{G_2} C_{G_2} + \cdots + P_{G_n} C_{G_n}}{Q}$$

Where:

A = 24-hour average combined reactor opening loss and emissions from all sources following the reactor used as a stripper, in g vinyl chloride/kg product (dry weight basis).

Q = Total production of resin in batches for which stripping is completed during the 24-hour period, in kg.

C = Average combined reactor opening loss and emissions from all sources following the reactor used as a stripper of all batches of grade G_i resin for which stripping is completed during the 24-hour period in g vinyl chloride/kg product (dry weight basis) (determined according to procedure prescribed in § 61.67(g)(6)).

P = Production of grade G_i resin in the batches for which C is determined, in kg.

G_i = Grade of resin; e.g., G_1, G_2, and G_n.

n = Total number of grades of resin in batches for which stripping is completed during the 24-hour period.

If no 24-hour average combined reactor opening loss and emissions from all sources following the reactor used a stripper in excess of the limits prescribed in § 61.64(f) are determined, the report shall state that no excess vinyl chloride emissions were determined.

23. By adding paragraphs (d), (e) and (f) to § 61.70 as follows:

§ 61.70 Reporting.

* * * * *

(d) The owner or operator shall include in the report a record of relief valve discharges as prescribed in § 61.65(a)(4), and the owner or operator shall report exceedences of the relief valve discharge frequency limits prescribed in § 61.65(a) to be determined as follows:

(1) For polyvinyl chloride plants producing dispersion, latex or bulk resins, the relief valve discharge frequency from polyvinly chloride reactors is to be determined using the following equation. Separate calculations are to be made for each resin type (t) as defined:

$$F_t = \frac{N}{Y}$$

Where

F_t = relief valve discharge frequency per 100 polymerization batches from all reactors producing resing type t

N = total number of relief valve discharges during the 12-month period preceding the close of the 6-month reporting period from all reactors producing resin type t

Y = total number of polymerization batches of resin type t during the 12-month period preceding the close of the 6-month reporting period divided by 100

t = resin type: dispersion (including latex) or bulk resin type

(2) For polyvinyl chloride plants producing suspension resins, the relief valve discharge frequency from polyvinyl chloride reactors is to be determined in two ways using the following equations:

$$F_{ss} = \frac{N}{Y}; \text{ and } F_{ss} = N$$

where

F_{ss} = relief valve discharge frequency per 100 polymerization batches from all reactors producing suspension resin

F_{ss} = relief valve discharge frequency per 12-month period from all reactors producing suspension resin

N = total number of relief valve discharges during the 12-month period preceding the close of the 6-month reporting period from all reactors producing suspension resin

Y = total number of polymerization batches of suspension resin during the 12-month period preceding the close of the 6-month reporting period divided by 100

(3) For polyvinyl chloride plants producing suspension, dispersion, latex, or bulk resins, the relief valve discharge frequency from all other equipment (excluding polyvinyl chloride reactors) is to be determined in two ways using the following equations:

$$F_e = \frac{N}{Y}; \text{ and } F_s = N$$

where

F_e = relief valve discharge frequency per 100 polymerization batches from all equipment (excluding reactors)

F_s = relief valve discharge frequency per 12-month period from all equipment (excluding reactors)

N = total number of relief valve discharges during the 12-month period preceding the close of the 6-month reporting period from all equipment (excluding reactors)

Y = total number of polymerization batches of all resin types combined divided by 100

(4) For polyvinyl chloride plants using the solution process or any other continuous production process, the relief valve discharge frequency is the summation of each relief valve discharge from all equipment types during the 12-month period preceding the close of the 6-month reporting period.

(5) For ethylene dichloride/vinyl chloride plants, the relief valve discharge frequency is the summation of each relief valve discharge from all equipment types during the 12-month period preceding the close of the 6-month reporting period.

(6) A polymerization batch consists of each sequence of charging VC and other materials to the reactor, heating reactor contents, polymerization of reactor contents, and removal of reactor contents including any incomplete sequence that is aborted after charging VC to the reactor. For bulk resin production plants, a single "polymerization batch" includes both prepolymerization and postpolymerization reactor operations.

(e) The owner or operator shall include in the report the number of relief valve discharges to the atmosphere during the 3-month period preceding the report from each of the following sources: suspension resin production reactors; dispersion and latex resin production reactors; bulk resin production reactors; all nonreactor equipment in PVC plants; all equipment used in solution process and other continuous process PVC plants; and all equipment in EDC/VC plants; any other source.

(f) The owner or operator shall include in the report the number of reactor openings and the design capacity of the number of polymerization batches for each type of resin in each plant during the 6-month period preceding the report. The design capacity of the number of polymerization batches may be defined

initially and remain unchanged unless significant changes to the design capacity occur.

24. By revising paragraph (a) introductory text of § 61.71 as follows

§ 61.71 Recordkeeping.

(a) The owner or operator of any source to which this subpart applies shall retain the following information at the source and make it available for inspection by the Administrator for a minimum of 3 years:

* * * * *

25. By adding the words "vinyl chloride" to the definition of the term "volatile hazardous air pollutants" in § 61.241 of Subpart V as follows:

§ 61.241 Definitions.

* * * * *

"Volatile hazardous air pollutant" or "VHAP" means a substance regulated under this part for which a standard for equipment leaks of the substance has been proposed and promulgated. Benzene is a VHAP. Vinyl chloride is a VHAP.

(Sec. 112 Clean Air Act of 1976)

[FR Doc. 85-509 Filed 1-8-85; 8:45 am]

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Vinyl Chloride

Part II

Environmental Protection Agency

National Emission Standards for Hazardous Air Pollutants; Alternative Test Method 107A (Vinyl Chloride)

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 61

[AD-FRL 1643-6]

National Emission Standards for Hazardous Air Pollutants; Alternative Test Method 107A (Vinyl Chloride)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule and notice of public hearing.

SUMMARY: The proposed method would apply to the measurement of the vinyl chloride content of solvents, resin-solvent solution, polyvinyl chloride resin, resin-slurry, wet resin, and latex samples. The proposed method was derived from a test method submitted to EPA by Union Carbide. The intent of this proposed method is to provide this alternative analytical procedure because it may be preferred over Method 107 in some circumstances.

A public hearing will be held to provide interested persons an opportunity for oral presentation of data views, or arguments concerning the proposed method.

DATES: *Comments.* Comments must be received on or before April 13, 1981.

Public Hearing. A public hearing will be held on March 26, 1981 (about 30 days after proposal) beginning at 9 a.m.

Request to Speak at Hearing. Persons wishing to present oral testimony must contact EPA by March 19 (1 week before hearing).

ADDRESSES: *Comments.* Comments should be submitted (in duplicate if possible) to: Central Docket Section (A-130), Attention: Docket A-80-37, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460.

Public Hearing. The public hearing will be held at Emissions Measurement Laboratory Building, Page Road and Interstate 40, R.T.P. North Carolina 27711. Persons wishing to present oral testimony should notify Ms. Deanna Tilley, Standards Development Branch (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5421.

Docket. Docket No. A-80-37, containing material relevant to this rulemaking, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, SW., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Mr. Roger T. Shigehara (MD-19), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-2237.

SUPPLEMENTARY INFORMATION: On October 21, 1976 (41 FR 46560) and on June 7, 1977 (42 FR 29005) the Environmental Protection Agency promulgated Method 107—Determination of Vinyl Chloride Content of Inprocess Wastewater Samples and Vinyl Chloride Content of Polyvinyl Chloride Resin, Slurry, Wet Cake, and Latex Samples. Since that time, Union Carbide has submitted comparative supporting data to EPA on a test method that embodies a less sophisticated, but also technically satisfactory, analytical approach. Because practical considerations would favor its use in some instances, this alternative method is being considered for adoption as an EPA method. If adopted, this alternative test method would be available to determine compliance with the national emission standard for vinyl chloride, 40 CFR, Part 61 Subpart F.

(Secs. 112, 114, and 301(a) of the Clean Air Act as amended (42 U.S.C. 7412, 7414, and 7601(a)))

Dated: February 4, 1981.

Walter C. Barber,

Acting Administrator.

It is proposed to amend 40 CFR Part 61 by adding Method 107A to Appendix B as follows:

Appendix B—Test Methods

* * * * *

Method 107A—Determination of Vinyl Chloride Content of Solvents, Resin-Solvent Solution, Polyvinyl Chloride Resin, Resin Slurry, Wet Resin, and Latex Samples[1]

Introduction

Performance of this method should not be attempted by persons unfamiliar with the operation of a gas chromatograph or by those who are unfamiliar with source sampling because knowledge beyond the scope of this presentation is required. Care must be exercised to prevent exposure of sampling personnel to vinyl chloride, a carcinogen.

1. *Applicability and Principle.*

1.1 Applicability. This is an alternative method and applies to the measurement of the vinyl chloride content of solvents, resin solvent solutions, PVC resin, wet cake slurries, latex, and fabricated resin samples. This method is not acceptable where methods from Section 304(h) of the Clean Water Act, 33 U.S.C. 1251 et seq. (the Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977) are required.

1.2 Principle. The basis for this method lies in the direct injection of a liquid sample into a chromatograph and the subsequent evaporation of all volatile material into the carrier gas stream of the chromatograph, thus permitting analysis of all volatile material including vinyl chloride.

2. *Range and Sensitivity.*

The lower limit of detection of vinyl chloride in dry PVC resin is 0.2 ppm. For resin solutions, latexes, and wet resin, this limit rises inversely as the nonvolatile (resin) content decreases.

With proper calibration the upper limit may be extended as needed.

3. *Interferences.*

The chromatograph columns and the corresponding operating parameters herein described normally provide an adequate resolution of vinyl chloride. In cases where resolution interferences are encountered, the chromatograph operator shall select the column and operating parameters best suited to his particular analysis problem, subject to the approval of the Administrator. Approval is automatic, provided that the tester produces confirming data through an adequate supplemental analytical technique, such as analysis with a different column or GC/mass spectroscopy, and has the data available for review by the Administrator.

4. *Precision and Reproducibility.*

A standard sample of latex containing 181.8 ppm vinyl chloride analyzed 10 times by the alternative method showed a standard deviation of 7.5 percent and a mean error of 0.21 percent.

A sample of vinyl chloride copolymer resin solution was analyzed 10 times by the alternative method and showed a standard deviation of 6.6 percent at a level of 35 ppm.

5. *Safety.*

Do not release vinyl chloride to the laboratory atmosphere during preparation of standards. Venting or purging with vinyl chloride monomer (VCM) air mixtures must be held to minimum. When purging is required, the vapor must be routed to outside air. Vinyl chloride, even at low-ppm levels, must never be vented inside the laboratory.

6. *Apparatus.*

6.1 Sampling. The following equipment is required:

6.1.1 Glass Bottles. 16-oz wide mouth with polyethylene-lined, screw-on tops.

[1] Mention of trade names or specific products does not constitute endorsement by the U.S. Environmental Protection Agency.

6.1.2 Adhesive Tape. To prevent loosening of bottle tops.

6.2 Sample Recovery. The following equipment is required:

6.2.1 Glass Vials. 20-ml capacity with polycone screw caps.

6.2.2 Analytical Balance. Capable of weighing to ±0.01 gram.

6.2.3 Syringe. 50-microliter size, with removable needle.

6.2.4 Fritted Glass Sparger. Fine porosity.

6.2.5 Aluminum Weighing Dishes.

6.2.6 Sample Roller or Shaker. To help dissolve sample.

6.3 Analysis. The following equipment is required:

6.3.1 Gas Chromatograph. Hewlett Packard Model 5720A or equivalent.

6.3.2 Chromatograph Column. Stainless steel, 6.1 m by 3.2 mm, packed with 20 percent Tergitol E-35 on Chromosorb W AW 60/80 mesh. The analyst may use other columns provided that the precision and accuracy of the analysis of vinyl chloride standards are not impaired and that he has available for review information confirming that there is adequate resolution of the vinyl chloride peak. (Adequate resolution is defined as an area overlap of not more than 10 percent of the vinyl chloride peak by an interferent peak. Calculation of area overlap is explained in Appendix C, Supplement A: "Determination of Adequate Chromatographic Peak Resolution.")

6.3.3 Valco Instrument Six-Port Rotary Valve. For column back flush.

6.3.4 Septa. For chromatograph injection port.

6.3.5 Injection Port Liners. For chromatograph used.

6.3.6 Regulators. For required gas cylinders.

6.3.7 Soap Film Flow Meter. Hewlett Packard No. 0101-0113 or equivalent.

6.4 Calibration. The following equipment is required:

6.4.1 Analytical Balance. Capable of weighing to ±0.0001 g.

6.4.2 Erlenmeyer Flask With Glass Stopper. 125 ml.

6.4.3 Pipets. 0.1, 0.5, 1, 5, 10, and 50 ml.

6.4.4 Volumetric Flasks. 10 and 100 ml.

7. *Reagents.*

Use only reagents that are of chromatograph grade.

7.1 Analysis. The following items are required:

7.1.1 Hydrogen Gas. Zero grade.

7.1.2 Nitrogen Gas. Zero grade.

7.1.3 Air. Zero grade.

7.1.4 Tetrahydrofuran (THF). Reagent grade.

Analyze the THF by injecting 10 microliters into the prepared gas chromatograph. Compare the THF chromatogram with that shown in Figure 107A-1. If the chromatogram is comparable to A, the THF should be sparged with pure nitrogen for approximately 2 hours using the fritted glass sparger to attempt to remove the interfering peak. Reanalyze the sparged THF to determine whether the THF is acceptable for use. If the scan is comparable to B, the THF should be acceptable for use in the analysis.

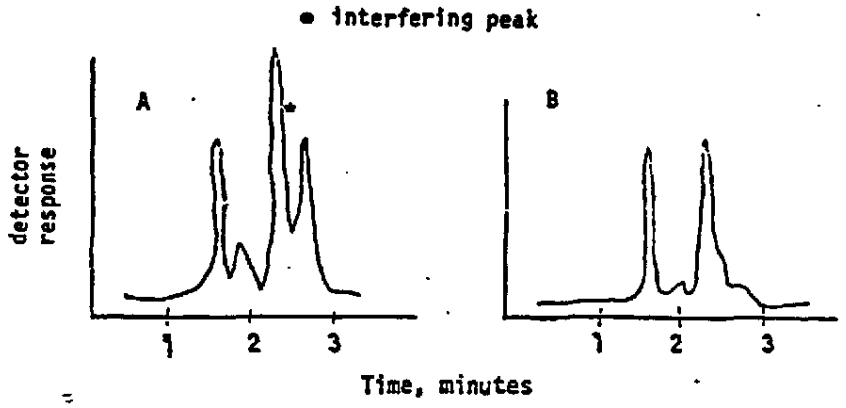

Figure 107A-1

7.1.5 N, N-Dimethylacetamide (DMAC). Spectrographic grade. For use in place in THF.

7.2 Calibration. The following item is required:

7.2.1 Vinyl Chloride 99.9 Percent. Ideal Gas Products lecture bottle, or equivalent. For preparation of standard solutions.

8. *Procedure.*

8.1 Sampling. Allow the liquid or dried resin to flow from a tap on the tank, silo, or pipeline until the tap has been purged. Fill a wide-mouth pint bottle, and immediately tightly cap the bottle. Place an identifying label on each bottle and record the date, time, sample location, and material.

8.2 Sample Treatment. Samples must be run within 24 hours.

8.2.1 Resin Samples. Weight 9.00 ± 0.01 g of THF or DMAC in a tared 20-ml vial. Add 1.00 ± 0.01 g or resin to the tared vial containing the THF or DMAC. Close the vial tightly with the screw cap, and shake or otherwise agitate the vial until complete solution of the resin is obtained. Shaking may require several minutes to several hours, depending on the nature of the resin.

8.2.2 Suspension Resin Slurry and Wet Resin Samples. Slurry must be filtered using a small Buchner funnel with vacuum to yield a wet resin sample. The filtering process must be continued only as long as a steady stream of water is exiting from the funnel. Excessive filtration time could result in some loss of VCM. The wet resin sample is weighed into a tared 20-ml vial with THF or DMAC as described earlier for resin samples (8.2.1) and treated the same as the resin sample. A sample of the wet resin is used to determine total solids as required for calculating the RVCM (Section 8.3.4).

8.2.3 Latex and Resin Solvent Solutions. Samples must be thoroughly mixed. Weigh 1.00 ± 0.01 g of the latex or resin-solvent solution into a 20-ml vial containing 9.00 ± 0.01 g of THF or DMAC as for the resin samples (8.2.1). Cap and shake until complete solution is obtained. Determine the total solids of the latex or resin solution sample (Section 8.3.4).

8.2.4 Solvents and Non-viscous Liquid Samples. No preparation of these samples is required. The neat samples are injected directly into the gas chromatograph.

8.3 Analysis.

8.3.1 Preparation of Gas Chromatograph. Install the chromatographic column, and condition overnight at 70°C. Do not connect the exit end of the column to the detector while conditioning.

8.3.1.1 Flow Rate Adjustments. Adjust the flow rates as follows:

a. Nitrogen Carrier Gas. Set regulator on cylinder to read 60 psig. Set column flow controller on the chromatograph using the soap film flow meter to yield a flow rate of 40 cc/min.

b. Burner Air Supply. Set regulator on the cylinder at 40 psig. Set regulator on the chromatograph to supply air to the burner to yield a flow rate of 250 to 300 cc/min using the flow meter.

c. Hydrogen. Set regulator on cylinder to read 60 psig. Set regulator on the chromatograph to supply 30 to 40 cc/min using the flow meter. Optimize hydrogen flow to yield the most sensitive detector response without extinguishing the

flame. Check flow with flow meter and record this flow.

d. Nitrogen Back Flush Gas. Set regulator on the chromatograph using the soap film flow meter to yield a flow rate of 40 cc/min.

