F 501 (1-67)

THE GOODYEAR TIRE & RUBBER COMPANY

AKRON, OHIO 44316

January 7, 1976

Comments on National Emission Standards for Hazardous Air Pollutants, Proposed Standard for Vinyl Chloride, published in the Federal Register, Vol. 40, No. 248, pp. 59531-59552, December 24, 1975.

These comments are directed to the analytical methods in the proposed standard. Most of them have been mentioned previously at a meeting with EPA in Research Triangle Park on May 20, 1975, or in a written record of those comments sent to EPA and SPI on May 22, 1975, or in a letter to Mr. William Grimley of EPA on August 28, 1975. They are being repeated now because it is understood that comments properly sent to EPA by February 23, 1976, will be considered and answered.

In the descriptive part of the proposed standard on p. 59542 under "Emission Tests," it is stated that "portable hydrocarbon detectors or Method 106 can be used to determine the degree to which vinyl chloride has been removed from equipment prior to opening the equipment to the atmosphere." In the regulation itself, the only mention of the option of using the portable hydrocarbon detector in this application is in 61.67 (g) (5) (i) (B). It seems that 61.67 (g) (1) should state that the portable hydrocarbon detector can be used for the testing required in 61.64 (a) (2).

Method 106

Tedlar bags are very expensive ($91 each). We would prefer to have Saran bags ($6 each) allowed as alternatives.

Section 4.3.1 specifies a strip chart recorder for the gas chromatograph, while section 6.4 calls for measurement of peak area with an automatic integrator. We believe that the strip chart recorder is adequate for this use and that the automatic integrator is unnecessarily elaborate and expensive ($5200) when peak height, triangulation, and disc integrators are sufficiently accurate for this use.

STANDARD SUPPORT

AND

ENVIRONMENTAL IMPACT STATEMENT:

EMISSION STANDARD

FOR

VINYL CHLORIDE

VOLUME II

Emission Standards and Engineering Division

U. S. Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

JUL 18 1976

~~MAY 1976~~

Final Standard Support and Environmental Impact Statement

Vinyl Chloride Emissions from Ethylene Dichloride-

Vinyl Chloride and Polyvinyl Chloride Plants

Type of Action: Administrative

Prepared by

Director, Emission Standards and Engineering Division (Date)
Environmental Protection Agency
Research Triangle Park, N. C. 27711

Approved by

Assistant Administrator (Date)
Office of Air and Waste Management
Environmental Protection Agency
401 M Street, S. W.
Washington, D. C.

Final Statement Submitted to Council on Environmental Quality

on

(Date)

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Environmental Protection Agency
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Chapter 1

Summary of the Environmental Impact of the Emission Standard for Vinyl Chloride

Summary of the Environmental Impact of the Emission Standard for Vinyl Chloride

Background: On December 24, 1975, the Environmental Protection Agency (EPA) proposed a national emission standard for vinyl chloride under the authority of section 112 of the Clean Air Act. At that time, EPA requested public comments on the proposal. Fifty comment letters were received from environmental groups, industry, State and local air pollution control agencies, and individual citizens. On February 3, 1976, EPA held a public hearing on the proposed standard in Washington, D. C. Both the written comments and the comments made at the public hearing as well as EPA's responses to these comments are summarized in this document. The summary of comments and responses serves as the basis for revisions which have been made to the standard between proposal and promulgation.

EPA decided to regulate vinyl chloride because it has been implicated as the causal agent of angiosarcoma and other serious disorders, both carcinogenic and noncarcinogenic, in people with occupational exposure and in animals with experimental exposure to vinyl chloride. Reasonable extrapolations from these findings cause concern that vinyl chloride may cause or contribute to the same or similar disorders at present ambient air levels. The purpose of the standard is to minimize vinyl chloride emissions from all known process and fugitive emission sources in ethylene dichloride-vinyl chloride and polyvinyl chloride plants to the level attainable with best available control technology. This will have the effect of furthering the protection of public health by minimizing the health risks to the people living in the vicinity of these plants and to any additional people who are exposed as a result of new construction.

discussion of the water consumption impact can be found in the first comment in Section 2.8 of Chapter 2 of this document.

A summary of the environmental impact of the promulgated standard is as follows:

The primary environmental impacts of the standard are beneficial and will consist of reductions in vinyl chloride emissions from ethylene dichloride-vinyl chloride and polyvinyl chloride plants, and consequently, corresponding reductions in ambient air concentrations of vinyl chloride and risks to health in the vicinity of these sources. Although the standard will not eliminate all vinyl chloride emissions, it will further the protection of public health by minimizing emissions. For a typical average-sized ethylene dichloride-vinyl chloride plant, the standard will reduce hourly vinyl chloride emissions from 176 kg to 10 kg. This is approximately a 94 percent reduction. For a typical average-sized polyvinyl chloride plant, the hourly vinyl chloride emissions will be reduced from 330 kg to 16 kg, or by approximately 95 percent. Percentage numbers for both source categories are based on an estimated 90 percent reduction in fugitive emissions and 1974 emission levels.

There are several potential secondary environmental impacts of the standard. These include increased atmospheric emissions of hydrogen chloride, lowered pH of inprocess wastewater due to hydrogen chloride, small increases in the quantity of vinyl chloride released into inprocess wastewater, increased solid waste disposal due to carbon used for adsorption, and increased energy consumption. The types and degree of the secondary impacts resulting from the standard

Economic Impact of the Standard: In accordance with Executive Order 11821 and OMB Circular A-107, EPA carefully evaluated the economic and inflationary impact of the proposed standard and alternative control levels. The economic analysis is contained in Chapter 7 of the SSEIS, Vol. I. Since changes in the standard since proposal do not affect the level of control required, the economic impacts of the promulgated standard and alternative control levels are essentially the same as described for the proposed standard. There is one exception. EPA estimated that there would be four plant closures as a result of the promulgated standard. Of the four plants identified as possible closure candidates, one (Occidental Petroleum Corporation's polyvinyl chloride plant in Hicksville, N. Y.) has given notice that it no longer produces polyvinyl chloride, and the other three (Jenngt Corporation's plants in Somerset, N. J., Torrence, Calif., and Tucker, Ga.) have indicated that they do not intend to close as a result of the standard.

A summary of the economic impact of the promulgated standard is as follows:

The total capital cost for existing plants to meet the standard is estimated to be $198 million, of which $15 million is for ethylene dichloride-vinyl chloride plants and $183 million is for polyvinyl chloride plants. EPA estimates that these plants will have to spend $70 million per year to maintain the required emission levels. In addition, total capital cost for existing plants to meet the EPA's 1983 water effluent guideline limitations is $83 million and the total annualized operating cost is $17 million. The costs to the industry of meeting

Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enforcement of Long-Term Production: By taking steps now to establish standards based on best available control technology to minimize vinyl chloride emissions, EPA will be able to minimize exposure and prevent severe illnesses and deaths which may have occurred in future years as a result of prolonged community exposure to vinyl chloride. Therefore, the standard may curtail industrial expansion on a short-term basis, as a result of funds being diverted from support of industrial expansion to support of installation of process changes and control systems to attain the standard; but it will enhance the long-term productivity of man and his environment.

Irreversible and Irretrievable Commitments of Resources: Irreversible and irretrievable resources which would be committed to reduce ambient concentrations of vinyl chloride include energy and the materials to construct incinerators, boilers, monitoring equipment, carbon adsorption units, etc. If incineration were used to meet the standard, additional energy and materials would be needed for operation of an absorption unit to abate hydrogen chloride emissions.

Chapter 2

Summary of Public Hearing and Comments

2.1 LIST OF COMMENTATORS

Comment No.	Commentators
VC-1	Robert A. Fine Hooker Chemical Corporation
VC-2	Constance Panchuk PARKLABREA
VC-3	Mr. and Mrs. F. B. Minnock (U. S. Resident)
VC-4	Marilyn E. Sadowski (U. S. Resident)
VC-5	Dr. Martin Wersba (U. S. Resident)
VC-6	Dr. John F. Finklea National Institute for Occupational Safety and Health
VC-7	Susan Howard (U. S. Resident)
VC-8	Gayle and Herb Weaver (U. S. Resident)
VC-9	Dr. Peter F. Infante National Institute for Occupational Safety and Health
VC-10	June Armstrong (U. S. Resident)
VC-11	Robert H. Collom, Jr. Department of Natural Resources (Georgia)
VC-12	Harry H. Hovey, Jr. N. Y. State Department of Environmental Conservation
VC-13	R. W. Laundrie The General Tire and Rubber Co.
VC-14	R. E. Widing PPG Industries, Inc.

Comment No.	Commentator
VC-31	Robert W. Hill Diamond Shamrock Corporation
VC-32	Richard Fleming Air Products and Chemicals, Inc.
VC-33	R. A. Abramowitz R. A. Fine Hooker Chemical Corporation
VC-34	Mitchell R. Zavon, M.D. Ethyl Corporation
VC-35	John C. White EPA - Region VI
VC-36	Jack Jaglom The Pantasote Company of New York, Inc.
VC-37	Professor Benjamin Linsky West Virginia University
VC-38	Sidney M. Wolfe, M.D. Health Research Group
VC-39	Kip Howlett Georgia-Pacific Corporation
VC-40	Keysor-Century Corporation
VC-41	John M. Daniel, Jr. State Air Pollution Control Board (Virginia)
VC-42	Charles R. Barden, P.E. Texas Air Control Board
VC-43	Dr. Thomas A. Robinson Vulcan Materials Co.
VC-23a	Barry I. Castleman Environmental Defense Fund
VC-44	George P. Ferreri Bureau of Air Quality and Noise Control (Maryland)

Chapter 2 contains a summary of the public comments on the proposed standard and EPA's responses to them. The comments are divided into sections. The first section discusses the rationale for regulating vinyl chloride under the authority of section 112 of the Clean Air Act; i.e. EPA's decision to list vinyl chloride as a hazardous air pollutant and the approach used for regulating vinyl chloride under section 112. The next three sections discuss the selection of source categories, the emission limits, and testing, reporting, and recordkeeping requirements. The comments in these three sections are organized to correspond with the different section numbers in the proposed standard. The remaining sections include comments on the test methods, economic and environmental impacts, process and control technology, and the Quantitative Risk Assessment for Community Exposure to Vinyl Chlorides. Comments on the Scientific and Technical Assessment Report for Vinyl Chloride and Polyvinyl Chloride are included in section 2.2.1 on EPA's decision to list vinyl chloride as a hazardous air pollutant.

2.2 Rationale for Regulating Vinyl Chloride Under the Authority of Section 112 of the Clean Air Act.

2.2.1. Decision to List Vinyl Chloride as a Hazardous Air Pollutant.

(Except for commentators VC-32, VC-23, and VC-46, the comments contained in this section generally did not contest EPA's decision to list vinyl chloride as a hazardous air pollutant. However, they did argue that EPA has placed great and sometimes unwarranted emphasis on factors suggesting the possibility of a health risk while "playing down" or not even mentioning factors which suggest that there may be no significant risk at all. Examples cited by the commentators are listed below).

1. VC-22, VC-27, VC-29, VC-32

Comment: The U. S. worker EPA discussed as having been exposed to vinyl chloride levels lower than those usually encountered in polyvinyl chloride production has been dropped from the National Institute of Occupational Safety and Health's listing of workers with angiosarcoma.

Response: Table 6.18, page 73, of the Scientific and Technical Assessment Report (STAR) includes the data which were available at the time of publication, documented by the Center for Disease Control. Dr. John T. Herbert, Center for Disease Control, was contacted by telephone on March 29, 1976. Dr. Herbert, on that date, stated that the information in Table 6.18, including the footnotes was still correct. He also stated that four additional cases from Canada had been added to the list. There are questions concerning the level of exposure of those cases not involved directly in polyvinyl chloride and vinyl chloride production, and in some cases the pathology. These uncertainties are stated in the appropriate footnotes to table 6.18. However, in spite of these uncertainties, in view of the possible exposure patterns, these cases cannot be ignored in the evaluation of the potential public health problems.

2. VC-22, VC-29, VC-27, VC-32, VC-46

Comment: EPA has not summarized the results from the more extensive ambient monitoring program but stated that the results from the more extensive ambient monitoring program are generally in the same range as found in previous studies except for peak concentrations. The more recent data actually shows significantly lower ambient concentrations of vinyl chloride than previously measured.

Response: A report entitled "EPA Programs of Monitoring Vinyl Chloride in Ambient Air" summarizing the data from the more extensive monitoring program was made available by EPA. A detailed analysis comparing the results from the two monitoring programs has not been performed by EPA. The sampling procedures, placement of samplers, extent of sampling, and quality of analysis were not the same in the two programs. Only one of the plants monitored in the second program was also monitored in the first program.

Response: Section 112 of the Clean Air Act defines the term "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, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." The sentence in question refers to the factors the Administrator considered in his judgment that vinyl chloride should be listed as a hazardous air pollutant. These factors include:

(1) Data from occupational exposure studies indicate that vinyl chloride is a carcinogen, and possibly a mutagen and teratogen.

(2) Data from animal exposure studies demonstrate that vinyl chloride is a carcinogen and a teratogen.

(3) Date from microbial systems indicate that vinyl chloride is a mutagen.

(4) Vinyl chloride has been measured in communities surrounding ethylene dichloride-vinyl chloride and polyvinyl chloride plants.

(5) The threshold for effects has not been demonstrated. In absence of proof to the contrary, EPA believes that it is prudent to assume that there is no-effect level.

(6) There is an expected latency period of 20 years or more from the time of community exposure to vinyl chloride and the appearance of effects.

7. VC-17, VC-22, VC-27, VC-29, VC-32, VC-46. Public Hearing Record--Presentation of P. J. Gehring of Dow Chemical, p. 87.

Comment: EPA has implied that vinyl chloride is "an apparent non-threshold pollutant." Laboratory data on metabolism has been developed under Manufacturing Chemists Association administered research study. The data indicate that there are at least two different metabolic routes for destroying vinyl chloride, and therefore, raise questions as to the validity of the EPA stated assumption.

