agenda

SPI

VI EXECUTIVE BOARD MEETING

Headquarters Plaza Hotel
3 Headquarters Plaza
Morristown, New Jersey

Tuesday
September 13, 1994
8:00 a.m.

8:00a	I.	**OPENING OF MEETING AND SELF-INTRODUCTIONS**	W. Patient
8:10a	II.	**APPROVAL OF MINUTES OF PREVIOUS MEETING**	Group
8:15a	III.	**REPORT OF PREVIOUS EXEC. COMMITTEE MEETINGS**	W. Patient
8:30a	IV.	**FINANCIAL REPORT**	R. Burnett
		A. Fiscal year 1993-1994 Final Report	/M.Schneider
		B. Status of Current Expenditures	
8:50a	V.	**KEY ISSUES UPDATE**	
		A. Kansas Pipe Project	F. Krause
		B. EDC/VCM Ad Hoc Task Force	M. Scheck /F. Krause
		C. Nichols-Dezenhall Grassroots Project	T. Termine
		D. Incineration Task Force	F. Krause
		E. Environmental Issues Task Force - Interim Report	G. Rutman
		F. Communications Update	D. Meeker
10:30a		- - - - - - B R E A K - - - - - -	
10:40a	VI.	**COMMITTEE AND LEGISLATIVE UPDATES**	
10:50a	VII.	**LEGAL COUNSEL'S REPORT**	
11:10a	VIII.	**INTERNATIONAL ACTIVITIES**	
		A. Update from Associate Members	Group
		B. October 1994 Tripartite Meeting	R. Burnett
11:30a	IX.	**OLD BUSINESS**	
		A. Report on VI Membership in ECVM	R. Burnett
		B. Responsible Care Partnership	R. Burnett
		C. California EIR	
11:45a	X.	**NEW BUSINESS**	
		A. Affiliate Member Report/Recommendations	V. Struber
		B. Other	
12:15a	XI.	**ADMINISTRATIVE ITEMS**	
12:30a	XII.	**NEXT MEETING ADJOURNMENT**	

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The Vinyl Institute, A Division of The Society of the Plastics Industry, Inc.
65 Madison Avenue • Morristown, NJ 07960 • (201) 898-6699 • Fax # (201) 898-6633

PROGRAM
EXECUTIVE BOARD
SEPTEMBER 13, 1994

I. OPENING OF MEETING AND SELF-INTRODUCTIONS

VI Executive Board Chairman William Patient will convene the meeting at 8:00 a.m. with a round of self-introductions.

II. APPROVAL OF MINUTES OF PREVIOUS MEETING

It is in order to approve the minutes of the May 24, 1994 Executive Board meeting, a copy of which is found under Tab A.

III. REPORT OF PREVIOUS EXECUTIVE COMMITTEE MEETINGS

The Executive Committee has held meetings on June 20, July 15, August 16 and September 12. Mr. Patient will report on the substance of the discussions not covered elsewhere on the program for this meeting.

TREASURER - 12 From US
- DIOXIN LETTER
- VI TECH MEET
- CCC MEETING 10/20/40

IV. FINANCIAL REPORT

A. Fiscal Year 1993-1994 Final Report

VI Treasurer Mark Schneider will review the final statement of expenditures against budget for FY 1993-1994 (the period June 1, 1993 through May 31, 1994) as found under Tab B.

B. Status of Current Expenditures

Mr. Schneider will review the most recent FY 1994-1995 cash basis statement as included under Tab C.

V. KEY ISSUE UPDATE

A. Kansas Pipe Project

A final package of materials related to the potable water issue in a rural water district in Kansas was prepared by Dr. Gottesman and presented to the U.S. Environmental Protection Agency on August 18. Mr. Krause will highlight the contents and update the Board on the meeting with EPA. Background information is contained under Tab H. - BOU IN EPA COURT!!
- NOT INDUSTRY CHAIRMAN!!

B. EDC/VCM Ad Hoc Task Force

Mrs. Scheck and Mr. Krause will update the Executive Board on specific actions taken since the task force's last meeting on August 16, including follow-up appropriate to the meeting of the Data Sharing Task Force

- DIOXIN LEVEL IN VCM & PVC IS SAME LEVEL

with a representatives of ECVM held on August 5. Background information is included in the Issues Management Committee report included under Tab D.

C. Nichols-Dezenhall Grassroots Project

Ms. Termine of Nichols-Dezenhall will update the Executive Board on the implementation of the coalition building initiatives including the July 19 meeting with representatives of allied trade associations.

D. Incineration Task Force

A newly formed ad hoc task force on incineration issues, chaired by Don Goodman of OxyChem, held its organizational meeting on July 12 and met again on August 17. The task force's principal objectives are to a) fully document what is known about the role PVC does/does not play in municipal solid waste incineration and similarly in medical/regional incineration, and b) maintain a continuing library of laboratory results on the combustion of PVC and analyze results for correlation to commercial units. Mr. Krause will update the Board on activities completed or underway to implement those objectives. Background information is included under Tab E.

E. Environmental Issues Task Force - Interim Report

At the request of the VI Executive Committee, VI Legal Committee Chair Greg Rutman of Geon has been chairing a Environmental Issues Task Force. The group held its first meeting on July 14 and agreed to a short term strategy. Mr. Rutman will provide the Board with an interim report. Background information is included under Tab F.

F. Communications Update

Mr. Meeker of Edward Howard & Co. will update the Board on activities undertaken to implement the FY 94-95 program to promote the eco-benefits of vinyl and review general agency activities. Background information is included under Tab G.

VI. COMMITTEE AND LEGISLATIVE UPDATES

Background reports on the following are included in the briefing book as follows:

Technical Committee	Tab H
Health, Safety and Environment Committee	Tab I
Vinyl Institute Group on Recycling	Tab J

Updates on these reports will be made at this time by staff or committee chair as appropriate.

VII. GENERAL COUNSEL'S REPORT

The General Counsel's report is included under Tab K. Mr. de la Cruz will highlight items of interest and related topics.

VIII. INTERNATIONAL ACTIVITIES

A. Update from Associate Members

At this time it is appropriate for representatives of Associate Member companies to brief the Board on any items or activities of interest.

B. Next Tripartite/IGCCA Meeting

The next meetings of the PVC Tripartite Group and the International Group of Chlorine Chemistry Associations (IGCCA) are scheduled for the week of October 24 in Tokyo. Mr. Burnett will review the attendee list and agenda topics.

IX. OLD BUSINESS

A. Report of VI Membership in ECVM

At the May 24 Executive Board meeting, a motion was approved for the Vinyl Institute to join the European Council of Vinyl Manufacturers. Mr. Burnett will update the Board on the implementation of this motion.

B. CMA/Responsible Care Partnership Affiliation

Mr. Burnett will update the Board on actions taken by the Chemical Manufacturers Association to formally approve the Vinyl Institute as a Responsible Care Partner.

C. California EIR

Dr. Gottesman will provide an update on the status of the preparation of an Environmental Impact Report for the expanded use of plastic pipe in the state of California. Background information is included under Tab L.

X. NEW BUSINESS

A. Affiliate Member Report and Recommendations

In conjunction with the May 1994 Annual Meeting, the Affiliate Members met to discuss issues of interest. The group asked for time on the agenda of the September Board meeting to deliver its report. Mr. Struber, representing the Affiliate Members, will report at this time.

B. Other

It is in order that any other new business that has been brought to the attention of the Chairman or Executive Director be discussed at this time.

XI. ADMINISTRATIVE ITEMS

Since the last Executive Board meeting, the chairmanship of two Institute committees has changed. The Health, Safety & Environment Committee will be chaired by Jim Kachtick of OxyChem. The Vinyl Institute Group on Recycling (VIGOR), will be chaired by Rich Ryder of Klockner Pentaplast.

It will be in order for Mr. Burnett to bring any additional administrative items to the attention of the Board at this time.

XII. NEXT MEETING/ADJOURNMENT

The next meeting of the Executive Board is scheduled for Wednesday, December 7 in Houston, Texas. There being no further business, a motion to adjourn is in order.

EUROPE – SWEDEN NEXT ISSUE COULD BE PVC ADDITIVES
FPC – JOINED CCC Blowing DUES

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minutes

SPI

VINYL INSTITUTE EXECUTIVE BOARD

Four Season Resort and Club
4150 MacArthur Boulevard
Irving, Texas

Tuesday
May 24, 1994
7:30 am

ATTENDEES:

Frank Borrelli, Georgia Gulf Corp.
Brian Bourgeois, PPG Industries
Robert H. Burnett, Vinyl Institute
Frank Conrad, CertainTeed
Romeo Costa, CPC
Peter de la Cruz, Keller & Heckman
George S. Dillon, Jr., Dow Chemical
David Fultz, Elf Atochem NA
Rodolfo Gedeon, Petroquimica Colombiana S.A.
Ron Gilbert, Westlake
Roy T. Gottesman, Chemical Management Resources
Peter Hollins, European Vinyls Corp.
Masamitso Kaneko, Mitsubishi Kasei Vinyl
Lars Kildahl, Norsk Hydro
Elyse Lewis, GE Specialty Chemicals
Brad Lienhart, Chlorine Chemistry Council
Dwight M. Lyman, Exxon Chemical
Robert E. Margevich, Akzo Nobel
Ron McCreedy, Dow Chemical
David Meeker, Edward Howard & Co.
Gilbert J. Muller, BASF Corporation
William Patient, The Geon Co., CHAIR
John Russ, Borden Chemicals & Plastics
Meredith N. Scheck, Vinyl Institute
Mark J. Schneider, Vista Chemical
Ervin E. Schroeder, Shintech Inc.
Nelson Stefany, Rohm and Haas Co.
Vic Struber, Witco
John Svalander, ECVM
Tom Swanson, Georgia Gulf Corp.

I. OPENING OF MEETING AND SELF INTRODUCTIONS

Vinyl Institute Executive Board Chairman William F. Patient convened the meeting at 7:30 am with a round of self introductions. Mr. Patient extended a welcome to new Executive Board meeting attendees and guests.

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II. SPECIAL PRESENTATION

Mr. Patient introduced Dr. Lou Maresca of The Geon Company and noted that Dr. Maresca had been invited to the Executive Board meeting to make a special presentation on the subject of reproductive and endocrine effects of chemicals on humans. Dr. Maresca's presentation followed.

III. APPROVAL OF MINUTES OF PREVIOUS EXECUTIVE BOARD MEETING

Mr. Russ moved that the minutes of the Vinyl Institute Executive Board meeting held March 9, 1994 as included under Tab A of the briefing book be approved. The second to the motion was made by Mr. Schroeder and approved without objection by a voice vote.

IV. FINANCIAL REPORT

A. Status of Current Expenditures

On behalf of VI Treasurer Mark Schneider, Mr. Burnett reviewed the Cash Basis Statement of Revenue and Expenditures through March 31, 1994 of the current fiscal year, as included under Tab B of the briefing book. Mr. Burnett noted that the anticipated final projection in the recycling area will rely on repayment schedules regarding equipment loans. Mr. Burnett further commented that it is anticipated that year-end expenditures will approximate income, with the surplus carried forward.

B. Proposed Budget for Fiscal Year 1994-1995

Mr. Burnett reviewed the elements of the proposed budget for the fiscal year starting June 1, 1994 and ending May 31, 1995, as included under Tab C. Mr. Burnett noted that it is anticipated that expenditures in the recycling area will be scaled down, the expenditures in the technical area will be about even, with major increases in the issues management area. He further noted that the budget does not include the $250,000 in funding for either crisis management activity or the spokesperson proposal, but commented that support for these activities would come out of the carry forward.

During discussion on the budget, Mr. Burnett noted that if the funds were not expended at the rate thought to be likely, that second half assessments could be adjusted. Mr. Patient cautioned anyone on the Board to anticipate that this would happen. Mr. Patient further commented that with the level of expenditures targeted by both the CCC and the APC this coming fiscal year that the 15 percent increase in the Institute's budget might even be

considered conservative. At the conclusion of the discussion, Mr. Russ moved that the budget be approved as submitted. The second to the motion was made by Mr. Bailey and approved without objection.

C. Revised Dues Structure

Mr. Burnett noted that at the previous Executive Board meeting he was asked to prepare a motion to implement the suggestion that the dues structure be revised for classes of membership other than full members, who would continue to be assessed in accord with the bylaws. Mr. Bailey moved that the dues for the following categories of membership be set as follows: Supporting Members - $20,000; Affiliate Members - $30,000; Associate Members - $25,000. The motion was seconded by Mr. Fultz.

During discussion on the motion, Mr. Struber noted that the affiliate members met on May 23, 1994 and during that meeting discussions took place regarding increasing the base of financial support of Institute activities. Mr. Struber asked for time on the agenda of the next Executive Baord meeting to present a report and recommendations for discussion and action by the Board. Mr. Patient noted that such an activity would be placed on the agenda. He then called for a vote on the motion, which was approved without objection.

IV. OLD BUSINESS

A. Report on Implementation of Chairman's Ad Hoc Task Force Recommendations as Approved March 9, 1994

Mr. Burnett reported that to implement a portion of the recommendations of the Chairman's Ad Hoc Task Force, the firm of Nichols-Dezenhall has been retained. After a brief summary of the firm's activities, Mr. Burnett noted that the principal short term activities will focus on organizing the industry's grassroots and expanding the coalition building activities initiated by Mike Marshall. He further stated that Theresa Termine of Nichols Dezenhall will be giving a presentation at the Issues Management Committee meeting on activities to be undertaken during the first 30 days. Mr. Burnett further stated that a series of new communication vehicles are being considered to support this expanded outreach effort. Mr. Burnett noted that the issue of retaining a national spokesperson is still to be addressed.

Mr. Patient thanked Mr. Schneider and his colleagues for participating in the work of this task force and noted that he considers the group's objective to be complete.

B. Status Report: EDC/VCM/PVC Ad Hoc Task Force

On behalf of the task force, co-chairman Ron McCreedy updated the Executive Board on activity since the last Executive Board meeting. He noted that as detailed in the material under Tab D of the briefing book, it was the consensus of the task force that it is not feasible to implement a defensible testing program based on a single model plant concept. Mr. McCreedy reported that the next step that needs to be taken is to assemble all public domain data available in the U.S. and Europe, and to use this material to identify data gaps. Mr. McCreedy noted that the group will come back to the Board in September with a suggested sampling program to fill in the data gaps.

During discussion on the data available, Mr. McCreedy noted that the data collection activities in Europe had been undertaken under a confidentiality agreement. Mr. Svalander commented that he will work on a program to have the data made accessible, with the understanding that any data produced in the U.S. would be similarly shared. Mr. Kildahl noted that confidentiality agreements had been signed by individual companies and that these individual agreements would need to be honored. Mr. Svalander commented that perhaps a face-to-face meeeting would be useful in moving the process further along and noted that the data has already been shared with governmental entities in the North Sea area.

Also during the discussion, Mr. Lienhart noted that there is a legal opinion from CMA staff on reporting requirements under TSCA. He further updated the group on pertinent Chlorine Chemistry Council activities and commented that a panel of independent scientists has been reviewing the dioxin document. He further updated the Board on preliminary work underway within CCC to develop a new multi-stakeholder institution in partnership with the U.S. EPA that would foster technology transfer. Mr. Lienhart noted that this concept is to be reviewed by the CCC Board at its next meeting.

In closing the discussion, Mr. Patient noted that he is interested in having an agreed upon universally accepted protocol and challenged the work group to provide this at the next Board meeting. Mr. McCreedy noted that the task force is scheduled to meet on May 25 and encouraged interested meeting participants to attend. Mr. Schneider moved that the report be accepted and that the group be encouraged to expedite their activities. The motion was seconded by Mr. Russ and approved by voice vote.

C. **Tripartite Meeting**

Mr. Burnett noted that the next Tripartite meeting is scheduled to be held October 25 and 26 in Tokyo and encouraged any Board member interested in attending to let him know. Mr. Lienhart noted that this meeting was being held in the same location and preceding dates of the meeting of the International Group of Chlorine Chemistry Associations and the International Association of Synthetic Rubber Producers.

D. **Responsible Care Partnership**

Mr. Burnett noted that the application for partnership status in the Chemical Manufacturers Association's Responsible Care program has been received and accepted. The CMA Board is scheduled to officially vote on the application during its next meeting.

V. **NEW BUSINESS**

A. **Associate Membership: European Council of Vinyl Manufacturers**

Mr. Patient noted that a letter has been received from the European Council of Vinyl Manufacturers offering an ECVM associate membership to the Vinyl Institute at a dues of 10,000 DM which would formalize the contacts that already exist. Mr. Patient moved that an application of membership for the VI within the ECVM be made. The motion was seconded by Mr. Schroeder and approved without objection.

VI. **FUTURE MEETING DATES AND LOCATION FOR THE EXECUTIVE BOARD**

Mr. Burnett noted that the schedule of proposed meeting dates and locations for the next fiscal year is included in the program portion of the briefing book. Mr. Svalander noted that for the March 8, 1995 meeting, Atlanta or another international airport location is preferable over New Orleans for those traveling from Europe. Mr. Burnett asked if their is preference for the next annual meeting. There were no objections to the week suggested; Mr. Russ suggested a California location and others suggested either Atlanta or Dallas.

With no specific locations agreed on, Ms. Benkner was asked to research and make recommendations on a location bearing in mind the desire to make the location accessible for international travelers.

VII. **ADJOURNMENT**

There being no other business, Mr. Fultz moved at 9:05 that the meeting be adjourned. The second to the motion was made by Mr. Schroeder and agreed to without objection.

Respectfully submitted,

Meredith Scheck

Meredith N. Scheck
Assistant Director

B

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ISSUES MANAGEMENT COMMITTEE
VI BOARD REPORT
September 13, 1994

We have been busy implementing the plans discussed and approved at the Annual Meeting in May. Hi-lites are noted below.

KEY ISSUES

GREENPEACE-CHLORINE-PVC

Deal With Anti-Vinyl Legislation - The grass roots mobilization system is up and running driven by Theresa Termine from Nichols-Dezenhall. Using a customer database established via confidential input from VI members we have made two mailings and are about to make a third just prior to the Dioxin Reassessment announcement on 9/13/94. Many processors have already written or contacted their congressman and invited them for plant tours. Our grass roots program is being closely coordinated with both CCC and SPI mobilization efforts.

A Trade Coalition meeting was held on July 19th, kicked off by Bill Patient with over 35 industry groups represented and another 20 requesting interest. Feedback has been very positive and some associations have already placed stories in their trade publications.

Bob Burnett has opened up a dialogue between the Vinyl industry and EPA in meetings with a number of their key officials. We understand the Dioxin Reassessment will be issued on September 13th with some specific focus on PVC and EPA has asked for a commitment from the VI to work with EPA on the issue. After agreement with the Executive Committee, Bob has sent a letter for the VI committing our industry to characterize our emissions and respond appropriately.

Clean Water Act likely will not get action in this congressional session but is being closely monitored by CCC. Superfund may get some action and Metzenbaum has submitted proposal to study reproductive effects. This is difficult to oppose but we are arguing superfund is the wrong venue.

Communications - An expanded and intensified communications program has been initiated and is reported separately by Dave Meeker - Edward Howard.

The Dioxin Issue - Dioxin Reassessment - as noted above the EPA Dioxin Reassessment is scheduled to be released on 9/13/94. We expect PVC will be getting some additional attention from media and Greenpeace and are putting in place plans to address.

Characterization: The VCM/EDC task group has issued the guidelines to all VCM/PVC producers to standardize on EPA testing protocols, identified laboratories for testing, compiled data in the public domain and established a confidential database to be managed by Keller and Heckman. Sampling and testing will be done by individual companies according to their environmental priorities. We have also have also discussed some of the European data with a representative of ECVM (European Council of Vinyl Manufacturers).