8.3.1.2 Temperature Adjustments. Set temperature as follows:

a. Oven (chromatographic column) at 70°C.

b. Injection Port at 100°C.

c. Detector at 300°C.

8.3.1.3 Ignition of Flame Ionization Detector. Ignite the detector according to the manufacturer's instructions. Allow system to stabilize approximately 1 hour.

8.3.1.4 Recorder. Set pen at zero and start chart drive.

8.3.1.5 Attenuation. Set attenuation to yield desired peak height depending on sample VCM content.

8.3.2. Chromatographic Analyses.

a. Sample Injection. Remove needle from 50-microliter syringe. Open sample vial and draw 50-microliters of THF or DMAC sample recovery solution into the syringe. Recap sample vial. Attach needle to the syringe and while holding the syringe vertically (needle uppermost), eject 40 microliters into an absorbent tissue. Wipe needle with tissue. Now inject 10 microliters into chromatograph system. Repeat the injection until two consecutive values for the height of the vinyl chloride peak do not vary more than 5 percent. Use the average value for these two peak heights to compute the sample concentration.

b. Back Flush. After 4 minutes has elapsed after sample injection, actuate the back flush valve to purge the first 4 feet of the chromatographic column of solvent and other high boilers.

c. Sample Data. Record on the chromatograph strip chart the data from the sample label.

d. Elution Time. Vinyl chloride elutes at 2.8 minutes. Acetaldehyde elutes at 3.7 minutes. Analysis is considered complete when chart pen becomes stable. After 5 minutes, reset back flush valve and inject next sample.

8.3.3 Chromatograph Servicing.

a. Septum. Replace after five sample injections.

b. Sample Port Liner. Replace the sample port liner with a clean spare after five sample injections.

c. Chromatograph Shut Down. If the chromatograph has been shut down overnight, rerun one or more samples from the preceding day to test stability and precision prior to starting on the current day's work.

8.3.4 Determination of Total Solids (T.S.). For wet resin, resin solution, and PVC latex samples, determine the T.S. for each sample by accurately weighing approximately 3 to 5 grams of sample into a tared aluminum pan. The initial procedure is as follows:

a. Where water is the major volatile component: Tare the weighing dish, and add 3 to 5 grams of sample to the dish. Weigh to the nearest milligram.

b. Where volatile solvent is the major volatile component: Transfer a portion of the sample to a 20-ml screw cap vial and cap immediately. Weigh the vial to the nearest milligram. Uncap the vial and transfer a 3- to 5-gram portion of the sample to a tared aluminum weighing dish. Recap the vial and reweigh to the nearest milligram. The vial weight loss is the sample weight.

To continue, now place the weighing pan in a 130°C oven for 1 hour. Remove the dish and allow to cool to room temperature in a desiccator. Weigh the pan to the nearest 0.1 mg. Total solids is the weight of material in the aluminum pan after heating divided by the net weight of sample added to the pan originally times 100.

9. *Calibration of the Chromatograph.*

9.1 Preparation of Standards. Prepare a 1 percent by weight (approximate) solution of vinyl chloride in THF or DMAC by bubbling vinyl chloride gas from a cylinder into a tared 125-ml glass-stoppered flask containing THF or DMAC. The weight of vinyl chloride to be added should be calculated prior to this operation, i.e., 1 percent of the weight of THF or DMAC contained in the tared flask. This must be carried out in a laboratory hood. Adjust the vinyl chloride flow from the cylinder so that the vinyl chloride dissolves essentially completely in the THF or DMAC and is not blown to the atmosphere. Take particular care not to volatize any of the solution. Stopper the flask and swirl the solution to effect complete mixing. Weigh the stoppered flask to nearest 0.1 mg to determine the exact amount of vinyl chloride added.

Pipet 10 ml of the approximately 1 percent solution into a 100-ml glass-stoppered volumetric flask, and add THF or DMAC to fill to the mark. Cap the flask and invert 10 to 20 times. This solution contains approximately 1,000 ppm by weight of vinyl chloride (note the exact concentration).

Pipet 50–, 10–, 5–, 1–, 0.5–, and 0.1-ml aliquots of the approximately 1,000 ppm solution into 100 ml glass stoppered volumetric flasks. Dilute to the mark with THF or DMAC, cap the flasks and invert each 10 to 20 times. These solutions contain approximately 500, 100, 50, 10, 5, and 1 ppm vinyl chloride. Note the exact concentration of each one. These standards are to be kept under refrigeration in stoppered bottles, and must be renewed every 3 months.

9.2 Preparation of Chromatograph Calibration Curve.

Obtain the gas chromatograph for each of the six final solutions prepared in Section 9.1 by using the procedure in Section 8.3.2. Prepare a chart plotting peak height obtained from the chromatogram of each solution versus the known concentration. Draw a straight line through the points derived by the least squares method.

10. *Calculations.*

10.1 Response Factor. From the calibration curve described in Section 9.2. select the value of C_c that corresponds to H_c for each sample. Compute the response factor, R_f, for each sample as follows:

$$R_f = \frac{C_c}{H_c} \qquad \text{Eq. 107A-1}$$

10.2 Residual vinyl chloride monomer concentration (C_{rvc}) or vinyl chloride monomer concentration in resin:

$$C_{rvc} = 10 H_s R_f \qquad \text{Eq. 107A-2}$$

Where:

H_s = Peak height of sample, mm.

R_f = Chromatograph response factor.

10.3 Samples containing volatile material, i.e., resin solutions, wet resin, and latexes:

$$C_{rvc} = \frac{H_s R_f (1{,}000)}{T.S.} \qquad \text{Eq. 107A-3}$$

10.4 Samples of solvents and inprocess waste water:

$$C_{vc} = \frac{H_s R_f}{0.888} \qquad \text{Eq. 107A-4}$$

Where:

0.888 = Specific gravity of THF.

11. *Bibliography.*

1. Communication from R.N. Wheeler, Jr.; Union Carbide Corporation. Part 61 National Emissions Standards for Hazardous Air Pollutants Appendix B, Method 107—Alternate Method, September 19, 1977.

[FR Doc. 81-4080 Filed 2-11-81; 8:45 am]
BILLING CODE 6560-26-M

Subpart F—National Emission Standard for Vinyl Chloride

[41 FR 46559, October 21, 1976]

§ 61.60 Applicability.

(a) This subpart applies to plants which produce:

(1) Ethylene dichloride by reaction of oxygen and hydrogen chloride with ethylene,

(2) Vinyl chloride by any process, and/or

(3) One or more polymers containing any fraction of polymerized vinyl chloride.

(b) This subpart does not apply to equipment used in research and development if the reactor used to polymerize the vinyl chloride processed in the equipment has a capacity of no more than 0.19 m^3 (50 gal).

(c) Sections of this subpart other than §§61.61; 61.64 (a)(1), (b), (c), and (d); 61.67; 61.68; 61.69; 61.70; and 61.71 do not apply to equipment used in research and development if the reactor used to polymerize the vinyl chloride processed in the equipment has a capacity of greater than 0.19 m^3 (50 gal) and no more than 4.07 m^3 (1100 gal).

[42 FR 29005, June 7, 1977]

§ 61.61 Definitions.

Terms used in this subpart are defined in the Act, in subpart A of this part, or in this section as follows:

(a) "Ethylene dichloride plant" includes any plant which produces ethylene dichloride by reaction of oxygen and hydrogen chloride with ethylene.

(b) "Vinyl chloride plant" includes any plant which produces vinyl chloride by any process.

(c) "Polyvinyl chloride plant" includes any plant where vinyl chloride alone or in combination with other materials is polymerized.

(d) "Slip gauge" means a gauge which has a probe that moves through the gas/liquid interface in a storage or transfer vessel and indicates the level of vinyl chloride in the vessel by the physical state of the material the gauge discharges.

(e) "Type of resin" means the broad classification of resin referring to the basic manufacturing process for producing that resin, including, but not limited to, the suspension, dispersion, latex, bulk, and solution processes.

(f) "Grade of resin" means the subdivision of resin classification which describes it as a unique resin, i.e., the most exact description of a resin with no further subdivision.

(g) "Dispersion resin" means a resin manufactured in such away as to form fluid dispersions when dispersed in a plasticizer or plasticizer/diluent mixtures.

(h) "Latex resin" means a resin which is produced by a polymerization process which initiates from free radical catalyst sites and is sold undried.

(i) "Bulk resin' 'means a resin which is produced by a polymerization process in which no water is used.

(j) "Inprocess wastewater" means any water which, during manufacturing or processing, comes into direct contact with vinyl chloride or polyvinyl chloride or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product containing vinyl chloride or polyvinyl chloride but which has not been discharged to a wastewater treatment process or discharged untreated as wastewater.

(k) "Wastewater treatment process" includes any process which modifies characteristics such as BOD, COD, TSS, and pH, usually for the purpose of meeting effluent guidelines and standards; it does not include any process the purpose of which is to remove vinyl chloride from water to meet requirements of this subpart.

(l) "In vinyl chloride service" means that a piece of equipment contains or contacts either a liquid that is at least 10 percent by weight vinyl chloride or a gas that is at least 10 percent by volume vinyl chloride.

(m) "Standard operating procedure" means a formal written procedure officially adopted by the plant owner or operator and available on a routine basis to those persons responsible for carrying out the procedure.

(n) "Run" means the net period of time during which an emission sample is collected.

(o) "Ethylene dichloride purification" includes any part of the process of ethylene dichloride production which follows ethylene dichloride formation and in which finished ethylene dichloride is produced.

(p) "Vinyl chloride purification" includes any part of the process of vinyl chloride production which follows vinyl chloride formation and in which finished vinyl chloride is produced.

(q) "Reactor" includes any vessel in which vinyl chloride is partially or totally polymerized into polyvinyl chloride.

(r) "Reactor opening loss" means the emissions of vinyl chloride occurring when a reactor is vented to the atmosphere for any purpose other than an emergency relief discharge as defined in § 61.65(a).

(s) "Stripper" includes any vessel in which residual vinyl chloride is removed from polyvinyl chloride resin, except bulk resin, in the slurry form by the use of heat and/or vacuum. In the case of bulk resin, stripper includes any vessel which is used to remove residual vinyl chloride from polyvinyl chloride resin immediately following the polymerization step in the plant process flow.

(t) "Standard temperature" means a temperature of 20° C (69° F).

(u) "Standard pressure" means a pressure of 760 mm of Hg (29.92 in. of Hg).

[42 FR 29005, June 7, 1977]

§ 61.62 Emission standard for ethylene dichloride plants.

[42 FR 29005, June 7, 1977]

(a) Ethylene dichloride purification: The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from any equipment used in ethylene dichloride purification is not to exceed 10 ppm, except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

(b) Oxychlorination reactor: Except as provided in § 61.65(a), emissions of vinyl chloride to the atmosphere from each oxychlorination reactor are not to exceed 0.2 g/kg (0.0002 lb/lb) of the 100 percent ethylene dichloride product from the oxychlorination process.

§ 61.63 Emission standard for vinyl chloride plants.

An owner or operator of a vinyl chloride plant shall comply with the requirements of this section and § 61.65.

(a) Vinyl chloride formation and purification: The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from any equipment used in vinyl chloride formation and/or purification is not to exceed 10 ppm, except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

§ 61.64 Emission standard for polyvinyl chloride plants.

An owner or operator of a polyvinyl chloride plant shall comply with the requirements of this section and § 61.65.

(a) Reactor: The following requirements apply to reactors:

(1) The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each reactor is not to exceed 10 ppm, except as provided in paragraph (a)(2) of this section and § 61.65(a).

(2) The reactor opening loss from each reactor is not to exceed 0.02 g vinyl chloride/Kg (0.00002 lb vinyl chloride/lb) of polyvinyl chloride product, with the product determined on a dry solids basis. This requirement applies to any vessel which is used as a reactor or as both a reactor and a stripper. In the bulk process, the product means the gross product of prepolymerization and postpolymerization.

(3) Manual vent valve discharge: Except for an emergency manual vent valve discharge, there is to be no discharge to the atmosphere from any manual vent valve on a polyvinyl chloride reactor in vinyl chloride service. An emergency manual vent valve discharge means a discharge to the atmosphere which could not have been avoided by taking measures to prevent the discharge. Within 10 days of any discharge to the atmosphere from any manual vent valve, the owner or operator of the source from which the discharge occurs shall submit to the Administrator a report in writing containing information on the source, nature

[Sec. 61.64(a)(3)]

and cause of the discharge, the date and time of the discharge, the approximate total vinyl chloride loss during the discharge, the method used for determining the vinyl chloride loss, the action that was taken to prevent the discharge, and measures adopted to prevent future discharges.

(b) Stripper: The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each stripper is not to exceed 10 ppm, except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

(c) Mixing, weighing, and holding containers: The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each mixing, weighing, or holding container in vinyl chloride service which precedes the stripper (or the reactor if the plant has no stripper) in the plant process flow is not to exceed 10 ppm, except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

(d) Monomer recovery system. The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each monomer recovery system is not to exceed 10 ppm, except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

(e) Sources following the stripper(s): The following requirements apply to emissions of vinyl chloride to the atmosphere from the combination of all sources following the stripper(s) [or the reactor(s) if the plant has no stripper(s)] in the plant process flow including but not limited to, centrifuges, concentrators, blend tanks, filters, dryers, conveyor air discharges, baggers, storage containers, and inprocess wastewater:

(1) In polyvinyl chloride plants using stripping technology to control vinyl chloride emissions, the weighted average residual vinyl chloride concentration in all grades of polyvinyl chloride resin processed through the stripping operation on each calendar day, measured immediately after the stripping operation is completed, may not exceed:

(i) 2000 ppm for polyvinyl chloride dispersion resins, excluding latex resins;

(ii) 400 ppm for all other polyvinyl chloride resins, including latex resins, averaged separately for each type of resin; or

(2) In polyvinyl chloride plants controlling vinyl chloride emissions with technology other than stripping or in addition to stripping, emissions of vinyl chloride to the atmosphere may not exceed:

(i) 2 g/kg (0.002 lb/lb) product from the stripper(s) [or reactor(s) if the plant has no stripper(s)] for dispersion polyvinyl chloride resins, excluding latex resins, with the product determined on a dry solids basis;

(ii) 0.4 g/kg (0.0004 lb/lb) product from the strippers [or reactor(s) if the plant has no stripper(s)] for all other polyvinyl chloride resins, including latex resins, with the product determined on a dry solids basis.

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants.

An owner or operator of an ethylene dichloride, vinyl chloride, and/or polyvinyl chloride plant shall comply with the requirements of this section.

(a) Relief valve discharge: Except for an emergency relief discharge, there is to be no discharge to the atmosphere from any relief valve on any equipment in vinyl chloride service. An emergency relief discharge means a discharge which could not have been avoided by taking measures to prevent the discharge. Within 10 days of any relief valve discharge, the owner or operator of the source from which the relief valve discharge occurs shall submit to the Administrator a report in writing containing information on the source, nature and cause of the discharge, the date and time of the discharge, the approximate total vinyl chloride loss during the discharge, the method used for determining the vinyl chloride loss, the action that was taken to prevent the discharge, and measures adopted to prevent future discharges.

(b) Fugitive emission sources:

(1) Loading and unloading lines: Vinyl chloride emissions from loading and unloading lines in vinyl chloride service which are opened to the atmosphere after each loading or unloading operation are to be minimized as follows:

[42 FR 29005, June 7, 1977]

(i) After each loading or unloading operation and before opening a loading or unloading line to the atmosphere, the quantity of vinyl chloride in all parts of each loading or unloading line that are to be opened to the atmosphere is to be reduced so that the parts combined contain no greater than 0.0038 m^3 (0.13 ft^3) of vinyl chloride, at standard temperature and pressure; and

(ii) Any vinyl chloride removed from a loading or unloading line in accordance with paragraph (b)(1)(i) of this section is to be ducted through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm, or equivalent as provided in § 61.66.

(2) Slip gauges: During loading or unloading operations, the vinyl chloride emissions from each slip gauge in vinyl chloride service are to be minimized by ducting any vinyl chloride discharged from the slip gauge through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm, or equivalent as provided in § 61.66.

(3) Leakage from pump, compressor, and agitator seals:

(i) Rotating pumps: Vinyl chloride emissions from seals on all rotating pumps in vinyl chloride service are to be minimized by installing sealless pumps, pumps with double mechanical seals, or equivalent as provided in § 61.66. If double mechanical seals are used, vinyl chloride emission from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the pump; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(ii) Reciprocating pumps: Vinyl chloride emissions from seals on all reciprocating pumps in vinyl chloride service are to be minimized by installing double outboard seals, or equivalent as provided in § 61.66. If double outboard seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the pump; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(iii) Rotating compressor: Vinyl chloride emissions from seals on all rotating compressors in vinyl chloride service are to be minimized by installing compressors with double mechanical seals, or equivalent as provided in § 61.66. If double mechanical seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the compressor; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(iv) Reciprocating compressors: Vinyl chloride emissions from seals on all reciprocating compressors in vinyl chloride service are to be minimized by installing double outboard seals, or equivalent as provided in § 61.66. If double outboard seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the compressor; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(v) Agitator: Vinyl chloride emissions from seals on all agitators in vinyl chloride service are to be minimized by installing agitators with double mechanical seals, or equivalent as provided in § 61.66. If double mechanical seals are used, vinyl chloride emissions from the seals are to be minimized by maintaining the pressure between the two seals so that any leak that occurs is into the agi-

tated vessel; by ducting any vinyl chloride between the two seals through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(4) Leakage from relief valves: Vinyl chloride emissions due to leakage from each relief valve on equipment in vinyl chloride service are to be minimized by installing a rupture disk between the equipment and the relief valve, by connecting the relief valve discharge to a process line or recovery system, or equivalent as provided in § 61.66.