Response: The results of the recent studies by Dr. P. J. Gehring are indeed significant; however, they are not sufficient to resolve the issue of a biological threshold, or to establish such a value. Dr. Gehring's studies reflect a short-term response to relatively high levels of exposure (one hour of 50-1,000 ppm). Studies by Dr. Selikoff on industrial workers exposed to vinyl chloride for more than five years reveal that the substance bioaccumulates, and is not excreted or otherwise metabolized after five weeks of non-exposure. Thus, one short-term response to high level exposure is irrelevant in terms of long-range responses to chronic low-level exposure.

Response: The statement from the Quantitative Risk Assessment for Community Exposure to Vinyl Chloride is taken out of context. The following is an extract from the subject document:

"This survey has produced no evidence that living around vinyl chloride plants is a factor in the occurrence of liver angiosarcoma. This conclusion is far different than saying that living around plants is not a risk factor for several reasons: (1) This type of survey of a disease with a latent time from first exposure to diagnosis of 17 years reflects exposures that started at some time before 1957, when the quantities of vinyl chloride produced were much smaller than the current production levels. (2) This survey did not include the place of occupation of the currently suspected collection of liver angiosarcoma cases. Therefore, it underestimates the risk of being near a vinyl chloride plant. (3) This survey might not have detected all existing liver angiosarcoma cases, although the number we have is consistent with the national statistics. The circumstantial evidence for this is that there was not substantial overlay between the three sources of case information. If the data sources had been complete, the information collected by CDC from the National Center for Health Statistics would contain all the cases reported by both the Armed Forces Institute of Pathology and the state health department. (4) In over 90 percent of the cases traced in this survey, the only information available was the residence at the time of death and in some cases, the residence of the spouse or parent only. This information is only a crude indication of where the individuals spent most of their lives. (5) In contrast with our expectation when the survey was started, there is a significant rate of changes in diagnosis after the slides are confirmed by the National Cancer Institute. The 286 cases currently on file cannot be regarded as definately established liver angiosarcoma.

11. VC-22, VC-32

Comment: Chapter 6 of the STAR document includes an extensive bibliography on vinyl chloride monomer toxicology and epidemiology. There are at least three additional scientific documents which have become available that are pertinent and should be made a part of the EPA hearings docket.

(a) "Report on Mortality Data Collected by Organization Resources Councilors, Inc., Concerning the Effects of Vinyl Chloride Exposure in PVC Fabrication." (Available from ONC, 1625 I Street, N. W., Washington, D. C. 20006).

(b) "Metabolic Studies in Vinyl Chloride as a Function of Concentration" by Dow Chemical Company under Manufacturing Chemists Association administered research study. (Available from MCA, 1835 Connecticut Avenue, N. W., Washington, D. C. 20009).

of the efforts are complimentary, others are totally separate, and the costs are not altogether overlapping. Ventilation contributes only an insignificant reduction in the vinyl chloride levels in the work place and, therefore, any concern that the emissions found in 1974 would continue are completely unfounded. Any justification as to the need for an emission reduction should be based on those emissions found after completion of all projects designed to comply with the OSHA regulation.

Response: EPA stated in the preamble to the proposed standard that the OSHA standard is expected to indirectly reduce atmospheric emissions to some degree, but that the degree is unknown. In the SSEIS, Vol. I, the reason that the degree is unknown is explained. The OSHA standard requires that employee exposure be reduced to 1 ppm. It does not prescribe the means for doing this. It does require that employers institute feasible controls to the fullest extent possible and to continue to improve and apply engineering controls until full compliance is achieved. Some of the engineering controls used to meet the OSHA standard can also be used to meet EPA's standard. Since a plant owner knows both what OSHA and EPA expect he can plan so that he can use some of the same controls to meet both standards. OSHA did not prescribe any deadlines for compliance through engineering controls. The plants are expected to use some combination of respiratory protection, ventilation techniques, and emission reduction. The plants are not expected to be uniform in what they use. OSHA does not require submittal of a formal plan describing what the plants plan to use. Therefore, in order to find out how much emission reduction the OSHA standard is achieving, EPA would have to send to each plant a request for information on the controls they are using, the controls they plan to use, and how much these controls will reduce emissions. This does not seem to be necessary, since it is not likely to change EPA's standard. If the plants are using engineering controls rather than ventilation and respiratory protection to meet the OSHA standard, this is achieving both OSHA and EPA goals. On plant visits EPA has observed that engineering controls have been employed to a large extent, but that ventilation practices are still employed to some extent. An example would be open-sided buildings.

With regard to cost, EPA has always been interested in obtaining figures on the cost of the OSHA standard. During the February 3, 1976, public hearing Susan Wyatt of EPA asked Ralph Harding of the Society of Plastics Industry (SPI) how much of the cost to meet EPA's standard can also be attributed to meeting the OSHA standard. (Public Hearing Transcript, p.69). Mr Harding replied that he did not know and that it is a premature number at this time. He continued by saying that he thought they were interrelated, but that he didn't think the industry was ready to ascribe "which costs to which standard." In order to get information on the costs of the OSHA standard, EPA would have to request each plant to submit cost figures for both present and future controls. The benefits from this exercise are not apparent.

for than vinyl chloride gaseous losses. Polyvinyl chloride collected in baghouses or cyclones can be weighed. The efficiencies of these collection devices are known, so the loss from them can be calculated. Polyvinyl chloride discharged into wastewater settles out and can be weighed. This is not true for vinyl chloride gas. If it were assumed that 50 percent of the emissions were solid as was suggested by the commentator, a typical 68 million kilogram per year plant would lose nearly 2000 kg of polyvinyl chloride per day. Because polyvinyl chloride losses are more easily accounted for, they are considered to be lower than this. Thus, EPA assumed that all unaccounted for losses were vinyl chloride monomer.

With regard to diffusion modeling, it seems reasonable to estimate the worst atmospheric concentrations that are to be expected. It should be emphasized that these estimates were based on worst, but realistic conditions. Eighty to 220 meters from the center of the plant would in many cases be on plant property. At one plant that was monitored, a sampler was located across the street from a plant and was about 200 meters from the primary emission point. In EPA's modeling, all emissions were assumed to occur from the center of the plant property. In fact, emission sources, particularly at polyvinyl chloride plants are located more diffusely on the plant property. Fugitive emission sources, in particular, are likely to be located closer to plant property lines than assumed. For this reason they may have a larger impact outside of the property lines than indicated by the diffusion modeling.

Although the estimated maximum concentrations of vinyl chloride were given in the SSEIS, Vol. I, EPA also states in the Quantitative Risk Assessment Document that an average exposure of 17 ppb was estimated to exist within a 5-mile radius of an average plant. This figure was also based on 1974 emission levels.

17. VC-32, VC-34, VC-46

Comment: Available health data are not sufficient to justify regulating vinyl chloride under section 112. Section 112 of the Clean Air Act allows the Administrator to regulate those substances which may cause or contribute to an increase in mortality, or an increase in serious irreversible or incapacitating reversible illnesses. In the case of vinyl chloride, none of these requirements had been reported outside of the plant which can be traced directly to any plant or to any manufacturing use of vinyl chloride or the formation of polyvinyl chloride products.

Response: As implied by the commentator, no community cases of angiosarcoma have been verified as being caused by ambient exposure to vinyl chloride. Thus, there is no proof that vinyl chloride ambient concentrations cause cancer, teratogenesis, and mutagenesis. The data base showing that vinyl chloride causes

19. VC-6

Comment: "This letter is in regard to the most recent assessment of health problems which may follow exposures to vinyl chloride. It is our hope that this assessment may be of some assistance to your Agency in discussion of standards to limit vinyl chloride emissions into the ambient air. Two studies that are conducted by NIOSH and CDC personnel which directly bare on this issue of community effects are those which Dr. Infante of NIOSH performed while he was at the Ohio Health Department and subsequent investigations by the Division of Cancer and Birth Defects of the Bureau of Epidemiology in Atlanta. Enclosed are copies of these two studies.

"Our scientists may differ in their interpretation of particular studies in relation to vinyl chloride exposure and teratogenesis. They are, however, in complete agreement that while the issue is not yet resolved, the potential public health ramifications remain a cause for concern. Please note that we are speaking only of vinyl chloride monomer-VCM, and not of polyvinyl chloride plastic.

"The points raised in conversations with your office dealt specifically with the issue of teratogenicity of VCM among humans. Neither the Infante not the CDC study resolve the matter. Dr. Infante's study used available birth and fetal death record information and identified three areas with increased rates of central nervous system malformations. The CDC investigation followed up cases in one city and found no parental association between VCM exposure and plant employment. There also appeared to be no differences between cases an controls with respect to location of residence relative to the plant in Painesville. In this circumstance no association could be established with VCM. However, the authors stated, "This study clearly does not rule out the possibility that vinyl chloride may be teratogenic." Because of the small numbers of cases involved, there still might be an effect that was not detectable in Painesville.

"It is important to remember that the possible effects of VCM exposure also include mutagenicity. Mutagenesis and carcinogenesis are sufficiently correlated that demonstration of one is cause for concern about the other. The carcinogenicity of VCM in humans is well demonstrated via the NIOSH cohort mortality study and by various animal studies. There are also data to demonstrate VCM-induced transplacental carcinogenesis in rate. In the past year, several reports have indicated that VCM is mutagenic via the microbial test system, and that VCM metabolities have induced mutations in the mammalian cells. Likewise, four independent reports from four different countries have shown an excess of chromosomal aberrations in lymphocytes of workers exposed to VCM as compared to controls. I should also note that NIOSH is participating in a collaborative study with a university

2.2.2. Approach for Regulating Vinyl Chloride Under Section 112.

1. Proceedings of the Public Hearing, Presentation by Barry Castleman of the Environmental Defense Fund, p.9; VC-23, VC-10, VC-2, VC-7, VC-16.

Comment: The standard should be based on a cost/risk analysis rather than best available control technology. In other words, a socially acceptable risk should be determined. The socially acceptable risk should be justified by the social importance, that is, the benefits to society of the article, whose production entails the risk. EPA did not seriously evaluate the desirability of continuing all existing uses of vinyl chloride. The Environmental Defense Fund (EDF) pointed out several uses of vinyl chloride for which EPA named no substitutes if polyvinyl chloride were banned. One of these was credit cards. Credit cards are also one of the fastest growing uses of polyvinyl chloride.

A 95 percent reduction of vinyl chloride emissions should reduce risk of adverse health risks, but will not necessarily minimize health risks. Section 112 requires more protection of public health than the proposed standard will provide, especially in view of the evidence that polyvinyl chloride products also cause adverse health effects. An example is hydrogen chloride fumes from burning polyvinyl chloride products.

A zero emission limit should be established for vinyl chloride. Vinyl chloride should be phased out. Vinyl chloride usage should be banned now for products for which substitutes are available. Substitutes should be developed for the remaining uses of vinyl chloride, and all vinyl chloride usage should be banned eventually.

Response: In the preamble to the proposed standard EPA named its reasons for not setting a zero emission limit for vinyl chloride, as follows: (1) There are beneficial uses of vinyl chloride products for which desirable substitutes are not readily available, (2) there are potentially adverse health and environmental impacts from substitutes which have not been thoroughly studied, (3) there are a number of employees, particularly in the fabrication industries, who would become at least temporarily unemployed, and (4) control technology is available which is capable of substantially reducing emissions of vinyl chloride into the atmosphere.

EPA agrees that substitutes do exist or could be manufactured for most vinyl chloride or polyvinyl chloride uses. However, in general, these substitutes do not have some of the more desirable characteristics of polyvinyl chloride, such as nonflammibility. If vinyl chloride and polyvinyl chloride were banned, other substitutes with these more desirable characteristics would likely be developed.

It is very doubtful that a ban on vinyl chloride would cause the cities of New Orleans, La.; Houston, Tx.; Baton Rouge, La.; and Long Beach, Calif. to be in a total state of unemployment. Polyvinyl chloride and fabrication plants are more widely dispersed throughout the country.

5. VC-16

Comment: The vinyl chloride standard is not stringent enough. More stringent restrictions could include (1) no variances on time schedules to install the best available controls, (2) zero emission limits for substitutable uses of polyvinyl chloride plastics after one year, and (3) zero emissions for all sources of vinyl chloride after three years.

Responses: A response to suggestions 2 and 3 can be found under comment #1 in section 2.2.2. In regard to the first suggestions, the Clean Air Act allows for a waiver period of up to two years after the standard is promulgated to comply with the standard, provided that EPA "finds that such period is necessary for the installation of controls ...". Variances will not be granted unnecessarily. In many cases it takes much longer to install control equipment than the 90 days that the Clean Air Act allows for compliance. Waivers will be granted only for the time that is necessary to install controls. The standard requires control of several emission points. It is probable that control equipment can be installed on some points sooner than others. Compliance for each different point will be required as expeditiously as practicable.

6. VC-29, VC-31, VC-32.

Comment: Industry suggests that EPA expend more effort on the fine tuning of the cost/benefit ratio. There are several requirements in the proposed standard which offer little benefit in terms of emission reductions for the costs required. They are requiring replacement of single seals on rotating equipment with double seals; installation of car unloading purge units at plants where monomer delivery by rail car is infrequent; the requirement for stripping all dispersion resins to 2000 ppm; excessive recordkeeping, and a gasholder.

The risk of vinyl chloride exposure appears to be entirely limited to workers in polyvinyl chloride plants. There is no basis for the prohibition of vinyl chloride and polyvinyl chloride, as some demand, or for a standard which requires expenditures bearing no reasonable relationship to the benefits obtained.

in its determination of whether controls are needed, particularly in the absence of any conclusive medical evidence that vinyl chloride emissions have a detrimental effect on the general public living in the neighborhood of such plants.