As most of you know, Greenpeace published data from the Swedish EPA on two PVC resin samples showing very low dioxin levels of 0.55 and 6.3 ppt (picograms/gram TEQ). Norsk-Hydro has confirmed these analysis were made at University of Umea in Sweden. To our knowledge there are no other published data on dioxin in PVC. Swedish EPA did not believe this level would have any health impact since it is in same range as grass, agricultural soil etc., and as a result did not respond to the data. In addition we do not believe any dioxin would migrate and have some theoretical work in progress to confirm this. We will keep you informed as we get more data.

Greenpeace has issued several PR pieces, one a two page handout at the NPE show in Chicago called **"No Future for PVC"** and another at a Greenpeace gathering in St. Louis titled **"Achieving Zero Dioxin"**. We have issued an excellent response **"The Truth About Vinyl"** which you should have seen by now. In addition a small task group has addressed the Zero Dioxin document and with Nichols-Dezenhall and Edward Howard's assistance have defined a Crisis plan to prepare our industry for any focus on PVC in the Dioxin Reassessment release on 9/13/94.

An Incineration Task Group has been formed under the Technical Committee and chaired by Don Goodman to consolidate and expand our data/communications on incineration which will be a major focus by EPA in the Dioxin Reassessment. Details are covered separately by Ron McCreedy/Don Goodman.

Bill Carroll - Oxychem is now a loaned executive to CCC assuming responsibility for dioxins and product stewardship. This provides the VI an even closer tie to CCC specifically as it relates to the dioxin issue since Bill will continue to be involved in our efforts.

An Environmental Issues task group - chaired by Greg Rutman was formed to focus attention on direct attacks on PVC by Greenpeace or other organizations or individuals. A 48 hour response plan has been defined.

CHLORINE CHEMISTRY COUNCIL

A number of the VI companies are represented in the CCC and Bob Burnett sits on the operating committee. The activities are numerous and difficult to cover adequately in this report, but here are some hilites:

- New managing director to be named shortly to replace Brad Lienhart who will be leaving 10/1/94.
- CCC gearing up for 9/13/94 EPA dioxin release.
  Outreach: Information for company use, dioxin Q&A, basic talking points, reprints, video and audio clips on key issues to use with local media, scientists to take calls, etc.
  Science: Jack Moore - former EPA administrator has set up an independent scientific panel to analyze and respond to the EPA dioxin reassessment. A separate outside analysis will be done for CCC use to respond.
- Two meetings with EPA, first with chemical industry and environmentalists, second with broader dioxin stakeholders and environmentalists. Mission: develop multi-stakeholder support on characterizing and reducing dioxin sources. Good progress, next meeting after 13th assessment release. CCC position - support EPA multi-stakeholder process on dioxin.
- Multi stakeholders process to address non-cancer health effects (endocrin, etc.) being explored outside EPA.
- CCC working closely with International Group of Chlorine Chemistry Associations (IGCCA) on science and communications basis share information and resources.
- Cantox report formally being released and published in the Journal of Toxicology. Media/scientific PR in progress.
- Grassroots mobilization about in place. Setting up member coordinators in priority states to work issues with Chemical Industry Councils (CIC).
- Formosa and ICI America joining CCC.

KANSAS PIPE DRINKING WATER QUALITY - We believe this effort has been concluded successfully with a visit to EPA on 8/18/94. Ron McCreedy will cover in the Technical Committee report.

PVC TRIPARTITE/IGCCA MEETING - Meetings will be back to back on 10/24-28/94 in Toyko. VI will be represented by number of members.

F. E. Krause

8/26/94

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INCINERATION TASK FORCE

The Vinyl Institute has created an Incineration Task Force in anticipation of adverse EPA actions regarding dioxins and furans. After the dioxin reassessment, we believe EPA will focus on dioxins from incineration, particularly the incineration of municipal waste (MSW), hospital waste (MW), and plant industrial waste (HWI & BIF) containing (high) levels of PVC and HCl.

It has been seven years since the NYSERDA study was completed in 1987, and we have relied on these results when vinyl is under attack for either HCl or dioxin generation. Later work done by Professor Rappe in Sweden and others around the world show small scale incineration of PVC may correlate to dioxin emissions but have no meaning for large scale municipal incineration.

Don Goodman of OxyChem was appointed chairman of the Incineration Task Force, with Fred Krause (Geon), Ron McCreedy (Dow), Dick Magee (NJIT), Roy Gottesman (CMR), and Bill Carroll (CCC/OxyChem) as members. The initial objectives are: (1) to document what is known about PVC in MSW relative to dioxin emissions from commercial incinerators; (2) to document what is known about PVC in MW relative to dioxin emissions from hospital (and regional) incinerators; and (3) to maintain a current and continuing library of small scale (lab) results on the combustion of PVC, to analyze these results for correlation to commercial incinerators, and to provide rebuttal as needed.

These objectives were focussed and expanded to study background data and analysis of the relationship between chlorine (Cl_2) and dioxins for all MSW, MW, HWI, and BIF process characteristics and emission databases. Dick Magee brought forward a proposal from the American Society of Mechanical Engineers (ASME) to hire Rigo & Rigo Associates, Inc. of Cleveland, OH. The purpose of ASME as the contractor is to provide unassailable objectivity to the study. The ASME oversight and review committees will bring independent reviewers (including EPA members) and high level peer reviewed documentation and reports. (VI had a successful model in the recent Midwest Research Institute/ASME report on MSW/MW incineration costs with/without PVC).

The Incineration Task Group interviewed Dr. H. Gregory (Greg) Rigo, principal of Rigo & Rigo Associates, Inc. by phone and found him to be extremely knowledgeable about incineration and to have several proprietary databases VI had not discovered. He is also user friendly (i.e., willing to set his priorities to our needs) and appears to be sympathetic to Plastics, Vinyl, PVC, and Cl_2. The overall project time is 4 - 6 months, with the understanding that municipal and medical wastes be analyzed first for early response, if necessary.

The combined approach of fast action sweat equity by the committee to be responsive to EPA attacks on PVC, HCl, and Cl_2 with comprehensive data from an experienced and knowledgeable contractor (Rigo & Rigo), plus ASME oversight for objectivity will provid sufficient response and timeliness to EPA directives for mor information on dioxins from incineration. A rapid start, and therefore, conclusion of this project will assure VI of having the most accurate, comprehensive sets of data for comment back to EPA, and appropriate rebuttal to EPA challenges.

The ASME proposal calls for $130,000 for the Rigo & Rigo/ASME study. Since there are many unanswered questions regarding dioxins and since VI may want to use Greg Rigo as an expert witness or advocate to talk about the report, I am proposing an additional $20,000 as a contingency fund, for a total of $150,000 to be fully funded by VI.

It is likely that CCC will become a substantial partner to this study, and that APC will make a contribution. Bill Carroll has promised to take these requests to CCC and APC. A successful response will reduce the budget requirements for VI.

D. Goodman 8/22/94

ENVIRONMENTAL ISSUES TASK FORCE

The Environmental Issues Task Force held its first meeting on July 14, 1994 at SPI Headquarters. The group developed a three-point short-term strategy consisting of screening false or misleading statements made by environmental groups, collecting proof to dispute such statements and recommending legal and public relations strategies aimed at causing the environmental groups to cease making the same statements.

Initially activity has resulted in sending two letters to an environmental group and one to the environmental group's so-called expert witness. Progress has been made in gathering potentially false or misleading statements for further review.

Greg Rutman, Chair
EITF
August 11, 1994

G

Edward Howard & Co.
Public Relations Counsel
Founded 1925

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TO: VI Executive Board *DATE:* August 24, 1994

FROM: Dave Meeker / Nora Jacobs *COPIES:*
Edward Howard & Co.

SUBJECT: Quarterly Report: September 1994

Following is a summary of significant communications activities during the past quarter:

1. **EPA Dioxin Reassessment** — Working with a special task force and Nichols-Dezenhall, a plan is being developed that will prepare the industry for the release of the EPA's dioxin reassessment on September 13. That plan will include components to prepare members and customers for any emphasis that the reassessment may place on PVC.

2. **Initiation of Intensified and Expanded Communication Program** — Following the board's approval of the intensified communication program at its annual meeting, focus has been on broadening communications activities on several fronts.

   - Working with consultant Mike Marshall and consulting firm Nichols-Dezenhall, a series of activities were launched to identify and bring together organizations which have an interest in protecting the use of vinyl products. Some 85 organizations were identified and invited to a coalition meeting held in Washington in June. The organizations ranged from the National Homebuilders Association to the American Association of Meat Processors.

   - Detailed analysis of anti-vinyl literature and comprehensive response material — A detailed analysis was undertaken of the Greenpeace document, "No Future for PVC" and a line-by-line response titled, "The Truth About Vinyl" was prepared to answer misinformation and untrue allegations contained in the document. Copies of the response document have been circulated throughout the industry and downstream to coalition partners and others.

   - A new quick response mechanism is being put in place to deal with future attacks and a response to the document titled, "Achieving Zero Dioxin" is underway. Because of its technical nature, this document has been referred to the Technical Committee for review.

- Establishment of the VI news bureau has been formalized under the management of Michelle McDonough. The function of the news bureau will be to continue to respond to attacks on vinyl, to promote important uses of vinyl and recycled vinyl and to aggressively publicize ecobenefits of vinyl in a variety of applications.

  Among significant coverage during the period was the *Wall Street Journal* and the *Christian Science Monitor* coverage of the Toggle Tube made from recycled vinyl, trade publications coverage of safety and environmental awards and the new recyclers directory, and aggressive promotion of the study results from the Michigan Governor's Scientific Advisory Board on Chlorine.

  At Michelle's direction, a revised method of analyzing media coverage of the vinyl industry has been prepared and is now in place. The system attempts to analyze the effectiveness we are having in delivering our messages and reaching our target media in obtaining space which has high impact, and in being covered in a way which adds credibility to our message.

- Expanded ecobenefit research is underway with the information derived to be used as the basis for publicity efforts throughout the nation. We are seeking the assistance of industry researchers on matters ranging from using conservation through the use of vinyl to environmental comparisons with other material.

3. VERCE — VERCE activities continue at a high level and a completely updated database analysis has been completed for the VERCE program. That summary shows that there are now 5,247 organizations in the VERCE database including 103 federal agency contacts, 494 municipal contacts and 399 state agencies.

4. **Environmental Group Monitoring** — This is an ongoing function of the communication program which, during the past quarter, was focused on the second Citizens Conference on Dioxin in St. Louis, attended by John Opdycke. Opdycke's report laid forth a number of ideas which were discussed at the conference by environmentalists intent on continuing to attack vinyl. Protective actions intended to deal with each of these recommendations are in preparation.

5. **Kansas Water Situation** — Dave Meeker worked with a special committee on the Kansas water situation to review the EPA recommendation and update our communication material relating to the issue.

6. **Partners Program** — The Partners Program continues to grow as we move downstream in the industry, with the number of active members now approaching 200. In the past few months, John Opdycke has made presentations regarding the program to the Chemical Fabrics and Film Association and SPI's Vinyl Formulators Division. In addition, a mailing was sent to members of both the Vinyl Siding Institute and the Vinyl Window and Door Institute to further encourage their involvement in the program. We expect additional Partners will also be derived from the coalition efforts underway.

7. **Vinyl - The Next Generation** — A program intended to spell out the future potential of vinyl in all of its applications is underway and will be a strong and effective response to those who think that vinyl has no future. The concept that is now being shaped will include a white paper spelling out the technical and economic impact of vinyl into the 21st century, a video with a future orientation and a global conference on the future of vinyl, bringing together the best future thinking in our industry. This concept will be developed more fully in discussion with the board.

H

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THE TECHNICAL COMMITTEE REPORT WILL BE DISTRIBUTED AT THE BOARD MEETING.

HEALTH, SAFETY & ENVIRONMENT COMMITTEE

The committee has not met since the May 22, 1994 meeting held in conjunction with the VI Annual Meeting. The next meeting of the committee will be held September 21 in conjunction with the annual meeting of the Vinyl Chloride Safety Association. This schedule follows the pattern developed during the chairmanship of Frank Borrelli, i.e. of having three meetings per year supplemented by teleconferences and ad hoc task group meetings as necessary, with the committee chair serving as liaison between the HSE and other VI committees and task forces as required.

New Chairman: Jim Kachtick assumed the chairmanship of the committee on August 1, 1994. Jim, who has been a member of the committee since the Institute was founded in 1983, becomes the committee's third chairman, succeeding Frank Borrelli. Jim currently serves as OxyChem's Manager - Environmental, Southern Region.

The new chairman intends to undertake a review of the committee's mission statement and objectives at the next meeting.

EDC/VCM Task Force: Several members of the committee are participants in the EDC/VCM Task Force, which has been co-chaired by the Chairs of the Technical and Health, Safety & Environment Committees. A updated report on this activity is included in the Technical Committee report and not duplicated here. It is anticipated that this activity will continue to require committee member participation.

Liaison with CMA: Dave Penney of Vista Chemical has agreed to provide liaison between the Vinyl Chloride Research Panel of the Chemical Manufacturers Association and the VI to assure that there is cooperation on projects where appropriate and to guarantee that potential duplication of activities is avoided.

M.N. Scheck
Staff to the HSE Committee
August 22, 1994

INTRODUCTION

In 1987, the San Antonio Air Logistics Command initiated an investigation into the cable assembly problems that are affecting the Air Force Major Commands. The proliferation and utilization of certain types of materials in electronic cable and connector technology has produced a negative impact on logistics support of defense weapons systems. System readiness and supportability are often the victim of cable designs utilizing unsuitable materials which fail prematurely in a system's life cycle. During the course of the investigation, it was determined certain materials have had wide use both in military and commercial applications. They are now banned for use by the military and specifically by the Air Force. The defense industry and the military are both culpable of using materials that are known to be poisonous and highly corrosive during decomposition and outgassing. Even though the subject has been studied and debated for many years, only recently has the military taken the initiative to eliminate these materials. Decomposition and outgassing routinely occur in relatively stable environments and are accelerated with increased heat or ultraviolet light.

A prime example would be the utilization of polyvinylchloride (PVC) which is banned for Air Force use by MIL-STD-1587. Most people think of PVC as an innocuous plastic used in household plumbing and lawn furniture. PVC is the most commonly used insulating and jacketing material in electronic cable assemblies. It is extensively used in heat shrinkable products. It has been the material of choice in most electronic support equipment and aerospace vehicle cable assembly applications. PVC decomposes autocatalytically and leads to corrosion problems in wiring and its' adjacent structures. For example, a common cable weighing ten pounds using PVC as a prime insulating material would contain approximately five pounds of PVC. This five pounds of PVC will outgas over 2.5 pounds during a period of as little as five years. This decomposition will occur faster or slower due to the environment in which it is used. The outgassed material is hydrogen chloride gas, which when mixed with normal moisture in the air, results in hydrochloric acid. This hydrochloric acid mist inside of electronic equipment will inevitably lead to corrosion which will negatively affect the operation and life cycle of the equipment.

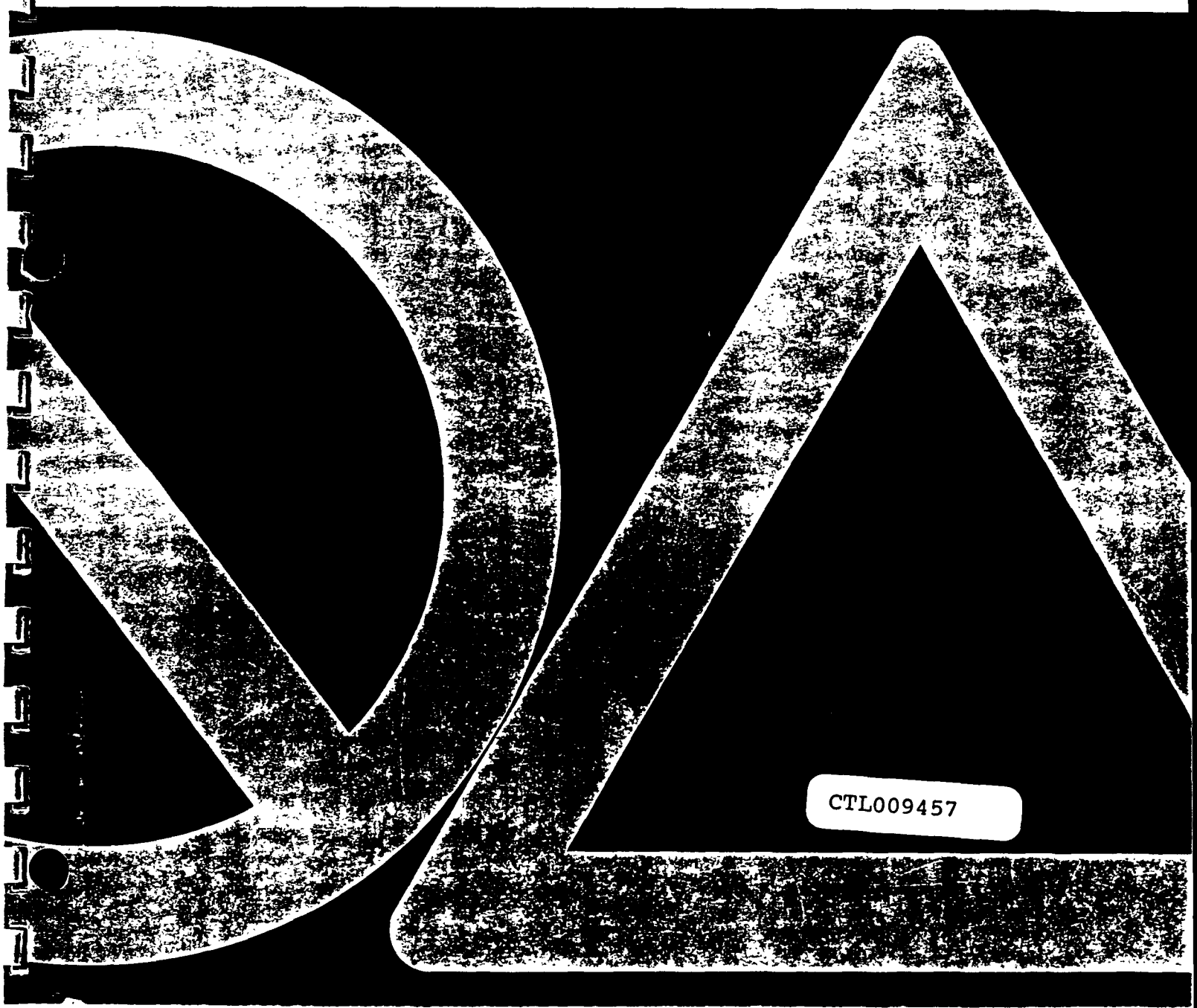
In an effort to comply with MIL-STD-1587, a search was made for the applicable specifications pertaining to the manufacture of cable assemblies. The applicable specifications are divided into four major categories: 1) MIL-I Specifications pertaining to insulation sleevings, 2) MIL-W Specifications pertaining to single conductor wire and associated extruded or taped insulations, 3) MIL-C Specifications, which are further divided into those pertaining to multi-conductor cable and associated extruded or taped insulations, and 4) MIL-P Specifications pertaining to potting compounds.