(5) Manual venting of gases: Except as provided in § 61.64(a)(3), all gases which are manually vented from equipment in vinyl chloride service are to be ducted through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm; or equivalent as provided in § 61.66.

(6) Opening of equipment: Vinyl chloride emissions from opening of equipment (including loading or unloading lines that are not opened to the atmosphere after each loading or unloading operation) are to be minimized as follows:

(i) Before opening any equipment for any reason, the quantity of vinyl chloride is to be reduced so that the equipment contains no more than 2.0 percent by volume vinyl chloride or 0.0950 m^3 (25 gal) of vinyl chloride, whichever is larger, at standard temperature and pressure; and

(ii) Any vinyl chloride removed from the equipment in accordance with paragraph (b)(6)(i) of this section is to be ducted through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm, or equivalent as provided in § 61.66.

(7) Samples: Unused portions of samples containing at least 10 percent by weight vinyl chloride are to be returned to the process, and sampling techniques are to be such that sample containers in vinyl chloride service are purged into a closed process system.

(8) Leak detection and elimination: Vinyl chloride emissions due to leaks from equipment in vinyl chloride service are to be minimized by instituting and implementing a formal leak detection and elimination program. The owner or operator shall submit a description of the program to the Administrator for approval. The program is to be submitted within 45 days of the effective date of these regulations, unless a waiver of compliance is granted under § 61.11. If a waiver of compliance is granted, the program is to be submitted on a date scheduled by the Administrator. Approval of a program will be granted by the Administrator provided he finds:

(i) It includes a reliable and accurate vinyl chloride monitoring system for detection of major leaks and identification of the general area of the plant where a leak is located. A vinyl chloride monitoring system means a device which obtains air samples from one or more points on a continuous sequential basis and analyzes the samples with gas chromatography or, if the owner or operator assumes that all hydrocarbons measured are vinyl chloride, with infrared spectrophotometry flame ion detection, or an equivalent or alternative method.

(ii) It includes a reliable and accurate portable hydrocarbon detector to be used routinely to find small leaks and to pinpoint the major leaks indicated by the vinyl chloride monitoring system. A portable hydrocarbon detector means a device which measures hydrocarbons with a sensitivity of at least 10 ppm and is of such design and size that it can be used to measure emissions from localized points.

(iii) It provides for an acceptable calibration and maintenance schedule for the vinyl chloride monitoring system and portable hydrocarbon detector. For the vinyl chloride monitoring system, a daily span check is to be conducted with a concentration of vinyl chloride equal to the concentration defined as a leak according to paragraph (b)(8)(vi) of this section. The calibration is to be done with either:

(A) A calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.2 of Test Method 106 and in accordance with section 7.1 of Test Method 106, or

(B) A calibration gas cylinder standard containing the appropriate concentration of vinyl chloride. The gas composition of the calibration gas cylinder standard is to have been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer. If a gas chromatograph is used as the vinyl chloride monitoring system, these gas mixtures may be directly used to prepare a chromatograph calibration curve as described in section 7.3 of Test Method 106. The requirements in section 5.2.3.1 and 5.2.3.2 of Test Method 106 for certification of cylinder standards and for establishment and verification of calibration standards are to be followed.

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(iv) The location and number of points to be monitored and the frequency of monitoring provided for in the program are acceptable when they are compared with the number of pieces of equipment in vinyl chloride service and the size and physical layout of the plant.

(v) It contains an acceptable plan of action to be taken when a leak is detected.

(vi) It contains a definition of leak which is acceptable when compared with the background concentrations of vinyl chloride in the areas of the plant to be monitored by the vinyl chloride monitoring system. Measurements of background concentrations of vinyl chloride in the areas of the plant to be monitored by the vinyl chloride monitoring system are to be included with the description of the program. The definition of leak for a given plant may vary among the different areas within the plant and is also to change over time as background concentrations in the plant are reduced.

(9) Inprocess wastewater: Vinyl chloride emissions to the atmosphere from inprocess wastewater are to be reduced as follows:

(i) The concentration of vinyl chloride in each inprocess wastewater stream containing greater than 10 ppm vinyl chloride measured immediately as it leaves a piece of equipment and before being mixed with any other inprocess wastewater stream is to be reduced to no more than 10 ppm by weight before being mixed with any other inprocess wastewater stream which contains less than 10 ppm vinyl chloride; before being exposed to the atmosphere, before being discharged to a wastewater treatment process; or before being discharged untreated as a wastewater. This paragraph does apply to water which is used to displace vinyl chloride from equipment before it is opened to the atmosphere in accordance with § 61.64(a)(2) or paragraph (b)(6) of this section, but does not apply to water which is used to wash out equipment after the equipment has already been opened to the atmosphere in accordance with § 61.64(a)(2) or paragraph (b)(6) of this section.

(ii) Any vinyl chloride removed from the inprocess wastewater in accordance with paragraph (b)(9)(i) of this section is to be ducted through a control system from which the concentration of vinyl chloride in the exhaust gases does not exceed 10 ppm, or equivalent as provided in § 61.66.

(c) The requirements in paragraphs (b)(1), (b)(2), (b)(5), (b)(6), (b)(7) and (b)(8) of this section are to be incorporated into a standard operating procedure, and made available upon request for inspection by the Administrator. The standard operating procedure is to include provisions for measuring the vinyl chloride in equipment ≥4.75 m^3 1,250 gal in volume for which an emission limit is prescribed in § 61.65(b)(6)(i) prior to opening the equipment and using Test Method 106, a portable hydrocarbon detector, or an equivalent or alternative method. The method of measurement is to meet the requirements in § 61.67(g)(5)(i)(A) or (g)((5)(i)(B).

[41 FR 53017, December 3, 1976]

§ 61.66 Equivalent equipment and procedures.

Upon written application from an owner or operator, the Administrator may

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approve use of equipment or procedures which have been demonstrated to his satisfaction to be equivalent in terms of reducing vinyl chloride emissions to the atmosphere to those prescribed for compliance with a specific paragraph of this subpart. For an existing source, any request for using an equivalent method as the initial measure of control is to be submitted to the Administrator within 30 days of the effective date. For a new source, any request for using an equivalent method is to be submitted to the Administrator with the application for approval of construction or modification required by § 61.07.

§ 61.67 Emission tests.

(a) Unless a waiver of emission testing is obtained under § 61.13, the owner or operator of a source to which this subpart applies shall test emissions from the source.

(1) Within 90 days of the effective date in the case of an existing source or a new source which has an initial startup date preceding the effective date, or

(2) Within 90 days of startup in the case of a new source, initial startup of which occurs after the effective date.

(b) The owner or operator shall provide the Administrator at least 30 days prior notice of an emission test to afford the Administrator the opportunity to have an observer present during the test.

(c) Any emission test is to be conducted while the equipment being tested is operating at the maximum production rate at which the equipment will be operated and under other relevant conditions as may be specified by the Administrator based on representative performance of the source.

(d) [Reserved]

(e) When at all possible, each sample is to be analyzed within 24 hours, but in no case in excess of 72 hours of sample collection. Vinyl chloride emissions are to be determined within 30 days after the emission test. The owner or operator shall report the determinations to the Administrator by a registered letter dispatched before the close of the next business day following the determination.

[42 FR 29005, June 7, 1977]

(f) The owner or operator shall retain at the plant and make available, upon request, for inspection by the Administrator, for a minimum of 2 years records of emission test results and other data needed to determine emissions.

(g) Unless otherwise specified, the owner or operator shall use test Test Methods in Appendix B to this part for each test as required by paragraphs (g)(1), (g)(2), (g)(3), (g)(4), and (g)(5) of this section, unless an equivalent method or an alternative method has been approved by the Administrator. If the Administrator finds reasonable grounds to dispute the results obtained by an equivalent or alternative method, he may require the use of a reference method. If the results of the reference and equivalent or alternative methods do not agree, the results obtained by the reference method prevail, and the Administrator may notify the owner or operator that approval of the method previously considered to be equivalent or alternative is withdrawn.

(1) Test Method 106 is to be used to determine the vinyl chloride emissions from any source for which an emission limit is prescribed in §§ 61.62(a) or (b) § 61.63(a), or §§ 61.64(a)(1), (b), (c), or (d), or from any control system to which reactor emissions are required to be ducted in § 61.64(a)(2) or to which fugitive emissions are required to be ducted in §§ 61.65(b)(1)(ii), (b)(2), (b)(5), (b)(6)(ii), or (b)(9)(ii).

(i) For each run, one sample is to be collected. The sampling site is to be at least two stack or duct diameters downstream and one half diameter upstream from any flow disturbance such as a bend, expansion, contraction, or visible flame. For a rectangular cross section an equivalent diameter is to be determined from the following equation:

$$\text{equivalent diameter} = 2\,\frac{(\text{length})\,(\text{width})}{\text{length} + \text{width}}$$

The sampling point in the duct is to be at the centroid of the cross section. The sample is to be extracted at a rate proportional to the gas velocity at the sampling point. The sample is to be taken over a minimum of one hour, and is to contain a minimum volume of 50 liters corrected to standard conditions.

(ii) Each emission test is to consist of three runs. For the purpose of determining emissions, the average of results of all runs is to apply. The average is to be computed on a time weighted basis.

(iii) For gas streams containing more than 10 percent oxygen the concentration of vinyl chloride as determined by Test Method 106 is to be corrected to 10 percent oxygen (dry basis) for determination of emissions by using the following equation:

$$C_{b\,(\text{corrected})} = C_b\,\frac{10.9}{20.9 - \text{percent } O_2}$$

where:

$C_{b\,(\text{corrected})}$ = The concentration of vinyl chloride in the exhaust gases, corrected to 10-percent oxygen.

C_b = The concentration of vinyl chloride as measured by Test Method 106.

20.9 = Percent oxygen in the ambient air at standard conditions.

10.9 = Percent oxygen in the ambient air at standard conditions, minus the 10.0-percent oxygen to which the correction is being made.

Percent O_2 = Percent oxygen in the exhaust gas as measured by Reference Method 3 in Appendix A of Part 60 of this chapter.

(iv) For those emission sources where the emission limit is prescribed in terms of mass rather than concentration, mass emissions in kg/100 kg product are to be determined by using the following equation:

$$C_{BX} = \frac{[C_b\,(2.60)\,Q\,10^{-6}]\,[100]}{Z}$$

where:

C_{BX} = kg vinyl chloride/100 kg product.

C_b = The concentration of vinyl chloride as measured by Test Method 106.

2.60 = Density of vinyl chloride at one atmosphere and 20° C in kg/m³.

Q = Volumetric flow rate in m³/hr as determined by Reference Method 2 of Appendix A to Part 60 of this chapter.

10^{-6} = Conversion factor for ppm.

Z = Production rate (kg/hr).

[42 FR 29005, June 7, 1977]

(2) Test Method 107 is to be used to determine the concentration of vinyl chloride in each inprocess wastewater stream for which an emission limit is prescribed in § 61.65(b)(9)(i).

(3) Where a stripping operation is used to attain the emission limit in § 61.64(e), emissions are to be determined using Test Method 107 as follows:

(i) The number of strippers and samples and the types and grades of resin to be sampled are to be determined by the Administrator for each individual plant at the time of the test based on the plant's operation.

(ii) Each sample is to be taken immediately following the stripping operation.

(iii) The corresponding quantity of material processed by each stripper is to be determined on a dry solids basis and by a method submitted to and approved by the Administrator.

(iv) At the prior request of the Administrator, the owner or operator shall provide duplicates of the samples required in paragraph (g)(3)(i) of this section.

(4) Where control technology other than or in addition to a stripping operation is used to attain the emission limit in § 61.64(e), emissions are to be determined as follows:

(i) Test Method 106 is to be used to determine atmospheric emissions from all of the process equipment simultaneously. The requirements of paragraph (g)(1) of this section are to be met.

(ii) Test Method 107 is to be used to determine the concentration of vinyl chloride in each inprocess wastewater stream subject to the emission limit prescribed in § 61.64(e). The mass of vinyl chloride in kg/100 kg product in each in process wastewater stream is to be determined by using the following equation:

$$C_{BX} = \frac{[C_a\,R\,10^{-6}]\,[100]}{Z}$$

where:

C_{BX} = kg vinyl chloride/100 kg product.

C_a = The concentration of vinyl chloride as measured by Test Method 107.

R = water flow rate in l/hr, determined in accordance with a method which has been submitted to and approved by the Administrator.

10^{-6} = Conversion factor for ppm.

Z = Production rate (kg/hr), determined in accordance with a method which has been submitted and approved by the Administrator.

(5) The reactor opening loss for which an emission limit is prescribed in § 61.64 (a) (2) is to be determined. The number of reactors for which the determination is to be made is to be specified by the Administrator for each individual plant at the time of the determination based on the plant's operation. For a reactor that is also used as a stripper, the determination may be made immediately following the stripping operation.

(i) Except as provided in paragraph (g) (5) (ii) of this section, the reactor opening loss is to be determined using the following equation:

$$C = \frac{W\ (2.60)\ (10^{-4})\ (Cb)}{YZ}$$

where:

C = kg vinyl chloride emissions/kg product.
W = Capacity of the reactor in m³.
2.60 = Density of vinyl chloride at one atmosphere and 20° C in kg/m³.
10^{-4} = Conversion factor for ppm.
Cb = ppm by volume vinyl chloride as determined by Test Method 106 or a portable hydrocarbon detector which measures hydrocarbons with a sensitivity of at least 10 ppm.
Y = Number of batches since the reactor was last opened to the atmosphere.
Z = Average kg of polyvinyl chloride produced per batch in the number of batches since the reactor was last opened to the atmosphere.

(A) If Method 106 is used to determine the concentration of vinyl chloride (Cb), the sample is to be withdrawn at a constant rate with a probe of sufficient length to reach the vessel bottom from the manhole. Samples are to be taken for 5 minutes within 6 inches of the vessel bottom, 5 minutes near the vessel center, and 5 minutes near the vessel top.

(B) If a portable hydrocarbon detector is used to determine the concentration of vinyl chloride (Cb), a probe of sufficient length to reach the vessel bottom from the manhole is to be used to make the measurements. One measurement will be made within 6 inches of the vessel bottom, one near the vessel center and one near the vessel top. Measurements are to be made at each location until the reading is stabilized. All hydrocarbons measured are to be assumed to be vinyl chloride.

(C) The production rate of polyvinyl chloride (Z) is to be determined by a method submitted to and approved by the Administrator.

(ii) A calculation based on the number of evacuations, the vacuum involved, and the volume of gas in the reactor is hereby approved by the Administrator as an alternative method for determining reactor opening loss for postpolymerization reactors in the manufacture of bulk resins.

§ 61.68 Emission monitoring.

(a) A vinyl chloride monitoring system is to be used to monitor on a continuous basis the emissions from the sources for which emission limits are prescribed in § 61.62(a) and (b), § 61.63(a), and § 61.64(a)(1), (b), (c), and (d), and for any control system to which reactor emissions are required to be ducted in §61.64(a) (2) or to which fugitive emissions are required to be ducted in §61.65 (b) (1) (ii), and (b) (2), (b) (5), (b) (6) (ii), and (b) (9) (ii).

[41 FR 53017, December 3, 1976]

(b) The vinyl chloride monitoring system(s) used to meet the requirement in paragraph (a) of this section is to be a device which obtains air sampels from one or more points on a continuous sequential basis and analyzes the samples with gas chromotography or, if the owner or operator assumes that all hydrocarbons measured are vinyl chloride, with infrared spectrophotometry, flame ion detection, or an equivalent or alternative method. The vinyl chloride monitoring system used to meet the requirements in § 61.65(b)(8)(i) may be used to meet the requirements of this section.

(c) A daily span check is to be conducted for each vinyle chloride monitoring system used. For all of the emission sources listed in paragraph (a) of this section, except the one for which an emission limit is prescribed in § 61.62(b), the daily span check is to be conducted with a concentration of vinyl chloride equal to 10 ppm. For the emission source for which an emission limit is prescribed in § 61.62(b), the daily span check is to be conducted with a concentration of vinyl chloride which is determined to be equivalent to the emission limit for that source based on the emission test required by §61.67. The calibration is to be done with either:

[41 FR 53017, December 3, 1976]

(1) A calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.2 of Test Method 106 and in accordance with section 7.1 of Test Method 106, or

[42 FR 29005, June 7, 1977]

(2) A calibration gas cylinder standard containing the appropriate concentration of vinyl chloride. The gas composition of the calibration gas cylinder standard is to have been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer. If a gas chromatograph is used as the vinyl chloride monitoring system, these gas mixtures may be directly used to prepare a chromatograph calibration curve as described in section 7.3 of Test Method 106. The requirements in sections 5.2.3.1 and 5.2.3.2 of Test Method 106 for certification of cylinder standards and for establishment and verification of calibration standards are to be followed.

[42 FR 29005, June 7, 1977]

§ 61.69 Initial report.

(a) An owner or operator of any source to which this subpart applies shall submit a statement in writing notifying the Administrator that the equipment and procedural specifications in §§ 61.65 (b) (1), (b) (2), (b) (3), (b) (4), (b) (5), (b) (6), (b) (7), and (b) (8) are being implemented.

(b) (1) In the case of an existing source or a new source which has an initial startup date preceding the effective date, the statement is to be submitted within 90 days of the effective date, unless a waiver of compliance is granted under § 61.11, along with the information required under § 61.10. If a waiver of compliance is granted, the statement is to be submitted on a date scheduled by the Administrator.