Response: EPA realizes that the costs to install and operate control systems are generally nonproductive. This is the reason EPA does an economic impact study. Installation of controls does have some positive impact on costs to the plant in that more vinyl chloride is recovered. This is also considered in EPA's economic study.

9. VC-46

Comment: Three alternatives are proposed in the report. One alternative would accomplish a 90 percent emission reduction in the entire plant; another 94 percent; and another 97 percent. The reason for selecting the 94 percent emission level is unclear, and this selection should be carefully and thoroughly explained since the reduction difference between the three options is only 7 percent and the difference between the lower and middle option is only 4 percent.

Response: It is assumed that the commentator is discussing the alternatives for the oxychlorination process in ethylene dichloride-vinyl chloride plants. The reasons for the selection of these three alternatives is explained thoroughly in Chapter 5 of the SSEIS, Vol. I. The reason that the relative degree of difference between the reduction levels for the three alternatives is relatively small is that the oxychlorination process is only one of several emission points in an ethylene dichloride-vinyl chloride plant and on the average it represents only 10 percent of the emissions from the plant. The alternatives actually represent a range in emission reduction for the oxychlorination process from 0 to 99 percent.

The reason that the 94 percent level was selected is explained in detail in section 8.2.1 of Chapter 8 of the SSEIS, Vol. I. In summary, the 97 percent reduction level was not selected because of the large energy expenditure required. The 94 percent reduction level would achieve some degree of emission reduction without incurring the large energy expenditure.

stating the emission levels for sources following the stripper in two different ways. This discussion seems to infer that the regulation is proposed for the sake of regulation and enforcement rather than for accomplishing safety in the surrounding communities.

Response: The goal of the standard which is, as suggested, "the safety in the surrounding communities" is achieved through the amount of emission reduction required. Both ways in which the standard for sources following the stripper are written achieve essentially the same degree of emission reduction.

15. VC-32

Comment: The proposed standard is unnecessary to provide an ample margin of safety to protect the public health because the margin of safety which EPA has implicitly accepted as ample has already been achieved by industry as a result of the OSHA standard for vinyl chloride and industry's increasing awareness and understanding of the health hazard of high level exposure to vinyl chloride.

Response: EPA is aware that emissions have been reduced as a result of the OSHA standard and industry's awareness of the vinyl chloride problem. EPA's standard will further reduce emissions. Since the threshold level of effects for vinyl chloride is unknown, EPA has determined that it is prudent to minimize emissions by requiring this additional control.

16. Proceedings of Public Hearing, Presentation at the Public Hearing by Barry Castleman, p.16.

Comment: EPA should have declared vinyl chloride as a hazardous air pollutant in June 1974. That way the final standards would have been due by June 1975. The public would have been spared an additional year of unregulated emissions. EPA compiled a best available technology standard after observing the industry through 1974. Through almost all of 1975, the standard was reviewed by industry, the public and other government agencies. It is important to try to put regulations out and shorten this review process.

Response: EPA also favors expeditious rulemaking. However, for the vinyl chloride standard there were many technical details and issues that needed to be resolved before the standard could be proposed. Preparation of environmental and economic impact statements for the standard is time-consuming but has beneficial effects in decision-making and in understanding the impact a standard will have. EPA's policy of having a recommended standard reviewed by other groups within EPA, other federal agencies, interested parties, and public advisory committees before it is proposed or promulgated is also beneficial to the quality of the standard.

19. VC-22

Comment: In the second paragraph of page 1-6, it is noted that the standard would be applicable to an existing process, as well as "any other process developed in the future." This statement is far-reaching and conjectural. It is not clear how EPA could realistically regulate specific emission limitations on a future process yet even to be developed, particularly when the basis for the current limitations stems from the application of the best available control technology currently existing.

Response: The statement on page 1-6 refers to the fact that EPA does not want to limit the standard to existing polymerization processes by name, because a new variation on the polymerization process could be developed and not be covered by the standard only because it was not specifically named. The control technology required for the existing polymerization process is essentially the same and is likely to apply to new types of polymerization. Existing processes vary depending on whether water is used, how much detergent is used, etc. The equipment used in the various processes is similar.

20. VC-23

Comment: EPA should make a formal commitment to conduct a complete review of the standard one year after promulgation. EPA should keep pushing for improved technology to reach the ultimate goal of zero emissions. EPA should review all new construction to see that best control technology available at the time is installed.

Response: It is EPA's policy to review the need to change standards as new technology is developed. Priorities would determine when a standard is revised. Priorities are determined by the amount of impact a new standard or revised standard for a particular pollutant would have in comparison to setting or revising standards for another pollutant.

21. VC-42

Comment: EPA should push the development of improved stripping technology by setting a two-phase standard. The first phase would require stripping to 400 ppm as proposed. The second phase would have a plant-wide fixed-point emission standard of 100 kg vinyl chloride per million kg of polyvinyl chloride in any product, averaged over any calendar day. The second phase standard could be achieved in 5 years.

Response: EPA also favors development of improved stripping technology. Section 112 of the Clean Air Act doesn't directly provide for a two-phase standard. It states that a plant must meet a standard

Response: In order to require plume dispersion hardware, since a number of plants would be involved, EPA would have to specify an ambient air quality goal for vinyl chloride. EPA has not done this because there is not sufficient data on health effects to establish a numerical threshold of effects for vinyl chloride.

In visiting polyvinyl chloride plants, EPA has observed that dryer stacks are generally 15 meters high and discharge horizontally. Concentration levels of 1 ppm are of concern. States may find that they want to require dispersion hardware to further reduce ambient concentrations. The fact that EPA has not required dispersion hardware does not preclude States from doing so, nor should it discourage them from doing so.

24. VC-42

Comment: The standard should include a limit on the mass emissions allowed per unit time. Otherwise, the total emissions will simply grow as plant size increases.

Response: There are advantages to a mass per unit time standard. It could be used to limit growth as suggested. It would also clearly preclude dilution as a means of attaining the standard.

EPA, however, did not propose a mass emission limit for two reasons:

(1) The standard is based on best available control technology rather than an ambient air quality goal. If the ambient air quality goal approach had been used, EPA would have calculated an emission rate for the entire plant which would allow the plant to meet the ambient air quality goal under worst case conditions. The emission rate in kg/hr would have been adopted as the standard.

(2) The air volumes and mass emissions from specific emission points, particularly at polyvinyl chloride plants, fluctuate. There are a number of pieces of equipment at each plant. The configuration for ducting the emissions from the different pieces of equipment varies from plant to plant. Reactors and strippers at most plants are batch processes. Capture and ducting of fugitive emissions to a control device is intermittent. Sufficient information is not available for developing a mass emission standard which could be applied to all plants.

Table I

EMISSION DATA ON

LABORATORY AND PILOT FACILITIES

UTILIZING VINYL CHLORIDE

Company Code	Reactor Size (gal.)	Number of Units	Produced Rate (lb/yr)	Estimated Total Emissions per Year (lb)	Resin Use
A	50	2	30,000	400	Testing and scrap
B	0.4	6	1,084	89	Experimental
	3.25	1	987	100	Experimental
	300	1	36,450	5,000	Tests, trials in lab and to customers
C	50	1	17,000	2,800	Sold as off grade
D	0.5	1	192	48	Scrap
	0.8	4	2,112	697	Scrap
	0.8	2	600	878	Scrap
	15	6	23,100	240	Scrap
	30	1	960	240	Scrap
	30	2	28,800	266	Scrap
	1100	2	666,000	10,656	Scrap
E					Divided between:
	300	2	113,812	10,000	1. Experimental evaluation & tests
	5	3	400	6,075	2. Customer samples
	10	1	100	3,038	3. Remainder is placed in landfill (about 80%)
F	.5	1	380	25	Experimental
	10	2	27,338	1,600	Experimental
	50	2	136,687	10,800	Experimental
G	.5 to 2	11	16,000	225	Scrap
	50 to 100	5	10,000	500	Scrap
	750	2	50,000	2,000	Customer Sampling and scrap
H					
	200	1	72,900	17,045	Testing
	15	1	5,468	928	Testing
	10	1	608	100	Testing

Other cut-off points were suggested by other commentators. VC-13 wants to exempt all research and pilot plant facilities. VC-40 wants to exempt reactors with a capacity of 7560 l (2000 gal) or less. This would also essentially exempt all research and development facilities. Commentator VC-27, the operator of an ethylene dichloride-vinyl chloride plant, requested that quality control facilities be exempted from the standard.

Response: As stated in the preamble to the proposed standard, EPA recognizes that some small research and development facilities may exist where the emissions of vinyl chloride are insignificant and covering these facilities under the standard would be unnecessary and inappropriate; however, EPA did not have sufficient information available to clearly define which facilities should be excluded from the standard. The standard has been revised so that it exempts polyvinyl chloride reactors and associated process equipment from applicability of the standard if the reactors are used for research and development and have a capacity of no more than 0.19 m^3 (50 gal). The figure 0.19 m^3 (50 gal) was selected because it distinguishes between research and development equipment that is generally found in the laboratory and that which is found in pilot scale facilities. The emissions from the laboratory scale facilities are relatively small and application of the controls required by the standard would be impractical and expensive. Reactors greater than 0.19 m^3 (50 gal) in size but no more than 4.07 m^3 (1100 gal) are required to meet the 10 ppm emission limits for reactors, strippers, monomer recovery systems, and mixing, weighing, and holding containers. Research and development equipment in this size range would encounter technical problems in meeting other parts of the standard. For most resins meeting the reactor opening emission limit involves reducing the number of reactor openings. In research and development the reactors have to be opened after every batch for thorough cleaning. With regard to the stripping requirements, one of the purposes of research and development is to gain an understanding of the conditions which need to be carried out during the stripping operation for a particular resin to meet the standard. The first part of the research involves development of a marketable product. A later phase involves development of the stripping conditions for the resin. Each batch in a research and development reactor could not be expected to meet the stripping limitations. Averaging would not help because typically only one or two batches are made daily.

The figure 4.07 m^3 (1100 gal) was selected as an upper cut-off limit because there are no commercial reactors below this size.

An exemption for research and development equipment in ethylene dichloride-vinyl chloride plants is not needed. Most research at these plants involves the oxychlorination process. Requiring pilot scale oxychlorination processes to meet the stack standard is consistent with requiring research and development equipment in polyvinyl chloride plants to meet the 10 ppm limits. The fugitive emission limits apply only to equipment "in vinyl chloride service."

Since the equipment in the oxychlorination process is not "in vinyl chloride service," the fugitive emission requirements would not apply to the research and development equipment.

Quality control facilities do not need to be exempted, because they are not covered by the standard. Equipment which is not specifically named by the standard (e.g., reactors, strippers, oxychlorination process, etc.) would not have to be controlled.

2. VC-25

Comment: Copolymer resin plants manufacturing resins with less than a 50 percent vinyl chloride content should be regulated as any other polyvinyl chloride resin plant is regulated. EPA should, however, clarify the application of the proposed standard to operations involving vinyl chloride use on an intermittent basis. On any given day, our plant may manufacture copolymers containing vinyl chloride or it may be manufacturing an unrelated material. Vinyl chloride monomer will be stored on the premises permanently though use is intermittent. EPA should not require records, tests, and reports for the whole operation of the plant, except when vinyl chloride is being used. Each production run of a latex containing vinyl chloride should not be counted as a new source and a reactor line should not have to be requalified via emission tests and an initial report each time a production run is made.

processes are a much larger percentage of the total emissions from an average plant that the oxychlorination process is. The incinerator tested by EPA is controlling the ethylene dichloride purification and vinyl chloride formation and purification process and meets the 10 ppm limit.

4. VC-18

Comment: During formation of vinyl chloride, there is a column to separate by-product HCl from the vinyl chloride. The HCl overhead in this column is ducted to the oxychlorination process. During upsets of this system, HCl must be vented to the atmosphere. This stream contains about 30 ppm of vinyl chloride. We estimate this venting occurs about five times per year releasing 12.15 kg (27 lbs) of vinyl chloride per year. Removing this small amount of vinyl chloride will increase the cost of our control device $500,000. This stream should be exempted from §61.63(a).

Response:EPA has discussed this problem with two other companies. Both of these companies avoid venting the HCl stream to the atmosphere by operating the cracking furnaces only when the oxychlorination process is operating.

5. VC-35

Comment: The 10 ppm limit for vinyl chloride emissions from the various control equipment should specifically mention that it is to be determined prior to mixing with other gases.

Response: On October 14, 1975 (40 FR 48299) §61.17 was added to Subpart A - General Provisions of Part 61. Section 61.17 (entitled "Circumvention") prevents an owner or operator from building, erecting, installing, or using any article, machine, equipment, process, or method, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Dilution would be a method of concealing an emission which would otherwise constitute a violation of an applicable standard.

6. VC-18, VC-21, VC-25, VC-29, VC-34

Comment: An averaging time of 30 days should be provided for the 10 ppm limit for stack emissions. Otherwise multiple back-up systems will have to be employed at a grossly disproportionate cost in order to meet the 10 ppm limit on an instantaneous basis.

Response: The standard does provide for an averaging time of at least three hours. Section 61.67 states that an emission test is to consist of three runs. Each run is to be an hour in length. The continuous monitor provides an indication of instantaneous emissions, but will not be used to determine compliance.

3. VC-27

Comment: The preamble to the proposed standard states that "... as technologies using less energy for controlling the oxychlorination reactor are developed, EPA will evaluate the desirability of proposing standards which would require a higher degree of control at all plants." The possibility of more stringent regulation as technologies might develop forces serious evaluation of the prudence of current prompt investment and emission control efforts which might be rendered obsolete in the future, without due consideration of ambient air emission levels then existent and further assessment of the results of substantial efforts now underway to quantify health risks at very low exposure levels.

Response: It is EPA's responsibility to examine new technology as it is developed and revise its standards accordingly. If EPA developed a more stringent standard for the oxychlorination reactor, it would also look at the impact of adopting that standard for existing plants. Depending on these impacts, EPA may apply the standard only to new plants by developing the standard under section 111 of the Act.