Chemicals

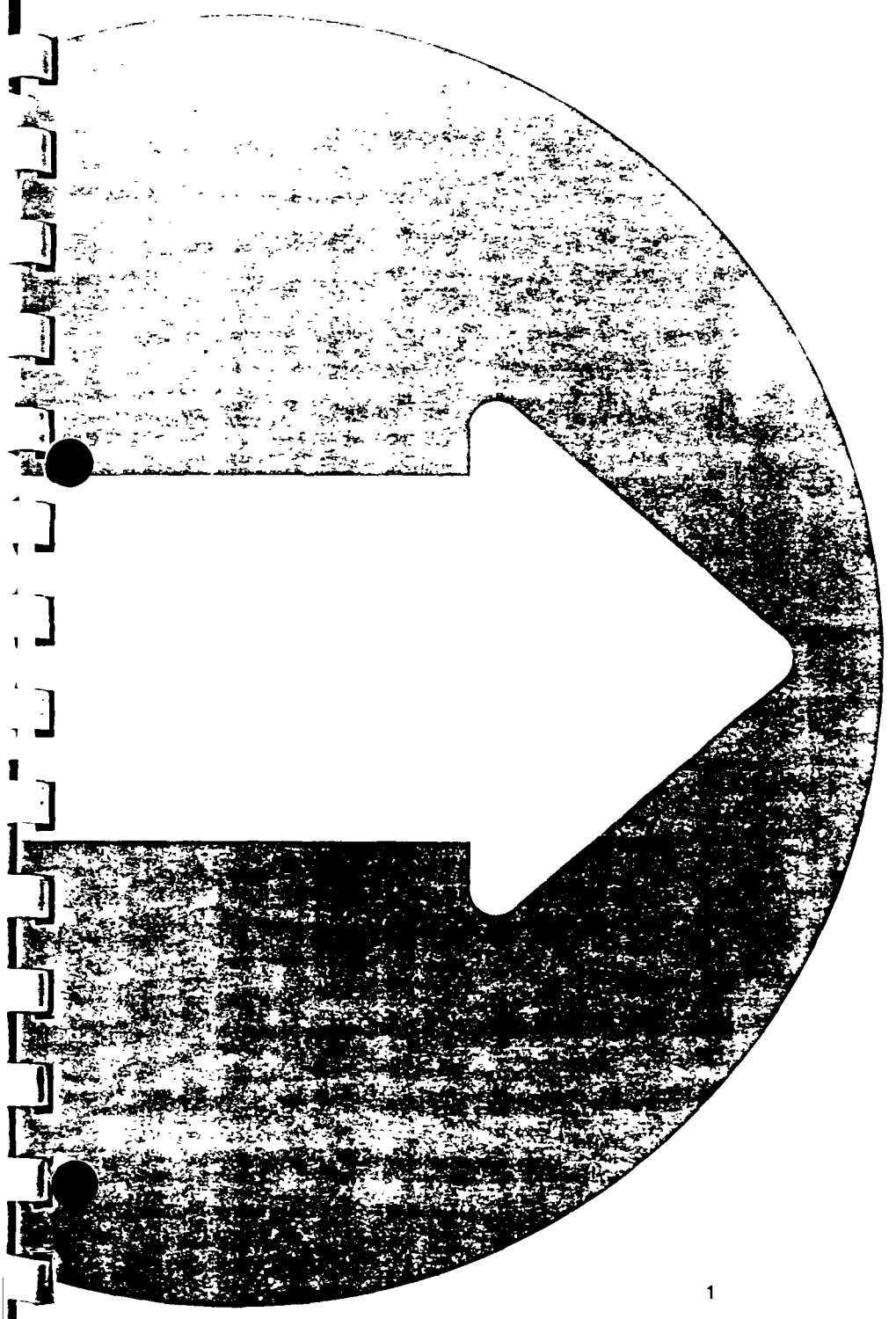
PPG INDUSTRIES

Vinyl Chloride Monomer

handling and properties



Contents



Statements and methods presented are based upon the best available information and practices known to PPG Industries at present, but are not representations or warranties of performance, result or comprehensiveness, nor do they imply any recommendations to infringe any patent or an offer of license under any patent

The products mentioned herein can be hazardous if not used properly. Any health hazard and safety information contained herein should be passed on to your customers or employees, as the case may be. PPG Industries also recommends that, before use, anyone using or handling this product thoroughly read and understand the information and precautions on the label, as well as in other product safety publications such as the Material Safety Data Sheet.

Although this product is intended for industrial and manufacturing uses, it, as all potentially hazardous materials, must be kept out of the reach of children.

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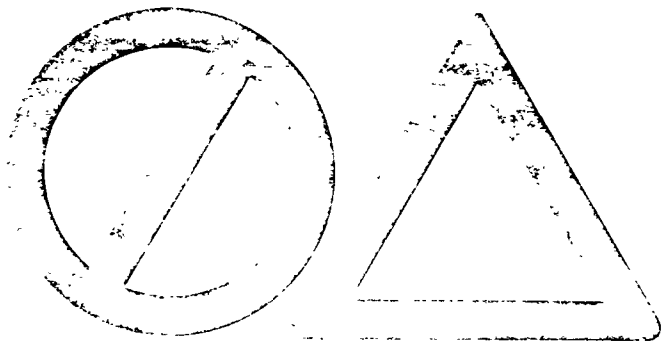
Introduction



Introduction

This third edition reflects the work practice changes required by the Occupational Safety and Health Standard and the Environmental Protection Agency Standard plus their additions and amendments as of the dates listed on the reprints at the end of this manual. The procedures set forth in this manual follow the work practice guidelines adopted for PPG plants producing vinyl chloride monomer. The PPG guidelines and work practices described in this manual may not be applicable to the vinyl chloride monomer operations of individual customers. PPG recommends that customers develop work practice guidelines specifically designed for their individual operations.

The Chemical Division of PPG Industries manufactures vinyl chloride monomer at Lake Charles, Louisiana, and at Guayanilla, Puerto Rico. The combined capacity of these two facilities is rated at 900 million pounds per year. This capacity makes PPG a major supplier of vinyl chloride monomer to producers of polyvinyl chloride resins. PPG is also a major supplier of percarbonate polymerization initiators used in the manufacture of polyvinyl chloride. The following pages show PPG's large-scale commitment to vinyl chloride monomer production.

Commitment

PPG's Commitment To Vinyl Chloride Monomer Production

In 1969, PPG expanded its Lake Charles, Louisiana vinyl chloride plant and, in 1971, built a Puerto Rican plant that greatly expanded PPG's capacity for producing chlorine and vinyl chloride monomer. Built at the same time nearby in Puerto Rico was an olefins plant half-owned by PPG. Its annual capacity includes one billion pounds of ethylene, which PPG combines with chlorine to produce vinyl chloride monomer.

A new large tanker, the S S Puerto Rican, transports refrigerated vinyl chloride monomer to a terminal at Paulsboro, New Jersey There vinyl chloride monomer is stored under refrigeration and shipped to customers in tank cars and in a fleet of dedicated tank trucks PPG can also ship vinyl chloride monomer at ambient temperatures by barge and ocean-going ships as well as by pipeline.

PPG produces vinyl chloride monomer by an oxyhydrochlorination process and holds more than 400 domestic and foreign patents on this technology. PPG developed the process in the early 1950s and commercialized it in the early 1960s

Related to PPG's vinyl chloride monomer is its production of vinylidene chloride monomer.

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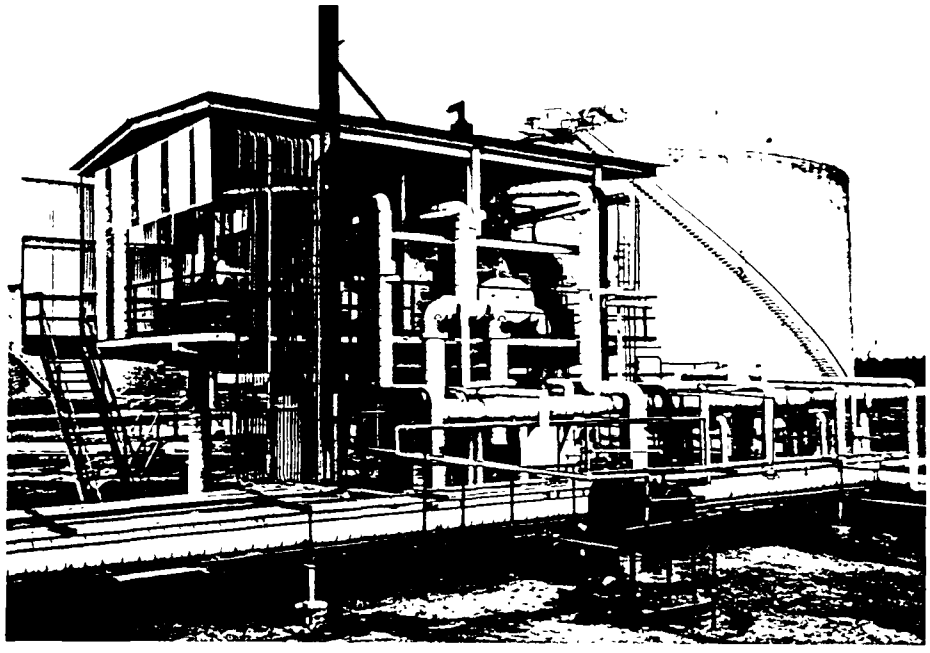
At the PPG plant in Guayanilla, Puerto Rico, a modern 34,000-ton chemical tanker, the S S Puerto Rican, receives a load of vinyl chloride monomer that will travel under refrigeration to Paulsboro, New Jersey



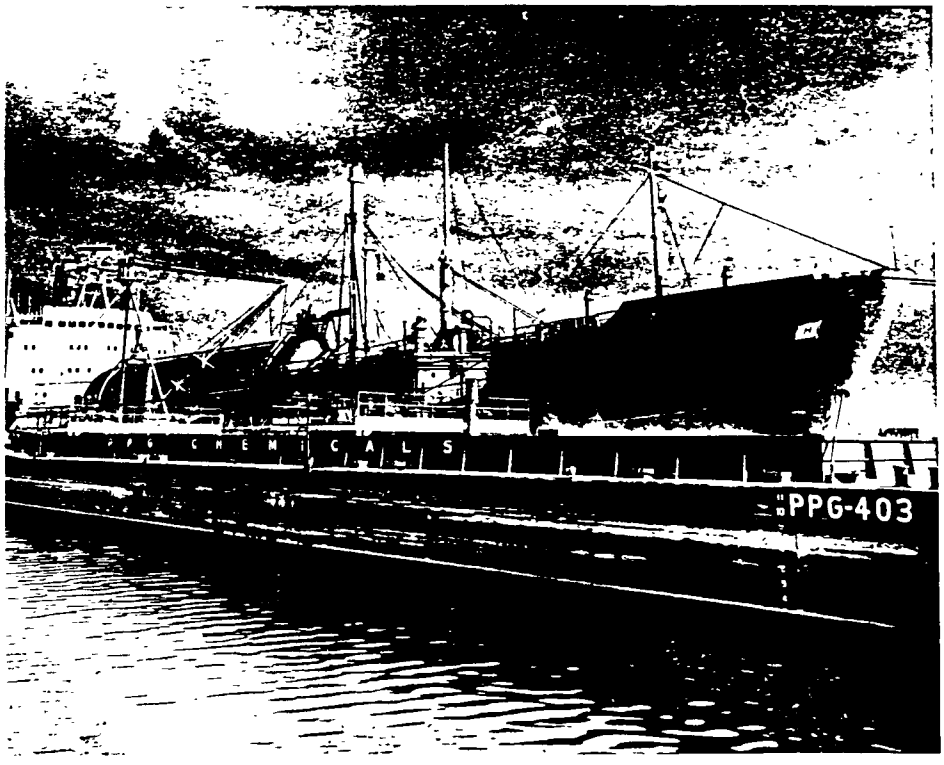
In the foreground is the refrigeration unit of a vinyl chloride monomer storage tank at the Paulsboro, New Jersey terminal This is the nation's largest terminal for vinyl chloride monomer and the world's largest for refrigerated vinyl chloride monomer

Tank truck is being loaded with 20 tons of liquid vinyl chloride monomer under pressure

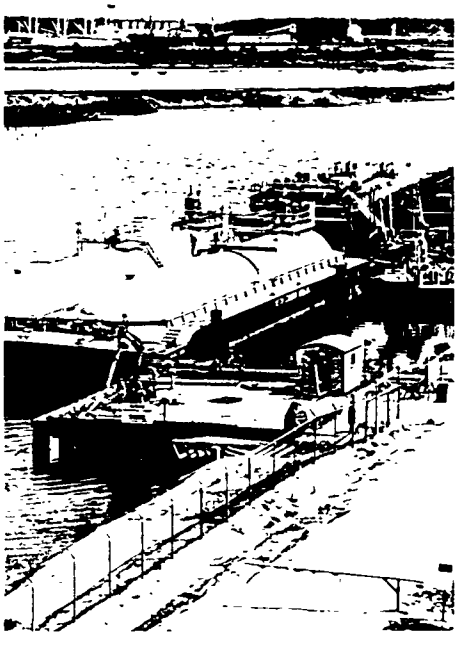
PPG offers the East Coast's first tank truck deliveries of vinyl chloride monomer The Paulsboro terminal can store 53 3 million pounds of the monomer

CTL009461

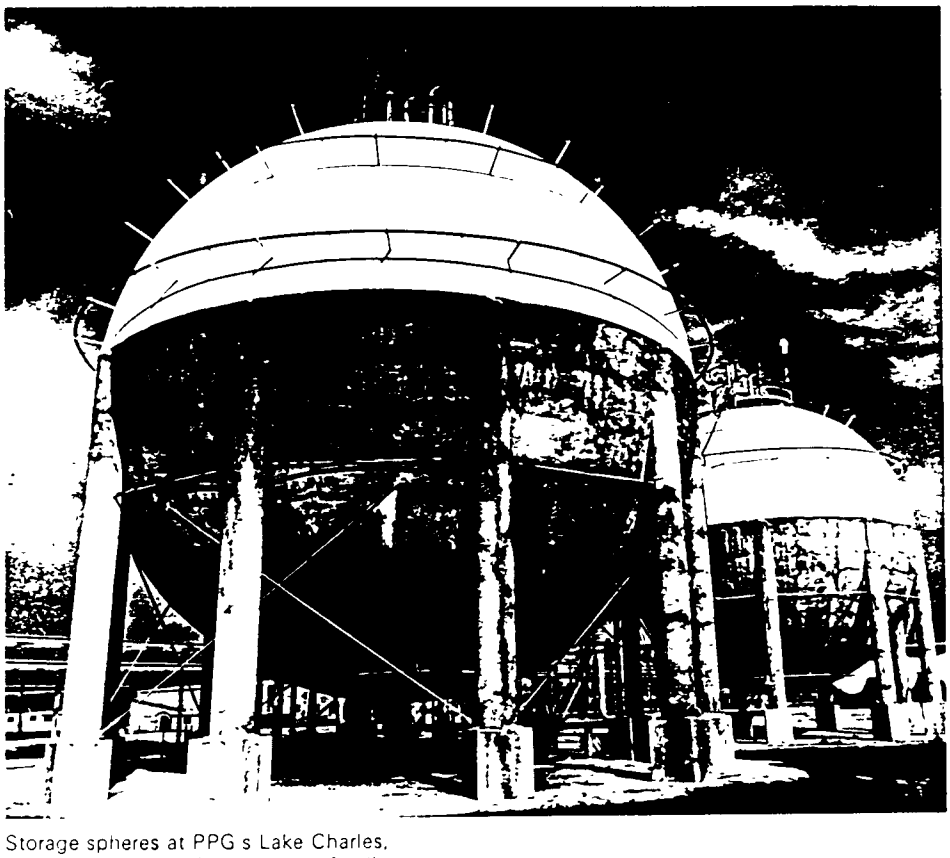
At PPG's Lake Charles, Louisiana plant, a tank car is being loaded with liquid vinyl chloride monomer under pressure. PPG has a fleet of tank cars dedicated to vinyl chloride service



Norwegian vessel has taken on a cargo tank of liquid vinyl chloride monomer under pressure from the PPG plant in Lake Charles, Louisiana PPG loads ships with up to six million pounds of monomer



Barge holding cargo tanks of liquid vinyl chloride monomer under pressure is being loaded at the PPG plant in Lake Charles, Louisiana From there, the barge can travel up the Mississippi and Ohio rivers A barge can hold up to four million pounds of monomer



Storage spheres at PPG s Lake Charles, Louisiana plant hold thousands of gallons each of liquid vinyl chloride monomer under pressure

CTL009462

CH_2CHCl

Properties

Chemical Names:

Vinyl chloride, vinyl chloride monomer, chloroethylene, chloroethene
Chemical Formula: CH_2CHCl
Molecular Weight: 62.5
Description:

At ordinary temperatures and pressures, vinyl chloride is a colorless gas with a mild, sweet odor. But as supplied in tank cars and trucks under pressure, it is a liquid. Vinyl chloride is highly volatile and its vapor is extremely flammable. Containers are labeled "cancer-suspect agent."

Boiling Point, °C	—13.8
°F	+7.0
Freezing Point, °C	—153.7
°F	—245
Flash Point, open cup, °C	—78
°F	—108.4
Explosive Limits, volume % in air at 25°C (77°F)	3.6 to 33
Autoignition Temperature, °C	472
°F	882
Critical Temperature, °C	158.4
°F	317
Critical Pressure, psia	775
Vapor Density, air = 1	2.15
Solubility, water in monomer at 25°C (77°F), weight %	0.11

Solubility

Vinyl chloride is relatively insoluble in water but soluble in most organic solvents.

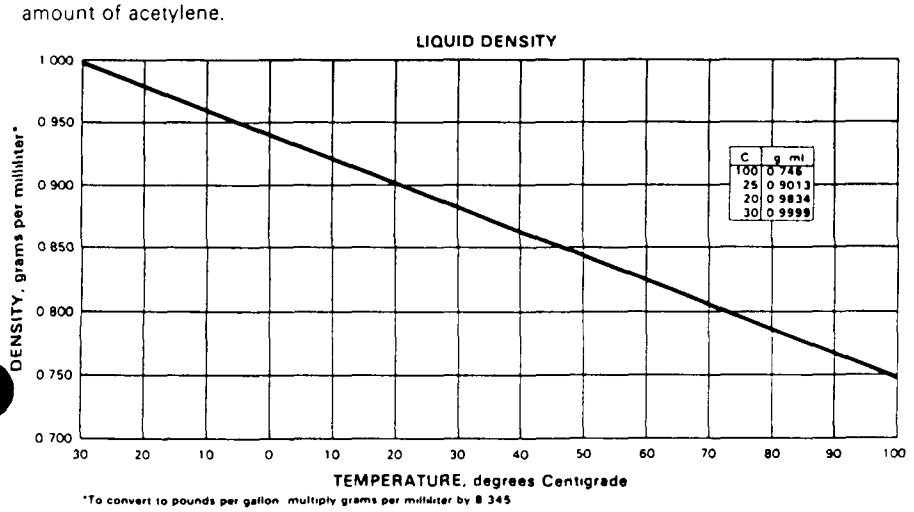
Reactivity

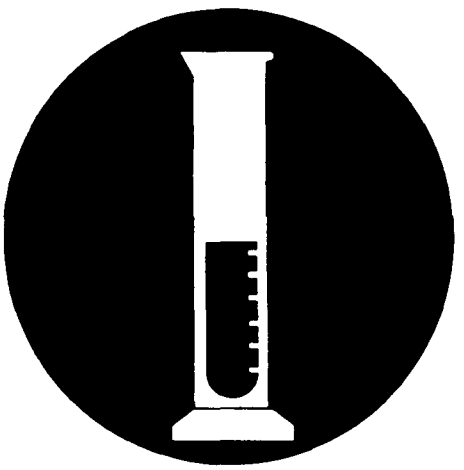
Vinyl chloride polymerizes exothermically in the presence of light, air, oxygen or catalysts. Heat alone will not initiate polymerization. Vinyl chloride is thermally stable to quite high temperatures. Although peroxide formation due to air exposure is a slow reaction, certain peroxide products are shock-sensitive. Vinyl chloride is noncorrosive to metals when dry at normal ambient temperatures, but water at elevated temperatures accelerates corrosion. The double bond behaves as in other unsaturated compounds. The chlorine atom is relatively inactive and is more stable than in saturated or allylic compounds.