(2) In the case of a new source which did not have an initial startup date preceding the effective date, the statement is to be submitted within 90 days of the initial startup date.

(c) The statement is to contain the following information:

(1) A list of the equipment installed for compliance,

(2) A description of the physical and functional characteristics of each piece of equipment.

(3) A description of the methods which have been incorporated into the standard operating procedures for measuring or calculating the emissions for which emission limits are prescribed in §§ 61.65 (b) (1) (i) and (b) (6) (i).

(4) A statement that each piece of equipment is installed and that each piece of equipment and each procedure is being used.

§ 61.70 Semiannual report.

(a) The owner or operator of any source to which this subpart applies shall submit to the Administrator on September 15 and March 15 of each year a report in writing containing the information required by this section. The first semiannual report is to be submitted following the first full 6 month reporting period after the initial report is submitted.

[41 FR 53017, December 3, 1976]

(b) (1) In the case of an existing source or a new source which has an initial startup date preceding the effective date, the first report is to be submitted within 180 days of the effective date, unless a waiver of compliance is granted under § 61.11. If a waiver of compliance is granted, the first report is to be submitted on a date scheduled by the Administrator.

(2) In the case of a new source which did not have an initial startup date preceding the effective date, the first report is to be submitted within 180 days of the initial startup date.

(c) Unless otherwise specified, the owner or operator shall use the Test Methods in Appendix B to this part to conduct emission tests as required by paragraphs (c) (2) and (c) (3) of this section, unless an equivalent or an alternative method has been approved by the Administrator. If the Administrator finds reasonable grounds to dispute the

results obtained by an equivalent or alternative method, he may require the use of a reference method. If the results of the reference and equivalent or alternative methods do not agree, the results obtained by the reference method prevail, and the Administrator may notify the owner or operator that approval of the method previously considered to be equivalent or alternative is withdrawn.

(i) The owner or operator shall include in the report a record of any emissions which averaged over any hour period (commencing on the hour) are in excess of the emission limits prescribed in §§ 61.62(a) or (b), § 61.63(a), or §§ 61.64(a)(1), (b), (c), or (d), or for any control system to which reactor emissions are required to be ducted in § 61.64(a)(2) or to which fugitive emissions are required to be ducted in § 61.65(b)(1)(ii), (b)(2), (b)(5), (b)(6)(ii), or (b)(9)(ii). The emissions are to be measured in accordance with § 61.68.

(2) In polyvinyl chloride plants for which a stripping operation is used to attain the emisison level prescribed in § 61.64-e), the owner or operator shall include in the report a record of the vinyl chloride content in the polyvinyl chloride resin. Test Method 107 is to be used to determine vinyl chloride content as follows:

(i) If batch stripping is used, one representative sample of polyvinyl chloride resin is to be taken from each batch of each grade of resin immediately following the completion of the stripping operation, and identified by resin type and grade and the date and time the batch is completed. The corresponding quantity of material processed in each stripper batch is to be recorded and identified by resin type and grade and the date and time the batch is completed.

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(ii) If continuous stripping is used, one representative sample of polyvinyl chloride resin is to be taken for each grade of resin processed or at intervals of 8 hours for each grade of resin which is being processed, whichever is more frequent. The sample is to be taken as the resin flows out of the stripper and identified by resin type and grade and the date and time the sample was taken. The corresponding quantity of material processed by each stripper over the time period represented by the sample during the eight hour period, is to be recorded and identified by resin type and grade and the date and time it represents.

(iii) The quantity of material processed by the stripper is to be determined on a dry solids basis and by a method submitted to and approved by the Administrator.

(iv) At the prior request of the Administrator, the owner or operator shall provide duplicates of the samples required in paragraphs (c)(2)(i) and (c)(2)(ii) of this section.

(v) The report to the Administrator by the owner or operator is to include the vinyl chloride content found in each sample required by paragraphs (c)(2)(i) and (c)(2)(ii) of this section, averaged separately for each type of resin, over each calendar day and weighted according to the quantity of each grade of resin processed by the stripper(s) that calendar day, according to the following equation:

$$A_{T_i}=\frac{\sum_{j=1}^{n} P_{G_j} M_{G_j}}{Q_{T_i}}=\frac{P_{G_1} M_{G_1}+P_{G_2} M_{G_2}+\cdots+P_{G_n} M_{G_n}}{Q_{T_i}}$$

where:

A = 24-hour average concentration of type T_i resin in ppm (dry weight basis).

Q = Total production of type T_i resin over the 24-hour period, in kg.

T_i = Type of resin; $i=1,2 \ldots m$ where m is total number of resin types produced during the 24-hour period.

M = Concentration of vinyl chloride in one sample of grade G_i resin, in ppm.

P = Production of grade G_i resin represented by the sample, in kg.

G_i = Grade of resin; e.g., G_1, G_2, and G_3.

n = Total number of grades of resin produced during the 24-hour period.

[42 FR 29005, June 7, 1977]

(vi) The owner or operator shall retain at the source and make available for inspection by the Administrator for a minimum of 2 years records of all data needed to furnish the information required by paragraph (c)(2)(v) of this section: The records are to contain the following information:

(A) The vinyl chloride content found in all the samples required in paragraphs (c)(2)(i) and (c)(2)(ii) of this section, identified by the resin type and grade and the time and date of the sample, and

(B) The corresponding quantity of polyvinyl chloride resin processed by the stripper(s), identified by the resin type and grade and the time and date it represents.

(3) The owner or operator shall include in the report a record of the emissions from each reactor opening for which an emission limit is prescribed in § 61.64(a)(2). Emissions are to be determined in accordance with § 61.67(g)(5), except that emissions for each reactor are to be determined. For a reactor that is also used as a stripper, the determination may be made immediately following the stripping operation.

§ 61.71 Recordkeeping.

(a) The owner or operator of any source to which this subpart applies shall retain the following information at the source and make it available for inspection by the Administrator for a minimum of two years:

(1) A record of the leaks detected by the vinyl chloride monitoring system, as required by § 61.65(b)(8), including the concentrations of vinyl chloride as measured, analyzed, and recorded by the vinyl chloride detector, the location of each measurement and the date and approximate time of each measurement.

(2) A record of the leaks detected during routine monitoring with the portable hydrocarbon detector and the action taken to repair the leaks, as required by § 61.65(b)(8), including a brief statement explaining the location and cause of each leak detected with the portable hydrocarbon detector, the date and time of the leak, and any action taken to eliminate that leak.

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(3) A record of emissions measured in accordance with § 61.68.

[42 FR 29005, June 7, 1977]

(4) A daily operating record for each polyvinyl chloride reactor, including pressures and temperatures.

[42 FR 29005, June 7, 1977]

[Sec. 61.71(a)(4)]

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 61]

[FRL 728-5]

VINYL CHLORIDE

National Emission Standards for Hazardous Air Pollutants

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The proposed amendments are being made to the vinyl chloride standard which has promulgated October 21, 1976, and would apply to new and existing ethylene dichloride, vinyl chloride, and polyvinyl chloride plants. The standard and the proposed amendments implement the Clean Air Act and are based on the Administrator's determination that vinyl chloride is a hazardous air pollutant. The intended effect of the proposed amendments is to require improved effectiveness of control technology at existing plants, impose more stringent emission limits on new sources, and prohibit an emission increase within the vicinity of an existing source due to the construction of a new source.

DATES: Comments must be received on or before August 1, 1977.

ADDRESSES: Comments should be submitted (preferably in triplicate) to the Emission Standards and Engineering Division, Environmental Protection Agency, Research Triangle Park, North Carolina, Attention: Mr. Don R. Goodwin.

All public comments received may be inspected and copied at the Public Information Reference Unit (EPA Library), Room 2922, 401 M Street, SW., Washington, D.C.

FOR FURTHER INFORMATION CONTACT:

Don R. Goodwin, Emission Standards and Engineering Division, Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Telephone No. 919-688-8146, ext. 271.

SUPPLEMENTARY INFORMATION:

Background

On October 21, 1976, EPA promulgated a standard for vinyl chloride under the authority of section 112(b)(1)(B) of the Clean Air Act, as amended (41 FR 46561). The standard applies to ethylene dichloride, vinyl chloride, and polyvinyl chloride plants.

On November 19, 1976, the Environmental Defense Fund (EDF) petitioned the United States Court of Appeals for the District of Columbia Circuit to review the standard. Motions to intervene were subsequently filed on behalf of the Society of the Plastics Industry, Inc., the Goodyear Tire and Rubber Company and Air Products and Chemicals, Inc., and were granted by order of the Court on January 18, 1977. On March 24, 1977, EDF and EPA moved to dismiss the proceedings in view of a settlement agreement requiring EPA to take certain additional actions. These include a restatement of EPA's policy for regulating carcinogens under section 112 of the Clean Air Act; the proposal of amendments which would require increased efficiency of existing control equipment, require more stringent control at new sources, and prohibit increases in emissions within the vicinity of an existing source due to new construction; and the initiation of a review of the vinyl chloride standard three years after the promulgation of the amendments.

Zero Emission Goal

The vinyl chloride standard has been criticized for allegedly placing unwarranted emphasis on technological rather than health considerations. Although EPA disagrees with this criticism, it seems appropriate to restate EPA's approach to the regulation of carcinogens in general and under Section 112 of the Clean Air Act, and to explain how the vinyl chloride standard and the proposed amendments are consistent with this approach and with the protection of public health.

On May 25, 1976, EPA published interim procedures and guidelines for health risk and economic impact assessments of suspected carcinogens (41 FR 21402), which define EPA's approach to regulatory action for suspect carcinogens. As indicated in that publication, there are two steps involved in the decision-making process with regard to the regulation of a potential carcinogen. Although different EPA statutory authorities impose different requirements, in general two decisions must be made with regard to each potential carcinogen. The first decision is whether a particular substance constitutes a cancer risk. The second decision is what regulatory action, if any, should be taken to reduce that risk.

In deciding whether a cancer risk exists, EPA will consider a substance a presumptive cancer risk when it causes a statistically significant excess incidence of benign or malignant tumors in humans or animals. In the case of vinyl chloride, EPA evaluated all available data and concluded that a cancer risk exists. In deciding how and whether to regulate, EPA examined section 112 of the Clean Air Act. Section 112 of the Act requires that emission standards be set "at the level which in the judgment of the Administrator provides an ample margin of safety to protect the public health from such hazardous air pollutants." This requirement appears to assume that each pollutant regulated will have a threshold level of effects below which no health effects will occur. As explained in the documentation for the current standard (40 FR 59532, December 24, 1975; 41 FR 46560, October 21, 1976), it has not been possible to determine if there is a threshold level of effects for vinyl chloride and it is not certain that such a threshold may be determined in the near future. In the absence of strong evidence to the contrary, then, the only level of vinyl chloride which would appear to be absolutely protective of health is zero, which may be achievable only by banning vinyl chloride emissions completely. That, in turn, would require closing the entire industry. As explained in the earlier rulemaking it is not clear that Congress would have intended this result, so instead EPA required the lowest level achievable using technological means. (See 40 FR 59534 and 41 FR 46562).

In order to insure that the standard continues to approach the only level of emissions which is known to be absolutely protective of health, namely zero emissions, EPA is proposing amendments which require more efficient use of existing control technology at existing plants and more effective controls at new plants, and which encourage technology to reach this goal without banning vinyl chloride.

More Stringent Standards for Existing Sources

EPA is proposing amendments which would require sources presently subject to a 10 ppm emission limit to reduce emissions to 5 ppm within three years of promulgation of the amendments. The affected sources include ethylene dichloride purification; vinyl chloride formation and purification; reactors, strippers; mixing, weighing, and holding containers; monomer recovery systems; and fugitive emissions which have been captured in accordance with the existing regulation.* If the owner or operator of a source believed that a control system would not be capable of meeting the 5 ppm limit, he would be able to request that the Administrator approve an interim emission limit for that source. Such requests would have to be made one year before the compliance date. In requesting an interim emission limit, the owner or operator would have to submit supportive data and meet with EPA to discuss his particular problems in attaining compliance. The meeting would be announced in the FEDERAL REGISTER and any interested party would be allowed to attend and submit written or oral comments. If an interim emission limit were granted to the source, the required emission level would be specified in a written notification from EPA and in the FEDERAL REGISTER. Each source granted an interim emission limit would be reviewed every three years to determine whether emissions could be reduced to 5 ppm, or at least to a lower interim emission limit.

In proposing the reduction from 10 to 5 ppm, it is not EPA's intent that a control system which has been installed to

*As an explanatory note, paragraph (b) of § 61.65 contains nine fugitive emission regulations. For several of these, the fugitive emissions are required to be captured and conducted to a control device meeting 10 ppm. According to the proposed amendments, the emissions from this control device would have to be reduced to 5 ppm in the same way any other source currently required to meet 10 ppm would have to do. Rather than incorporating both the 5 and 10 ppm emission limits in each paragraph in § 61.65(b), a separate paragraph (c) containing these emission limits is being added to § 61.65. All the other paragraphs in (b) are cross-referenced in paragraph (c).

meet the 10 ppm emission limit be removed and replaced with another more efficient control system or that a second control system be added behind the first control system. The purpose of the proposed amendment is to force owners and operators to maximize the effectiveness of existing control systems.

More Stringent Standards for New Sources

The proposed amendments would also require more stringent controls for new sources; i.e., sources for which construction is commenced after the date of proposal of these amendments. According to § 61.02 of the General Provisions, "commenced" means that an owner or operator has undertaken a continuous program of construction or modification or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.

New sources of types which would be subject to the 10 ppm emission limit under the current standard would be required under the amendments to meet a 5 ppm emission limit at the time of startup. With new sources there would be no provision allowing requests for EPA approval of an interim emission limit. New sources would be required to meet the more stringent emission limit at the time of startup, because they have an opportunity to design their equipment to meet the 5 ppm emission limit at the time construction is commenced. Existing sources, on the other hand, require time to maximize the effectiveness of their control systems.

The proposed amendment would also require ethylene dichloride-vinyl chloride plants to control emissions from new oxychlorination reactors to 5 ppm. This requirement is based on installation of a recycling and oxygen feed system with an incinerator or equivalent control device. The current standard limits emissions from the oxychlorination reactor to 0.2 g/kg (0.0002 lb/lb) of the 100 percent ethylene dichloride product from the oxychlorination reactor. This emission limit can be met by changing process parameters, rather than installing a control device. During the development of the current standard EPA considered requiring existing sources to control emissions with an incinerator or equivalent technology, but rejected this approach because a large quantity of fuel would be required to reduce emissions from a relatively small source. An existing oxychlorination reactor typically has a large volume, low hydrocarbon effluent gas stream, and large quantities of supplemental fuels would be required for combustion of its emissions.

A new plant can reduce the volume of its effluent gas stream and make it more concentrated by recycling the gas stream and using oxygen instead of air to feed into the process. (3, 4) the current standard was not based on this technology because it was not considered feasible to retrofit existing plants so that they could use oxygen instead of air. The recycling and oxygen feed methodology is considered feasible for new oxychlorination reactors because it can be incorporated at the time of construction. Since the use of this technology would eliminate the supplemental fuel problem referred to above, it is EPA's judgment that new oxychlorination reactors should be controlled to the same extent that is proposed for other emission sources.

The proposed amendment also includes a more stringent emission limit for new polyvinyl chloride resins being processed in equipment following the stripping operation. That is, the amendment would apply to resins for which production for the purpose of marketing was commenced after the proposal of the amendment. The amendment would require all new resins except new dispersion resins to be stripped to 100 ppm and new dispersion resins to be stripped to 500 ppm. These limits for new products would be one-fourth of the limits contained in the standard for existing products. Consistent with the current standard, the amendment would permit the use of control devices rather than stripping technology to meet the emission limit. In this case equipment being used to process all new resins except new dispersion resins would have to be controlled to 0.01 kg/kg product and the equipment used for new dispersion resins would have to be controlled to 0.05 kg/kg product.

A "new source" is defined in 40 CFR 61.02 as a stationary source, the construction or modification of which is commenced after proposal of a standard. There was some question based on this definition as to whether the amendment to the stripping standard for new sources should apply to new polyvinyl chloride resins or the installation of new equipment following the stripper. If the applicability of the amendment for new sources were based on the installation of new equipment following the stripper, it would be difficult to determine what constitutes a new source at an existing plant. This is based on the reasoning that the stripping standard requires that all equipment following the stripper in the process be controlled as a unit. The series of equipment following the stripper includes pumps and conveying equipment which might be expected to be replaced on a frequent and routine basis. Replacing one of these pieces of equipment would in effect cause the whole series of equipment following the stripper to have to meet the standard for new sources. In other words, all resins processed in the series of the equipment would have to meet the lower standard even though only a minor part of the equipment had been replaced.

EPA decided that a more reasonable and direct approach was to make the proposed amendment apply to the production of new polyvinyl chloride resins. This is based on the reasoning that emissions from the equipment following the stripper are a function of the amount of vinyl chloride left in the resin after the stripping operation is completed; i.e., the resin is the source of the emissions rather than the equipment. The same equipment can be used to process different resin grades. Variations in the emissions from the equipment are a function of the resin being processed rather than the characteristics of the equipment. The control technology which is used for the equipment following the stripper is likewise more directly linked to the resin than the equipment. Stripping is used to control the emissions due to the vinyl chloride in the resin before the resin is processed in the equipment.

Before the hazards of vinyl chloride became known, stripping technology was employed by polyvinyl chloride manufacturers to recover raw materials for economic purposes. As a result of a standard promulgated by the Occupational Safety and Health Administration (39 FR 35890), some companies investigated improvements in stripping methodology for emission control purposes. (1)

Optimum stripping consists of a set of operating conditions which must be developed experimentally on an individual basis for the many resins. In developing the current standard, EPA recognized that stripping technology for dispersion resins had not been refined to the same extent as it had been for other resins and that there was more difficulty in stripping dispersion resins than other resins. For this reason a less stringent emission limit was established for dispersion resins. Dispersion resins are permitted a higher emission limit under the proposed amendment for the same reason.