2.4.3 §61.64(a)(2)

1. VC-29, VC-22

Comment: The inclusion of the words "is open and" in the last sentence of §61.64(b), (c), and (d) is inconsistent with the wording "before opening" in §61.65 (b)(6)(i) to which this sentence applies. For clarity and to resolve this discrepancy, the last sentence of §61.64(b) should be reworded as follows: "This requrement does not apply to equipment that meets the requirement in §61.65(b)(6)(i)."

Response: The commentator's suggestion does not appear to clarify the sentence. This is exemplified by inserting his suggestion in the last sentences of §§61.64(b), (c), and (d). They would then essentially read as follows: "The 10 ppm requirement does not apply to equipment that before it is opened the quantity of vinyl chloride is to be reduced so that the equipment contains no more than 2.0 percent by volume vinyl chloride ... etc. The intent of the last sentence of §61.64(b), (c), and (d) is to say that the 10 ppm requirement does not apply to equipment that is open and has already met the requirement in §61.65(b)(6)(i) before it was opened. In other words, the standard does not apply to equipment which is not in operation. In the promulgated standard, the last sentence in the proposal §61.64(b) has been changed to: "This requirement does not apply to equipment that is open and out of operation and that met the requirement in §61.65(b)(6)(i) before it was opened."

resins. EPA also recognized in the preamble to the proposed standard that achievement of the requirements for dispersion resins depends on development of more advanced control technology in the period subsequent to the promulgation of the standard and prior to the effective date of some of its provisions.

Extensive scientific research is presently being conducted to develop this control technology and these efforts have been successful for many dispersion resin products. However, after more than ten months of concentrated research, there still remain several dispersion resin products which cannot be stripped to 2000 ppm residual vinyl chloride. Stripping capability for these dispersion resins range from 3000 to 10,000 ppm residual vinyl chloride. It now appears uncertain that sufficient time remains to allow development, engineering, equipment procurement, installation, and demonstration of the necessary stripping equipment within the maximum compliance time. Due to these factors, EPA should give additional consideration to the standard for dispersion resins prior to promulgation of the final standard.

Specifically, the industry requests the allowable residual vinyl chloride content of certain dispersion resins to be set at 6,000 ppm. The specific dispersion resins to which this 6,000 ppm limit should apply shall be based on a manufacturers demonstration that specific resins cannot be stripped on a commercial scale of 2,000 ppm. The industry pledges its efforts to continue researching methods of stripping all dispersion resins to a residual vinyl chloride level of 2,000 ppm or less and invites EPA to reevaluate the status of dispersion resin stripping technology in mid-1978 and to amend the regulation as appropriate.

Response: EPA also recognized in the preamble to the proposed standard that some grades of resins are more difficult to strip than others. Therefore, rather than requiring that each grade of dispersion resins be stripped to 2,000 ppm, the proposed standard permits industry to average different grades of dispersion resins together over a 24-hour period. Only one of the eight manufacturers of dispersion resins specifically commented that the dispersion resin standard should be made less stringent. Only two of several grades of dispersion resins made by this company cannot meet the 2,000 ppm limit. In considering this information and the information obtained prior to proposal of the standard, EPA has decided that making the standard less stringent is not warranted.

chloride in the dispersion resin. These emissions can be controlled in two ways. Either more vinyl chloride can be stripped out of the resin or control equipment can be placed on the stack. As explained in the preamble to the proposed standard, dispersion resins are more difficult to strip than other resins. Also, a different kind of dryer is used in the manufacture of dispersion resins than is used for other resins. This dryer uses larger volumes of air than the other dryers. A control device reducing the effluent to a given concentration therefore does not reduce the mass emissions from a dryer at a dispersion resin plant as low as at other resin plants. At dispersion resin plants, add-on control devices achieve about the same degree of emission reduction as stripping to 2,000 ppm. So there is no advantage to requiring add-on controls. The costs of add-on controls at an average dispersion plant is significantly higher than improved stripping. For improved stripping, the installed capital cost is $3,319,000 and the total ammualized costs is $1,363,000. For incineration, the installed capital cost is $5,287,000 and the total annualized cost is $4,892,000.

EPA investigated the possibility of reducing the air volume from dispersion resin dryers by a recirculation system. This does not appear to be a practical solution.

In regard to special handling for dispersion resins, when the processing (drying) of dispersion resins is completed, the product contains no more residual vinyl chloride than other resin types. There is no provision under section 112 of the Act for setting up a schedule for reducing vinyl chloride levels in dispersion resins. EPA can, however, review the status of control at a later time and revise the standard as appropriate.

4. VC-40

Comment: Allowing averaging of different resin grades is unfair to a small polyvinyl chloride plant that makes only one resin grade. The resin made by this company is a copolymer and is more difficult to strip than homopolymer. Other producers have the flexibility of being able to average together homopolymers and copolymers.

Response: EPA agrees that the averaging concept does favor the larger plant making a variety of resin grades. However, EPA contacted another company which manufactures the same copolymer as the commentator. This copolymer is essentially the only resin produced at one of its plants. The company reported wide variations among batches with regard to the degree of stripping that is achieved. However, over a 24-hour period there are a large number of batches produced and the average of all batches consistently meets the 400 ppm limit. Differences in recipes used at different plants, however, can affect the stripping levels achieved. Considering this information and the fact that the averaging concept does provide needed flexibility for the industry as a whole, EPA has not removed the provision for averaging from the standard.

7. VC-28

Comment: The preamble to the proposed standard suggests that stripping technology can be developed within two years following promulgation of the standard. This assumes that a plant can get a waiver of compliance. There is no guarantee that an existing plant can obtain a waiver. Also, newly constructed plants cannot obtain waivers and would have to meet the 2000 ppm limit within 90 days of start-up. This would deter construction of new plants.

Response: It is true that there is no guarantee that a waiver would be granted to allow the development of stripping technology for dispersion resins. However, it is likely that EPA would grant resin manufacturers the maximum two years to comply with the stripping part of the standard if they complied with the other provisions of the standard and reduced the vinyl chloride levels in the resin as much as possible in the two year period. This was a consideration in EPA's decision to base the standard on developing technology rather than on technology available at the time that the standard was being developed.

With regard to newly constructed plants, it is true that section 112 does not provide for waivers of compliance. A "new source" is defined in §61.02 of the General Provisions as a stationary source, the construction or modification of which is commenced after the proposal of the standard. The owner or operator constructing a new source would therefore be aware of the requirements of the standard before construction is commenced. Whereas the owner or operator of an existing source would have to retrofit a plant to meet the standard, it would appear that the owner or operator of a source undergoing construction can more readily design that source to meet the standard. It seems appropriate to prohibit newly constructed sources from operating out of compliance with the standard.

8. VC-13, VC-18, VC-21, VC-29

Comment: The intent of the standard is that once the polyvinyl chloride resin has been stripped to 400 or 2000 ppm, as appropriate, all of the emission requirements from that point on in the process have been met. Two changes in wording should be made to make the standard consistent with this intention.

First, after the resin has been stripped to 400 ppm or 2000 ppm, the plant owner or operator should be able to open the stripper with the resin in it without having to meet the "opening of equipment" requirement in §61.65(b)(6). The vinyl chloride which escapes from the resin into the vapor space above the resin should be exempted from meeting the "opening of equipment" requirement.

is stripped. Measuring the residual vinyl chloride in a sample of stripped resin is much easier than measuring the emissions from multiple sources following the stripper, and provides the same information.

11. VC-21, VC-22, VC-25, VC-29, VC-31, VC-35

The proposed standard requires that in the case where 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."

VC-21, VC-22, and VC-29 request that the 8-hour requirement be changed to 24 hours. The rationale for this request is that instrument charts for a continuous stripper reflect adequately the degree of control attained over the process, and in a system operating properly, a single sample per day is adequate.

VC-25 requests that for batch stripping one sample be taken at random for each eight hours of operation. The rationale for this request is that the proposed standard discriminates against a plant which strips batchwise as opposed to a plant which has continuous stripping. The plant with batch stripping would have to analyze more samples.

VC-31 requests that samples be required only once per day.

According to VC-35, there are no criteria or guidelines provided for determining the number of strippers and samples and the types and grades of resin to be sampled for each individual plant. Therefore, the standard is vague and may be left open to negotiation.

Response: The proposed standard requires that the vinyl chloride in the stripped slurry samples be measured both during the initial emission testing within 90 days of the effective date (unless a waiver of compliance is obtained) and on a continuous basis. There are no criteria or guidelines provided for determining the number of strippers and samples and the types and grades of resin to be sampled during the initial testing periods. At one time, EPA considered requiring one sample of each grade and type of resin manufactured at the plant. However, this could be disruptive to production schedules and does not seem necessary because of the continuous sampling required. For the continuous sampling, there are specific requirements. One sample is to be taken for each batch of each grade and type of resin stripped. One sample is required for each batch of resin stripped because the degree of emission reduction achieved through stripping is primarily dependent on the procedures carried out rather than a control device. The vinyl chloride levels in the stripped resins are permitted to be averaged over a 24-hour period. A daily resin sample would give no assurance that the 24-hour average level was being met on a continuous basis.

2.4.5 §61.65(a)

1. VC-21, VC-26, VC-29, VC-31

Comment: A zero emission limit is proposed for relief discharges which can be prevented. According to the preamble to the proposed standard, operator error is to be considered preventable. This statement goes beyond normal legal responsibility based on negligence. A plant manager may be held responsible only if an operator is improperly trained. Errors in human judgment, however, are beyond complete prevention.

Response: Whether an operator error will be considered preventable or not will have to be decided on an individual basis depending on the surrounding circumstances. Examples of preventable operator errors would be errors due to lack of training or negligence.

2. VC-42

Comment: It is recommended that §61.65(a) on relief valve discharges be amended to require that all relief valves in vinyl chloride service in ethylene dichloride, vinyl chloride, and polyvinyl chloride plants be required to discharge to flares capable of combusting all vinyl chloride received.

Response: There are several ways of limiting relief valve discharges to the atmosphere. One of these is flares. EPA is concerned only that these discharges are eliminated. If a plant successfully employs other methods to prevent the discharges, there is no apparent reason to require flares in addition to the other methods.

3. VC-20

Comment: EPA should require the owner or operator to report by telephone any emergency discharge into the atmosphere from relief valves immediately rather than within 10 days, to be followed by a complete written report of the accident within 10 days.

Response: There is no apparent benefit to be gained by requiring the plant to immediately report a discharge. This would not result in reduced emissions or reduced community exposure. Enforcement action would await the written report in 10 days anyway.

4. VC-18

Comment: Thermal relief valves activate very seldom and emit little vinyl chloride when they do. Some of these are located in remote parts of the plant and can be tied into a control device only with difficulty. The benefit for doing this will be insignificant. EPA

5. VC-24

Comment: §61.65(a) should be amended to clarify that the term "emergency relief discharge" includes steps necessary to repair damage occurring as a result of such discharges and that such steps should not be subject to the emission limitations contained in the regulations. For example, a rupture disk will be damaged as a result of a discharge from an emergency system. Steps taken to replace the rupture disk could involve evacuation of a portion of the vinyl chloride remaining in the equipment. The limitation upon emissions from opening of equipment should not apply to this situation.

Response: Steps necessary to repair damage occurring as a result of emergency relief discharges are not exempt from emission limitations contained in the regulations. Emergency relief discharges are discharges which cannot be prevented. Steps taken to repair damage after a discharge are deliberate and planned and the emissions can be prevented or at least reduced.

6. VC-39

The proposed standard defines "emergency relief discharge" as a discharge which could not have been avoided by taking all available measures to prevent the discharge." (Emphasis added) Our contention is that our facility contains sufficient features to satisfy the "all available measures" provision. The following is a summary of the features in our polyvinyl chloride plant which collectively prevent reactor relief valve discharges.

1. Computer control with automatic transfer to back-up computer.

2. Total back-up analog instrumentation with the "bumpless" transfer.

3. Two sources of electric power.

4. Two emergency generators.

5. Automatic restart of critical motors following a power interruption.

6. A 200,000 gallon reservoir of refrigerated water for controlling reactor temperature.

7. Inverter powered control of instruments and computer.

8. Computer actuated chemical system for stopping the polymerization reaction.

9. Computer controlled peak shaving system for reduction of excess reactor pressure.

10. Use of a reactor size vessel in the recovery system for collection of gas surges and thus prevention of reactor over-pressuring.

2. VC-31

Comment: The requirement for loading and unloading lines should not be applied to pipeline delivery of vinyl chloride. To obtain a residual of as little as 0.0038 m^3 (0.13 ft^3) of vinyl chloride in a substantial length of pipe would be exceedingly difficult. Moreover, it does not seem necessary since they are not disconnected and opened with each loading and unloading.

Before opening a pipeline to make repairs (necessitated by a leak or corrosion, for example), the line is purged and drained of its contents to eliminate fire hazards. This is done by evacuating the residual vinyl chloride vapor in a long pipeline below 2 percent of its volume, except by venting to the atmosphere. Achieving the 0.0038 m^3 residual level would require the installation of a number of valves. Proper design, however, requires that the number of valves be kept at a minimum, since valves are a principal source of fugitive emissions in a pipeline.

The standard for unloading lines and loading lines should be changed so that the vinyl chloride has to be reduced to 0.0038 m^3 or 2 percent, whichever is greater.

Response: Since pipelines are not opened on a routine basis, the standard has been revised to exclude them from meeting the requirement for unloading and loading lines in §61.65(b)(1). When pipelines are opened, they are required to meet the opening of equipment standard in §61.65(b)(6).

(1) The emissions from a single mechanical seal pump are very small. An average single pump with a single mechanical seal and handling refined vinyl chloride would emit only 0.0033 percent of the 16 kg/hr which EPA calculates an average plant will emit after the standard is in effect. A single pump with a single mechanical seal pumping a liquid containing 10 percent by weight vinyl chloride would emit 0.00033 percent of the target 16 kg/hr.