Specification and Typical Analysis:

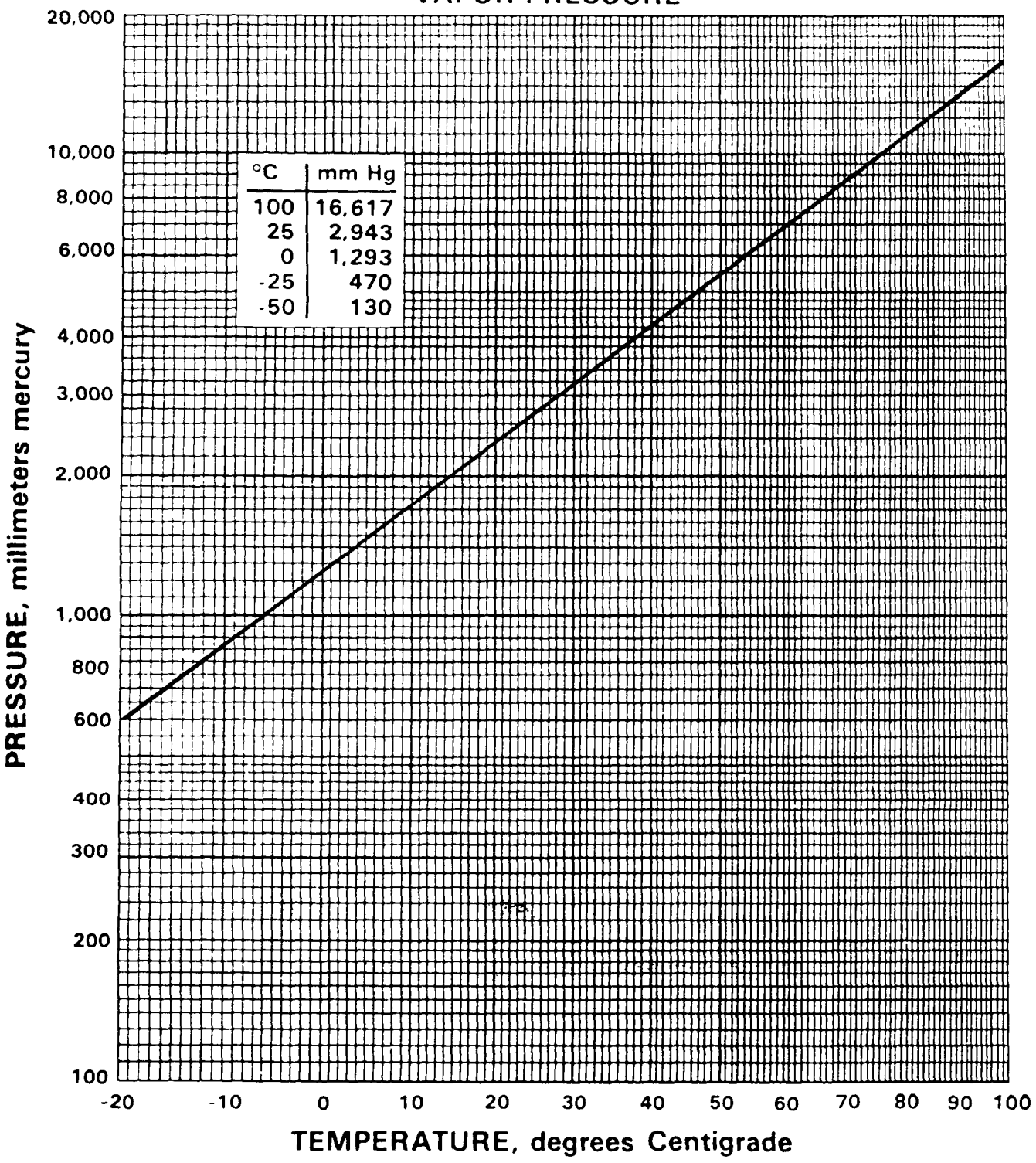
	Specification	*Typical Analysis*
Appearance	clear, free of suspended matter	clear, free of suspended matter
Color	colorless, water-white	colorless, water-white
Acidity, as HCl, ppm	2 maximum	<0.1
Iron, as Fe, ppm (filtered sample)	0.3 maximum	0.1
Nonvolatile residue, ppm	50 maximum	5
Water, ppm	100 maximum	50
Peroxide, as H_2O_2, ppm	0 06 maximum	0 01
Acetaldehyde, ppm	0 4 maximum	<1
Acetylene, ppm	2 maximum*	<1

*This maximum is an industry standard, however, the PPG product contains no detectable amount of acetylene.





VAPOR PRESSURE



°C	mm Hg
100	16,617
25	2,943
0	1,293
-25	470
-50	130

CTL009465

Health Solutions

CTL009466

Guidelines

Work Practice Guidelines

PPG Industries has work practice guidelines used at its own plants to reduce exposure to vinyl chloride monomer during manufacture, storage and loading. Portions of the guidelines are reproduced here.

The OSHA and EPA standards for vinyl chloride appear after page 36

Users of vinyl chloride monomer should observe the requirements of the appropriate regulatory agencies.

I. Labeling and Posting

A. Signs

1. Entrances to the regulated areas[1] shall be prominently posted with legible signs bearing the following:

DANGER!
CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY

2. Areas where hazardous operations[2] are performed or where an emergency currently exists shall be posted with legible signs bearing the following:

CANCER-SUSPECT AGENT
IN THIS AREA
PROTECTIVE EQUIPMENT
REQUIRED
AUTHORIZED PERSONNEL ONLY

NOTICE

The PPG guidelines and work practices described in this manual may not be applicable to the vinyl chloride monomer operations of individual customers. PPG recommends that customers develop work practice guidelines specifically designed for their individual operations.

B. Labels for Monomer Containers

Vinyl chloride monomer in containers or vessels located outside the regulated area shall be labeled as follows:

VINYL CHLORIDE

DANGER!
EXTREMELY FLAMMABLE
LIQUID AND GAS
UNDER PRESSURE
CANCER-SUSPECT AGENT
HARMFUL IF INHALED
MAY POLYMERIZE VIOLENTLY
UNDER FIRE CONDITIONS OR
LOSS OR REMOVAL OF INHIBITOR

Keep away from heat, sparks and open flame.
Keep container closed.
Use with adequate ventilation.
Avoid breathing vapor.
Avoid contact with skin.
Keep cylinder out of sun and away from heat.
Container should be grounded when being emptied.
Never drop cylinder.

FIRST AID: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

IN CASE OF:
Fire—Use water spray, dry chemical, or carbon dioxide.
Spill or Leak—For small spills, evacuate area and permit to evaporate. For large spills or leaks, evacuate area. Dike or flush to ground and let evaporate. Do not flush to sewer because of explosion hazard. Eliminate possible sources of ignition. Wear suitable respiratory protection.

C. Waste Material

Waste material removed from regulated area in closed containers for disposal shall have the following label:

WASTE MATERIAL
DANGER!
MAY CONTAIN
VINYL CHLORIDE MONOMER
EXTREMELY FLAMMABLE
VINYL CHLORIDE IS
A CANCER-SUSPECT AGENT

[1] "Regulated area" means an area where vinyl chloride concentrations are in excess of the permissible exposure limit.

[2] "Hazardous operation" means any operation, procedure, or activity where a release of either vinyl chloride liquid or gas might be expected as a consequence of the operation or because of an accident in the operation, which would result in an employee exposure in excess of the permissible exposure limit.

D. Equipment

Process equipment, materials and clothing contaminated with vinyl chloride monomer shall not be removed from a regulated area unless it has been purged or placed in closed containers bearing the following legend:

DANGER!
CONTAMINATED WITH
VINYL CHLORIDE MONOMER
CANCER-SUSPECT AGENT

II. Apprisal of Employees

Each employee working in a regulated area shall be apprised of all known hazards, the consequences of overexposure, appropriate emergency procedures, proper conditions for safe use and precautions to prevent exposure to vinyl chloride monomer. Each plant shall have prepared an operations manual detailing procedures for performing the work which contains specific safe work practices. These practices shall not contain inherent steps that result in exposure of the employee.

III. Medical

Medical surveillance shall be required or made available to workers covered by this Work Practice Guideline no less frequently than every 12 months. For employees who have worked over 10 years, this period shall be every six months This medical program shall be considered the practical minimum and these examinations should be reviewed every three years for revisions and supplemental testing where indicated.

IV. Personal Protective Equipment and Clothing

A. Respiratory Protection

1. General

When the limits of exposure prescribed on page 13 under Toxicity cannot be met by limiting the concentration of vinyl chloride monomer in the work environment through feasible engineering means, the plant must establish and enforce a program of respiratory protection detailing the required protection of each job classification.

2. Non-Routine Operations

The requirements set forth in this section shall apply for non-routine operations such as brief exposure to concentrations as a result of maintenance or repair activities, emergency situations, or other short-time, non-standard work routines A respiratory protection program meeting the general requirements outlined in the American National Standard, Practices for Respiratory Protection, Z88.2-1969 shall be established and enforced. This program shall include instructions on the selection, fitting, use, testing for leakage, cleaning and maintenance of the respiratory protective device.

3. Vessel Cleaning, Draining, Charging or Maintenance

a Where employees are engaged in cleaning, charging or maintenance inside vessels, respiratory protection shall be worn at all times Where the concentration of vinyl chloride monomer inside the vessel has been purged below 25 ppm, and there is adequate oxygen content (19 5 volume %) to support life, an approved chemical canister mask which provides a service life of at least 4 hours for concentrations of vinyl chloride up to 25 ppm shall be worn.

Whenever air-purifying respirators are used, the vessel shall be continuously purged with fresh air.

Where air-purifying respirators are used, the air-purifying canisters or cartridges shall be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first.

Apparatus prescribed for higher concentrations may be used for any lower concentration.

b. Where the concentration of vinyl chloride monomer cannot be brought below 25 ppm, the employees shall wear a Type C, supplied-air respirator, continuous-flow type, with full or half facepiece, helmet or hood (Type C per OSHA Standard page 35897, not over 1000 ppm)

c. Employees making the first break into a process line, storage line or vessel that contained or contains vinyl chloride monomer shall wear respiratory protection appropriate to protect the employee from exposure to vinyl chloride monomer.

CTL009468

4 Routine Operations

a Workers loading or unloading tank cars, tank trucks, barges, ships, filling cylinders and other such similar operations where the facility does not have a closed system for vapor equalization, shall wear Type C respiratory protection during the above-mentioned operations

b. Where there are loading and unloading operations which incorporate equalization lines, Type C respirators shall be located in the immediate area and worn in the event of spillage, leaks or emergencies. Only those employees properly protected with Type C respiratory protection shall attempt to correct an upset condition or emergency.

c. Employees engaged in loading, unloading and production shall have on their person a chemical cartridge respirator to be used for escape purposes

d. Employees who collect samples for quality control purposes shall wear respiratory protection consisting of a chemical cartridge(s) type during the period when the sample is inserted and removed from the sampling line. Respiratory protection consisting of a chemical cartridge type shall be worn when gate and globe valves are operated.

e. Employees who monitor the workplace air shall have available appropriate respiratory protection in the event of leaks in equipment. These employees shall wear the respiratory protection when levels being measured exceed the permissible limit.

Self-contained breathing apparatus

B. Clothing

1) Protective gloves, footwear or foot coverings, and protective head covering and protective eye wear shall be provided for use in regulated areas. This protective equipment shall be worn during maintenance and cleaning operations on or inside previously purged vessels, pipes, pumps and valves not removed from the regulated area.

2) For vessel cleaning, maintenance and changing charges, protective clothing shall be worn to prevent skin contact with liquid vinyl chloride monomer or other materials containing vinyl chloride monomer.

3) Employees making a break into a closed system line which contains or contained vinyl chloride monomer or other materials containing vinyl chloride monomer shall wear protective clothing.

V. Work Practices

A. Emergency Procedures

Specific emergency procedures shall be prescribed. The procedures shall be readily available, in writing, to the employees. The employees shall be familiarized with these procedures, and trained and rehearsed in their application.

B. Engineering Procedures

An engineering review procedure shall be established to incorporate design changes where feasible to minimize sources of vinyl chloride monomer vapors from processes, loading, unloading operations and maintenance procedures that contribute to employee exposures. Where local exhaust ventilation is used, it shall be designed and maintained to prevent the accumulation of or recirculation of vinyl chloride monomer vapor into a non-regulated area. Sample collection ports shall be so designed that during the sample collection period, the sample container is part of a closed loop system. Valves shall be located as close as practical to the end of the disconnecting line. Valves shall be located where their frequent closings are necessary to isolate equipment. Valves shall be made of high-quality type to prevent leakage of vinyl chloride monomer or liquid streams containing vinyl chloride monomer.

Blow-down and purge lines from equipment shall be designed to return to the process or to discharge to an emission control device such as an incinerator.

The emissions of vinyl chloride vapor are stringently regulated in monomer- and polymer-producing plants These regulations, published in the Federal Register on October 21, 1976 (41FR46559) can also be found in the Code of Federal Regulations 40CFR61 Subpart F. These regulations should be consulted before implementing engineering procedures.

C. Laboratory Procedures

1) All quality control testing and analyses shall be performed in a laboratory equipped with a chemical laboratory hood having a capture velocity adequate to collect vinyl chloride monomer vapors under conditions prevailing in the laboratory. The discharge from the laboratory hood shall be designed so that vinyl chloride vapors do not reenter other non-regulated areas.

2) All full sample containers (bombs) shall be stored inside the laboratory hood pending analysis. Sample bombs empty or practically empty of liquid shall not be stored in the laboratory unless the storage space is properly ventilated and under negative pressure. Sample bombs may be stored outside the laboratory building provided the storage location meets safety requirements.

The unused portion of sample remaining after analysis must be discharged back to process or to a suitable emission control device. Discharge to atmosphere is not permitted.

3) Analytical test instruments such as a gas chromatograph, that are located inside the laboratory but outside the laboratory hood, shall have their purge and bypass lines discharge into the laboratory hood.

4) All quality control sampling containers (bombs) shall be periodically checked to assure the integrity of the valves, to inspect for leakage, and to verify that they are labelled as required in section (1) of the OSHA Standard. Screw caps shall be provided for all sample bombs and used when the bomb is not in service.

5) No glassware containing vinyl chloride shall be removed from the laboratory hood.

D. General Housekeeping

1) To prevent airborne contamination and accidental skin contact with vinyl chloride monomer, emphasis shall be placed upon periodic inspection, prompt repair of equipment and leaks, and proper handling, storage and disposal of materials.

2) An initial air monitoring survey and atmospheric sampling tests shall be made in accordance with applicable standards There shall be periodic tests for leaks at pumps, valves and flanges and for emission of vinyl chloride monomer The frequency of these tests shall be such to verify the integrity of equipment and adherence to proper work practices and shall comply with the EPA monitoring requirement 40CFR61 65(b)(8)

3) For waste material and contaminated equipment handling, see Section I (C) and (D) on Labeling and Posting.

E. Special Precautions

Vinyl chloride monomer is a gas at ambient temperatures. Therefore, waste materials, equipment and other sources of the monomer in closed containers shall not be placed in areas of excessive temperature or sunlight where buildup of internal pressure may result in rupture of the container, fire or explosion.

F. Vessel Entry

1) A vessel entry procedure shall be developed. Employees shall be familiarized with the procedure in writing, and shall be trained and rehearsed in the techniques provided for in the procedure.

2) Atmospheres within the vessel shall be purged to where vinyl chloride monomer contained therein is below 25 ppm and the oxygen content contained therein is sufficient for supporting life. The purged material must be routed to an emission control device until the vinyl chloride monomer concentration within the vessel reaches 2% by volume. Then the vessel may be opened to atmosphere and purging continued until the 25 ppm level is reached Where either the vinyl chloride monomer concentration cannot be reduced below 25 ppm or where there is insufficient oxygen or where other toxic materials may be present in concentrations dangerous to life, an air-supplied respirator (Type C) and protective clothing, as stated in Section IV of this Work Practice Guideline, shall be provided by the plant and used by the employee. In vessels which have been purged to below 25 ppm, respiratory protection outlined in Section IVA3 shall apply.

3) All piping to and from the vessel shall be blanked or otherwise isolated prior to entry.

G. Blow-Down Procedure

Whenever any equipment which contains or contained vinyl chloride monomer is to be purged or blown-down, there shall be a written procedure established to prevent the worker from being exposed. This can be accomplished by returning the blow-down stream to the process through equalizing lines or to an emission control device. If these systems are not feasible, Section IV of this Guideline shall be followed.

H. Tank Car, Tank Truck, Barge and Ship Loading and Unloading

Each unloading line and each vapor equalizing line shall be equipped with vent connections permitting, at the completion of unloading, pressure to be vented, and the hose purged with an inert gas back to the process or to an emission control device. The EPA vinyl chloride regulation 40CFR61 65(b)(1) should be consulted for details on loading lines.

VI. Sanitation

A. General

Storage or consumption of food, storage or use of containers of beverages, application of cosmetics or smoking are prohibited in regulated areas.

B. Showers and Hand-Washing Facilities

Showers and hand-washing facilities shall be available to all vinyl chloride workers.

C. Clothing

Clothing saturated with vinyl chloride monomer or with other process streams containing vinyl chloride monomer shall be promptly removed and replaced with uncontaminated clothing.

VII. Monitoring and Record-Keeping Requirements

A. Workplace Areas

1) Concentrations of vinyl chloride monomer in the regulated area shall be monitored at strategic sampling points. Adequate summary records of these concentrations shall be maintained and held available for inspection for a period of 30 years.

2) a. Sampling frequency and patterns shall be adequate to represent the regulated area environment and to demonstrate proper work practices and the integrity of the equipment.

b. As required by the EPA vinyl chloride standard 40CFR61 65(b)(8) and 40CFR61 6, a monitoring program must be established to insure control of fugitive emissions. Vessel environments shall be periodically monitored at frequent intervals for vinyl chloride monomer concentrations during the times they are occupied by an employee. Summary records of these measurements shall be maintained for 30 years.

3) Where the manufacturing process is located out-of-doors, a sampling station should be located downwind of the operations. Multiple sampling points may be necessary.

B. Personal Monitoring

1) Sampling shall be of such frequency and pattern as to represent levels of exposure of employees to vinyl chloride monomer. Provisions set forth in the OSHA standard for vinyl chloride monomer shall be followed. Summary records shall be maintained for 30 years for all sample schedules to include the sampling data, analytical methods, type of respiratory protection in use (if applicable) and the concentrations of vinyl chloride monomer. Job summary records shall be maintained so that they may be classified by employee.

2) Each worker shall have access to the sample results as they pertain to his occupational exposure.

3) Within ten working days after monitoring which discloses that any employee has been exposed beyond the OSHA standard, each such employee shall be notified in writing of the results of the overexposure. An evaluation of the incident shall be made and corrective action outlined.

VIII. Emission Restrictions

Section 112 of the Clean Air Act requires EPA to control "hazardous air pollutants." The federal regulatory response to the law is found in the Code of Federal Regulations, 40CFR61, National Emission Standards for Hazardous Air Pollutants (NESHAPS).