EPA believes that for some resins, companies have already developed stripping technology which would meet the proposed amendment. (2) For other resins, the proposed standard would require additional improvement in stripping technology. If stripping technology has not been developed to the extent necessary to meet the proposed amendment for a particular resin, the manufacturer would have the option of developing the technology or not producing the resin.

The current standard, unlike the proposed amendment, was not based on the premise that an owner or operator would have the option of not producing a particular resin. It is EPA's judgment that the owner or operator making a new product has more freedom of choice than the owner or operator already making a particular product in selecting those resins which are to be produced. EPA's standard would be included in the variables under consideration when decisions are being made as to which resins are to be produced.

The proposed amendment would apply to any new source, whether it constituted replacement of an existing source in an existing plant, the expansion of an existing plant, or part of an entirely new plant. That is, if a new oxychlorination reactor or a new polyvinyl chloride reactor were installed at an existing plant, it would be subject to the emission limits for new sources. This means that as existing sources are gradually replaced with new sources in an existing plant,

the overall emission level from that existing plant would be reduced.

Emission Offset

Because the present vinyl chloride standard focuses on reducing emissions rather than attaining a particular ambient air quality concentration, there is no provision for limiting the size of plants or the clustering of plants in a geographical area. The doubling of the size of an existing plant or the construction of a new plant beside an existing plant would considerably increase the ambient air concentrations of vinyl chloride in the vicinity of the plant(s) even if the vinyl chloride standard was met. EPA determined at the time of promulgation of the current standard that the costs of prohibiting the production of vinyl chloride and polyvinyl chloride were too high and the continued operation of existing plants should be allowed. EPA believes, however, that the standard should include a mechanism for prohibiting an increase in ambient concentrations of vinyl chloride due to new construction in areas where existing sources are already located.

Accordingly, EPA is proposing an amendment which would prohibit an increase in emissions within 8 kilometers (km) (approximately five miles) of an existing source due to the construction of a new emission source. This means that if a new source were added to an existing plant, the increase in emissions due to that new source would have to be offset by a reduction in emissions from other existing sources within that plant or at other plants within 8 km of the construction site of the new source. Similarly, a new plant could not be constructed within 8 km of an existing plant(s) unless the emission increase due to the new plant were offset by an emission reduction at the existing plant or plants. This provision may result in few existing plants being expanded and few new plants being constructed in the vicinity of existing plants. However, the proposed amendment does not preclude this possibility.

The offset provision would apply only to new construction which results in an increase in production rate. Replacing or adding equipment such as pumps, compressors, agitators, sampling equipment and unloading hoses is a routine practice at existing plants. Additions of equipment of this nature would, in and of itself, be expected to result in little, if any, increase in emissions. In EPA's judgment, a plant should not be required to prove this fact each time one of these pieces of equipment is added. The addition of this type of equipment in conjunction with major process equipment, however, is likely to result in both an increase in emissions as well as an increase in production rate, and is therefore covered by the offset provision.

If the offset provision were adopted, the reduction in emissions could be achieved in the production rate of an existing source or sources. The baseline emission rate would be determined based on the maximum production rate which had been attained by each existing source. The allowable emission rate for each source would be based on the maximum production rate at which that source would be operated in the future.

Also, if the emissions from an existing source were already below the emission limit applicable to it, the proposed amendment would give the source credit for the difference between the emission limit and the actual emission level. That is the baseline emission rate would be based on the standard rather than on an emission test. It is EPA's judgment that this is a more equitable approach than penalizing a source which has already taken measures to reduce emissions below the standard. Such a source would have less room for further reducing emissions.

The emission limits applicable to both the existing and new sources involved in the offset arrangement would be contained in the approval of new construction granted by the Administrator under 40 CFR 61.08.

EPA believes that a policy of no net increase in emissions due to new construction is justified because of the hazardous nature of vinyl chloride. However, EPA recognizes the potential difficulties in implementing such a policy and interested persons are urged to submit comments and factual information relating to this policy.

Review of Standard

EPA plans to undertake a full-scale review of Subpart F of 40 CFR Part 61 beginning three years from the promulgation of any amendments. In the study EPA will review information concerning technological advances in the control of vinyl chloride emissions to determine what further changes might then be appropriate to move toward the goal of zero vinyl chloride emissions. EPA will also consider recent health data to determine whether the approach for regulating vinyl chloride should be altered.

Environmental Impact

The proposed amendment, in contrast to the current standard, would encourage the development of new technology and improvements in existing technology and would have the following three positive environmental impacts: (1) further reduction of emissions at existing plants, (2) no increase in emissions within 8 km of an existing source, and (3) lower emissions from new sources than would be accomplished through the current standard regardless of the construction site. These environmental impacts would provide progress toward the ultimate goal of zero emissions without banning vinyl chloride, and in the process would provide additional protection of public health by further minimizing the health risks to the people living in the vicinity of existing plants and to any additional people who are exposed as a result of new construction.

Specifically, for those existing sources which are currently subject to a 10 ppm emission limit, emissions would be reduced by half within three years after the promulgation date of these amendments. At both an existing average-sized ethylene dichloride-vinyl chloride plant and an existing average-sized polyvinyl chloride plant, which contain other sources than the ones required to meet a 5 ppm emission limit, it is estimated this will have the effect of reducing total emissions by less than one percent. Emissions at existing plants would be further reduced as existing oxychlorination reactors are replaced with new oxychlorination reactors and as new polyvinyl chloride resins are preduced to replace existing ones.

Under the proposed amendment, emissions from new plants would be considerably lower than they would be under the current standard. For a typical new average-sized ethylene dichloride-vinyl chloride plant (318×10^6 kg/yr or 700×10^6 lb/yr produced), the hourly emissions would be 5.1 kg (11.5 lb) instead of 10.3 kg (23.1 lb). For a typical new average-sized dispersion polyvinyl chloride plant (45×10^6 kg/yr or 100×10^6 lb/yr production), the emissions would be about 9 kg/hr (20 lb/hr) instead of 17.5 kg/hr (39 lb/hr) and for a typical new average-sized suspension polyvinyl chloride (68×10^6 kg/yr or 150×10^6 lb/yr production) the emissions would be 13.5 kg/hr (30 lb/hr) instead of 16 kg/hr (36 lb/hr). These emissions are calculated based on the emission factors published in the documentation for the existing standard. (1) Ambient air concentrations are expected to be reduced proportionately.

The only negative environmental impact would be an increase in hydrogen chloride emissions at ethylene dichloride-vinyl chloride plants if incineration were used to control emissions from new oxychlorination reactors. However, due to the corrosion problems which would otherwise occur on plant property and in the community, plants are expected to use scrubbers to control the hydrogen chloride emissions. The proposed amendment is not expected to have a significant impact on energy consumption.

Economic Impact

The potential economic impacts of the proposed standard are:

(1) Costs for research and development of improved methodology for operation of existing control technology so that it can be used to meet the 5 ppm emission limit.

(2) Costs for research and development of improved stripping techniques to meet the standard for new polyvinyl chloride resins.

(3) Cost of research and development or licensing for converting over to the oxygen system for a new oxychlorination reactor.

(4) Possibly increased transportation costs of raw materials in the case that the offset policy results in the construction of a new plant farther from an existing plant than it otherwise would have been.

(5) Costs of building a new plant more than 8 km from an existing plant in the event that the offset requirement precluded the expansion of an existing plant.

(6) Delay in the production of a particular resin due to time spent developing stripping technology for that resin.

(7) No growth in the production of a particular resin due to the inability to strip that resin to required levels.

The types of costs which have been named would be difficult to quantify. The costs would be expected to vary considerably from one plant to another depending on the amount of research and development than had already been done, the extent to which technology could be transferred from other plants and processes, and the plans for new construction.

One area in which cost estimates can be generated is the use of an oxygen-recycle oxychlorination process as opposed to an air-based system. The proposed amendment does not require the use of the oxygen-recycle system, but many plants would be expected to employ this system to avoid the high costs of incinerating the high volume gas stream from a typical air-based system. The primary cost of using the oxygen-recycle system is the cost of the oxygen itself. The cost of the oxygen for a particular plant would depend on whether the plant was located where there is a considerable demand for both the oxygen and nitrogen products of air separation. According to one recent article, if it is assumed that such a demand exists, the cost of the oxygen ($14.34/ton) would be approximately equivalent to the cost of compressing air for use in the air-based system. (1) Another report in which this assumption was not made and the economics of the air and oxygen systems were being compared, it was concluded that overall production economics "favor the oxygen process even if vent gas incineration would not be required for an air-based plant since the sum of all remaining advantages offered by oxygen-based plant operation more than outweighs the incremental cost for the oxygen feed." (2)

Miscellaneous: The Administrator invites comments on all aspects of the proposed amendments.

(Section 112 of the Clean Air Act, sec. 4(a) of Pub. L. 91-604, 84 Stat. 1685 (42 U.S.C. 1857c-7) and section 301(a) of the Clean Air Act, sec. 2 of Pub. L. No. 90-148, 84 Stat. 504 as amended by sec. (15)(c)(2) of Pub. L. 91-604, 84 Stat. 1713 (42 U.S.C. 1857 g(a)). Secs. 61.67 and 61.68 also proposed under the authority of section 114 of the Clean Air Act, as added by sec. 4(a) of Pub. L. 91-604, 84 Stat. 1687 and amended by Pub. L. 93-319, sec. 6(a)(4), 88 Stat. 259 (42 U.S.C. 1857c-9).)

NOTE.—The Environmental Protection Agency has determined that this document does not contain a major proposal requiring preparation of an Economic Impact Analysis under Executive Orders 11821 and 11949 and OMB Circular A-107.

Dated: May 27, 1977.

DOUGLAS M. COSTLE,
Administrator.

REFERENCES

(1) *Standard Support and Environmental Impact Statement: Emission Standard for Vinyl Chloride*, EPA-450 12-75-009, October, 1975.

(2) "Goodrich Reports Impressive Progress in Solving Vinyl Chloride Problem," *American Paint and Coatings Journal*, Vol. 60, No. 31, January 12, 1976, p. 24.

(3) E. W. Wimer and R. E. Feathers, "Oxygen Gives Low Cost VCM," *Hydrocarbon Processing*, March 1976, pp. 81-84.

(4) Peter Reich, "Air or Oxygen For VCM?," *Hydrocarbon Processing*, March, 1976, pp. 85-89.

It is proposed that Subpart F of 40 CFR Part 61 be amended as follows:

1. In § 61.08, paragraph (b) is revised to read as follows:

§ 61.08 Approval by the Administrator.

* * * * *

(b) If the Administrator determines that a stationary source for which an application pursuant to § 61.07 was submitted will not, if properly operated, cause emissions in violation of the standard or violation of § 61.73, he will approve the construction or modification of such source.

* * * * * *

2. Section 61.62 is revised to read as follows:

§ 61.62 Emission standard for ethylene dichloride plants.

An owner or operator of an ethylene dichloride plant shall comply with the requirements of this section and § 61.65.

(a) Ethylene dichloride purification: Except as provided in § 61.65(a), the concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from any equipment used in ethylene dichloride purification is not to exceed the appropriate emission limit as follows:

(1) Each source for which construction had commenced on or before (date of proposal of these amendments), 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after the promulgation of these amendments).

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(b) Oxychlorination reactor: Except as provided in § 61.65(a), emissions of vinyl chloride to the atmosphere are not to exceed the appropriate emission limit as follows:

(1) Each source for which construction had commenced on or before (date of proposal of these amendments), 0.2 g/kg (0.0002 lb/lb of the 100 percent ethylene dichloride product from the oxychlorination reactor.

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(c) The requirements of this section do not apply to equipment that has been opened, is out of operation and met the requirement in § 61.65(b)(6)(i) before being opened.

3. Section 61.63 is revised to read as follows:

§ 61.63 Emission standard for vinyl chloride plants.

An owner or operator of a vinyl chloride plant shall comply with the requirements of this section and § 61.65.

(a) Vinyl chloride formation and purification: Except as provided in § 61.65(a), the concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from any equipment used in vinyl chloride formation and/or purification is not to exceed the appropriate emission limit as follows:

(1) Each source, for which construction had commenced on or before June 2, 1977, 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after promulgation of these amendments).

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(b) The requirements of this section do not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

4. Section 61.64 is amended by revising paragraphs (a)(1), (b), (c), (d) and (e) and by adding paragraph (f) as follows:

§ 61.64 Emission standard for polyvinyl chloride plants.

An owner or operator of a polyvinyl chloride plant shall comply with the requirements of this section and § 61.65.

(a) Reactor: The following requirements apply to reactors:

(1) Except as provided in paragraph (a)(2) of this section and § 61.65(a), the concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each reactor is not to exceed the appropriate emission limit as follows:

(i) Each source for which construction had commenced on or before June 2, 1977 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after promulgation of these amendments).

(ii) Each source for which construction commenced after June 2, 1977, 5 ppm.

* * * * * *

(b) Stripper: Except as provided in § 61.65(a), the concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each stripper is not to exceed the appropriate emission limit as follows:

(1) Each source for which construction had commenced on or before June 2, 1977 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after final promulgation of these amendments).

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(c) Mixing, weighting, and holding containers: Except as provided in § 61.65(a), the concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each mixing, weighing, or holding container in vinyl chloride service which precedes the stripper (or the reactor if the plant has no stripper) in the plant process flow is not to exceed the appropriate emission limit as follows:

(1) Each source, for which construction had commenced on or before (date

of proposal of these amendments), 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after promulgation of these amendments).

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(d) Monomer recovery system. Except as provided in § 61.63(a), the concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from each monomer recovery system is not to exceed the appropriate concentration as follows:

(1) Each source for which construction had commenced on or before (date of proposal of these amendments), 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after promulgation of these amendments).

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(e) Sources following the stripper(s): The following requirements apply to emissions of vinyl chloride to the atmosphere from the combination of all sources following the stripper(s) [or the reactor(s) if the plant has no stripper] in the plant process flow including, but not limited, to centrifuges, concentrators, blend tanks, filters, dryers, conveyor air discharges, baggers, storage containers, and inprocess wastewater.

(1) In polyvinyl chloride plants using stripping technology to control vinyl chloride emissions:

(i) For a grade or grades of polyvinyl chloride resin which have been produced by the plant on or before June 2, 1977, the weighted average residual vinyl chloride concentration in all the grades processed through the stripping operation on each calendar day, measured immediately after the stripping operation is completed, may not exceed the appropriate emission limit as follows:

(A) 2,000 ppm for polyvinyl chloride dispersion resins, excluding latex resins;

(B) 400 ppm for all other polyvinyl chloride resins, including latex resins, averaged separately for each type of resin;

(ii) For a grade or grades of polyvinyl chloride resin which have not been produced by the plant on or before June 2, 1977, the weighted average residual vinyl chloride concentration in all the grades processed through the stripping operation on each calendar day, measured immediately after the stripping operation is completed, may not exceed the appropriate emission limit as follows:

(A) 500 ppm for polyvinyl chloride dispersion resins, excluding latex resins;

(B) 100 ppm for all other polyvinyl chloride resins, including latex resins, averaged separately for each type of resin; or

(2) In polyvinyl chloride plants controlling vinyl chloride emissions with technology other than stripping or in addition to stripping:

(i) For sources being used to process a grade or grades of polyvinyl chloride resin all of which had been produced by the plant on or before June 2, 1977:

(A) 2 g/kg (0.003 lb/lb) product from the stripper(s) [or reactor(s) if the plant has no stripper(s)] for dispersion polyvinyl chloride resins, excluding latex resins, with the product determined on a dry solids basis;

(B) 0.4 g/kg (0.004 lb/lb) product from the stripper(s) (or reactor(s) if the plant has no stripper(s)) for all other polyvinyl chloride resins, including latex resins, with the product determined on a dry solids basis.

(ii) For sources being used to process any grade of polyvinyl chloride resin not produced by the plant on or before June 2, 1977:

(A) 0.5 g/kg (0.0005 lb/lb) product from the stripper(s) (or reactor(s) if the plant has no stripper(s)) for dispersion polyvinyl chloride resins, excluding latex resins, with the product determined on a dry solids basis;

(B) 0.1 g/kg. (0.0001 lb/lb) product from the strippers (or reactor(s) if the plant has no stripper(s)) for all other polyvinyl chloride resins, including latex resins, with the product determined on a dry solids basis.

(f) The requirements of paragraphs (b), (c), and (d) of this section do not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(6)(i) before being opened.

5. Section 61.65 is amended as follows:

A. By replacing the phrase "10 ppm" with the phrase "the appropriate emission limit specified in § 61.65(c)" in paragraphs (b)(1)(ii), (b)(2), (b)(3)(i), (b)(3)(ii), (b)(3)(iii), (b)(3)(iv), (b)(3)(v), (b)(5), (b)(6)(ii), and (b)(6)(iii).

B. By revising paragraph (c) and adding paragraph (d) as set forth below.

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride, and polyvinyl chloride plants.

(c) The emission limit which is not to be exceeded is as follows: (1) Each source, for which construction had commenced on or before June 2, 1977, 10 ppm until (date three years after promulgation of these amendments) and 5 ppm after (date three years after promulgation of these amendments).

(2) Each source for which construction commenced after June 2, 1977, 5 ppm.