(2) Single mechanical seals have a reliability factor of 0.90 - 0.95, if properly fitted for vinyl chloride service. Double mechanical seals and their attendant flush holders, filters and gauges are estimated to have an overall system reliability of 0.70 - 0.80. To insure the integrity of the overall unit, redundancy of such pump systems would be required, with comparatively insignificant reduction of vinyl chloride emissions estimated to result.

Mechanical seal systems on resin slurries and solutions are even more prone to failure than average because the resinous materials tend to foul the pressure springs and the moveable seal face preventing proper automatic wear adjustment. The proposal to limit the use of double mechanical seals for liquids containing 50 percent or more vinyl chloride would exempt resin slurry or solution pumps from regulation.

(3) In the case of pumps required to transfer specification quality vinyl chloride through pipelines in the process unit or in loading operations, the inclusion of minute quantities of "an environmentally acceptable fluid such as ethylene dichloride" designed to flow into the pump, not out of the pump," would obviously contaminate the product and require purification facilities to remove such impurities or the use of alternate means to preclude the possibility of product contamination. Such measures would be expensive and create operation monitoring parameters now not envisioned, with further high costs attendant with them.

Response: EPA is aware that each fugitive emission source, such as one pump, taken by itself causes relatively small emissions. Fugitive emissions considered as a whole are a significant source of emissions, and the goal of the standard is to reduce these.

The 10 percent figure was selected as a means of distinguishing between equipment which handles vinyl chloride and that which does not.

Double mechanical seal pumps are used industry-wide for emission reduction. Where these pumps are not applicable, sealless pumps have been used.

relief valves may reduce leaks. However, in EPA's judgement relief valves do tend to leak more than rupture discs, and the addition of the rupture discs will reduce emissions. Preventing the leaks from relief valves in the first place appears to be a more efficient way of reducing emissions than detecting the leaks after they have already occurred.

In regard to the second point that pieces of a fragmented rupture disc can wedge relief valves open, modern rupture discs are designed so they do not fragment. Knife blades can be placed above the disc or the disc surface can be scored. When pressure is exerted on the disc, the disc divides into equal pie-shaped sections without fragmenting.

A slow leak between the rupture disc and the relief valve can be detected with a pressure gauge or by venting the space between the disc and valve and checking for leaks from the vent. Venting the space between the rupture disc and relief valve does create another potential source of emissions. However, since the rupture discs are less likely to leak than relief valves, the emissions from the vent are less than if there were no rupture disc.

3. VC-35

Comment: In addition to requiring the installation of a rupture disc between the equipment and the relief valve, a pressure gauge is recommended to be required between the rupture disc and the relief valve so that rupture disc leaks or rupture are readily apparent, especially where relief valves may not relieve, yet leakage could occur and go undetected.

Response: The use of a pressure gauge between the rupture disc and the relief valve is recommended in the SSEIS, Vol. I. Pressure build-up between the rupture disc and relief valve could prevent the relief valve from relieving when it should. Therefore, the pressure gauge is needed to protect the equipment that is serviced by the relief valve. Since the pressure gauge is needed primarily for safety reasons rather than emission control, EPA has highly recommended it but does not require it.

It is not practical to construct a gasholder or abatement device large enough to handle all of the monomer from all of the reactors in a plant or even one large reactor.

VC-25 gave an example of how manual venting was used to control the pressure and temperature in a vinyl acetate copolymer reactor when the short stop addition system failed to function. The reactor became uncontrollable at 6:20 a.m. Two additions of refrigerated water failed to restore control. At 7:35 a.m., with the pressure at (195 psi) and rising sharply, the reactor was vented to the air. The reactor rupture disc would have failed at 220 psi anyway and no later than 7:40 a.m. based on the slope of the pressure curve. The material discharged from the vent was semi-solid; thus, any vent recovery system would shortly have been inoperative and the operating status of relief valves highly questionable.

Response. The standard has been revised to allow emergency manual venting. Emergency manual venting could be used in situations like the one where a tornado damaged the safety equipment in the plant, but not in situations like the one described by commentator VC-25. In the situation described by commentator VC-25, the reactor contents could be vented to a gasholder.

and meet the 10 ppm requirement. The overall mass emissions from opening of equipment will be smaller than the emissions from stacks meeting the 10 ppm requirement, because the equipment is opened on an infrequent basis for inspection and maintenance.

The emissions from opening of equipment can be calculated. If vacuum is used, for example, the calculation would be based on the number of evacuations, the vacuum involved, and the volume of gas in the vessel. If the vessel is purged, the vinyl chloride concentration in the equipment can be measured and the total vinyl chloride emissions calculated based on the volume of gas in the vessel.

2.4.12 §61.65(b)(8)

1. VC-43

Comment: A plant operated by the commentator produces a dry, unrefined ethylene dichloride product and any vinyl chloride produced is basically a minor by-product. The requirement for a continuous leak detection system, as described in §61.65(b)(8)(i-iii) is felt to be unnecessary and would serve a very limited function when compared to its cost, installation and maintenance. A periodic, manual monitoring program would be a more equitable alternative.

Response: The leak detection program is required only for equipment in vinyl chloride service. "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. EPA has discussed this provision with the commentator. There is no equipment in this particular plant which is "in vinyl chloride service."

2. VC-31

Comment: The proposed standard does not give a clear definition of leak. By inference, any measurement by the vinyl chloride detection equipment which shows a higher background level than normal is construed to indicate a leak. A better proposal would be to define a leak as a measurement of greater than 25 ppm. This would minimize the continuous search for very small leaks which do not materially increase emissions.

Response: EPA considered including a definition for leak in the proposed standard. From an enforcement viewpoint this would be a preferable approach. However, the background concentrations in plants are expected to vary depending on the size of reactors, the age of the plant, the layout of the plant, and whether the plant is open or enclosed. The background concentrations are expected to decrease as engineering controls are implemented to meet the Occupational Safety and Health Administration standard. The higher the concentration defined as a leak, the less regulation of the smaller leaks. Twenty-five ppm is relatively high. EPA visited one newer plant which defined 0.5 ppm as a leak detection level. It is doubtful that this background concentration will be achieved at all plants by the time the standard is promulgated. Therefore, EPA has decided to define leak on a individual basis at each plant depending on the measured background concentrations.

6. VC-20

Comment: EPA should specify that companies are required to keep permanent records of the leak detection results. There should also be scheduled service, maintenance and calibration of leak detection equipment. These records must be subject to inspection upon request. EPA should also establish a level of vinyl chloride not to be exceeded and require reporting violations by the owner or operator when they occur.

Response: EPA requires that the records of leak detection results be kept for two years. The purpose of the leak detection program is to ensure that emissions from leaks are minimized by detecting them and correcting them as soon as possible after they occur. Keeping the leak detection results for longer than 2 years would not serve this purpose.

Section 61.65(b)(8) requires that each leak detection program include a calibration and maintenance schedule for the leak detection program which is acceptable to the Administrator.

The reason EPA has not established a level of vinyl chloride not to be exceeded is explained in comment number 2 in this section. The standard does not require the owner or operator to call EPA when a leak is detected for several reasons. First, the purpose of the program is to find sources of leaks and redesign equipment to reduce leakage from these sources and to correct leaks that do occur as soon as possible. A plant owner does not violate the intent of the standard by having a leak, but by not correcting the leak. EPA expects leaks to occur. Also, leaks occur relatively frequently and it would be burdensome for both the plants and EPA if all the plants called EPA when a leak occurred.

3. VC-23

Comment: EPA proposes to limit the concentration of vinyl chloride in inprocess wastewater to 10 ppm or less. However, EPA has not sufficiently investigated the more attractive possibility of recycling inprocess wastewater.

Response: The 10 ppm limit provides incentive for recycling because of the cost involved in treating the water. See Section 2.8, Comment No. 1.

4. VC-14

Comment: As noted in the preamble, steam stripping is the most suitable device for reducing vinyl chloride in inprocess wastewater. Section 61.65(b)(9) requires that the overhead from the stripper be routed to a furnace for further treatment. Neither does the data contained in the SSEIS, Vol. I support, nor do we know of any data which supports, the achievement of a 10 ppm bottoms stream from a stripper which is also producing an overhead product suitable for incineration. The standard should be revised to require the concentration of vinyl chloride be reduced to 25 ppm instead of 10 ppm.

Response: If the overhead from the stripper alone cannot support combustion, it can be blended with concentrated hydrocarbon wastewater streams or supplemental fuel. It is not apparent how revising the standard to 25 ppm would solve this problem.

5. VC-37

Comment: Activated carbon is available as a method for reducing vinyl chloride concentrations in wastewater. A reliable manufacturer of resins who develops systems on a proprietary basis has informed me that a pilot plant has been effective in cleaning up ethylene dichloride (a closely related material) from water. With 0.2 percent (2000 ppm) in the intake wastewater they were able to clean the water up to 0.05 ppm and steam off the catch for reuse of the product gas and reuse of the resin. Because no bench or pilot tests have been run with vinyl chloride in wastewater, it is important that work be done at once with vinyl chloride.

Response: EPA appreciates the information provided by the commentator. Before making the emission limit for inprocess wastewater more stringent, and in effect requiring activated carbon as the control measure, as suggested by the commentator, EPA would have to conduct studies on the effectiveness of activated carbon on reducing vinyl chloride concentrations in water. This would delay standard setting. EPA may conduct these studies at a later date. Meanwhile plants could employ activated carbon instead of waste stripping to meet the standard.

2.5 Testing, Reporting, Recordkeeping

2.5.1 §61.67

1. VC-13, VC-21, VC-26, VC-27, VC-29

Comment: Section 61.67(c) of the Emission Tests should be amended to eliminate the requirement that emission tests be conducted under the maximum production rate at which the equipment will be operated. The reason for the requested change is that the maximum production rate of a plant under optimum conditions may not be feasible or safe at the time of the test. Flexibility under conditions existing at the time must be allowed to insure that operator safety and public welfare is protected. Unique operating constraints may also require that tests be performed at levels well below maximum rates, owing to individual processes, which would require the Administrator's approval.

Response: The only scheduled emissions test is the initial test that is required to show that the plant is in compliance. After that, tests are performed only at the request of EPA. Since tests are likely to be required relatively infrequently, it does not seem unreasonable to request a plant owner to schedule his operations as required for the test. The purpose of the test is to observe whether the control equipment is sufficient to keep the emissions below the standard when it is operating at its peak load. If the standard is met under these conditions, it can be reasonably assumed that the standard is being met on a continuous basis. It should be noted that testing is not required during maximum operation of the equipment, but only "while the equipment being tested is operating at the maximum production rate at which the equipment will be operated." (emphasis added)

2. VC-11

Comment: In regard to the 10 ppm concentration standard for several of the stack emission sources, including the specifications for averaging time, oxygen content, and moisture content would clarify compliance determination.

Response: The averaging time is specified indirectly through Test Method 106. Section 61.67(a)(g)(1) specifies that Test Method 106 is to be used for those emission points that have a 10 ppm concentration limit. Test Method 106 requires that an integrated bag sample be collected for a minimum of one hour three times. This means that the emissions are averaged over a period of at least three hours. A specification has been added to the promulgated standard which would require that a time-weighted average be used, if the three runs are of different length. In the proposed standard, the concentration of vinyl chloride was to be corrected to 10 percent oxygen (wet basis) if combustion were used as the control measure. In the promulgated standard, this requirement has been expanded to all control measures.

6. VC-13, VC-18, VC-21, VC-22, VC-25, VC-27, VC-29

Comment: Section 61.67(e) requires that emission test results are to be determined within 30 days after the emission test and that the determinations are to be dispatched to EPA by registered mail the day following receipt of the determinations. This requirement should be changed so that the determinations are required to be reported to EPA by U. S. mail postmarked within 15 days following the determination. There is no urgency in reporting such data and, given the present state of our postal delivery system, there is no reason for registered mail.

Response: A source is supposed to be in compliance with the standard within 90 days of the promulgation of the standard. The proposed standard requires that the emission tests be done within the 90 day period, and permits an extra 30 days for determination of results. It seems unnecessary to allow two more weeks to mail the results. The purpose of using registered mail is to document the fact that emission data have been sent and received. This way if the results are lost in the mail, there will be no question that they were sent.

7. VC-13, VC-21, VC-22, VC-26, VC-27, VC-29, VC-30

Comment: It is recommended that paragraph (c) be changed so that a general rather than a detailed description of the method used or the procedure adopted to insure compliance with the standard is required. For many abatement systems employed in the industry, detailed descriptions of the equipment, the operating conditions, and the functional characteristics of the equipment are trade secrets and, in many cases, patentable technology. The use of this technology by other parties should be on a technology-fee basis which is established by the company developing the abatement equipment. If EPA would like additional information concerning the system, a section 114 request under the Clean Air Act would be an appropriate approach.

Response: The promulgated standard has been revised to require a "description" rather than a "detailed description." EPA agrees that a detailed description is not necessary in the initial report. Additional information can be gathered as necessary under section 114 of the Act or through inspection. If EPA does request information of a proprietary nature, the Clean Air Act does provide for an owner or operator to request confidential treatment of that information.

2.5.3 §61.69 as proposed or §61.70 as promulgated

1. VC-13, VC-21, VC-27, VC-29

Comment: Section 61.69(b)(1) requires a report 180 days after the effective date, while §61.68 requires a very comprehensive initial report 90 days after the effective date. The magnitude of these two reports is such that the allowable time is insufficient, and it is unlikely that all the facilities and procedural approvals required for the semi-annual report will be available immediately after the effective date. It is requested that §61.69(b)(1) be amended so that the first semi-annual report is due 270 days after the effective date or 180 days after the initial report, whichever comes first..