EPA has reserved this regulatory tool for those substances in wide use that are known to cause serious impairment of human health at very low concentrations. So far, mercury, asbestos, beryllium and vinyl chloride have been regulated in this category.

The Standard for Vinyl Chloride was published in the Federal Register on October 21, 1976, and became effective for existing sources 90 days thereafter. It represents one of the most sophisticated regulations EPA has yet published to control a single material or single industry. It is a technology-based regulation, prescribing both allowable emissions and allowable engineering and operating practices to secure the maximum possible reduction in vinyl chloride emissions. The regulation does not specify permissible ambient air concentrations.

The regulation applies to both vinyl chloride monomer and polymer plants. Specific emission limits are established for various emission sources. These sources include formation and purification equipment in vinyl chloride monomer plants. They also include reactors, strippers, mixing and weighing equipment, monomer-recovery equipment and all other sources following the reactor or stripper in a vinyl chloride polymer plant.

In addition to emission limits, operating procedures and/or engineering standards are specified to control relief valve discharges, loading and unloading line disconnection losses, slip gage emissions, seal leakage from pumps, compressors and agitators, relief valve leakage, emissions resulting from losses due to opening of equipment and taking and handling of samples. Other sources of fugitive leakage are addressed by requiring the installation and operation of a leak detection and elimination system. This includes both stationary and portable monitoring equipment and operating procedures designed to detect and locate other sources of leakage (such as valve stems and flanges) and to initiate repair.

Emission tests to demonstrate the performance of emissions control equipment are required. Continuous monitoring of control device emissions and of all uncontrolled source emissions is required to assure continuing compliance with the standard.

Because of its complexity, a careful study of the exact text of the regulation, including test procedures, should be undertaken prior to the engineering of any new vinyl chloride equipment. It should also be noted that preconstruction approval of additions or modifications to vinyl sources must be obtained from the applicable authority.

As of the date of publication of this manual, several states have been granted implementation and enforcement authority for NESHAPS regulations. In addition, many states are considering the adoption of state laws and regulations which may place more stringent standards on vinyl chloride than the federal standards. Contact with both state and federal pollution control agencies is advised to obtain up-to-date regulatory information.

Handling and Unloading

Handling and Unloading

In many handling and unloading steps, there are potential points of exposure to vinyl chloride monomer Consult with the technical service staff of PPG Industries' Chemical Division regarding where monomer unloading exposure points may be in your plant Check also for other exposure points that are peculiar to individual plant operations *PPG recommends that customers develop work practices specifically designed for their individual operations.*

Handling spills and leaks

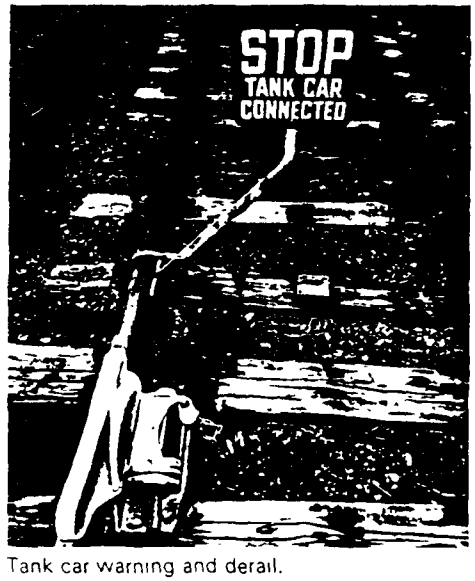
If the concentration of vinyl chloride vapor in air exceeds 3.6% by volume, the lower limit of the explosive range, persons should not enter area of spill or leak except for a rescue

Take care of a leak or spill immediately. Shut off or remove any possible source of ignition Keep people away and do not permit smoking Handle small spills by evacuating the area and letting the liquid evaporate. Dike the liquid from a large spill and let it evaporate. Do not flush vinyl chloride into a sewer because it may create an explosion hazard Spilled vinyl chloride should not be deliberately ignited.

Invisible leaks can be detected by using a soap solution or by instruments; never use a halide lamp because of the fire and explosion hazards. If it can be done without personal risk, shut off a leak.

Persons taking care of a leak or spill, or making a rescue, should use self-contained or air-supplied breathing apparatus and should wear spark-proof shoes and use spark-proof tools.

A person contacted by vinyl chloride liquid should take a bath promptly and discard contaminated clothing and shoes.



Tank car warning and derail.

Unloading tank cars

If tank car valves are defective or leaking, do NOT unload. Telephone the PPG Chemicals plant at Lake Charles, Louisiana, 318-882-1200.

Spotting Car

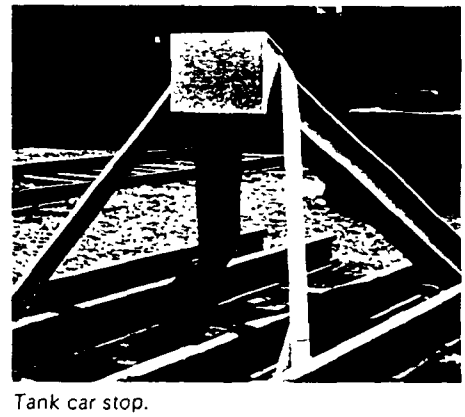
Spot tank car accurately on level track. Set car brakes and block wheels with standard rail clamps Unless car is protected by a closed and locked switch or gate, attach a derail to open end of track. Place caution signs complying with DOT regulations on track or car to give warning to persons approaching car from open end(s) of siding. The signs and derail must be left in place until after car is unloaded and disconnected

PPG tank cars are equipped only for top unloading The car type is DOT Class 112A-340W. The cars have a net weight capacity of 180,000 pounds corresponding to a nominal capacity of 26,000 gallons

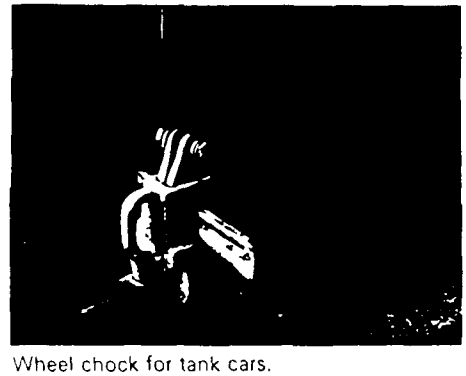
Workmen unloading shipments should wear goggles and protective clothing, that is, garments suited to the particular situation and probable extent of exposure.

Unloading procedures—particularly connecting, disconnecting and sampling—may release vinyl chloride vapors in the work area Workmen should use proper respiratory protection (see page 15, PPG Work Practice Guidelines, Section IVA2)

The car should not be left unattended while being unloaded.



Tank car stop.



Wheel chock for tank cars.

Preventing Ignition

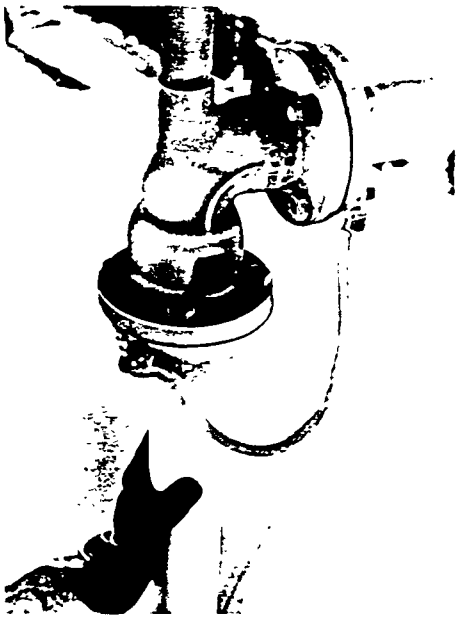
Static electricity must be dissipated to minimize the fire hazard. Connect grounding wire between the car tank and the unloading line. (See grounding arrangement diagram below.) Also, the car tank should be grounded as well as the rail under the tank car. Flanged joints in piping should be bonded by jumper cables. Welded pipe connections are preferable. Use a commercial meter for checking ground integrity.

All wiring and electrical equipment should be explosion-proof, Class 1, Group D. No flame- or spark-producing devices or smoking by personnel must be allowed in the area.

Follow federal, local and insurance regulations. A fire hose should be available to cool the car tank and surrounding equipment in case of fire.

Additional information appears in Manual Sheet TC-4 on "Unloading Flammable Liquids from Tank Cars," published by the Manufacturing Chemists Association, 1825 Connecticut Avenue, N.W., Washington, D.C. 20009.

Ground the tank car before unloading.



Flanged joints should be bonded by jumper cables.

Grounding Arrangement

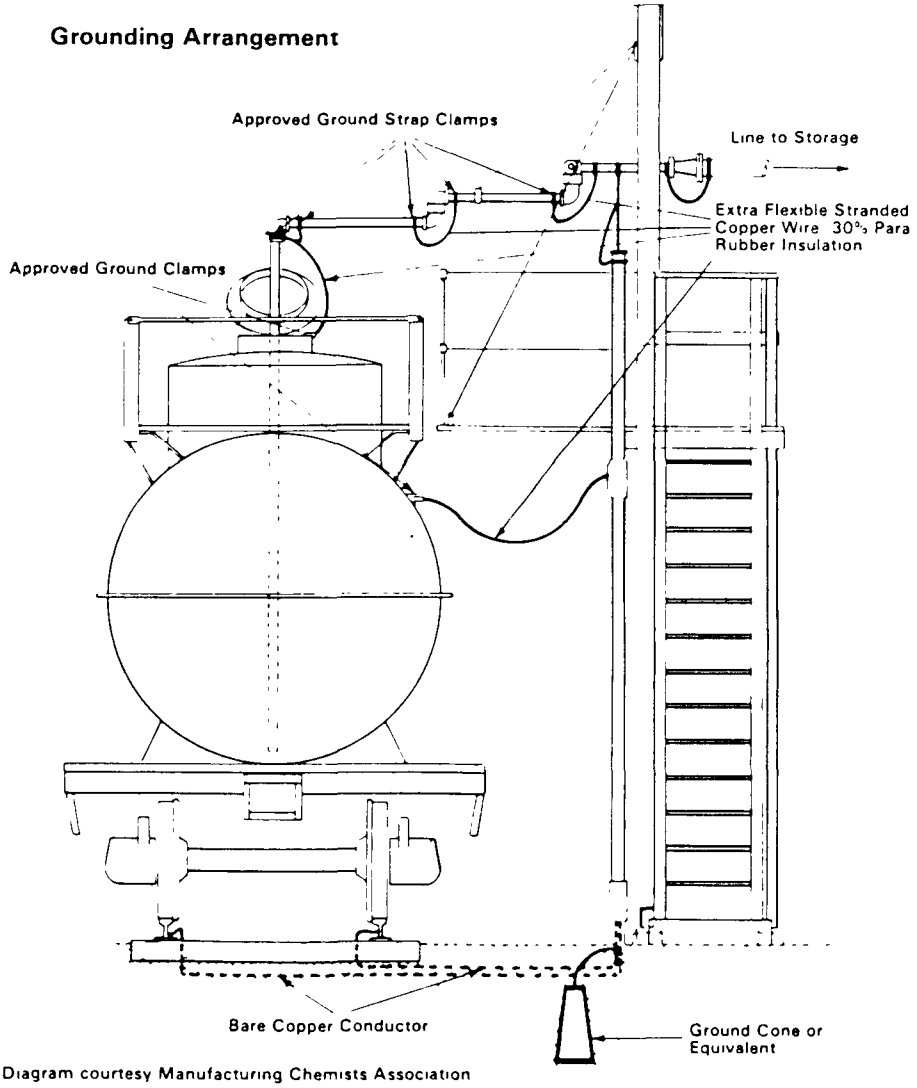
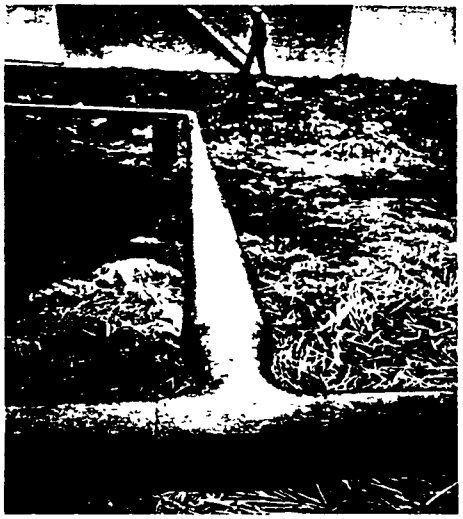


Diagram courtesy Manufacturing Chemists Association



Welded pipe connections are preferred for dissipating static electricity.

Check for ground integrity.

CTL009473

Check Before Unloading

Check all car valves to make sure they are closed. Check valves on the piping from storage tank to process to make sure they are closed. Check the vinyl chloride monomer concentration to make sure there are no invisible leaks from valves. Wear respiratory protection if there is any leakage. Take care of leak as recommended on page 19.

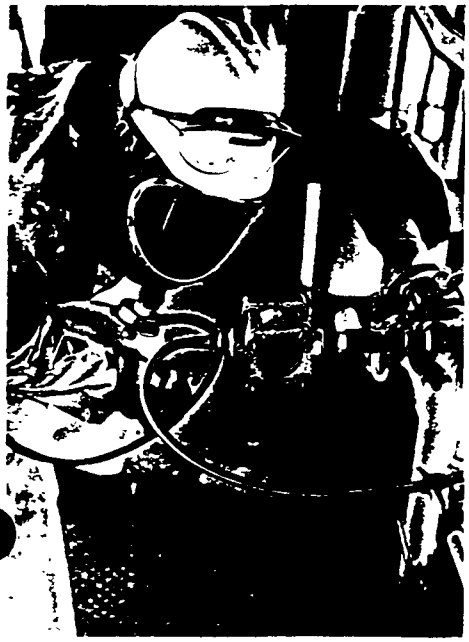
Check storage-tank level to make sure there is sufficient room for the car's contents. The PPG tank car is equipped with a gage rod assembly (see diagram of tank car fittings) for measuring the level of vinyl chloride.

To prevent exposure of workers to vinyl chloride monomer vapor, this procedure has been modified by connecting a "bull's-eye" sighting device to the end of the gage rod. It permits observing liquid vinyl chloride monomer in a system that is closed at the inspection site. The gas flowing out the bull's-eye is piped into the recovery system.

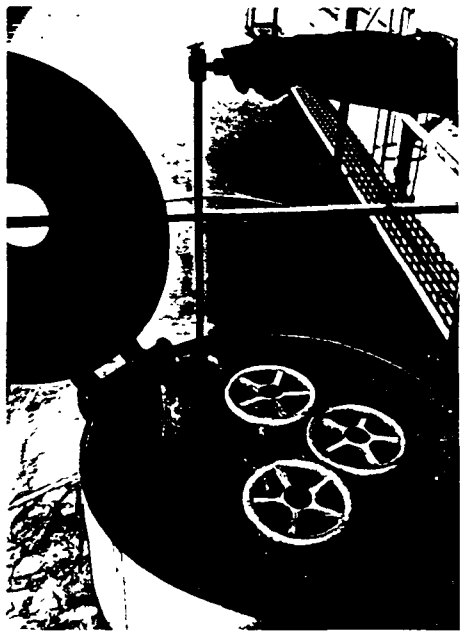
A 2-inch valve is installed vertically on the vapor padding connection and two 3-inch valves on the liquid unloading outlets, which are over eduction pipes. Users may reduce the vapor line valve to 1 inch providing vapor flow is sufficient to maintain positive pressure near the end of unloading. Both liquid outlets can be used to speed unloading if desired.

The vapor padding connection should be vented to the vapor at the top of the storage tank (see unloading diagram).

The thermowell dome fitting covers a closed system filled with antifreeze. A thermometer can be inserted in the ¾-inch opening to obtain the temperature of the vinyl chloride when desired.

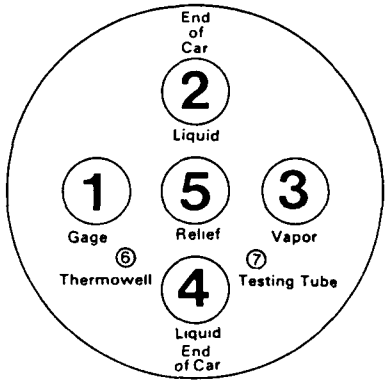


"Bull's-eye" sighting device permits observing liquid without exposure to vapor



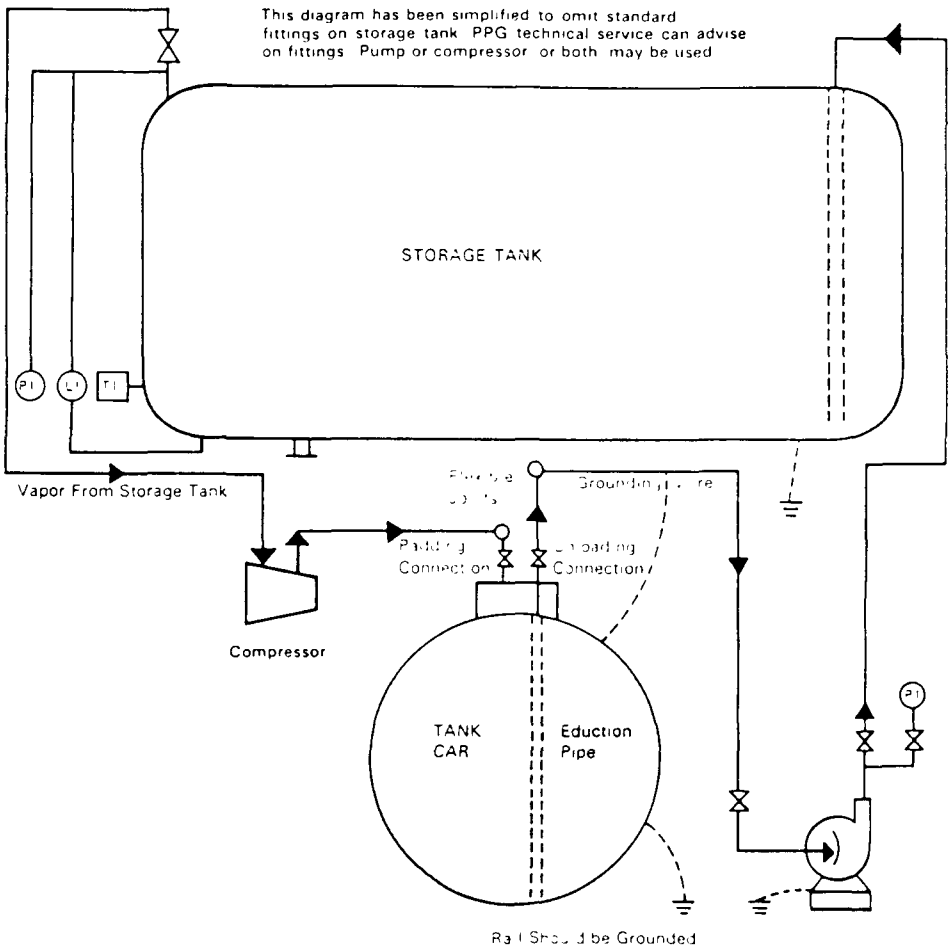
Measure level of vinyl chloride monomer liquid in tank car with gage rod assembly

Vinyl Chloride Monomer Tank Car Dome Fittings



1 Gage rod assembly
2 Liquid unloading valve
3 Vapor padding valve.
4 Liquid unloading valve.
5 Safety relief valve.
6 Thermowell
7. Testing tube.

Tank Car Unloading Station For Vinyl Chloride Monomer



[1]RANGE Full vacuum to 50 psig
[2]RANGE -50°F to 150°F

CTL009474

Sampling

Check contents of tank car by sampling before unloading to verify that contents of car are vinyl chloride and meet required specifications.