(d) The requirements in paragraphs (b)(1), (b)(2), (b)(5), (b)(6), (b)(7) and (b)(8) of this section are to be incorporated into a standard operating procedure, and made available upon request for inspection by the Administrator. The standard operating procedure is to include provisions for measuring the vinyl chloride in equipment ≥4.75 m³ (1250 gal) in volume for which an emission limit is prescribed in § 61.65(b)(6)(i) prior to opening the equipment and using Test Method 106, a portable hydrocarbon detector, or an equivalent or alternative method. The method of measurement is to meet the requirements in § 61.67(g)(5)(i)(A) or (g)(5)(i)(B).

6. In § 61.67, paragraph (a) is revised to read as follows:

§ 61.67 Emission tests.

(a) Unless a waiver of emission testing is obtained under § 61.13, the owner or operator of a source to which this subpart applies shall test emissions from the source as follows:

(1) For an existing source or a new source which has an initial startup date preceding October 21, 1976:

(i) Within 90 days following October 21, 1976, and

(ii) For those sources subject to §§ 61.62(a); 61.63(a); 61.64 (a)(1), (b), (c), and (d); and/or 61.65(b)(1), (b)(2), (b)(3), (b)(5), (b)(6), and/or (b)(9), within 90 days following (date three years after the promulgation date of these amendments).

(2) For a new source for which initial startup occurs after October 21, 1976, within 90 days of startup.

. . . . . .

7. In § 61.68, paragraph (c) is revised to read as follows:

§ 61.68 Emission monitoring.

. . . . . .

(c) A daily span check is to be conducted for each vinyl chloride monitoring system used. For all of the sources listed in paragraph (a) of this section, except for the one for which an emission limit is prescribed in § 61.62(b)(1), the daily span check is to be conducted with a concentration of vinyl chloride equal to the concentration emission limit applicable to it. For a source subject to the emission limit prescribed in § 61.62(b)(1), the daily span check is to be conducted with a concentration of vinyl chloride which is determined to be equivalent to the emission limit for that source based on the emission test required by § 61.67. The calibration is to be done with either:

. . . . . .

8. A new § 61.72 is added to read as follows:

§ 61.72 Request for interim emission limit.

(a) If in the opinion of the owner or operator of an existing source, that source will be unable to comply with the 5 ppm emission limit in §§ 61.62(a)(1); 61.63(a)(1); 61.64 (a)(1)(i), (b)(1), (c)(1), (d)(1); and/or 61.65(c)(1) on or before (date three years after promulgation of these amendments), the owner or operator of that source may request that the Administrator approve an interim emission limit for that source. The request is to be in writing and is to be submitted to the Administrator within six months prior to (date two years after promulgation of these amendments). The request is to include:

(1) The reasons the source is incapable of being in compliance with the 5 ppm emission limit and data to support those reasons, and

(2) A suggested interim emission limit and description of the methodology for attaining that limit.

(b) Any owner or operator of a source who has submitted to the Administrator a written request for an interim emission limit in accordance with § 61.72(a), shall within 60 days of the date of the written request meet with the Administrator concerning the information contained in the request. The meeting is to be open to interested persons, who are to be allowed to submit oral or written testimony relevant to compliance of the source.

(c) The Administrator will within 120 days of receipt of the written request required by paragraph (a) of this section, notify the owner or operator in writing of approval or denial of approval of an interim emission limit.

(d) If an interim emission limit is approved the notification is to include the level of the interim emission limit, which may be the level requested or a more stringent one.

(e) A determination to deny approval of an interim emission limit is to set forth the specific grounds on which such denial is based.

(f) Approval for any interim emission limit granted for any source under § 61.72(c) shall expire three years from the date of issuance. The owner or operator may request an extension of approval for an interim emission limit or a lower interim emission limit. The request is to be in writing, is to be submitted within six months prior to a year before the expiration date and is to include the information listed in § 61.72 (b), (c), (d), and (e) are to apply.

9. A new § 61.73 is added to read as follows:

§ 61.73 Offset of emissions due to new construction.

(a) No owner or operator is to construct a new source which alone or in combination with other sources being constructed at the same time results in an increased production rate unless he demonstrates to the Administrator's satisfaction that such construction will not cause an increase in vinyl chloride emissions within 8 km of any other source which is subject to this subpart.

(b) Reduction in production rate is an allowable mechanism for attaining an offset in emissions.

(c) The baseline emission rate is to be determined based on the level of emissions allowable by the standard.

(d) Reducing emissions from an interim emission limit to the standard for a source is not an acceptable means of achieving an emission offset.

(e) In the application for approval of construction required by § 61.07, owners or operators of sources subject to this subpart shall include, in addition to the information required by § 61.07, the following information:

(1) The name, address, and location of any plant subject to this subpart which is located within 8 km of the proposed location of the source to be constructed.

(f) The emission limits applicable to both the new source(s) and the source(s) at which emissions are being reduced to balance the increase in emissions due to the new construction are to be established by the Administrator in the approval for construction required by § 61.08.

(Secs. 112 and 301(a) of the Clean Air Act, sec. 4(a) of Pub. L. No. 91-604, 84 Stat. 1683; sec. 2 of Pub. L. No. 90-148, 81 Stat. 504 (42 U.S.C. 1855c-7, 1857g(a)). Secs. 61.67 and 61.68 also issued under sec. 114 of the Clean Air Act, sec 4(a) of Pub. L. No. 91-604, 84 Stat. 1687 (42 U.S.C. 1857c-9).)

[FR Doc.77-15572 Filed 6-1-77;8:45 am]

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Office of Education

[45 CFR Parts 163 and 163a]

CAREER EDUCATION AND CAREER DEVELOPMENT

Addition of Programs

AGENCY: Office of Education, HEW.

ACTION: Proposed rule.

SUMMARY: The Commissioner of Education, with the approval of the Secretary of Health, Education, and Welfare, proposes to add two new career education programs as enacted by the Education Amendments of 1976. Part 163 contains provisions for a new one-year program of financial assistance to States and other allottees for Fiscal Year 1978 to plan for the improvement and development of career education and career development programs and activities for individuals of all ages. Part 163a contains provisions for the Commissioner of Education to conduct a number of career information activities during Fiscal Year 1978, including the collection, analysis, and dissemination of information pertaining to career trends and options in the United States as well as exemplary materials from the career education field. Both these programs are new authorizations for which no funding has been requested by the Administration.

DATES: Comments must be received on or before July 5, 1977.

ADDRESSES: Comments should be addressed to Sidney High, U.S. Office of Education, 7th and D Streets, S.W., Room 3108-A, Washington, D.C. 20202.

FOR FURTHER INFORMATION CONTACT:

Sidney High, 202-245-2331.

SUPPLEMENTARY INFORMATION: (a) *Organization.* Part 163 (sections 331-334 of Pub. L. 94-482), as set forth in this proposed rule, contains those provisions which are applicable to the program of Federal assistance to States and other allottees to enable them to plan for the development of career education and career development programs. The assistance provided under this Part is also subject to the applicable provisions contained in the Office of Education General Provisions Regulations published in 45 CFR Parts 100 and 100b (38 FR 30654, November 6, 1973). Part 163a (section 333 of Pub. L. 94-482) contains those provisions applicable to the program of collection, analysis, and dissemination by the Commissioner of career information and exemplary materials. To the extent the Commissioner proceeds by contract, as authorized by section 335 of Pub. L. 94-482, the program will also be governed by the applicable provisions of the Federal Procurement Regulations, 41 CFR Chapters 1 and 3. To the extent the Commissioner proceeds by grant, the applicable provisions of 45 CFR Part 100a (38 FR 30662, November 6, 1973) will apply.

(b) *Comments and responses.* In the Notice of Intent to Issue Regulations (published in 41 FR 51550 on November 22, 1976) the Commissioner requested public comment on a number of specific issues in addition to inviting expressions of public sentiment on any issue considered worthy of comment. In the thirty days afforded interested persons in which to make their views known, 64 State and national organizations, associations, and agencies and 3 individuals submitted comments. The comments on the specific issues listed in the Notice of Intent are summarized below:

(1) Given the apparent overlap between the planning authorities contained in section 406(f)(2) of Pub. L. 93-380 and sections 331-34 of Pub. L. 94-482, how can the latter program be designed to avoid duplication of the former program? (a) Should planning under sections 331-34 focus on career education for individuals beyond the secondary school level? (b) Should States be required to explain the relationship between activities carried out and proposed under the two authorities?

The commenters were overwhelmingly supportive of the view that duplication of activities conducted under both authorities (Pub. L. 93-380 and Pub. L. 94-482) should be as limited as possible. They clearly thought the regulation should require a careful explanation of the relationship between these two planning efforts. It was suggested that planning activities conducted pursuant to Pub. L. 94-482 might properly extend and augment the planning already begun under Pub. L. 93-380. It was also noted by several commenters that State planning already being conducted under Title I and Title X of the Higher Education Act of 1965 (20 U.S.C. 1001 et seq.) should also be coordinated with planning efforts conducted pursuant to Pub. L. 94-482 because those titles deal with the continuing education of adults and, therefore, are closely related to the concept of career education for individuals of all ages. The proposed § 163.6(b) attempts to avoid duplication by requiring the allottee to explain the relationship between planning activities carried out under Pub. L. 93-380 and proposed under Pub. L. 94-482 in the event that the planning is addressed to the same age groups.

On the related question of priorities between K-12 and postsecondary planning, while the majority of commenters identified the need for cooperation be-

Subpart W—Massachusetts

§ 52.1147 [Amended]

5. In § 52.1147(a)(5), subparagraph (i) is amended by revising the words "an average annual throughput of 5,000,000" to read "a daily throughput of 20,000".

Subpart FF—New Jersey

§ 52.1598 [Amended]

6. In § 52.1598(c)(3), subparagraph (iv) is amended by revising the words "an average annual throughput of 5,000,000" to read "a daily throughput of 20,000".

Subpart NN—Pennsylvania

§ 52.2042 [Amended]

7. In § 52.2042(c)(3), subparagraph (iv) is amended by revising the words "an average annual throughput of 5,000,000" to read "a daily throughput of 20,000".

Subpart SS—Texas

§ 52.2285 [Amended]

8. In § 52.2285(c)(3), subparagraph (iv) is amended by revising the words "an average annual throughput of 5,000,000" to read "a daily throughput of 20,000".

Subpart VV—Virginia

9. In § 52.2438(c), subparagraph (3) is amended by adding (iv), as follows:

§ 52.2438 Gasoline transfer vapor control.

* * * * * * *

(c) * * *

(3) * * *

(iv) Facilities which have a daily throughput of 20,000 gallons of gasoline or less are required to have a vapor recovery system in operation no later than May 31, 1977. Delivery vessels and storage containers served exclusively by facilities required to have a vapor recovery system in operation no later than May 31, 1977, also are required to meet the provisions of this section no later than May 31, 1977.

APPENDIX—GASOLINE VAPOR RECOVERY; SMALL BULK PLANTS; NOTICE OF AVAILABILITY OF STUDIES

This notice announces the availability of and summarizes studies conducted by EPA regarding the availability and applicability of control technology for small bulk plants in connection with Stage I Vapor Recovery regulations promulgated by EPA as discussed below.

EPA initiated several studies in 1976 to determine if the requirement to install gasoline vapor recovery equipment would place severe economic burdens on the industry and whether the 90 percent control level was achievable by a vapor balance system, and to further determine the availability of control equipment which would satisfy the requirements of the existing regulations. Pacific Environmental Services, Inc., of Santa Monica, California, was chosen by EPA to perform these studies.

BACKGROUND

In 1973 and 1974, the Administrator promulgated Stage I Vapor Recovery regulations for 13 Air Quality Control Regions (AQCRs). The AQCRs, FEDERAL REGISTER references, and promulgation dates are listed below:

Metropolitan Los Angeles AQCR, 38 FR 31251, November 12, 1973
Sacramento Valley AQCR, 38 FR 31251, November 12, 1973
San Joaquin Valley Intrastate AQCR, 38 FR 31251, November 12, 1973
Metropolitan Denver Intrastate AQCR, 38 FR 30823, November 7, 1973
Marion County, Indiana, 38 FR 12349, April 5, 1974
Maryland portion of National Capital Interstate AQCR, 38 FR 33719, December 6, 1973
Metropolitan Baltimore Intrastate AQCR, 38 FR 34252, December 12, 1973
Boston Intrastate AQCR, 38 FR 30969, November 8, 1973
New Jersey portion of New Jersey-New York-Connecticut Interstate AQCR, 38 FR 31399, November 13, 1973
New Jersey portion of Metropolitan Philadelphia Interstate AQCR, 38 FR 31399, November 13, 1973
Allegheny County portion of Southwest Pennsylvania Intrastate AQCR, 38 FR 32896, November 28, 1973
Houston-Galveston Intrastate AQCR, 38 FR 30643, November 6, 1973
San Antonio Intrastate AQCR, 38 FR 30643, November 6, 1973
Virginia portion of National Capital Interstate AQCR, 38 FR 33726, December 6, 1973

EXTENT OF THE STUDIES

The first study (EPA contract 68-01-3154, Task No. 5) evaluated the applicability and cost impact of bottom-loading vapor balance systems on small bulk plants. The second study (EPA contract 68-01-3156, Task No. 17) surveyed small bulk plants in and around Denver, San Diego, and the San Joaquin Valley, and included the source testing of two small bulk plants to determine if 90 percent control could be achieved for incoming and outgoing loads through the use of a vapor balance system and a refrigeration-condensation system. A third study (EPA contract 68-01-3156, Task No. 28) surveyed small bulk plants in the Washington, D.C., Baltimore, Md., and Houston/Galveston, Tex., areas to determine whether the descriptive, market and economic data presented in the report of the second study could be adequately applied to other areas of the country, and also to evaluate the methods being employed by bulk plant operators in these areas to comply with vapor recovery regulations. A fourth study (EPA contract 68-01-4140, Task No. 9) provided for the evaluation of the applicability, availability and the financial impact of installing and operating top-loading vapor balance systems at small bulk plants. In addition, Radian Corporation performed a study for EPA (EPA contract No. 68-02-1319, Task No. 2) in 1975 which evaluated vapor control methods for gasoline marketing operations, including small bulk plants.

RESULTS OF THE STUDIES

Among other things, the studies concluded that both refrigeration—condensation and vapor balance type systems are capable of achieving the 90 percent control levels established in the regulations. They further concluded that the equipment and technology for achieving these levels does exist in sufficient supply, and has been satisfactorily applied on gasoline transfer operations for a number of years.

These studies also concluded that certain types of vapor control systems (e.g., a bottom-loading vapor balance system) are more desirable from the viewpoint of the owner and operator because of the more efficient marketing capability that the systems provide. It must be emphasized that there is no requirement in the federal regulations that bottom-loading systems be installed. These bottom-loading systems, because of the additional modifications and equipment required for installation on bulk plants, are consistently much more expensive to install than the alternative top-loading vapor balance system.

The recent EPA studies on small bulk plants reaffirm the earlier conclusion that controls are available at a reasonable cost. Specifically, EPA has determined that the top-loading vapor balance system, which is readily available and the least expensive alternative, will meet the 90 percent control level established in the existing regulations at a reasonable cost. However, due to the Administrator's concern regarding the possible economic impacts of these regulations on the very small bulk plants (less than 4,000 gal/day of gasoline throughout), EPA will continue to study such impacts. EPA will report on its findings at the end of four to six weeks.

For further information or copies of the studies contact: Jared Flood, Regional Programs Section (EN-341), Division of Stationary Source Enforcement, U.S. Environmental Protection Agency, 401 M Street SW., Washington, D.C. 20460.

Dated: May 31, 1977.

DOUGLAS M. COSTLE,
Administrator.

[FR Doc.77-16097 Filed 6-6-77;8:45 am]

[FRL 740-7]

PART 61—NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Standard for Vinyl Chloride; Corrections and Amendments

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: These amendments are being made to the vinyl chloride standard which was promulgated under the authority of the Clean Air Act on October 21, 1976. The standard contains some typographical errors and needs clarification in some parts. These amendments are intended to correct the typographical errors and clarify the standard.

EFFECTIVE DATE: June 7, 1977.

FOR FURTHER INFORMATION CONTACT:

Don R. Goodwin, Emission Standards and Engineering Division, Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone 919-688-8146, ext. 271.

SUPPLEMENTARY INFORMATION: On October 21, 1976, under section 112 of the Clean Air Act, as amended (42 U.S.C. 1857), the Environmental Protection Agency (EPA) promulgated a national emission standard for vinyl chloride (41 FR 46560). The standard covers plants which manufacture ethylene dichloride, vinyl chloride, and/or polyvinyl chloride. Since that time, it has become apparent that a few sections of the standard and Test Methods 106 and 107 are unclear. The purpose of the amendments being made at this time is to clarify these sections and to correct typographical errors. These corrections are in addition to those published on December 3, 1976 (41 FR 53017). The Administrator finds that

good cause exists for omitting prior notice and public comment on these amendments as unnecessary and for making them immediately effective because they simply clarify and correct the existing regulations and impose no additional substantive requirements.

The most significant amendment involves clarification of the requirements for certification of the analysis of gas cylinders which may be used to calibrate testing and monitoring equipment. The standard, as promulgated on October 21, 1976, requires that an analysis of the gas used for calibration purposes, "* * * be traceable to the National Bureau of Standards or to a gravimetrically calibrated permeation tube." Comments were received indicating that the term "traceable" was unclear.