Response: The standard has been revised so that the first semi-annual report will not be due for at least 180 days after the initial report. All semi-annual reports will be due on March 15 and October 15. The first semi-annual report will be due after the first full semi-annual report period has past since the initial report was received. As an example, if the initial report is received by EPA on September 15, the first semi-annual report will be due the following March 15.

2. VC-29

Comment: To clarify the intent of the standard, §61.69(c)(2) should be changed by substituting the words:

"(2) The owner or operator shall include a summary of the analytical results on the stripped resin. Test Method 107 or equivalent is to be used."

Response: Clarifying changes have been made to this paragraph.

3. VC-23

Comment: The monitoring and recordkeeping requirements in the proposed rules appear to be adequate.

Response: No response necessary.

4. VC-13, VC-22, VC-29

Comment: The standard requires that the vinyl chloride levels in stripped resin be measured for each batch. It also requires that the vinyl chloride in reactors be measured each time they are to be opened. The preamble to the proposed standard suggested that for both reactor opening and improved stripping, it is possible over time to establish a relationship between the emissions measured and certain operating parameters. The general provisions and the proposed standard provide for waiver of emission tests and use of

2.6 Test Methods

1. VC-13

Comment: Method 106 was designed for isokinetic sampling of dusts and mists, not for sampling of gases. Appropriate changes are in order.

Response: Apparently, the commentator failed to read Method 106, as it has nothing to do with isokinetic sampling.

2. VC-14, VC-44

Comment: Test Method 106 is a very detailed testing procedure, capable of determining mass emission rates from equipment. The use of this elaborate procedure where only a concentration determination is required is burdensome and unnecessary.

A properly calibrated detector for vinyl chloride can make this determination with greater ease and equal precision for purposes of this section. We request that this section be modified to allow emission concentration limits to be measured with a calibrated vinyl chloride detector where emission limits are prescribed in section 61.62(a), 61.63(a) and from the control system.

Response: Method 106 yields an emission concentration only, not a mass emission rate.

Specification of Method 106 implies that an averaged emission concentration determination is required for a minimum period of one hour for each of three runs. Since it would be difficult to specify the correct number of instantaneous readings necessary to replace a single averaged value for each of the great variety of sources covered by the vinyl chloride standards, the integrated sample approach must remain the reference method. However, it is envisioned that individual sources may wish to develop data to substantiate the equivalency of instantaneous sample data for their processes. This data would consist of enough duplicate instantaneous/integrated sample data to be able to statistically determine how many instantaneous data points spread over a minimum period of one hour would be required for the average to not be statistically different from the integrated average values at the 95 percent confidence level. The conditions set forth in §61.67(g) would still apply with regard to any subsequent dispute over equivalency.

7. VC-17, VC-29

Comment: Regarding 5.3.2,in Test Method 107, Supelco, Inc., Supelco Park, Ballefonte, Pennsylvania 16823, recently announced that they are discontinuing Carbopack A. However, they say that 0.2 percent Carbowax 1500 on Carbopack C gives the same separation of vinyl chloride as 0.4 percent Carboway 1500 on Carbopack A.

Response: Carbopack C will also be listed in 5.3.2.

8. VC-17

Comment: Regarding 7.2.1 and 8.1 of Test Method 107, we cannot see why water is added to dry resin samples and to the calibration vials. It seems more logical to run the calibration standards and dry resin samples without water and to use Equation 107-4 when water is present in samples.

Response: If any water is present in the sample, the water elutes from the gas chromatograph column in a broad band, encompassing the time the vinyl chloride is eluted. As the water affects the sensitivity of the flame ionization detector, it was thought best to add enough water to every "dry" sample to have a water vapor saturated gas sample for the gas chromatograph thus insuring a reproducible amount of water vapor in each sample.

9. VC-17

Comments: The constants in Equations 107-3 and 107-5 of Test Method 107 could not be generated from Equation 107-2 and 107-4, respectively.

Response: A value for V_g of 23.5 was used instead of $23.5 - \frac{M_t}{1.4}$ as published.

The equations were correct as published, except brackets were missing in Equation 107-5 (See comment number 21 in this section).

10. VC-18, VC-27

Comment: Concerning §61.61(n), the definition of portable hydrocarbon detector, the two recommendations are to relax the sensitivity requirement from the proposed 5 ppm to 10 and 20 ppm, respectively.

Response: The definition of portable hydrocarbon detector has been revised to relax the sensitivity requirement to 10 ppm. Based on information supplied by Commentator VC-27, analyzers with a sensitivity of 5 ppm "are extremely delicate and require a high level of maintenance and considerable redundancy of units would be required." The standard requires that a portable hydrocarbon detector be used to detect leaks and measure vinyl chloride concentrations in equipment before opening it. In both cases an instrument with a sensitivity of 10 ppm will be adequate.

14. VC-27

Comment: The isothermal method of operation in Test Method 106 is fine for "air samples" but in analyzing vent streams up to 2 hours would be required for one analytical run. Analyzing each sample to ± 5 percent might require 6-8 hours of analysis to get a repeat on one sample. For several samples taken the same day there would be an inordinate amount of time for analysis. We would suggest duplicate runs in a temperature-programmed mode of operation.

Response: With proper care, temperature programming of the gas chromatograph operation should facilitate analysis, and is not meant to be precluded by absence of a description in the test method.

15. VC-27

Comment: The daily calibration curves required by Test Method 106 are unnecessary. A calibration curve run once for linearity and one standard daily check should maintain quality control on the instrument. Our experience has shown that vinyl chloride factors on a flame detector are valid for several months.

Response: If Method 106 tests are run on a routine basis, experience may show that daily calibration is unnecessary; however, for limited applications, the daily calibration would be advised.

16. VC-27

Comment: The leak-proof rigid containers described in 4.1.5 of Test Method 106 are the size of a 40 gallon drum and would be extremely difficult and hazardous to move to the top of a vent scrubber, out of a tank farm, etc., and would pose serious operator problems for sample-point logistics. Alternative considerations should be reviewed.

Response: Since Method 106 is only rarely used, the on-site disadvantages of the bag container should not constitute a major problem. For discussion of replacement of the integrated sample procedure, see comment VC-14.

17. VC-27

Comment: Only one specific column material is allowed in 4.3.2 of Test Method 106. This should be revised to permit use of any column which results in adequate resolution and determination of the vinyl chloride peak.

Response: Chromosob 102 is the only column which EPA has investigated to determine possible interferences, etc., for the analysis of vinyl chloride. It is expected that other columns may work equally well, but substantiating data must be provided to EPA before equivalency can be determined.

23. VC-35

Comment: Detailed performance specifications should be given for the vinyl chloride detector, and should be similar to those given where monitoring is required in Part 60 (Standards of Performance for New Sources).

Response: The promulgated standard requires that the monitoring system consist of a gas chromatograph; or if it is assumed that all hydrocarbons measured are vinyl chloride, infrared spectrophotometry, flame ion detection, or an equivalent method may be used. The standard included this flexibility so that if a plant has purchased a monitoring system for purposes related to the OSHA standards, it would not have to purchase a new system to meet the EPA standard. A gas chromatograph is 100 percent accurate if calibrated properly. EPA has developed some criteria for judging the adequacy of a plant's calibration and maintenance schedule for the monitoring system. These will be included in an enforcement guidelines document.

24. VC-35

Comment: The sampling procedure in paragraph 6.1 of Test Method 106 is not clear. The description of the sampling procedure in paragraph 6.1 and the drawing in Figure 106-1 do not include correct instructions for purging the sample line prior to sampling. If the instructions are followed as proposed, erroneous results will be obtained because the purged air will be drawn into the sample bag. Paragraphs 4.1.3 and 6.1 and Figure 106-1 should be changed.

Response: The procedure is correct as written. While the sample line is purged into the bag, the bag is subsequently evacuated before sampling commences.

25. VC-35

Comments: Four typographical errors are noted.

Response: These corrections have been made.

26. VC-42

Comment: A specialized procedure is described in §61.67(g)(1)(i) for use in sampling the emissions due to purging of vinyl chloride from reactors after a batch is completed.

Response: EPA calls this reactor opening emissions and has specified a method separate from the stack test method for testing these emissions. See §61.67(g)(5).

30. VC-50

Comment: Commentator VC-50 has found that on a Chromosorb 102 column using helium carrier gas, acetaldehyde has the same retention time as vinyl chloride and vinyl chloride cannot be distinguished from acetaldehyde unless the effluent from the column is fed into a mass spectrometer. It is therefore recommended that unless acetaldehyde is positively known to be absent from the stack gas, a different column be used.

Response: Section 3, "Interferences," of Test Method 106 will be reworded to include specific precautions regarding acetaldehyde interference.

firms and one EPA contractor. The commentator's estimate was one of the estimates used by EPA to develop the basic algorithm.

4. VC-26

Comment: The description "Allied Chemical/Geismar" used in Tables 7-24 through 7-32 should be changed to "Allied Chemical/ Baton Rouge". The production capacity attributed to Allied Chemical in the STAR document is incorrect.

Response: No response necessary. This comment serves as a correction.

5. VC-26

Comment: EPA estimates for control costs at the Allied Chemical/ Baton Rouge facility are lower than current company estimates.

Response: The total cost for the Baton Rouge plant is obtained by adding the costs incurred at the ethylene dichloride plant (Table 7-17) with the costs incurred at the vinyl chloride plant (Table 7-24). If this is done the total air pollution control costs are estimated to amount to $889,000 and total water pollution control costs are estimated at $1,775,000 for a grand total of $2,664,000 versus the company estimate of $2,260,000.

6. VC-27

Comment: The view that large, integrated petrochemical and chemical companies would supposedly have access to sufficient capital to invest in control devices is inappropriate without consideration of other company projects competing for capital.

Response: Consideration of the capital demands for competing products has been recognized. The background document states: " ... firms that own the various ethylene dichloride plants are generally large, integrated petrochemical and chemical companies that would supposedly have access to sufficient capital to invest in the additional control equipment. Whether a firm would actually choose to invest those funds in control devices, however, cannot be predicted with any degree of certainty particularly for those firms that are experiencing post-control decreases in profitability compared to the pre-control case." (Page 7-27) The intent of this statement was to point out that even though firms would probably have access to sufficient capital to invest in control devices they still might not choose to do so for profitability reasons.

11. VC-29

Comment: The estimate of capital requirements for a carbon adsorption system in the model suspension process polyvinyl chloride plant is understated.

Response: The polyvinyl chloride model plant carbon adsorption costs were based on data obtained from four sources of information: three polyvinyl chloride companies and one EPA contractor. The installed costs, when scaled to the model plant volumetric flowrates, ranged from $140,000 to $545,000. The $333,000 figure was the average of these four estimates. As this example illustrates, the EPA model plant control costs were based on data from diverse sources. They do not necessarily reflect the situation at any particular polyvinyl chloride plant, where the costs may be higher or lower for one or more reasons.

12. VC-29

Comment: The capital and operating costs for incineration are understated by a factor of two for polyvinyl chloride plants and a factor of two to three for ethylene dichloride-vinyl chloride plants.

Response: The costs for incineration at polyvinyl chloride and ethylene dichloride-vinyl chloride plants have been based on a range of data. Six information sources were employed: five companies and one EPA contractor. The installed cost [illegible] resulted from a least-squares analysis of the cost data from these six sources and is intended to represent average conditions. It is expected that some facilities would experience lower costs and some would experience higher costs.

13. VC-29

Comment: The allowance for administrative, selling, research and development, and interest costs is understated and overstates the return on investment at a given plant.

Response: Estimated costs for these items were derived after consultation with a committee composed of industry representatives. EPA sees no valid basis for alternating any of the figures that were used.

discharges and reactor opening is .31 and for water stripping is .80. Evacuation of compressors, double mechanical seals or pumps, and leak detection are included in the cost-effectiveness ratios for fugitive emissions.

15. VC-29

Comment: On Table 7-40, Tenneco/Flemington, Tenneso/Pasadena, and Union Carbide plants were omitted.

Response: The comment is correct.

16. VC-29

Comment: On Table 7-15, the total annualized cost should be $773,000 instead of $793,000.

Response: The correct number is $793,000. However, the figure of $407,000 shown on Table 7-15 should be $427,000.

17. VC-32

Comment: The number of plant shutdowns has not been accurately estimated.

Response: The number of plant shutdowns was inaccurately estimated, in that three out of four plants EPA forecasted would close have since told EPA they will not close. The fourth plant no longer produces polyvinyl chloride. Plant closures attributable to other regulations, if any, are not considered since they are not believed to be a direct consequence of the proposed EPA regulation. It would appear that the immediate cause of the closing of the Uniroyal plant is the OSHA regulation, although anticipation of the EPA regulation may have influenced the decision.

18. VC-32

Comment: The economic analysis is simplistic.

Response: The major thrust of the economic analysis is to determine the impact upon industry growth, prices, and plant closures. It is believed that these issues are treated in a full and complete manner.

19. VC-34

Comment: EPA cost estimates are low.

Examples are: (1) rubber-lined carbon-steel slurry tanks to replace stainless-steel vessels, (2) reactor opening control does not include tanks, pumps, and distribution lines for water purge or headers for relief valve vents, and (3) no scope description for improved stripping.

Response: The process scope for estimating investment costs is as follows:

1. Slurry Blend Tanks

As is stated on page 7-14 of the Standard Support and Environmental Impact Statement, the existing slurry blend tanks in the model plant are insufficient to withstand the pressure associated with venting to an incinerator. Therefore, they would probably need to be replaced.

The costs in the document were based on the following assumptions:

Each blend tank had a capacity of 24,000 gallons (3,342 ft^3).
Two tanks were installed in each reactor line.
The cost of removing an existing tank was offset by its salvage value.
The tank diameter equalled the height (16.2 feet).
The tank design pressure rating was 50 PSI gauge.
Tanks were fabricated of a carbon steel, lined with 1/4 inch rubber.
Costs were obtained from Guthrie's "Process Plant Estimating Evaluation and Control," 1974 edition, p. 151.