Samples are taken in stainless steel pressure bombs that meet the requirements of DOT Regulation 3B-400 and are dedicated to vinyl chloride service.

All pipe connections and valves at the sampling point should be as close together as possible to minimize the quantity of vinyl chloride monomer that must be vented before removing the sample bomb from the system.

The pipe leading from the sampling bomb is part of a closed loop system. It is connected to a common vent manifold leading to an emission control device. Suitable respiratory protection must be used during sampling if measurements of vinyl chloride monomer concentration have indicated that exposure is possible.

An alternative arrangement has piping and valves for two evacuated sampling bombs: one for collecting the sample; the other for collecting the bleed-off.

The operator should wear long sleeves and gloves to protect him from possible contact with residual liquid vinyl chloride monomer when he removes the bomb from the sampling position.

Liquid samples should be taken only through the gage rod assembly fitting.

1. Remove hood from gage rod assembly.

2. While holding rod, release latch.

CAUTION: When releasing latch, do not stand directly over rod because the car vapor pressure could make the rod rise rapidly once the latch is released.

3. Set rod to desired level in car.

In the center of the other fittings is a spring-loaded, safety relief valve set at 280 psig.

Connecting sample bomb

CTL009475

Pressurizing Car

PPG ships tank cars of vinyl chloride filled with liquid up to no more than 86% of the water weight capacity of the tank. Vinyl chloride vapor occupies the space above the liquid. Air or oxygen must not be introduced during unloading or storage to prevent formation of a flammable mixture or premature polymerization. Purge all lines thoroughly with nitrogen before hooking up. Use nitrogen with a maximum of 10 ppm oxygen. Nitrogen purging can be minimized by sealing the line and alternately pressurizing with nitrogen and bleeding off the nitrogen to a remote location or to a recovery system or incinerator.

Remove the threaded pipe plugs on the liquid and gas valves cautiously and connect the liquid unloading line and the vapor padding line (see unloading diagram). The vapor pressure is needed to prime the centrifugal forwarding pump, if one is used. To reduce pressure drop, locate the pump as close to the tank car as possible. Some installations have a compressor on the vapor line from the storage tank in addition to the pump. In warm climates, a compressor may be used alone without a pump, but in cold weather a pump is usually needed—with or without the compressor—to facilitate unloading. The vapor pressure used for padding should not exceed 225 psig. Never apply heat to accelerate the unloading of a vinyl chloride tank car.

To obtain flexibility in the unloading system, either stainless steel hose or steel pipe with flexible joints can be used. The flow of vinyl chloride from the tank car should be regulated by a valve in the transfer line. If the discharge rate suddenly becomes too great, an excess flow check valve in the tank car will close. To re-open this valve, close the unloading connection valve until the pressure is equalized

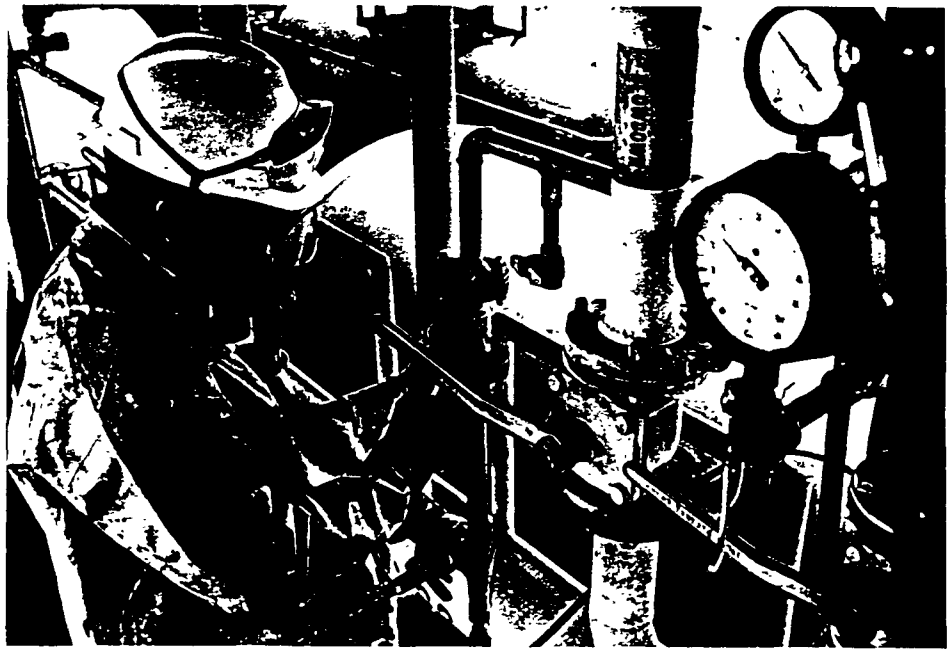
Checking Unloading Progress

Start unloading by slowly opening the vapor padding connection valve to the car. If it is necessary to discontinue unloading for any reason, close all valves tightly and disconnect all unloading connections. Be sure to observe proper procedures for clearing loading connections of vinyl chloride.

The lines leading from the unloading connection valve and the padding connection valve should be purged with nitrogen so that the vinyl chloride monomer vapor in those lines is transferred to the recovery system.

Check the storage tank frequently to determine when the tank car is almost empty. Completely unload the tank car, it should not be used for storage.

A pressure gage on the unloading line is the best way to indicate when all the liquid has been emptied from the car.



Purging line with nitrogen.

Connecting vapor padding line

Connecting liquid unloading line.

After Car Is Emptied

Stop the forwarding pump. Close the padding connection valve and then the unloading connection valve at the top of the car. After this, close all other valves in the vinyl chloride transfer line.

The lines leading from the unloading connection valve and the padding connection valve should be purged with nitrogen so the vinyl chloride monomer vapor in those lines is transferred to the recovery system.

Part 40CFR61.65(b)(1) of the EPA vinyl chloride regulation establishes the practices to be followed with respect to loading and unloading lines and should be consulted.

Check the vinyl chloride monomer concentration to make sure there are no invisible leaks from valves. Wear respiratory protection if there is any leakage. Take care of leak as recommended on page 19.

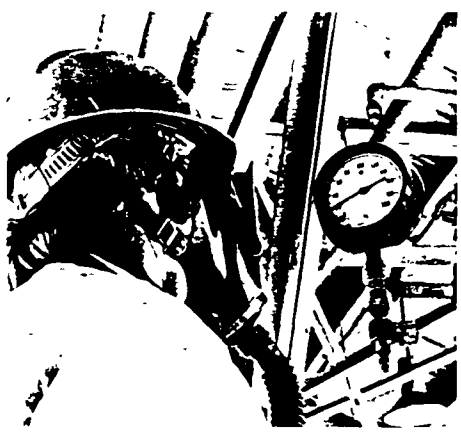
Do not allow tank car to stand with unloading connections attached after unloading has been completed. Remove all lines from the car and disconnect grounding wires.

Reverse the "DANGEROUS" placard on the car so that it reads "DANGEROUS—EMPTY" (see photo).

IMPORTANT

Leave at least 10 psig of vinyl chloride vapor pressure in the empty tank car being returned after closing and sealing all openings. The pressure is necessary to prevent air from entering the car.

Notify PPG Chemicals immediately if any valves are defective or leaking; telephone the manufacturing plant at Lake Charles, Louisiana 318-882-1200.



Leave at least 10 psig of vinyl chloride vapor pressure in the empty tank car.

After tank car is emptied, reverse "FLAMMABLE GAS" placard so that it reads "FLAMMABLE GAS-EMPTY."

TANK CAR DIMENSIONS

Car	Water Capacity	Length Over Strikers[1]	Overall Height[2]	Height to Valve Outlet[2]	Extreme Width[3]
90-ton	26,000 gal.	50'5"	15'5"	14'1-$\frac{11}{16}$"	10'6½"

[1]Add 2'7½" for length over center line of coupler knuckles.

[2]Heights are for empty cars and are measured from top of rail; heights of loaded cars may be as much as 4" less.

[3]Width over grab irons.

Note: Height to manway platform is 6" to 10" less than height to center line of valve.

TANK TRUCK DIMENSIONS

Overall Length	Height to Top of Relief Valve	Overall Width
48'7"	10'8" approx.	96"

CTL009477

Unloading tank trucks

Tank trucks deliver shipments usually within a 100-mile radius of Paulsboro, N J The tank trucks have a net weight capacity of 40,000 pounds corresponding to a nominal capacity of 5,200 gallons The trucks are unloaded on either side from the bottom near the back end Since the sizes of the liquid line connections (3 inches) and vapor padding connections (2 inches) are the same as for tank cars, any user receiving tank car shipments can take a tank truck shipment so long as the truck can get close enough to the unloading site. If not, a different length of pump suction line or vapor padding line would be needed Users may reduce the vapor padding connection to 1 inch, providing vapor flow is sufficient to maintain positive pressure near end of unloading.

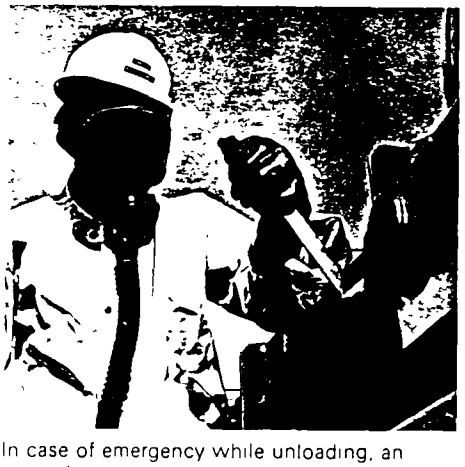
Personnel should not sit in the cab while unloading, and the unloading should not go unattended. Workers unloading shipments should wear goggles, protective clothing and protective respiratory equipment if needed.

Spotting Truck

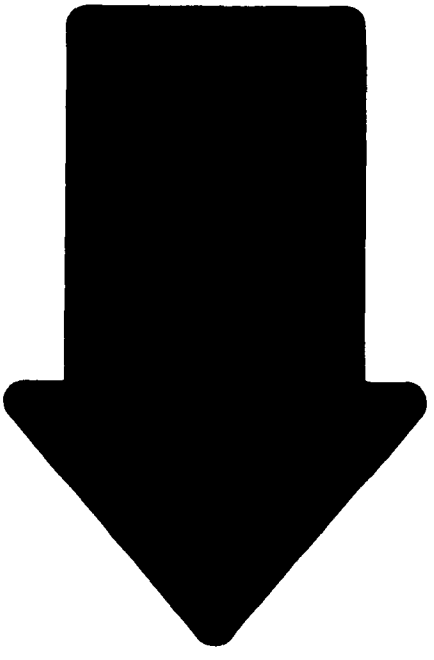
Shut off the truck engine. If for some reason the tractor must be separated from the trailer, do this before making any connections and place a "horse" that is strong enough under the front end. Don't rely on the support wheels to hold the load. Set the brakes and chock the wheels.

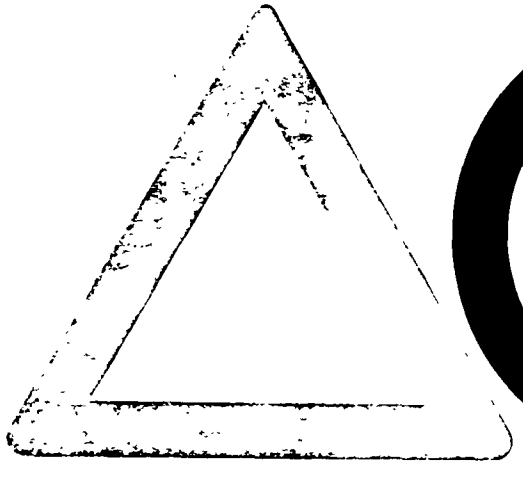
Locate the vinyl chloride truck so as to protect it from collision with a passing vehicle. Allow no vehicular traffic in the area until unloading is completed. If this cannot be done, minimize and control traffic by temporary roadblocks.

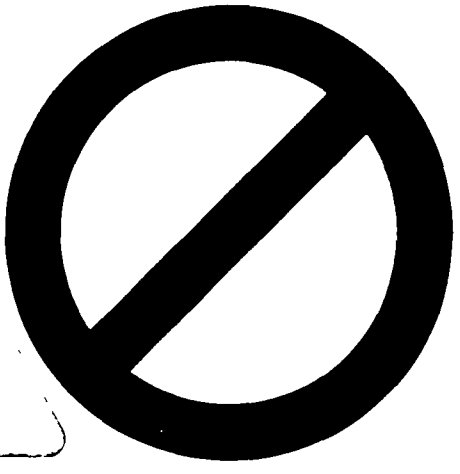
Chock the wheels of the tank truck



In case of emergency while unloading, an internal valve can be shut off by hand levers at the front and back of tank truck.







Preventing Ignition

Static electricity must be dissipated to minimize the fire hazard. Connect a grounding wire between the trailer tank and the unloading line. Also, the truck chassis should be grounded. Flanged joints in the unloading system piping should be bonded by jumper cables. Welded pipe connections are preferable to flanged. Use a commercial meter for checking ground integrity.

All wiring and electrical equipment should be explosion-proof. No flame- or spark-producing devices or smoking by personnel must be allowed in the area.

Follow federal, local and insurance regulations. A fire hose should be available to cool the trailer tank and surrounding equipment in case of fire.

Check Before Unloading

Check all tank truck valves to make sure they are closed, also check valves on the piping from storage tank to process. The valve at the truck end of the liquid line hose should have been closed after the previous delivery. Because liquid vinyl chloride monomer has a high coefficient of expansion, the liquid line to the storage tank should have a safety relief valve no smaller than one inch, preferably located close to the storage tank. Check the storage tank level to make sure there is sufficient room for the truck's contents.

Inspect the pump, vapor line and liquid line hoses or flexible-joint piping for any defects including leaks.

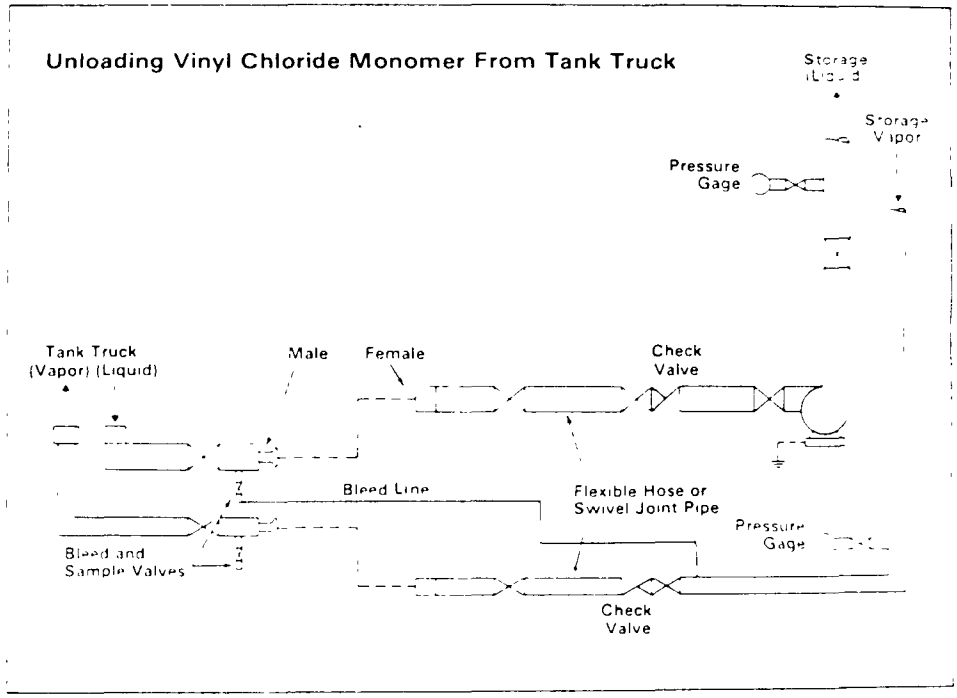
Ground the tank truck.

A fire hose and hydrant should be close by in case of fire.

A fire extinguisher should be close at hand.

Check storage tank level before unloading to make sure there is room for the truck's contents.

Unloading Vinyl Chloride Monomer From Tank Truck

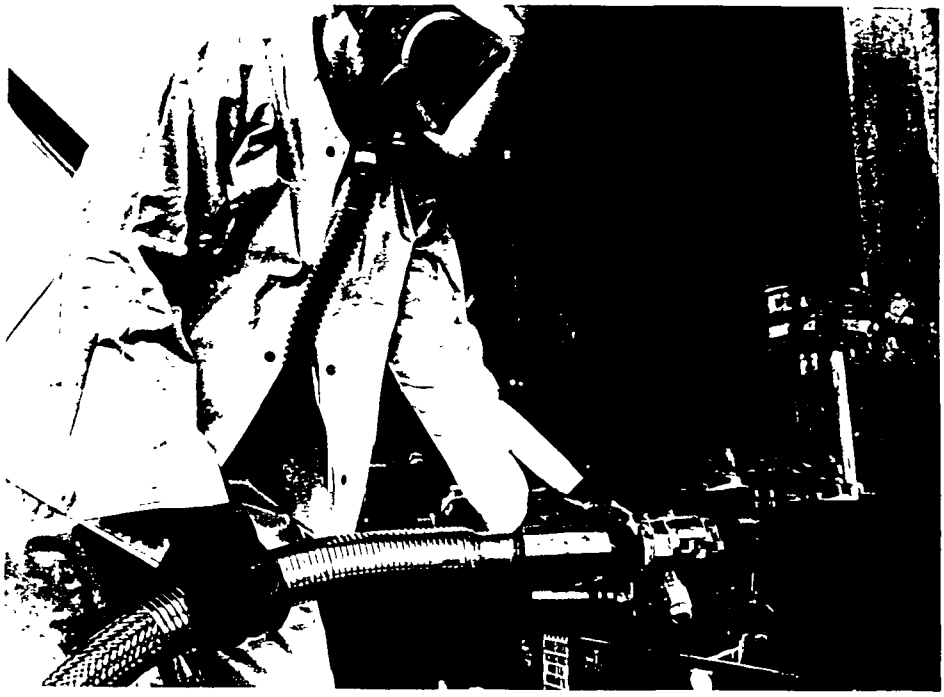


Store the hose or flexible arm off the ground on a suitable support The coupling covers should be in place to keep out dirt and moisture