These amendments require that the composition of gas cylinders which may be used for calibration of testing and monitoring equipment be certified by the gas manufacturer. The certified composition must have been determined by direct analysis of the gas contained in each calibration cylinder using an analytical procedure the manufacturer had calibrated on the day the analysis was performed. Calibration of the analytical procedure was to have been done using gases for which the concentrations have been verified: (1) By comparison with a calibrated vinyl chloride permeation tube, (2) by comparison with a gas mixture prepared in acordance with the procedure described in § 7.1 of Test Method 106 and using 99.9 percent vinyl chloride, or (3) by direct analysis by the National Bureau of Standards. These amendments are being made to §§ 61.65(b)(8)(iii) and 61.68(c), which contain the monitoring requirements, and to §§ 5.2 and 6.2 of Test Methods 106 and 107, respectively.

There are several other changes in wording for clarification purposes. For example, § 61.60 is being amended to clarify that the testing, reporting, and recordkeeping requirements apply to research and development equipment subject to §§ 61.64 (a)(1), (b), (c), and (d), and definitions for standard temperature and pressure are being added to § 61.61. The phrase "in vinyl chloride service" is being added to § 61.65(b)(1) to clarify that loading and unloading lines which clearly do not contain vinyl chloride do not have to be continuously tested to demonstrate that fact. Section 61.67(d) is being redesignated as § 61.67(g)(1)(ii) to clarify that conducting a series of three runs is not necessary when Test Method 107 is being used to determine emissions. A change is being made in § 61.67(g)(1)(iii) [which was originally promulgated as § 61.67(g)(1)(ii)] to establish that the concentration emission limits for gas streams are to be determined on a dry basis. Similarly, wording is being added to § 61.70(c)(2)(v) to establish that vinyl chloride concentrations in polyvinyl chloride resin are to be determined on a dry weight basis. An additional change to this same section is being made to clarify that a sample from each batch of resin is to be measured for its vinyl chloride content. Section 61.71(a) is being changed to correct typographical errors and to clarify that daily operating records for polyvinyl chloride reactors are required to be kept whether a relief valve discharges or not.

Section 4.3.2 of Test Method 106 is being revised to allow the option of using Poropak T as the column packing instead of GE SF-96 in a secondary gas chromatographic column if acetaldehyde is present. This packing has also been shown to produce adequate separation of vinyl chloride and acetaldehyde. Section 61.67(e) of the regulation and § 6.2 of Test Method 106 are being amended to include a limit on the amount of time a test sample can be kept before it is analyzed for vinyl chloride. Section 1.2 of Test Method 107 is being amended to clarify that chromatograph parameters can be altered if the precision and reproducibility of analysis of vinyl chloride cylinder standards is not impaired. Section 5.3.2 of Test Method 107 is being amended to allow the use of a pair of Poropak Q columns if methanol or acetaldehyde is present in the sample. Also in Test Method 107 a clarification for the term K_w has been added to § 9.2.

The remaining changes are corrections of typographical errors or are self-explanatory.

These amendments are issued under the authority of section 112 of the Clean Air Act, sec. 4(a) of Pub. L. 91-604, 84 Stat. 1685 (42 U.S.C. 1857c-7) and section 301(a) of the Clean Air Act, sec. 2 of Pub. L. No. 90-148, 81 Stat. 504, as amended by sec. (15)(c)(2) of Pub. L. 91-604, 84 Stat. 1713 (42 U.S.C. 1857g(a)). The amendments to §§ 61.67 and 61.68 are also issued under the authority of section 114 of the Clean Air Act, as added by sec. 4(a) of Pub. L. 91-604, 84 Stat. 1687 and amended by Pub. L. 93-319, sec. 6(a)(4), 88 Stat. 259 (42 U.S.C. 1857c-9).

NOTE: The Environmental Protection Agency has determined that this document does not contain a major proposal requiring preparation of an Economic Impact Analysis under Executive Orders 11821 and 11949 and OMB Circular A-107.

Dated: May 26, 1977.

EDWARD F. TUERK,
Acting Assistant Administrator for Air and Waste Management.

Part 61 of Chapter I, Title 40 of the Code of Federal Regulations is amended as follows:

1. In § 61.60, paragraph (c) is amended as follows:

§ 61.60 Applicability.

* * * * * * *

(c) Sections of this subpart other than §§ 61.61; 61.64 (a)(1), (b), (c), and (d); 61.67; 61.68; 61.69; 61.70; and 61.71 * * *.

2. In § 61.61 paragraphs (t) and (u) are added as follows:

§ 61.61 Definitions.

* * * * * * *

(t) "Standard temperature" means a temperature of 20° C (69° F).

(u) "Standard pressure" means a pressure of 760 mm of Hg (29.92 in. of Hg).

3. Section 61.62 is corrected as follows:

§ 61.62 Emission standard for ethylene dichloride plants.

(a) Ethylene dichloride purification: The concentration of vinyl chloride in all exhaust gases discharged to the atmosphere from any equipment used in ethylene dichloride purification is not to exceed 10 ppm, except as provided in § 61.65(a). This requirement does not apply to equipment that has been opened, is out of operation, and met the requirement in § 61.65(b)(8)(i) before being opened.

(b) Oxychlorination reactor: Except as provided in § 61.65(a), emissions of vinyl chloride to the atmosphere from each oxychlorination reactor are not to exceed 0.2 g/kg (0.0002 lb/lb) of the 100 percent ethylene dichloride product from the oxychlorination process.

4. In § 61.65, paragraphs (b)(1), (b)(8)(iii)(A), and (b)(8)(iii)(B) are amended as follows:

§ 61.65 Emission standard for ethylene dichloride, vinyl chloride and polyvinyl chloride plants.

* * * * * * *

(b) * * *

(1) Loading and unloading lines: Vinyl chloride emissions from loading and unloading lines in vinyl chloride service which are opened to the atmosphere after each loading or unloading operation are to be minimized as follows:

* * * * * * *

(8) * * *

(iii) * * *

(A) A calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.2 of Test Method 106 and in accordance with section 7.1 of Test Method 106, or

(B) A calibration gas cylinder standard containing the appropriate concentration of vinyl chloride. The gas composition of the calibration gas cylinder standard is to have been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer. If a gas chromatograph is used as the vinyl chloride monitoring system, these gas mixtures may be directly used to prepare a chromatograph calibration curve as described in section 7.3 of Test Method 106. The requirements in section 5.2.3.1 and 5.2.3.2 of Test Method 106 for certification of cylinder standards and for establishment and verification of calibration standards are to be followed.

(Secs. 112 and 301(a), Clean Air Act (42 U.S.C. 1857c-7 and 1857g(a)).)

5. Section 61.67 is amended by deleting and reserving paragraph (d), revising paragraphs (e), (g)(1)(ii) and (g)(1)(iii), and by adding paragraph (g)(1)(iv) as follows:

§ 61.67 Emission tests.

* * * * *

(d) [Reserved]

(e) When at all possible, each sample is to be analyzed within 24 hours, but in no case in excess of 72 hours of sample collection. Vinyl chloride emissions are to be determined within 30 days after the emission test. The owner or operator shall report the determinations to the Administrator by a registered letter dispatched before the close of the next business day following the determination.

* * * * *

(g) * * *

(1) * * *

(ii) Each emission test is to consist of three runs. For the purpose of determining emissions, the average of results of all runs is to apply. The average is to be computed on a time weighted basis.

(iii) For gas streams containing more than 10 percent oxygen the concentration of vinyl chloride as determined by Test Method 106 is to be corrected to 10 percent oxygen (dry basis) for determination of emissions by using the following equation:

$$C_{b\,(corrected)} = C_b \frac{10.9}{20.9 - \text{percent } O_2}$$

where:

$C_{b\,(corrected)}$ = The concentration of vinyl chloride in the exhaust gases, corrected to 10-percent oxygen.

C_b = The concentration of vinyl chloride as measured by Test Method 106.

20.9 = Percent oxygen in the ambient air at standard conditions.

10.9 = Percent oxygen in the ambient air at standard conditions, minus the 10.0-percent oxygen to which the correction is being made.

Percent O_2 = Percent oxygen in the exhaust gas as measured by Reference Method 3 in Appendix A of Part 60 of this chapter.

(iv) For those emission sources where the emission limit is prescribed in terms of mass rather than concentration, mass emissions in kg/100 kg product are to be determined by using the following equation:

$$C_{ax} = \frac{[C_b\,(2.60)\,Q\,10^{-6}]\,[100]}{Z}$$

where:

C_{ax} = kg vinyl chloride/100 kg product.

C_b = The concentration of vinyl chloride as measured by Test Method 106.

2.60 = Density of vinyl chloride at one atmosphere and 20° C in kg/m³.

Q = Volumetric flow rate in m³/hr as determined by Reference Method 2 of Appendix A to Part 60 of this chapter.

10^{-6} = Conversion factor for ppm.

Z = Production rate (kg/hr).

* * * * *

6. Section 61.68 is amended by revising paragraphs (c)(1) and (c)(2) as follows:

§ 61.68 Emission monitoring.

* * * * *

(c) * * *

(1) A calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.2 of Test Method 106 and in accordance with section 7.1 of Test Method 106, or

(2) A calibration gas cylinder standard containing the appropriate concentration of vinyl chloride. The gas composition of the calibration gas cylinder standard is to have been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer. If a gas chromatograph is used as the vinyl chloride monitoring system, these gas mixtures may be directly used to prepare a chromatograph calibration curve as described in section 7.3 of Test Method 106. The requirements in sections 5.2.3.1 and 5.2.3.2 of Test Method 106 for certification of cylinder standards and for establishment and verification of calibration standards are to be followed.

(Secs. 112, 114, and 301(a), Clean Air Act (42 U.S.C. 1857c-7, 1857c-9, and 1854g(a)).)

7. In § 61.70 paragraphs (c)(2)(i) and (c)(2)(v) are amended as follows.

§ 61.70 Semiannual report.

* * * * *

(c) * * *

(2) * * *

(i) If batch stripping is used, one representative sample of polyvinyl chloride resin is to be taken from each batch of each grade of resin immediately following the completion of the stripping operation, and identified by resin type and grade and the date and time the batch is completed. The corresponding quantity of material processed in each stripper batch is to be recorded and identified by resin type and grade and the date and time the batch is completed.

* * * * *

(v) The report to the Administrator by the owner or operator is to include the vinyl chloride content found in each sample required by paragraphs (c)(2)(i) and (c)(2)(ii) of this section, averaged separately for each type of resin, over each calendar day and weighted according to the quantity of each grade of resin processed by the stripper(s) that calendar day, according to the following equation:

$$A_{T_i} = \frac{\sum_{i=1}^{n} P_{G_i} M_{G_i}}{Q_{T_i}} = \frac{P_{G_1} M_{G_1} + P_{G_2} M_{G_2} + \cdots + P_{G_n} M_{G_n}}{Q_{T_i}}$$

where:

A = 24-hour average concentration of type T_i resin in ppm (dry weight basis).

Q = Total production of type T_i resin over the 24-hour period, in kg.

T_i = Type of resin; $i = 1, 2 \ldots m$ where m is total number of resin types produced during the 24-hour period.

M = Concentration of vinyl chloride in one sample of grade G_i resin, in ppm.

P = Production of grade G_i resin represented by the sample, in kg.

G_i = Grade of resin; e.g., G_1, G_2, and G_n.

n = Total number of grades of resin produced during the 24-hour period.

* * * * *

8. Section 61.71 is amended by correcting paragraphs (a)(2) and (a)(3), and by adding paragraph (a)(4) as follows:

§ 61.71 Recordkeeping.

(a) * * *

(2) A record of the leaks detected during routine monitoring with the portable hydrocarbon detector and the action taken to repair the leaks, as required by § 61.65(b)(8), including a brief statement explaining the location and cause of each leak detected with the portable hydrocarbon detector, the date and time of the leak, and any action taken to eliminate that leak.

(3) A record of emissions measured in accordance with § 61.68.

(4) A daily operating record for each polyvinyl chloride reactor, including pressures and temperatures.

9. Section 1.1 of Test Method 106 is corrected as follows:

1.1 An integrated bag sample of stack gas containing vinyl chloride (chloroethene) is subjected to chromatographic analysis, using a flame ionization detector.

10. Section 3 of Test Method 106 is corrected as follows:

3. *Interferences.* Acetaldehyde, which can occur in some vinyl chloride sources, will interfere with the vinyl chloride peak from the Chromasorb 102[1] column. See sections 4.3.2 and 6.4. If resolution of the vinyl chloride peak is still not satisfactory for a particular sample, then chromatograph parameters can be further altered with prior approval of the Administrator. If alteration of the chromatograph parameters fails to resolve the vinyl chloride peak, then supplemental confirmation of the vinyl chloride peak through an absolute analytical technique, such as mass spectroscopy, must be performed.

11. Section 4.1 of Test Method 106 is corrected as follows:

4.1 *Sampling* (Figure 106-1).

12. Section 4.1.3 of Test Method 106 is corrected as follows:

4.1.3 Male (2) and female (2) stainless steel quick-connects, with ball checks (one pair without) located as shown in Figure 106-1.

13. Section 4.1.10 of Test Method 106 is corrected as follows:

4.1.10 *Connecting tubing.* Teflon, 6.4 mm outside diameter, to assemble sample train (Figure 106-1).

14. Section 4.3.2 of Test Method 106 is amended as follows:

4.3.2 *Chromatographic column.* Stainless steel, 2 m×3.2 mm, containing 80/100 mesh Chromasorb 102. A secondary column of GE SF-96, 20 percent on 60/80 mesh AW Chromasorb P, stainless steel, 2 m×3.2 mm or Porapak T, 80/100 mesh, stainless steel, 1 m×3.2 mm is required if acetaldehyde is present. If used, a secondary column is placed after the Chromasorb 102 column. The combined columns should then be operated at 120° C.

15. Section 5.2 of Test Method 106 is revised as follows:

5.2 *Calibration.* Use one of the following options: either 5.2.1 and 5.2.2, or 5.2.3.

5.2.1 *Vinyl chloride, 99.9+ percent.* Pure vinyl chloride gas certified by the manufacturer to contain a minimum of 99.9 percent vinyl chloride for use in the preparation of standard gas mixtures in Section 7.1. If the gas manufacturer maintains a bulk cylinder supply of 99.9+ percent vinyl chloride, the certification analysis may have been performed on this supply rather than on each gas cylinder prepared from this bulk supply. The date of gas cylinder preparation and the certified analysis must have been affixed to the cylinder before shipment from the gas manufacturer to the buyer.

5.2.2 *Nitrogen gas.* Zero grade, for preparation of standard gas mixtures.

5.2.3 *Cylinder standards (3).* Gas mixture standards (50, 10, and 5 ppm vinyl chloride in nitrogen cylinders) for which the gas composition has been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the gas manufacturer to the buyer. These gas mixture standards may be directly used to prepare a chromatograph calibration curve as described in section 7.3.

5.2.3.1 *Cylinder standards certification.* The concentration of vinyl chloride in nitrogen in each cylinder must have been certified by the manufacturer by a direct analysis of each cylinder using an analytical procedure that the manufacturer had calibrated on the day of cylinder analysis. The calibration of the analytical procedure shall, as a minimum, have utilized a three-point calibration curve. It is recommended that the manufacturer maintain two calibration standards and use these standards in the following way: (1) a high concentration standard (between 50 and 100 ppm) for preparation of a calibration curve by an appropriate dilution technique; (2) a low concentration standard (between 5 and 10 ppm) for verification of the dilution technique used.

5.2.3.2 *Establishment and verification of calibration standards.* The concentration of each calibration standard must have been established by the manufacturer using reliable procedures. Additionally, each calibration standard must have been verified by the manufacturer by one of the following procedures, and the agreement between the initially determined concentration value and the verification concentration value must be within ± 5 percent: (1) verification value determined by comparison with a calibrated vinyl chloride permeation tube, (2) verification value determined by comparison with a gas mixture prepared in accordance with the procedure described in section 7.1 and using 99.9+ percent vinyle chloride, or (3) verification value obtained by having the calibration standard analyzed by the National Bureau of Standards. All calibration standards must be renewed on a time interval consistent with the shelf life of the cylinder standards sold.

16. Section 6.2 of Test Method 106 is amended as follows:

6.2 *Sample storage.* Sample bags must be kept out of direct sunlight. When at all possible analysis is to be performed within 24 hours, but in no case in excess of 72 hours of sample collection.

17. Section 7.1 of Test Method 106 is amended as follows:

7.1 *Preparation of vinyl chloride standard gas mixtures.* Evacuate a sixteen-inch square Tedlar bag that has passed a leak check (described in Section 7.4) and meter in 5 liters of nitrogen. While the bag is filling, use the 0.5 ml syringe to inject 250ml of 99.9+ percent vinyl chloride through the wall of the bag. Upon withdrawing the syringe needle, immediately cover the resulting hole with a piece of adhesive tape. The bag now contains a vinyl chloride concentration of 50 ppm. In a like manner use the other syringe to prepare gas mixtures having 10 and 5 ppm vinyl chloride concentrations. Place each bag on a smooth surface and alternately depress opposite sides of the bag 50 times to further mix the gases. These gas mixture standards may be used for 10 days from the date of preparation, after which time preparation of new gas mixtures is required. (CAUTION.—Contamination may be a problem when a bag is reused if the new gas mixture standard contains a lower concentration than the previous gas mixture standard did.)

18. Section 7.3 of Test Method 106 is amended as follows:

7.3 *Preparation of chromatograph calibration curve.* Make a gas chromatographic measurement of each gas mixture standard (described in section 5.2.2 or 7.1) using conditions identical with those listed in sections 8.3 and 8.4. Flush the sampling loop for 30 seconds at the rate of 100 ml/min with each standard gas mixture and activate the sample valve. Record C_s, the concentration of vinyl chloride injected, the attenuator setting, chart speed, peak area, sample loop temperature, column temperature, carrier gas flow rate, and retention time. Record the laboratory pressure. Calculate A_s, the peak area multiplied by the attenuator setting. Repeat until two injection areas are within 5 percent, then plot these points v. C_s. When the other concentrations have been plotted, draw a smooth curve through the points. Perform calibration daily, or before and after each set of bag samples, whichever is more frequent.