2. Reactor Opening Controls

As tables 7-8 and 7-9 indicate, costs for reactor purge water systems have been developed for controlling the relief valve discharge and reactor opening emission points. Each of these systems includes a storage tank for the purge water, a header system and pumps to deliver the water to the reactors.

The capital costs were obtained from two sources, both of which were polyvinyl chloride plants using these systems at the time. The costs - $102,000 and $310,000 were averaged to obtain the $206,000 figure for the model suspension plant. The dispersion plant cost ($78,000) was calculated by scaling from the suspension plant reactor capacity (90,000 gallons) to the dispersion plant capacity (18,000 gallons), using a 0.6 factor.

Although the costs of a header system for relief valve vents was not included under reactor opening controls, it was accounted for under fugitive controls (see tables 7-11 through 7-14). The cost of this

Item	Unit Value
I. Operating Labor	$6/man-hr
II. Utilities:	
1. Electric Power	$0.03 kilowatt-hr
2. Fuel (Natural Gas)	$2.00/million BTU
3. Process Water	$0.25/thousand gallons
4. Cooling Water	$0.10/thousand gallons
5. Steam	$3.00/thousand pounds
III. Operating Materials	
1. Sodium hydroxide	$0.35/pound
2. Nitrogen	$0.21/hundred cubic feet
IV. Maintenance	
1. Incineration	5% of Installed Cost/Year
2. Improved Stripping	15% of Installed Cost/Year
3. Carbon Adsorption	3% of Installed Cost/Year
4. Water Stripping	5% of Installed Cost/Year
5. Automatic Short-Stopping	5% of Installed Cost/Year
6. Automatic Short-Stopping	10% of Installed Cost/Year
7. Reactor Purge Water System	6¢ of Installed Cost/Year

24. VC-40

Comment: The economic impact of the regulation has been underestimated.

Response: A detailed company-by-company study was beyond the scope of the analysis. EPA believes that the estimation of economic impact is satisfactory.

25. VC-47

Comment: The projected capital cost of meeting all the emission standards is $198 million. Of this total, $183 million falls on polyvinyl chloride plants and $15 million falls on ethylene dichloride-vinyl chloride plants. The annualized costs (including operating and maintenance) are expected to be about $70 million, of which $58 million would be borne initially by polyvinyl chloride plants and $12 million by ethylene dichloride-vinyl chloride plants. In addition, the fugitive emission standards would involve another $37 million of capital costs and $25 million annualized costs.

Response: The statement is incorrect. The cost of fugitive emission controls is included in the capital cost estimate of $198 million and the annualized cost estimate of $70 million.

28. VC-34, VC-47

Comment: The projected costs of the standards do not incorporate any estimates of the costs associated with the research and development of control technology, lost production from down-time during control equipment installation, and losses from startup. It seems that EPA should have incorporated some estimates of these costs if the full impacts of the standard are to be identified and analyzed.

Response: The comment is correct in that research and development of control technology would add some additional costs to meeting the standard. These costs would vary considerable from plant to plant and are difficult to estimate. Losses from down-time during control equipment installation and from startup would not appear to add significantly to costs because polyvinyl chloride production is a batch process and it is not unusual for ethylene dichloride and vinyl chloride plants to be shut down for maintenance.

29. VC-34

Comment: The economic analysis fails to consider duplicate control systems needed to operate at 100 percent service factor.

Response: Costs for duplicate control equipment were not included since the control systems were designed to operate continuously with only routine maintenance. It was assumed that the maintenance would be performed during normal plant maintenance shut-downs.

30. Proceedings from the Public Hearing, Presentation by Barry Castleman, p. 9.

Comment: Some polyvinyl chloride substitutes must be available for those uses listed by EPA as having no substitutes.

Response: EPA attempted to list those materials that the industry believes to be acceptable substitutes for polyvinyl chloride resins. It is agreed that some substitutes would probably exist for all polyvinyl chloride uses, but the question of acceptability in individual applications would have to be evaluated closely.

31. Proceedings from the Public Hearing Presentation by Barry Castleman, p. 9.

Comment: The cost of vinyl chloride emissions in terms of worker health and community health and safety impacts has not been evaluated.

Response: It was beyond the scope of the analysis to attempt to quantify in economic terms the cost of vinyl chloride emissions to the general public.

required for stripping dispersion resins. Moreover, recipe water and steam stripping water do not discharge to a sewer, but rather are emitted to the atmosphere in the drying operation. Therefore, there is no increased waste water from improved dispersion resin stripping.

"For improved stripping of both suspension and dispersion resins, the quantity of steam sparged into the slurry which would result in increased water consumption is less than the 3,000-4,000 kg of steam per 10,000 kg of product stated on page 6-5. We conclude there will be no increased water consumption due to improved stripping, and no adverse environmental impact.

"The quantity of increased water consumption, as shown in Table 6-13, for water stripping is also questionable. The basis for such number is not given. It is technically possible to strip vinyl from these waste water sources by recycling such waste water sources to slurry stripping systems. By doing so, the amount of additional steam required is negligible.

"Increased water consumption data given for carbon adsorption is also questionable. First, this Table assumes carbon technology will be utilized across-the-board for the industry. Many producers certainly do not intend to use carbon adsorption. Additionally, even if carbon adsorption is used, regeneration with hot nitrogen is technically possible as noted on page 4-61. Obviously, if hot nitrogen is used, there would be no increased water consumption.

"Considering all other factors as noted above, it is questionable whether there would be any increased water consumption as a result of compliance with the proposed standard. Thus, it seems that EPA should make a more realistic analysis of the situation than it presently has done. Additionally, the percentage increase of water consumption as noted is meaningless in itself, particularly when based on the average of the range of numbers as shown in Footnote 1 of Table 6-13. The average of this range is extremely misleading and unrepresentative of industry operations for certain type of plants. When considering the range of base water consumption, the percentage increase is less than significant."

Response: Since there is no regulatory limit on the amount of water a plant can consume, EPA calculated the water consumption impact assuming that the control systems using water would be used and that there would be no recycling. It is gratifying to EPA to know that recycling will be used and that the water consumption impact will be negligible.

·esponse: Since there is no requirement to reuse the steam, it ·as assumed that no recycling is involved. EPA is pleased that ·t least the company represented by the commentator recycles the ·team.

5. VC-23, VC-35

Comment: EPA should require recycling of sludge from polyvinyl chloride plants if possible. The air emissions from sludge disposal sites have been subjected to preliminary investigation by EPA. Vinyl chloride levels at landfills were as high as 1.9 ppm, and in a residential area near one landfill the air contained 0.4 ppm. This exposure, because it is continuous, actually exceeds that permitted in the workplace (1 ppm, 8-hour exposure, 40 hours per week).

Response: The data referred to were obtained during a study done by Battelle for EPA which is entitled "A Preliminary Examination of Vinyl Chloride Emissions from Polymerization Sludges During Handling and Land Disposal" and is dated February 15, 1974. The results obtained were relatively high but it should be noted that they are instantaneous measurements. The 1.9 ppm figure cited by the commentator was measured only about 5 cm from the discharge stream during the discharge of fluid sludge to the landfill. The next highest measured value in the landfill area was 1.0 ppm. The study referred to was a preliminary study only. EPA's Office of Solid Waste Management Programs is planning to conduct a more detailed follow-up study to determine the extent of the problem. At the conclusion of that study it will be determined whether a regulation is needed, and if so, what type of controls should be required.

There are two sources of the solid wastes: (1) resin that cannot be marketed because it does not meet certain specifications, and (2) sludge removed from centrifuges and placed in ponds to separate out additional water. The vinyl chloride in sludge is primarily due to the vinyl chloride contained in polyvinyl chloride that collected in the centrifuge. Improved stripping required by this standard will reduce the vinyl chloride content of the polyvinyl chloride resin, and thus also the sludge.

On a trip to a polyvinyl chloride plant, the plant personnel stated that much of the "off-spec" resin is sold or recycled by blending it in with other batches. The plant had just recently begun to also recycle the polyvinyl chloride sludge from the settling ponds. Another company has recycled sludge when the market demand for polyvinyl chloride has been high.

8. VC-46

Comment: Pages 6-33 through 6-39 of the SSEIS, Vol. I compare the concentrations of hydrogen chloride in the vicinity of plants incinerating vinyl chloride with standards for hydrogen chloride in other countries. It is stated that EPA does not have a standard for exposure to hydrogen chloride and thereby lacks a yardstick for comparative measurement. Without further expansion, reference to ambient standards allowed in other countries should be omitted and justification should be presented for including a discussion over the ambient standards of 5 ppm which have already been established.

Response: In presenting information on environmental impacts, EPA believes that it is meaningless to report a long list of numbers without relating them to something. It would be helpful to compare them to an EPA standard. If one does not exist, it seems reasonable to compare them to standards established in other countries. These standards are based on health effects data. The 5 ppm standard referred to is for occupational exposure. All of the other standards discussed are below 5 ppm.

9. VC-46

Comment: Page 50 of the SSEIS, Vol. I discusses the caustic which would be required to neutralize the HCl collected in scrubbers. The fate and cost for disposal of the large amount of brine which would be released after neutralizing the HCl should be discussed.

Response: Neutralization of the HCl would result in sodium chloride being released into wastewaters. Since EPA has not deemed it necessary to require control of dissolved solids, there would be no additional cost associated with disposal of the sodium chloride. As discussed in the SSEIS, Vol. I, the amount of HCl that would have to be neutralized would be considerably reduced by reclaiming the HCl. HCl is a raw material used at ethylene dichloride-vinyl chloride plants.

10. VC-46

Comment: On page 6-59 of the SSEIS, Vol. I reference is made that plants could possibly reduce energy impact because they are typically located in large petrochemical complexes. The rationale for this statement should be clearly stated. Proximity to large petrochemical complexes will afford availability, but will not reduce the energy required.

Response: Incineration of hydrocarbons produces heat. The heat can be used in other processes in the plant. This provides an energy savings because otherwise the heat would have to be generated.

2.9 Process and Control Technology (Chapter 3 and 4 of Volume I of the Standard Support and Environmental Impact Statement).

1. VC-26

Comment: Furnace tubes, in the vinyl chloride conversion from ethylene dichloride, are not packed with charcoal or pumice as reported in the SSEIS, but are empty.

Response: EPA's statement was based on a draft document which is reference 6 in chapter 3. EPA now concurs.

2. VC-22

Comment: Vinyl chloride is a liquid below 7°F. It could not "float" on a pond of water as written on page 4-52 of the SSEIS.

Response: EPA concurs. The point was that the residual vinyl chloride monomer will be evaporated from the ponds, not staying in the water.

3. VC-22

Comment: Not all pressure rises can be detected by instrumentation in time to avert over-pressure conditions as stated on page 4-30 of the SSEIS.

Response: Change to "In most cases, potential problems can be quickly detected by instrumenting each reactor with temperature or pressure alarms to alert the operator to upset conditions."

4. VC-22

Comment: Gas holders cannot practically hold the vinyl chloride contained in an entire reactor batch if the reactor is large. (See p. 4-30 of SSEIS).

Response: It is technically feasible to construct a gas holder to hold the contents of the entire batch of a large reactor. At least one new plant is set up to discharge one reactor batch to another reactor and thus the second reactor is a "gas holder."

5. VC-22

Comment: The calculation on p. 4-22 of the SSEIS, Vol. I is in error in using tapped bulk density of polyvinyl chloride instead of true density (87 lbs/cu ft).

Response: EPA concurs with the correction. The true density was not available to EPA at the time of the calculation.

11. VC-29

Comment: The saturation point for vinyl chloride monomer in water is 1100 ppm at standard conditions, thus it is impossible to have concentrations of 2000 ppm as reported on page 3-15.

Response: The 2000 ppm figure was given to EPA by the B. F. Goodrich Chemical Company in a visit to their Henry, Illinois, plant on April 8, 1975. The estimate was based on their own tests of inprocess waste water from the plant. EPA feels that the condition is possible under non-equilibrium conditions with impure water streams.

12. VC-29

Comment: The origin of the data in Tables 3.6-3.9 is not reported, nor is the specific process for Table 3.7 identified.

Response: Tables 3.6 through 3.9 were developed from data submitted by vinyl chloride monomer and polyvinyl chloride producers in response to a May 31, 1974, section 114 request by Mr. Don Goodwin. Table 3.7 deals with both dispersion and latex resins.

13. VC-29

Comment: In bulk plants, the popo reactor may be cleaned after each batch and must be opened to transfer the product. This is clearer than the statement given in section 3.2.2.3 of the SSEIS, Vol. I. New data is available on emissions from bulk plants to update Table 3.8 of the document.

Response: EPA agrees with the first comment. While emission factors have changed in bulk plants, EPA does not plan to update Table 3.8. The factors in that table are based on data supplied to EPA in May 1974, the base date for the uncontrolled plant.

14. VC-29

Comment: The estimates in Table 3-9 for solution resins are incorrect since reactor opening loss and dryer loss are both non-existent.

Response: On June 26, 1974, the sole manufacturer of this type of product reported a dryer loss. The company also reported a precipitation tank loss equivalent to the reactor opening loss. The category in Table 3-9, "reactor opening loss" should be considered "precipitation tank loss."

15. VC-29

Comment: According to Chapter 4, carbon adsorption is not applicable to streams with low vinyl chloride monomer concentration, high in water and particulate and composed mainly of air. Untested

19. VC-29

Comment: The discussion of polyvinyl chloride inprocess waste water should note that the suspension resin process is involved. All data given is based on the suspension process.

Response: EPA concurs.

20. VC-17

Comment: The preamble and the document suggest that bulk process reactors be purged with nitrogen gas and vacuum. The writer suggests that steam has been shown to be effective in some cases.

Response: EPA concurs.