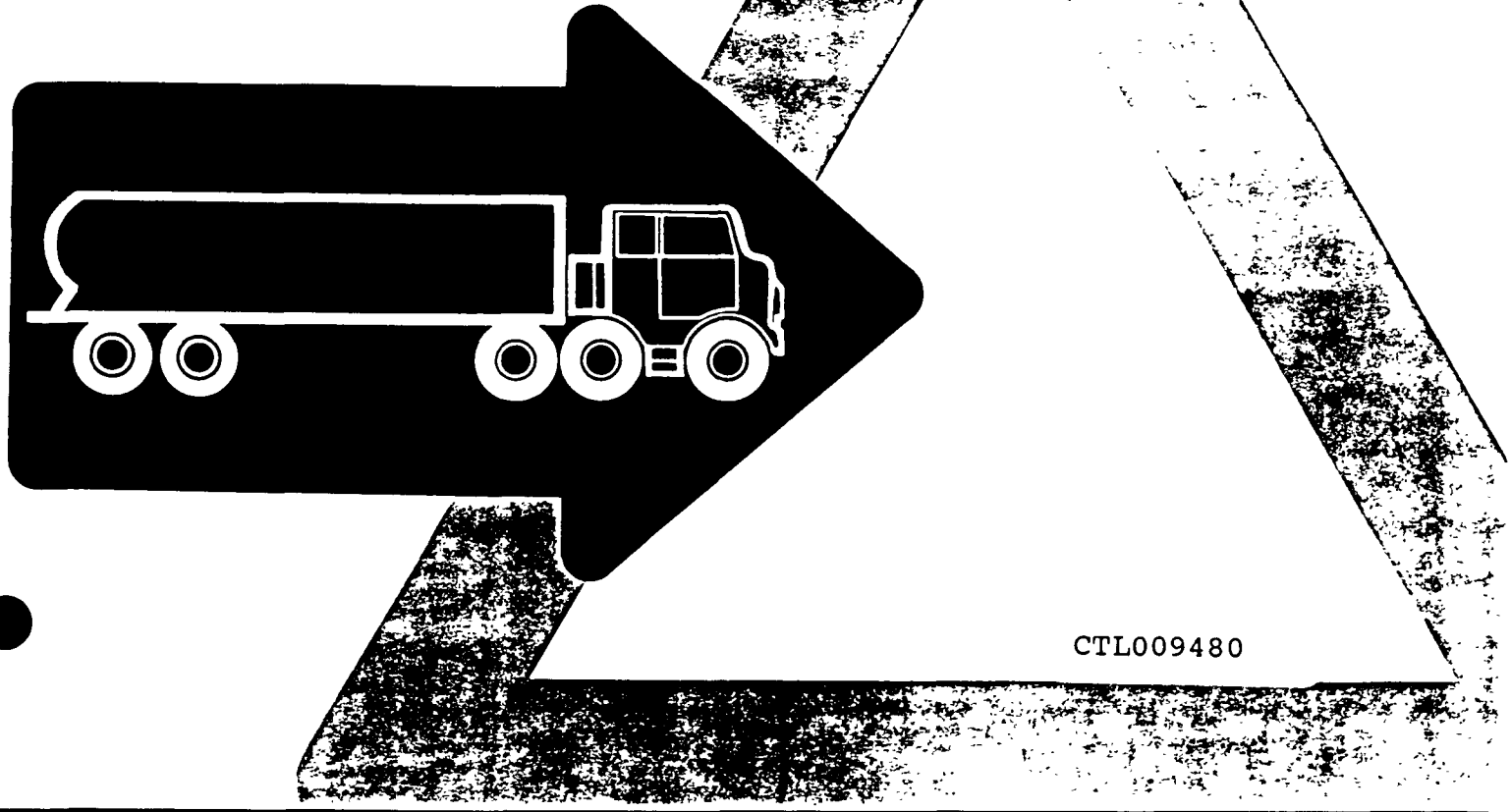
The short spool piece at the end of the hose should always remain with the hose Do not substitute a different piping section for it The spool piece is purposely short to minimize its air content and avoid the need for nitrogen purging All emptied sections of the system should be clean, dry and free of air before monomer is introduced If nitrogen purging is necessary, it can be minimized by sealing the line and alternately pressurizing with nitrogen and bleeding off the nitrogen to a recovery system or incinerator

If the liquid monomer in the truck is cold, its vapor pressure may be quite low. Hook up the coupling of the vapor padding line and ground it. Make sure the closure is tight. If the vapor pressure in the truck drops below 10 psig, bleed pressure from the storage-tank vapor space into the truck vapor space. Aside from the safety aspects, the storage-tank vapor space must be practically free of oxygen and other contaminants to avoid incurring charges for delaying the truck and purging it after the truck returns.

If a vapor compressor is used in addition to, or instead of, a pump, the compressor must not be capable of delivering over 100 psig The safety relief valve on the truck is rated at 150 psig



Hook up the vapor padding line



CTL009480

Unloading Procedure

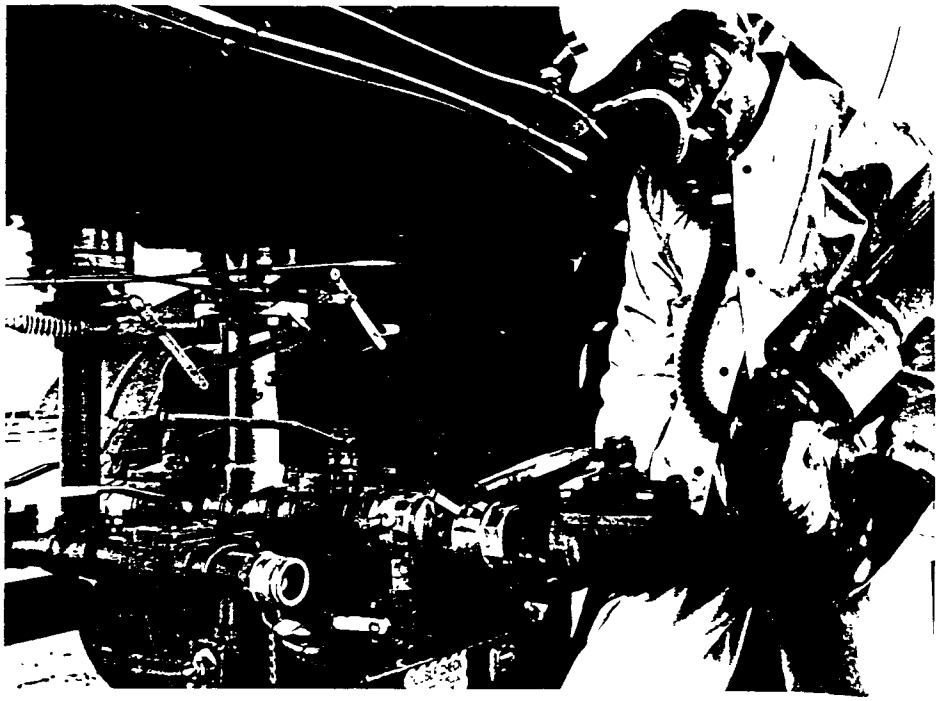
1. Hook up the coupling of the liquid line and ground it. Make sure the closure is tight and the spool piece bleed valve is closed.

2. The coupling of the vapor padding line has already been hooked up and grounded. Open valve from vapor space on storage tank.

3. Slowly open the truck and hose valves of the liquid line.

4. Start the pump and/or vapor compressor. If the excess flow valve in the truck liquid outlet closes, shut the outlet valve until the pressure is equalized. The flow of vinyl chloride from the truck should be regulated by a valve in the hose line, preferably the valve closest to the storage tank. The truck can be unloaded at a rate up to 350 gallons per minute. Keep a positive pressure on the truck vapor space to avoid the possibility of pulling in air and to prevent pump cavitation.

5. A change in the sound of the pump, as well as a pressure drop on the gage, indicates when the liquid has been completely unloaded from the truck. Do not try to pump out vapor from the truck, because this can produce a vacuum and suck in oxygen from the air. If the vapor pressure in the truck drops below 10 psig, bleed pressure from the storage-tank vapor space into the truck vapor space.



Hook up the liquid unloading line

Lever opens and closes internal valve to provide an alternate means of controlling liquid flow from tank truck

Check pressure on emptied tank truck to make sure at least [illegible] psig of vinyl chloride vapor pressure are left

CTL009481

After Truck Is Emptied

6. As soon as the liquid has been emptied from the truck, shut down the pump and/or compressor. Close the liquid valves on the truck and on the hose. Carefully bleed vapor from the liquid line spool piece (see diagram on page 26 and photo at right) to the storage-tank vapor space.

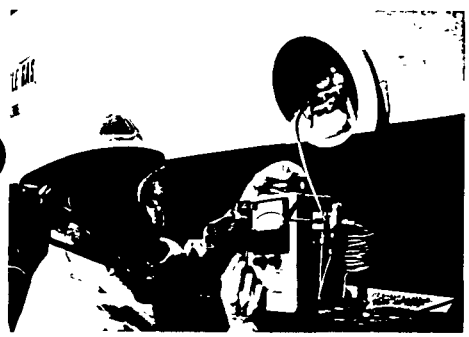
Part 40CFR61 65(b)(1) of the EPA vinyl chloride regulation establishes the rules for disconnecting unloading hoses and should be consulted Nitrogen purging to clear the spool piece may be needed in some cases

7. When both liquid and vapor pressures are gone, disconnect the liquid line from the truck and install the blind coupling covers. Shut off the bleed valve on the liquid line spool piece.

8. Likewise, disconnect the vapor line from the truck and install the blind coupling covers. Shut off the bleed valve on the vapor line spool piece. Use respiratory protection.

9. Remove electrical grounds.

10. Remove chocks to release the truck.



Check emptied tank truck for oxygen with a portable meter

CTL009482

Unloading barges and ships

Procedures for unloading vinyl chloride monomer from barge and ship cargo tanks are essentially the same as for unloading tank cars. There is, however, more variation in facilities and conditions at customers' plants that may require modifications of unloading methods and equipment. PPG technical service engineers are available for consultation on particular barge- or ship-unloading problems.

Facilities for unloading barges and ships should have self-contained breathing apparatus available for personnel and instruments for monitoring vinyl chloride vapor concentrations.

Construction materials

Aluminum and its alloys must not be used in equipment to store or handle vinyl chloride because explosive aluminum chloroalkyls can be formed. PPG's vinyl chloride is made from ethylene and contains no detectable amount of acetylene. However, vinyl chloride made from acetylene by an older process contains traces of acetylene that could react with copper or its alloys to form explosive copper acetylides. It is not safe to use such vinyl chloride in processing equipment containing copper or brass.

Carbon steel is the recommended construction material for storage tanks, pumps, valves, fittings and pipe to handle vinyl chloride. Although stainless steel is quite satisfactory, it is not necessary. Cast iron should not be used because equipment fracture or breakage could possibly permit a major spill. Equipment and piping should be able to withstand working pressures of 150 psig. If a system containing vinyl chloride monomer may be closed at any time, it should have duplicate relief valves.

Valves and fittings should be of a type that does not require lubrication. Many lubricants are attacked by vinyl chloride and should not be used. Eccentric-type plug valves are available that tighten further as the seats wear out.

Storage tanks

Vinyl chloride has indefinite storage life and does not polymerize when kept in contact with ferrous materials in the absence of air or oxygen, water, light and excessive heat.

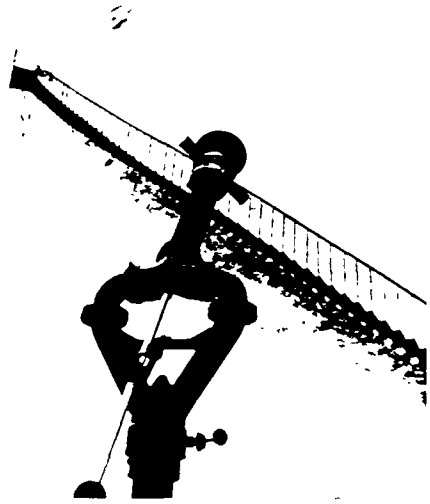
Storage areas should be selected to comply with local codes or authorities. Such organizations as the National Board of Fire Underwriters, the Factory Insurance Association and the National Fire Protection Association provide information about site selection on request.

Locate a vinyl chloride storage tank in a segregated area away from major process units. It should be engineered as a Class I, Group D, Division I area and treated as such. Process units such as furnaces or reactors, which have higher than average fire or explosion hazards, should be situated as far from a vinyl chloride storage tank as practical.

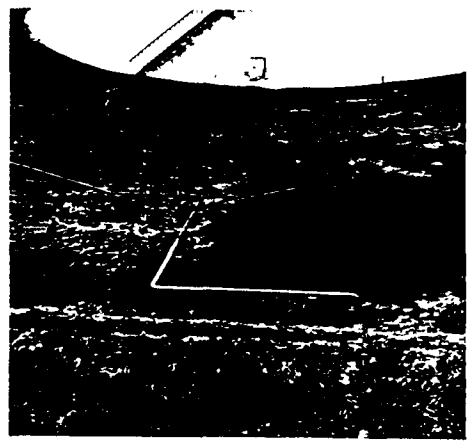
To take care of spilled liquid in the event of a tank rupture, adequate dikes and drainage should be constructed (see photo).

Storage tanks should be constructed of materials recommended above, in accordance with the ASME code for unfired pressure vessels. They should be designed to withstand full vacuum or a working pressure of 100 to 150 psig. However, vapor-recompression or refrigerated storage tanks can be designed for lower pressures. All-welded construction is recommended. Tanks should be painted with white or other heat-reflective paint. The installation should include a water-spray system in case of fire.

To prevent a buildup of static electricity while a tank is being filled, the liquid inlet line should extend to the tank bottom. The stand leg should have a hole in it near the top of the tank as a vacuum breaker that prevents blowback. The tank and filling equipment should be grounded against static electricity and lightning. Resistance to ground should not exceed 25 ohms.



Spray nozzle for cooling outside of storage tank in case of fire



A dike is needed to contain spilled liquid in case a tank should rupture

CTL009483

Liquid outlet lines to process should be equipped with check valves to prevent contamination by backflow.

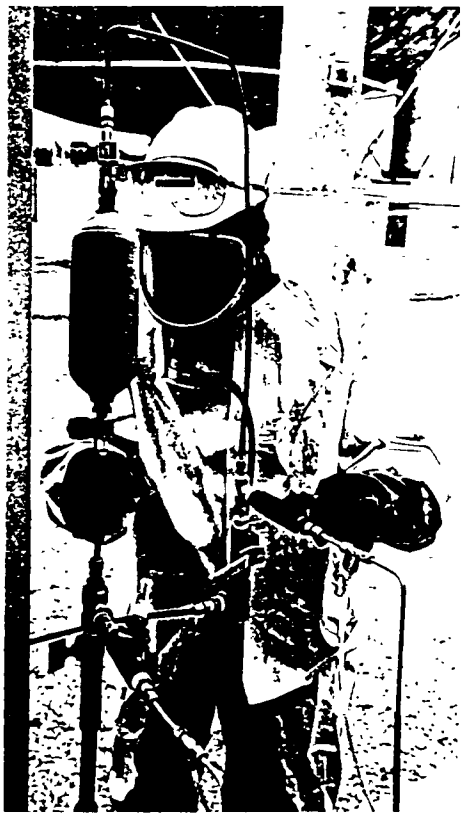
Adequately sized pressure-relief valves should be installed on top of a storage tank. To allow for periodic removal and inspection of the valves, they should be installed preferably with a 3-way plug cock in the line that can block off first one, then another valve from the tank. The EPA vinyl chloride regulation Part 40CFR61 65(b)(4) requires that a rupture disk be installed between the tank and relief valve. The disk must be properly installed to avoid a possible buildup of pressure between the relief valve and the rupture disk.

Indicators of liquid monomer temperature should be installed near the tank bottom to permit observation from the ground. Vapor pressure gages should be connected to the top of the tank but the indicator should be located near the ground. Tanks should also have a liquid level gage with ground-level readout. The level should not exceed 90% of the tank's capacity.

Before a tank receives vinyl chloride monomer, the tank should be cleaned and purged so that final oxygen content in the vapor phase does not exceed 1,000 ppm by volume after filling. Check tanks regularly for the presence of polymer. Tanks in vinyl chloride service should not be used to store other materials.

After a storage tank has been placed in operation, follow standard procedures to prevent oxygen from entering. For example, when tank cars or other shipping containers are unloaded, they could vent oxygen back to the storage tank, if their vapor space was of poor quality. The tanks must be inerted to remove oxygen, preferably by alternately pressurizing and depressurizing with nitrogen. Purge gas must vent to an emission control device.

Horizontal cylindrical tanks are used at ambient temperatures to hold up to 50,000 gallons of vinyl chloride; for higher capacities, spheres are preferable.



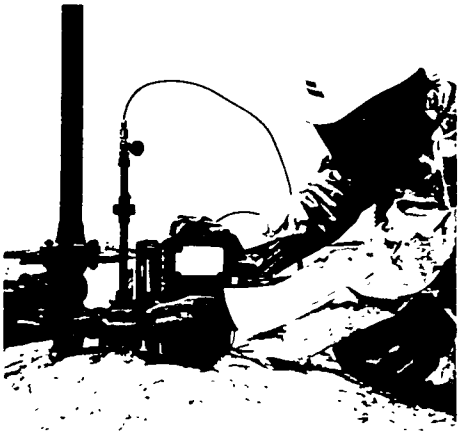
Sampling storage sphere with continuous loop system

Although vinyl chloride monomer is sometimes stored as a liquid at atmospheric pressure by means of refrigeration, it is usually stored under pressure. The actual pressure inside a storage tank depends on the ambient temperature (see graph on page 10). For example, between the freezing point of water and 25°C (77°F) the internal vapor pressure varies from 1293 to 2943 millimeters of mercury or from 25 to 57 psig. Therefore, every potential leak site should be checked periodically.

All vessels in the vinyl chloride monomer system should be interconnected by pressure equalization lines, which are connected to a refrigerated vapor-recovery system. The term, "vessels," includes storage tanks, shipping containers and processing equipment.

Since it is impossible to condense 100% of the vinyl chloride monomer vapor, the inert gas stream from the refrigeration unit will contain some vinyl chloride monomer and must be vented to an emission control device such as an incinerator.

Reading tank temperature indicator.



Testing storage tank for oxygen with a portable meter.

CTL009484

Transfer lines

To empty a line of vinyl chloride monomer, take care to bleed it off safely either to a condensing system or to an emission control device. Then blow out the line with nitrogen. Procedures for opening equipment that has contained vinyl chloride are found in Part 40CFR61 65(b)(6) of the EPA vinyl chloride standard. Before any maintenance such as welding is performed on a long transfer line, steaming should be continued for several hours. The line will have to be reamed if polymer has formed.

Lines that are liquid-full of vinyl chloride should not be closed at both ends without providing means of pressure relief such as a safety relief valve.

Relief valves on transfer lines should be vented to the top of a vinyl chloride monomer storage tank.

To prevent the buildup of static electricity, pipe connections should preferably be welded. If flanged connections are used, they should be bonded with jumper cables.

Waste disposal

Waste contaminated with vinyl chloride monomer is toxic and a potential fire hazard. The handling of vinyl chloride monomer waste must be done with strict adherence to the OSHA standard, "Exposure to Vinyl Chloride."

Vinyl chloride monomer waste should not be permitted to enter sewers or drains because potentially explosive vapor concentrations can collect.

Waste disposal depends largely on the surroundings, weather and the type of emergency that requires the disposal. Observe all federal, state and local regulations regarding health and pollution.

Monitoring exposures

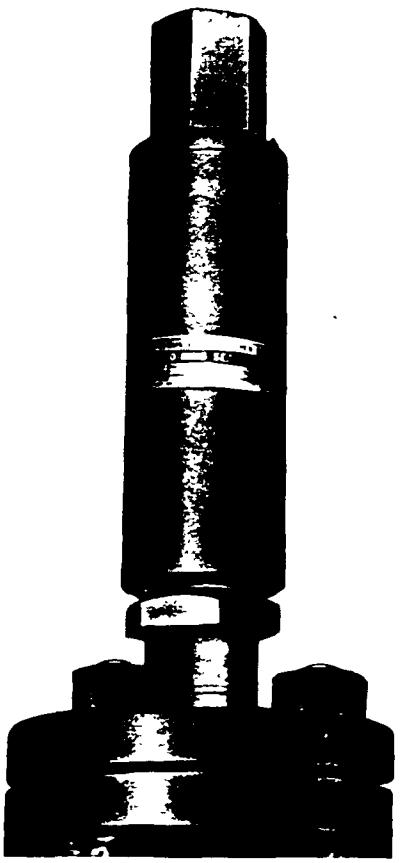
Equipment for determining concentrations of vinyl chloride monomer vapor in workplace air can be divided into three classes. (1) personal, (2) fixed area and (3) portable area monitoring.