19. Section 1.2 of Test Method 107 is amended as follows:

1.2 This procedure is suitable for determining the vinyl choride monomer (VCM) content of inprocess wastewater samples, and the residual vinyl chloride monomer (RVCM) content of polyvinyl chloride (PVC) resins, wet cake, slurry, and latex samples. It cannot be used for polymer in fused forms, such as sheet or cubes. If a resolution of the vinyl chloride peak is not satisfactory for a particular sample, then chromatograph parameters may be altered provided that the precision and reproducibility of the analysis of vinyl chloride cylinder standards are not impaired. If there is reason to believe that some other hydrocarbon with an identical retention time is present in the sample, then supplemental confirmation of the vinyl chloride peak through an absolute analytical technique, such as mass spectroscopy, should be performed.

20. Section 5.3.2 is amended as follows:

5.3.2 *Chromatographic column.* Stainless steel, 2 m × 3.2 mm, containing 0.4 percent Carbowax 1500 on Carbopak A, Perkin-Elmer Corporation No. 105-0123, or equivalent. Carbopak C can be used in place of Carbopak A. If methanol and/or acetaldehyde is present in the sample, a pair of Poropak Q columns in series (1 m × 3.2 mm followed by 2 m × 3.2 mm) with provision for backflush of the first column has been shown to provide adequate separation of vinyl chloride.

21. Section 6.2 of Test Method 107 is revised as follows:

6.2 *Calibration.*

6.2.1 *Cylinder standards (4).* Gas mixture standards (50, 500, 2,000, and 4,000 ppm vinyl chloride in nitrogen cylinders) for which the gas composition has been certified by the manufacturer. Lower concentration standards should be obtained if lower concentrations of vinyl chloride samples are expected, as the intent is to bracket the sample concentrations with standards. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer.

6.2.1.1 *Cylinder standards certification.* The concentration of vinyl chloride in nitrogen in each cylinder must have been certified by the manufacturer by a direct analysis of each cylinder using an analytical procedure that the manufacturer had calibrated on the day of cylinder analysis. The calibration of the analytical procedure shall, as a minimum, have utilized a three-point calibration curve. It is recommended that the manufacturer maintain two calibration standards and use these standards in the following way: (1) a high concentration standard (between 4,000 and 8,000 ppm) for preparation of a calibration curve by an appropriate dilution technique; (2) a low concentration standard (between 50 and 500 ppm) for verification of the dilution technique used.

6.2.1.2 *Establishment and verification of calibration standards.* The concentration of each calibration standard must have been established by the manufacturer using reliable procedures. Additionally, each calibration standard must have been verified by the manufacturer by one of the following procedures, and the agreement between the initially determined concentration value and the verification concentration value must be within ±5 percent: (1) verification value determined by comparison with a gas mixture standard generated in a similar manner to the procedure described in section 7.1 of Method 106 for preparing gas mixture standards using 99.9+ percent vinyl chloride, or (2) verification value obtained by having the calibration standard analyzed by the National Bureau of Standards. All calibration standards must be renewed on a time interval consistent with the shelf life of the cylinder standards sold.

22. Section 7.3.2.d. of Test Method 107 is corrected as follows:

d. *W—Stabilization time.* The normal setting is 0.2 minutes.

23. Section 9.2 of Test Method 107 is corrected as follows:

9.2 Residual vinyl chloride monomer concentration. or vinyl chloride monomer concentration.

Calculate C_{vc} as follows:

$$C_{vc}=\frac{A_1 P_a}{R_f T_1}\left(\frac{M_1 V_g}{m_t R}+K T_2\right)$$

Equation 107-2

where:

C_{vc} = Concentration of vinyl chloride in the sample, in ppm.
P_a = Laboratory atmosphere pressure, mm Hg.
T_1 = Room temperature, °K.
M_1 = Molecular weight of VCM (62.5).
V_g = Volume of vapor phase (vial volume less sample volume).
m_t = Weight of sample, grams.
R = Gas constant [62.360 (cc-mm-mole-degrees Kelvin)]
K = Henry's Law constant. For VCM in PVC at 90° C, $K=6.52\times10^{-4}=K_p$. For VCM in 1 cc (approximate) wastewater sample at 90° C, $K=5.0\times10^{-4}=K_w$.
T_2 = Equilibration temperature, °K.

If the following conditions are met, Equation 107-2 can be simplified as follows:

1. $T_1=22°$ C (295° K)
2. $T_2=90°$ C (363° K)
3. $P_a=750$ mm Hg.
4. $V_g=V_v-\frac{m_t}{1.4}=23.5-\frac{m_t}{1.4}$

where

V_v = Vial volume, cc (23.5).

5. Sample contains less than 0.5 percent water.

$$C_{vc}=\frac{A_1}{R_f}\left(4.197\times10^{-1}-\frac{5.988\times10^{-2}}{m_t}\right)$$

Equation 107-3

The following general equation can be used for any sample which contains VCM, PVC and water.

$$C_{vc}=\frac{A_1 P_a}{R_f T_1}\times\left[\frac{M_1 V_g}{R m_t}+K_w(TS)T_2+K_w(1-TS)T_2\right]$$

Equation 107-4

where:

TS = Total solids.

NOTE: K_w must be determined for samples with a vapor volume to liquid volume ratio other than 22.5 to 1. This ratio can be obtained by adjusting the sample weight through giving consideration to the total solids and density of the PVC.

Results calculated using Equation 107-4 represent concentration based on the total sample. To obtain results based on dry PVC content, divide by TS.

For a 1-cc wastewater sample (that is, 22.5 to 1 vapor volume to liquid volume ratio), K_w is 5.0×10^{-4}. Thus, Equation 107-4 can be simplified to the following:

$$C_{vc}=\frac{A_1}{R_f}\left[\frac{5.988\times10^{-2}}{m_t}+(2.066\times10^{-1})\right]$$

Equation 107-5

(Secs. 112 and 301(a) of the Clean Air Act, 42 U.S.C. 1857c-7 and 1857g(a).)

[FR Doc.77-15828 Filed 6-6-77;8:45 am]

Title 45—Public Welfare

CHAPTER I—OFFICE OF EDUCATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PART 177—FEDERAL, STATE AND PRIVATE PROGRAMS OF LOW INTEREST LOANS TO VOCATIONAL STUDENTS AND STUDENTS IN INSTITUTIONS OF HIGHER EDUCATION

Commissioner's "Equitable Share" of Payments on Certain Reinsured Loans

AGENCY: Office of Education, HEW.

ACTION: Interim Final Rule.

SUMMARY: This Guaranteed Student Loan Program (GSLP) rule prescribes the Commissioner's "equitable share" of a payment made by a borrower in discharge of his GSLP loan obligation to an approved State or private nonprofit loan insurance program (guarantee agency) after the Commissioner has made a reinsurance payment on that loan to the agency. This regulation assists in the implementation of a new 100 percent reinsurance program with guarantee agencies authorized by the Education Amendments of 1976 (Public Law 94-482). The regulation is needed immediately to prescribe the disposition of payments received from borrowers after the execution of each agreement.

EFFECTIVE DATE: Pursuant to sec. 431 (d) of the General Education Provisions Act, as amended (20 U.S.C. 1232(d)), these regulations have been transmitted to the Congress concurrently with the publication in the FEDERAL REGISTER.

That section provides that regulations subject thereto shall become effective on the 45th day following the date of such transmission, subject to the provisions therein concerning Congressional action and adjournment.

ADDRESSES: Written comments concerning this rule should be sent to the Associate Commissioner, Office of Guaranteed Student Loans, Office of Education, Room 4636, Regional Office Building No. 3, Seventh and D Streets, S.W., Washington, D.C.

FOR FURTHER INFORMATION CONTACT:

Robert F. Carmody, Jr., 202-472-2758.

SUPPLEMENTARY INFORMATION: This rule prescribes what the Commissioner's "equitable share" of payments is with respect to payments made by a borrower to a State or private nonprofit student loan insurance program ("guarantee agency") in full or partial discharge of the borrower's loan obligation, after the Commissioner has made a reinsurance payment to the guarantee agency with respect to that loan pursuant to a Supplemental Guaranty Agreement. Section 428A of the Higher Education Act of 1965 (Act), as added by section 127 of the Education Amendments of 1976 (Pub. L. 94-482), authorizes the Commissioner to enter with guarantee agencies into Supplemental Guaranty Agreements which provide for 100 percent Federal reinsurance on eligible loans. The statute also directs the Commissioner to prescribe by regulation his "equitable share" of payments collected by the guarantee agency from the borrower once the guarantee agency is subrogated to the rights of the lender after paying an insurance claim. The Commissioner of Education has already begun to enter into Supplemental Guaranty Agreements with guarantee agencies. These agreements provide that the Commissioner's "equitable share" will be determined by regulations to be prescribed by the Commissioner. This regulation is needed immediately to prescribe the disposition of payments received from borrowers after the execution of the agreements.

The definition contained in the interim rule is the same, except for a technical change, as the definition added to section 428(c) of the Act by Public Law 94-482 with respect to the Commissioner's "equitable share" of payments received by guarantee agencies participating in the standard 80 percent reinsurance agreement. It provides that the Commissioner's share of any such payments shall be that portion remaining after the guarantee agency has subtracted:

1. A percentage amount equal to the percentage, if any, of insurance it had previously paid on the loan obligation to the holder of the loan which was not reimbursed by Federal reinsurance;

2. An amount attributable to the allowable "administrative costs of collection of the loan," as defined at sections 428(c)(6)(B)(i) and 428(f)(3)(B) of the Act; and

3. An amount attributable to the allowable "administrative costs of preclaim assistance for default prevention," as defined at sections 428(c)(6)(B)(ii) and 428(f)(3)(C) of the Act.

The technical change clarifies that a guarantee agency may not deduct costs for loan collection and preclaims assistance which are reimbursed pursuant to section 428(f) of the Higher Education Act of 1965, as added by Public Law 94-482.

From the desk of
GEORGE J. LEVENDIS

File
Vinylidene chloride

10A Wed., February 23, 1977 ST. LOUIS POST-DISPATCH

Warns Of Chemical In Plastic Wraps

Compiled From Post Services

NEW YORK, Feb. 23 — The finding by a leading Italian researcher that a chemical used in some plastic food wraps can cause cancer in mice has prompted two United States cancer experts to alert the public and Government agencies to the need for closer scrutiny of the chemical and others.

At a press conference yesterday, Dr. E. Cuyler Hammond and Dr. Irving J. Selikoff said the chemical, called vinylidine chloride, was closely related to two other cancer-causing chemicals, vinyl chloride and trichloroethylene.

However, researchers at the Dow Chemical Company, the leading manufacturer of vinylidine chloride, said the Italian finding was of questionable significance. The Dow spokesmen cited a two-year, $1,000,000 study sponsored by American industries that showed no cancer-inducing effect of vinylidine chloride in rats.

Vinylidine chloride is a gaseous chemical that, when polymerized with vinyl chloride, makes Saran Wrap, a Dow product. (Other packaged plastic wraps are polyethylene.)

In the Italian study, conducted by Dr. Cesare Maltoni, rats, hamsters and mice were exposed to vinylidine chloride gas at high levels for up to one year. Kidney cancers developed in about 20 per cent of the male Swiss mice, but in none of the other animals.

Three years ago, Maltoni's studies of vinyl chloride, another plastics chemical, showed it to cause cancer in rats and mice. Shortly afterward the chemical was pinpointed as the cause of a rare, fatal liver cancer in exposed workers.

A Dow spokesman said that one third of the flexible plastic packaging for food in grocery shelves was made from vinylidine chloride. But he noted that studies of foods wrapped in such plastics had shown that none of the chemical migrated from the wrapping to the food.

Hammond said he, personally, would continue to use plastic food wraps. Asked how consumers should react to his warning against vinylidine chloride, he said, "It is my personal opinion that consusmers at this point need have no worry." His warning was intended to protect them from possible future risk, he said.

Carter

Cancer Experts Warn of Dangers In Some Plastic Wrap Chemicals

By JANE E. BRODY

The finding by a leading Italian researcher that a chemical used in some plastic food wraps can cause cancer in mice prompted two American cancer experts yesterday to alert the public and Government agencies to the need for closer scrutiny of this and related chemicals.

At a news conference at the New York Academy of Sciences, Dr. E. Cuyler Hammond and Dr. Irving J. Selikoff said that the chemical, called vinylidine chloride, was closely related to two other cancer-causing chemicals, vinyl chloride and trichloroethylene.

However, researchers at the Dow Chemical Company, the leading manufacturer of vinylidine chloride, said the Italian finding was of questionMble significance and cited a two-year, $1-million study sponsored by American industries that showed no cancer-inducing effect of vinylidine chloride in rats.

In addition, Dow researchers said that studies of foods wrapped in plastics made from vinylidine chloride had showed that none of the chemical migrated from the wrapping to the food. The test would have disclosed such contamination if it exceeded 10 parts of vinylidien chloride in one billion parts of food.

In the Italian study, conducted by Dr. Cesare Maltoni at the Institute of Oncology in Bologna, rats, hamsters and mice were exposed to vinylidine chloride gas at much higher levels—starting at 10 parts per million—for up to one year. Kidney cancers developed in about 20 percent of the male Swiss mice, but in none of the other animals.

Three years ago, Dr. Maltoni's studies of vinyl chloride, another plastics chemical, showed it to cause cancer in rats and mice. Shortly afterward the chemical was pinpointed as the cause of a rare, fatal liver cancer in exposed workers. Dr. Maltoni's studies of vinylidine chloride were begun at the behest of four European producers.

Vinylidine chloride is a gaseous chemical that, when polymerized with vinyl chloride, makes up Saran Wrap, a Dow product. (Other packaged plastic wraps are made of polyethylene.) The vinylidine chloride-vinyl chloride copolymer—called saran—is also used to wrap commercially prepared meats and cheeses. A Dow spokesman said that about one-third of the flexible plastic packaging for food in grocery stores is saran, representing an annual market of between 150 and 200 million pounds of plastic.

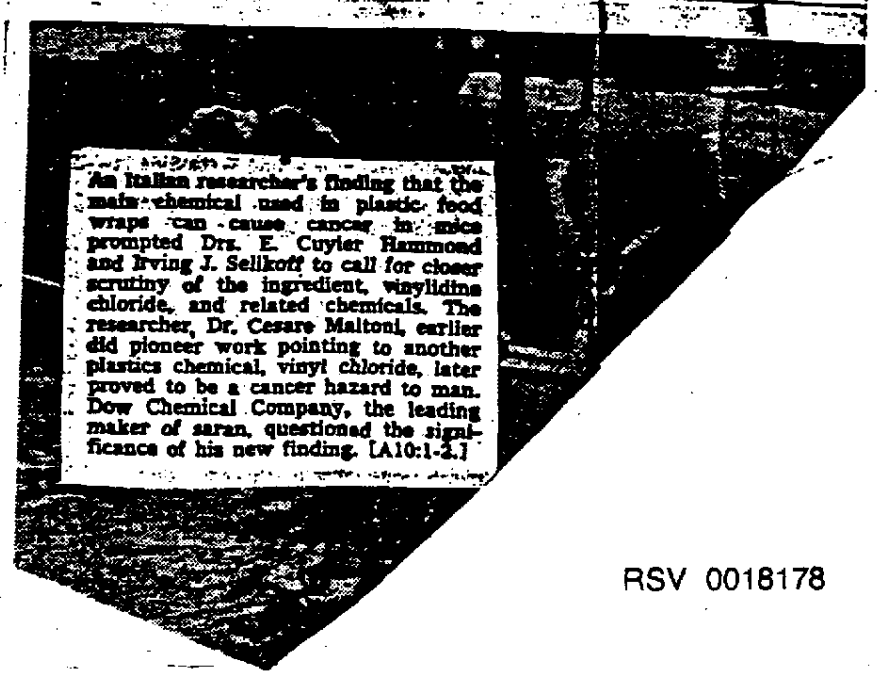
In announcing their concern about Dr. Maltoni's findings, Dr. Hammond, a vice president of the American Cancer Society, and Dr. Selikoff, director of environmental medicine at Mount Sinai Medical Center, said they saw no reason for the public to stop using saran products. But Dr. Hammond suggested that industry might try to remove residual vinylidine chloride from the finished plastic before it came into contact with food.

They said that Dr. Maltoni's finding warranted further examination by the Food and Drug Administration, the National Institute of Occupational Safety and Health and the National Institute of Environmental Health Sciences.

In a related development, the Natural Resources Defense Council has asked the Food and Drug Administration to recall existing stocks of Coca Cola in plastic bottles made from acrylonitrile, also called vinyl cyanide and another chemical relative of vinyl chloride. In response to a suit brought by the council in 1975, the drug agency last Friday rescinded its approval of market tests of the plastic soda bottles.

The agency's decision was based on recent findings that acrylonitrile causes birth defects and tumors in test animals and that small amounts of the chemical leach out of the bottles into the drink.

THE NEW YORK TIMES, WEDNESDAY, FEBRUARY 23, 1977



An Italian researcher's finding that the main chemical used in plastic food wraps can cause cancer in mice prompted Drs. E. Cuyler Hammond and Irving J. Selikoff to call for closer scrutiny of the ingredient, vinylidine chloride, and related chemicals. The researcher, Dr. Cesare Maltoni, earlier did pioneer work pointing to another plastics chemical, vinyl chloride, later proved to be a cancer hazard to man. Dow Chemical Company, the leading maker of saran, questioned the significance of his new finding. [A10:1-2.]