21. VC-21

Comment: EPA does not define dispersin, latex, and emulsion resins well. Clarity is needed in the process description. The following is offered: "The dispersion polymerization is discussed as though these are basically emulsion type polymerizations. Although the emulsion process is used, or can be used, to produce some dispersion resins it is not the principle method used. The comments describing the equipment are in error. The process is similar to the suspension process only in that monomer, water and catalyst are used in the polymerization. The difference is not that more soap is added to the slurry to stabilize the monomer droplets and form agglomerates. Suspension resin (p. 3-11) uses vinyl chloride monomer, water, catalyst and suspending agents, not soap. Dispersion resins use a dispersing technique which does not relate to suspending techniques as the article implies. If the emulsion process is used, it uses an emulsifying technique which again is quite different.

The particle size of the suspension resin after polymerizing and after drying is essentially identical. The particle size of the dispersion or emulsion resin after polymerizing is sub-microscopic. The spray dryer used to dry dispersion resins produces a particle size depends on the type of spray dryer and operating parameters.

Latex resins are not produced by the dispersion process; they are produced by the emulsion process, quite different, technically. More soap may be used by not during the polymerization. In some instances soap may not be added after polymerization which results in an unstable condition and leads to difficulty in stripping."

Response: EPA agrees that perhaps more clarity is needed in defining the various resins in the process description. The Agency points out, however, that these distinctions do not affect the proposed standard.

2.10 Comments on Qualtitative Risk Assessment for Community Exposure to Vinyl Chloride

1. VC-22, VC-27, VC-29, VC-32, VC-34

Comment: The risk assessment should have been based on the log-probit model, rather than the linear no-threshold model.

Response: A number of arguments were made by industry in support of this comment; they are discussed in turn.

First, it was argued that the risk assessment document was biased in favor of the linear model. It was the intention of the authors that the two extrapolation methods should have equal status; any impression to the contrary was inadvertant. Both methods are supported in the scientific literature, and both are equally lacking in empirical confirmation. It is true that the log-probit model results were shown as a range determined from a sensitivity analysis of the linear model results. This was done because it is computationally much more difficult to get a single number for the log-probit model, and the value of the number for the decision maker did not appear commensurate with the amount of work required to get it. Because the log-probit curve is non-linear and falls off very rapidly with dose, the results will be determined by the groups with the highest exposure and it is not valid mathematically to apply it to average data for large groups (as several industry comments have done). It would be necessary to perform a separate calculation for each community, direction, and distance category (over 2,500 combinations, and even this might not be sufficiently fine-grained. The only payoff of this massive amount of work would be to know just where in the range of, for example, 0.1 to 1 cases/year the log-probit results falls. Knowing this would not greatly help the Administrator in making a responsible decision.

Second, it was argued that the log-probit model better fitted the actual animal data and should therefore be the basis for extrapolation. While it is true that the deviations of the log-probit model from the actual data were somewhat smaller than for the linear model, the differences are not large enough to have any statistical significance. And even if they were statistically significant, that would not necessarily be a controlling consideration. The choice of a preferred extrapolation method should depend on one's view of the mechanisms of carcinogenesis and on the degree of conservatism one feels is appropriate. Neither of these is greatly effected by small differences in the fit of the two curves at high doses. And even if it is believed that variations in susceptibility are the main factor affecting dose-response, no information is available on the tails of the distribution.

at the time. The best available estimates of vinyl chloride emissions were also used. Diffusion modeling is a generally accepted technique in the air pollution field. The fact that two independent groups produced very similar results added to confidence in the diffusion modeling (although both are based on the same estimates of total emissions).

The risk assessment made clear that the situation with uncontrolled plants was being evaluated. The EPA monitoring in question occurred after the OSHA standard had been promulgated, so that the plants may have been operating more carefully to limit workers' exposures. It also occurred during an economic recession, during which production rates may have been less than full capacity. It seems doubtful, however, that these factors can account for a difference as large was was observed. In any future revision of the risk assessment, the monitoring data will be taken into account. It is possible that if this were done, the risks would be approximately one-tenth of the current estimates.

It should be noted that the risk assessment is not required by the Act and that the standard is not derived from it in any direct sense. It forms part of the background information available to the Administrator in deciding on the seriousness of the problem of vinyl chloride emissions.

2. VC-22, VC-23a, VC-29, VC-34

Comment: What importance should be attached to the negative finding in the risk assessment document of liver angiosarcoma cases clustered around VC and PVC plants?

Response: The risk assessment document described a survey of liver angiosarcoma cases in which evidence of higher than average clustering of cases among people living near VC and PVC plants was sought but not found. The document concluded that, for several reasons, the survey was not sensitive enough to detect such clustering even if it did occur, unless the actual rate of vinyl chloride induced angiosarcoma is many times greater than the maximum rate predicted by the model.

Industry comments generally interpreted the survey as evidence that cancer is not caused by community exposure to vinyl chloride, and a comment from an environmental group pointed out ractors not considered in the document which would make the survey even less sensitive than stated.

One industry comment alleged, but could not support this definite information, that the ambient concentration at some plants could have been more in past years than in 1974. Another industry stated that at one plant emissions did not change appreciably from the early 1950's to 1974, and consequently estimated that the risk to that community has not increased in this period.

and higher than the two larger studies that were rejected. These rates are consistent with the hypothesis that the larger populations had a heterogeneous mixture of jobs with a range of exposures. Unfortunately we had to go to a third study in order to estimate the concentration of VC to which this occupational group was exposed.

Therefore, the selection of studies was necessary in order to arrive at an incidence rate which was valid for a population exposed to a known VC concentration.

6. VC-23a, pp. 9-10 of EDF testimony

Comment: The risk assessment may understate the risk because it does not reflect the effects of pre-natal and childhood exposure, possible synergistic effects, or the effects of adult exposure for entire lifetimes.

Response: Ideally, animal studies for environmental carcinogens should involve exposure from conception to death. Unfortunately, the animal data on vinyl chloride were designed to simulate occupational rather than environmental exposure. For the risk assessment, it was necessary to do what was possible with the available data.

There is no data that would make possible an estimate of different susceptibility of fetuses or young children to the carcinogenic activity of vinyl chloride, or of possible synergistic (or antogonistic) effects of other environmental agents. Hence, such factors were not included in the calculations; the comment is correct that this is an additional source of uncertainty in the estimates. It is not possible to be sure that they would lead to higher estimates of effects.

The problem of limited adult exposure duration, one year for rats, up to 30 years or so for humans, was handled in a conservative way in the risk assessment. It was assumed that each period of exposure would have the same probability of causing cancer after correcting for species lifetime effects as that observed in the animal experiments, where young rats were exposed for about half their lifetime. This leads to an overstatement of the actual risk because of the long latency period, since pre-cancerous changes occurring late in life are less likely to cause clinical disease before death intervenes from other causes.

2. VC-18, VC-29, VC-30

Comment: Under the provisions of section 112 of the Clean Air Act, EPA may grant a waiver of compliance with a standard for a period not exceeding two years from the effective date of the standard. Plant owners and operators will need to take advantage of this provision.

Response: No response necessary.

3. VC-13, VC-25

Comment: The definition of "in vinyl chloride service" in §61.61(l) of the proposed standard should be revised in the following three ways.

(1) Add the qualification that the equipment must be operating under pressure. A piece of equipment that is not operating above atmospheric pressure cannot emit vinyl chloride to the atmosphere.

(2) The words contain vinyl chloride should be changed to contacts vinyl chloride. As an example an agitator does not contain material, but contacts the material being agitated.

(3) The qualification should be added that the principle phase of the contents of the equipment contains 10 percent vinyl chloride. The basis for this suggestion is to aleviate problems with vessels that contain stripped-to-specification slurries (the principle phase) but whose vapor space at the low pressure still might contain 10 percent by volume of vinyl chloride.

Response: The definition of "in vinyl chloride service" has been revised to incorporate the second suggestion, but not the first or third. EPA intends to cover the situation described in the third suggestion. The benefit of adding the first suggestion is not apparent.

4. VC-28

Comment: Clarification on the following two questions is requested:

(a) Once the residual vinyl chloride levels of 400 ppm for suspension resins and 2000 ppm for dispersion resins are met, may fugitive emission sources from equipment downstream from the reactor (reactor/stripper), exceed 10 ppm?

Response: If the 400 ppm and 2000 ppm limits have been met in the stripper, the fugitive emission limits do not apply to equipment downstream of the stripper.

Response: Drafts of the environmental impact statement were available to interested parties as early as March 1975. The information in these drafts was the basis of the proposed standard.

7. VC-46

Comment: Reference is made to one company in Chapter 2. Naming one plant out of several is inappropriate. The term "Vulcan Materials" should be substituted by an appropriate synonym so as to read "with the exception of one plant."

Response: The suggestion is probably appropriate. However, the document is not being rewritten, so this change will not be made.

8. VC-46

Comment: It should be stated that the total emissions from the vinyl chloride plant is one-third of the emission from the polyvinyl chloride fabricating plants.

Response: Table 2-1 on page 2-28 of the Standard Support Document lists the 1974 vinyl chloride emissions from ethylene dichloride-vinyl chloride plants as being 11 million kg per year and from polyvinyl chloride fabricating plants as being 600,000 kg per year.

9. VC-46

Comment: In Chapter 2, it is stated that "all vinyl chloride emissions from the fabricating plants are due to residual vinyl chloride in the raw materials coming from polyvinyl chloride plants." This statement is incorrect. Emissions in fabricating plants result from the vinyl chloride contained in the raw polyvinyl chloride used in the fabrication.

Response: The difference between the two statements is unclear.

10. VC-45

Comment: The data from the ambient sampling program around Shell's ethylene dichloride-vinyl chloride plant is not included under the data for Region VI on page 27 of the STAR document.

Response: This data is on page 30.

Response: The specifics for the compliance schedules are in §61.10 and 61.11 of the general provisions.

14. VC-18, VC-24, VC-33, VC-34

The standard should provide for variances for infrequent operations that produce small emissions. An example would be the requirement to strip vinyl chloride from water which has been used to purge vinyl chloride from a storage sphere before opening it up.

The standard should provide for excess emissions during start-up, shut-down, and malfunction. EPA has not included in its economic impact statement the costs which would be incurred during a malfunction either to shutdown production or to install back-up control equipment.

EPA should at least provide for excess emissions during a shutdown. If a breakdown occurs in the emission control equipment, there are on-going reactions in a plant that must be brought to completion prior to shutdown. This will require venting in excess of 10 ppm until a safe shutdown can be accomplished or the malfunction in the control system corrected.

One option would be to have a stream factor of 0.9 with a maximum emission limit of 0.04 kg/MG of polymer produced during noncompliance. This option would allow operators to repair, maintain, and modify operations of control devices that malfunctioned or required preventive maintenance without terminating production or otherwise seriously disrupting operations. In our plants (VC-18) this would cause a maximum increase in annual emissions of about 10 percent at the polyvinyl chloride plant and about 20 percent at the ethylene dichloride-vinyl chloride plant.

Response: (1) Variances.

There are no provisions at the present time for variances for standards promulgated under sections 111 or 112. The water used to purge vinyl chloride from a storage sphere would have to be treated only if it contains more than 10 ppm vinyl chloride. If it does need to be treated, it would not appear to be practical to install a larger water stripper for this purpose. Storing the water in that vessel or some other holding tank until it could be treated seems to be a more plausible solution.

"A recent complaint received was about a polyvinyl chloride fabricating plant indicating that accidental intermittent release of polyvinyl chloride particulate emissions, because of process malfunction, were impacting the surrounding ambient air to which the public has access. Serious concern therefore is expressed for the respiration or inhalation of the polyvinyl chloride particulate and any carcinogenic health effects that may result from residual vinyl chloride in the particulates, especially where such emissions are common occurrences and complacency is found in efforts to correct such accidental emissions.

"Clarification of carcinogenic health effects of polyvinyl chloride particulate, with appropriate regulation, is recommended as soon as health effects data from NIOSH are evaluated."

Response: In the preamble to the proposed standard, EPA stated that additional information may indicate a need to regulate polyvinyl chloride particulate. The information submitted by the commentator is appreciated.

17. VC-32

Comment: The preamble to the proposed standard states (40 FR 59543) that studies show that polyvinyl chloride particulate "may possibly" cause pneumoconiosis. Stiles and Wilson [Ann. Occup. Hyg. 16: 241 (1973] clearly demonstrated no such effect from polyvinyl chloride dust.

Response: The studies EPA referred to include:

1. B. B. Szende, et. al.; "Pneumoconiosis Caused by the Inhalation of Polyvinyl Chloride Dust," Med. Lavoro, Vol. 61, no. 8-9, 1970, p. 433.

2. Yu. J. Verthin and Yu. R. Mamontov, "On the State of the Bronchopulmonary System in Workers Engaged in the Manufacture of Articles Made of Polyvinyl Chloride," Gigiyena Tudor) Vol. 14, No. 10, 1970, pp. 29-32.

EPA will await additional studies being conducted by NIOSH to determine the need to regulate polyvinyl chloride particulate.

18. VC-32

Comment: It is not clear from the discussion in section 4.9 of the SSEIS, Vol. I which decision was reached on reactor opening emissions since no statement is made as to the final conclusion, but from section 4.12.5 and Table 7.8 it is assumed that the gasholder was

infiltration or restraint of surface flow of the water bearing vinyl chloride might prevent escape of the chemical as a result of such factors as pressure condition, aquifer texture, and sorption properties with respect to sediments, carbon, etc.

Although removal is estimated to be essentially complete, monitoring in specific situations is needed to verify this conclusion.

Response: As stated by the commentator, there are multiple factors which influence the rate at which vinyl chloride is transferred out of water into the air. These factors should be taken into account when designing the water stripper used to meet EPA's standard. EPA has conducted studies on the behavior of vinyl chloride in water. A report on this study entitled Dynamic Behavior of Vinyl Chloride in Aquatic Systems has been prepared (January 1976) and is available from the Environmental Research Laboratory, Office of Research and Development, EPA, Athens, Georgia, 30601. The conclusions of this study are discussed on page 6-45 of the SSEIS, Vol. I.