1. In personal monitoring, air from the worker's breathing zone is drawn through a tube that can be clipped to his shirt collar. Suction comes from a battery-operated pump that can fit into his shirt pocket or over his belt. Activated charcoal in the tube traps the vinyl chloride while the pump runs for 15 minutes. For analysis, the vinyl chloride is removed from the charcoal with carbon disulfide and is subsequently determined on a laboratory gas chromatograph having a flame ionization detector.

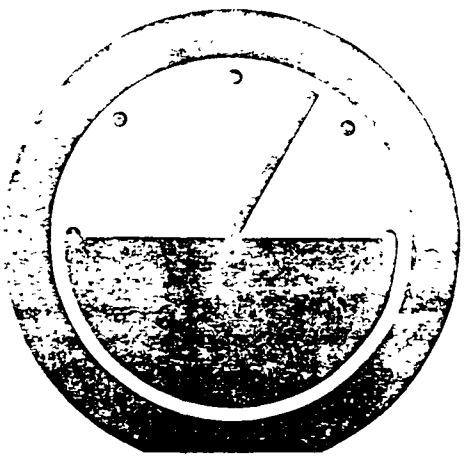
An alternative method gaining popularity because of its speed is an air bag strapped to a worker's back. A battery-operated pump attached to his person draws vapor into the bag. Injecting a needle into the bag obtains a sample for gas chromatographic analysis.

2. Fixed area monitoring uses either a gas chromatograph or infrared spectrophotometer. A suction pump near the instrument draws samples through long tubes ending at remote, fixed-site pickup points, commonly ten or twelve points. An automatic programmer provides sequential analyses of the multiple sampling points for cycles such as several minutes each. The instrument can be equipped to sound an alarm when a preset exposure limit is exceeded.

3. Portable instruments are used where fixed area monitoring is impractical. They can also serve for detecting leaks and for making rapid surveys of areas. The various types of portable instruments used include the infrared spectrophotometer, flame ionization instruments, and instruments that measure total hydrocarbons.



Relief valve on transfer line is vented to top of storage tank.



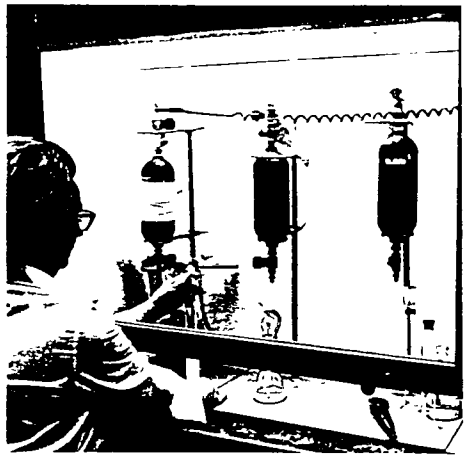
CTL009485

Personal monitoring device traps any vinyl chloride vapor on activated charcoal in tube

Reducing Exposure to Vapors in the Laboratory

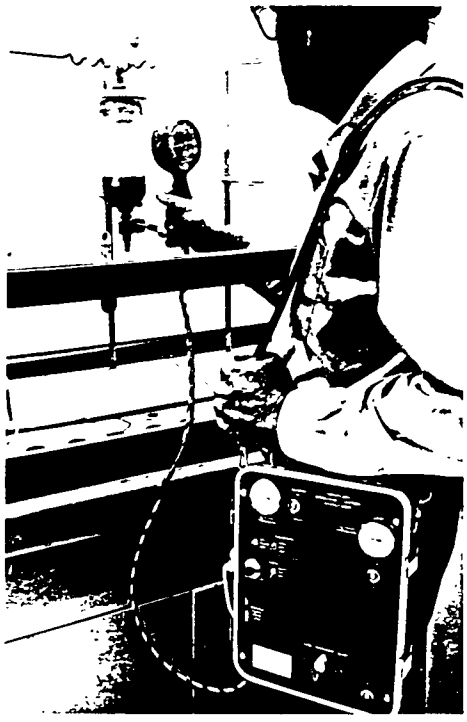
Store all sample bombs in a rack inside a fume hood. The hood should be large enough to permit doing all analyses without removing sample bombs from hood. Sample lines in and out of the chromatograph sampling valve should be piped to the hood. The "sample in" line is connected to a rotameter to measure sample flow. Thus, chromatographic sampling is carried out without removing sample bombs from hood.

If the chromatograph has a thermal conductivity detecting cell, the exit gas—consisting of vinyl chloride monomer vapor and the carrier gas—should be vented to the hood. However, if the chromatograph has a flame ionization detecting system, the vinyl chloride will be completely burned to form hydrogen chloride and carbon dioxide.



All analyses should be performed without removing sample bombs from hood

Personal monitoring device collects air and any vapor in plastic bag



Portable area monitoring instrument can also be used for detecting leaks

CTL009486

Analysis

Methods Of Analysis

The following abstracts are taken from the methods of analyses used by PPG Industries' Chemical Division to make the determinations listed under Specification and Typical Analysis on page 9. Copies of the complete methods are available on request from PPG's technical service staff.

Acidity, as HCl

This method involves the determination of the acidity or alkalinity of vinyl chloride monomer by absorption in neutral distilled water and titration of the absorbate to a pH of 7.0 with sodium hydroxide.

Testing for impurities in vinyl chloride monomer with gas chromatograph at PPG plant in Lake Charles, Louisiana.

Iron, as Fe

This method involves the spectrophotometric measurement of the color produced by the ferrous-*o*-phenanthroline complex. The vinyl chloride is allowed to evaporate from an alcohol-acid solution, and the iron is determined on the resulting solution.

Nonvolatile residue

A known weight of vinyl chloride is evaporated to dryness, and the weight of the residue is reported as nonvolatile residue.

Water

This method involves the determination of water in vinyl chloride monomer by titration with Karl Fischer reagent. The end point is determined electrometrically utilizing a suitable "dead-stop" titration apparatus.

Peroxide, as H_2O_2

This method involves spectrophotometric measurement of the red color of phenolphthalein produced by the peroxide oxidation of a reduced alkaline phenolphthalein solution. Alkaline cupric sulfate is used as an oxidation catalyst.

Acetaldehyde

The reaction of carbonyl compounds with 2,4-dinitrophenylhydrazine is the basis of the determination of acetaldehyde in vinyl chloride monomer. The reaction takes place under acid conditions in carbonyl-free methanol solvent to form the hydrazone. The addition of a solution of potassium hydroxide produces an intense wine-red color. The absorbance maximum occurs at 480 nm and is measured against a reagent blank.

CTL009487

Purchasing

Purchasing Information

Grades

PPG Industries produces only polymer-grade vinyl chloride monomer.

PPG normally supplies vinyl chloride monomer uninhibited. This eliminates the need for subsequent processing to remove the inhibitor. If required, PPG will add a suitable inhibitor.

Shipping

PPG Industries delivers vinyl chloride monomer by ship, barge, tank car and tank truck. There are three shipping points:

Guayanilla, Puerto Rico
Lake Charles, Louisiana
Paulsboro, New Jersey

The tank trucks hold up to 40,000 pounds of vinyl chloride. Tank car capacity is 180,000-pounds net weight. Ships ordinarily hold up to 6 million pounds and barges up to 4 million pounds.

PPG has a fleet of tank cars for vinyl chloride service only and leases a fleet of tank trucks designed and used only for delivering vinyl chloride.

Tank truck shipments, normally made within a 100-mile radius of Paulsboro, N.J., offer several benefits to customers:

Lower Investment

Frequent deliveries by tank truck permit lower investment in inventoried material both in tank and in transit. Since smaller storage facilities can suffice, less capital need be invested.

Fast Service

Truck deliveries provide fast service on short notice and can supply unusual as well as usual demands.

Savings on Assays and Polymerization Batch Control

The Paulsboro terminal has two huge storage tanks each holding over 26 million pounds of vinyl chloride. Because of these tremendous quantities, the vinyl chloride monomer in these tanks is more homogeneous than material coming from smaller tanks.

Dedicated Drivers

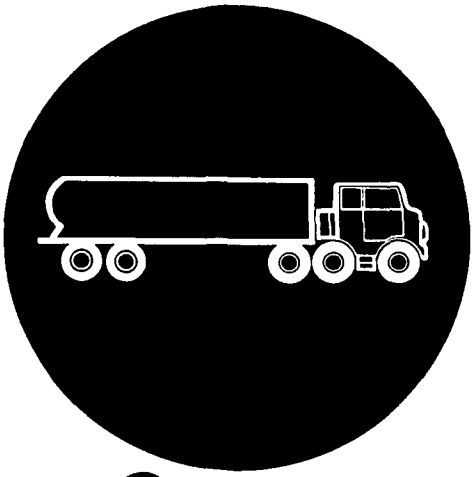
Truck drivers are trained and dedicated for vinyl chloride service. They are safe drivers and maintain good community relations.

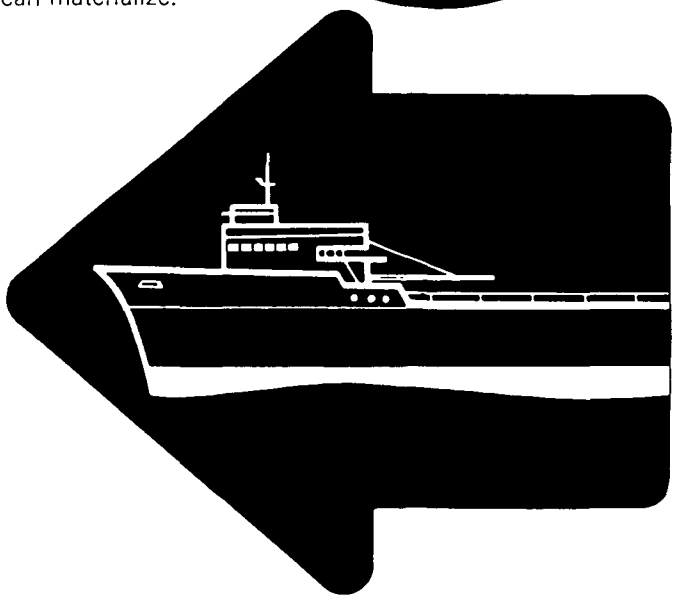
Rail Track Space Savings

Depending on the customer's situation, this advantage too can materialize.

Samples and service

The Pittsburgh-based technical service staff of PPG Industries' Chemical Division is available for consulting on handling, storage and use.





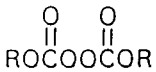
CTL009488

Percarbonate Initiators

Percarbonate Initiators For The Polymerization Of Vinyl Chloride

PPG Industries' Chemical Division supplies a line of peroxydicarbonate initiators for the polymerization of vinyl chloride, ethylene and other unsaturated monomers. These initiators provide free radicals at considerably lower reaction temperatures than most organic peroxide initiators. Because of their high efficiency, the peroxydicarbonates are used by companies that produce most of the annual U.S. output of polyvinyl chloride.

PPG has marketed diisopropyl peroxydicarbonate (IPP) for close to 30 years. Although many users prefer handling solid initiators such as IPP, those who find undiluted liquid initiators or their solutions advantageous can now select di-n-propyl peroxydicarbonate (NPP), di-sec-butyl peroxydicarbonate (SBP) or di-(2-ethylhexyl) peroxydicarbonate (EHP). Peroxydicarbonates have the same general formula:



Advantages that IPP, NPP, SBP and EHP have over other initiators for the production of polyvinyl chloride and other polymers include the capability of the peroxydicarbonates to:

Reduce Time of Batch Runs

Enable fast rate of conversion during the very first hour of reaction and, until the run is terminated, the polymerization rate remains high and constant.

Increase Production

Because batch runs take less time, a much greater annual output of polymer can be produced from the same equipment with peroxydicarbonates.

Make Polymerization Easier to Control

Rate of heat evolution is nearly constant. No large exotherm occurs near end of run as with many polymerization initiators that accelerate reactions near the end. In comparison with other commonly used peroxides, a peroxydicarbonate permits easier termination of a batch polymerization.

Improve Polymer Characteristics

Lower reaction temperatures, linear conversion rates, and less initiator residues are among the factors considered responsible for improving such characteristics as color, electrical resistivity, and stability to ultraviolet light and weathering.

Peroxydicarbonates are powerful oxidizing agents. They are hazardous chemicals shipped under refrigeration and must be stored under refrigeration.

Many users prefer handling solid IPP because the heat of fusion provides a safety factor, that is, the solid must melt before it decomposes. Also, pieces that have dropped are easier to pick up and dispose of than liquid spills.

However, other users find the undiluted liquid forms and solutions easier to handle and prefer adding initiator to process volumetrically instead of by weight. Also, NPP, SBP and EHP are more soluble in most of the solvents used to dilute peroxydicarbonate initiators.

More information

Detailed information appears in a 40-page booklet, "Percarbonate Polymerization Initiators," form A-961, available on request.

CTL009489

EXPOSURE TO VINYL CHLORIDE

Occupational Safety and Health Standards

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§ 1910.1017 Vinyl chloride.

(a) *Scope and application.* (1) This section includes requirements for the control of employee exposure to vinyl chloride (chloroethene), Chemical Abstracts Service Registry No. 75014.
[Section 1910.93q(a) (1) amended at 39 FR 41848, December 3, 1974; 1910.93q was redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(2) This section applies to the manufacture, reaction, packaging, repackaging, storage, handling or use of vinyl chloride or polyvinyl chloride, but does not apply to the handling or use of fabricated products made of polyvinyl chloride.

(3) This section applies to the transportation of vinyl chloride or polyvinyl chloride except to the extent that the Department of Transportation may regulate the hazards covered by this section.

(b) *Definitions.* (1) "Action level" means a concentration of vinyl chloride of 0.5 ppm averaged over an 8-hour work day.

(2) "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or his designee.

(3) "Authorized person" means any person specifically authorized by the employer whose duties require him to enter a regulated area or any person entering such an area as a designated representative of employees for the purpose of exercising an opportunity to observe monitoring and measuring procedures.

(4) "Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health, Education, and Welfare, or his designee.

(5) "Emergency" means any occurrence such as, but not limited to, equipment failure, or operation of a relief device which is likely to, or does, result in massive release of vinyl chloride.

(6) "Fabricated product" means a product made wholly or partly from polyvinyl chloride, and which does not require further processing at temperatures, and for times, sufficient to cause mass melting of the polyvinyl chloride resulting in the release of vinyl chloride.

(7) "Hazardous operation" means any operation, procedure, or activity where a release of either vinyl chloride liquid or gas might be expected as a consequence of the operation or because of an accident in the operation, which would result in an employee exposure in excess of the permissible exposure limit.
[Section 1910.93q(b) (7) amended at 39 FR 41848, December 3, 1974; Section 1910.93q was redesignated at 1910.1017 at 40 FR 23072, May 28, 1975]

(8) "OSHA Area Director" means the Director for the Occupational Safety and Health Administration Area Office having jurisdiction over the geographic area in which the employer's establishment is located.

(9) "Polyvinyl chloride" means polyvinyl chloride homopolymer or copolymer before such is converted to a fabricated product.

(10) "Vinyl chloride" means vinyl chloride monomer.

(c) *Permissible exposure limit.* (1) No employee may be exposed to vinyl chloride at concentrations greater than 1 ppm averaged over any 8-hour period, and

(2) No employee may be exposed to vinyl chloride at concentrations greater than 5 ppm averaged over any period not exceeding 15 minutes.

(3) No employee may be exposed to vinyl chloride by direct contact with liquid vinyl chloride.

(d) *Monitoring.* (1) A program of initial monitoring and measurement shall be undertaken in each establishment to determine if there is any employee exposed, without regard to the use of respirators, in excess of the action level.

(2) Where a determination conducted under paragraph (d) (1) of this section shows any employee exposures, without regard to the use of respirators, in excess of the action level, a program for determining exposures for each such employee shall be established. Such a program:

(i) Shall be repeated at least monthly where any employee is exposed, without regard to the use of respirators, in excess of the permissible exposure limit.

(ii) Shall be repeated not less than quarterly where any employee is exposed, without regard to the use of respirators, in excess of the action level.

(iii) May be discontinued for any employee only when at least two consecutive monitoring determinations, made not less than 5 working days apart, show exposures for that employee at or below the action level.

(3) Whenever there has been a production, process or control change which may result in an increase in the release of vinyl chloride, or the employer has any other reason to suspect that any employee may be exposed in excess of the action level, a determination of employee exposure under paragraph (d) (1) of this section shall be performed.

(4) The method of monitoring and measurement shall have an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50 percent from 0.25 through 0.5 ppm, plus or minus 35 percent from over 0.5 ppm through 1.0 ppm, and plus or minus 25 percent over 1.0 ppm. (Methods meeting these accuracy requirements are available in the "NIOSH Manual of Analytical Methods").

(5) Employees or their designated representatives shall be afforded reasonable opportunity to observe the monitoring and measuring required by this paragraph.

(e) *Regulated area.* (1) A regulated area shall be established where:

(i) Vinyl chloride or polyvinyl chloride is manufactured, reacted, repackaged, stored, handled or used; and

(ii) Vinyl chloride concentrations are in excess of the permissible exposure limit.

(2) Access to regulated areas shall be limited to authorized persons. A daily roster shall be made of authorized persons who enter.

(f) *Methods of compliance.* Employee exposures to vinyl chloride shall be controlled to at or below the permissible exposure limit provided in paragraph (c) of this section by engineering, work practice, and personal protective controls as follows:

(1) Feasible engineering and work practice controls shall immediately be used to reduce exposures to at or below the permissible exposure limit.

(2) Wherever feasible engineering and work practice controls which can be instituted immediately are not sufficient to reduce exposures to at or below the permissible exposure limit, they shall nonetheless be used to reduce exposures to the lowest practicable level, and shall be supplemented by respiratory protection in accordance with paragraph (g) of this section. A program shall be established and implemented to reduce exposures to at or below the permissible exposure limit, or to the greatest extent feasible, solely by means of engineering and work practice controls, as soon as feasible.

(3) Written plans for such a program shall be developed and furnished upon request for examination and copying to authorized representatives of the Assistant Secretary and the Director. Such plans shall be updated at least every six months.

(g) *Respiratory protection.* Where respiratory protection is required under this section:

(1) The employer shall provide a respirator which meets the requirements of this paragraph and shall assure that the employee uses such respirator, except that until April 1, 1976, wearing of respirators shall be at the discretion of each employee for exposures not in excess of 25 ppm, measured over any 15-minute period. Until April 1, 1976, each employee who chooses not to wear an appropriate respirator shall be informed at least quarterly of the hazards of vinyl chloride and the purpose, proper use, and limitations of respiratory devices.
[Section 1910.93q(g)(1) amended at 40 FR 13211, March 25, 1975; Section 1910.93q was redesignated 1910.1017 at 40 FR 23072, May 28, 1975]

(2) Respirators shall be selected from among those jointly approved by the Mining Enforcement and Safety Administration, Department of the Interior, and the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.

(3) A respiratory protection program meeting the requirements of § 1910.134 shall be established and maintained.

(4) Selection of respirators for vinyl chloride shall be as follows:

Atmospheric concentration of vinyl chloride	*Required apparatus*
(i) Unknown, or above 3,600 ppm	Open-circuit, self-contained breathing apparatus, pressure demand type, with full facepiece.
(ii) Not over 3,600 ppm	(A) Combination type C supplied air respirator, pressure demand type, with full or half facepiece, and auxiliary self-contained air supply; or (B) Combination Type C, supplied air respirator continuous flow type, full or half facepiece, and auxiliary self-contained air supply.
(iii) Not over 1,000 ppm.	Type C, supplied air respirator, continuous flow type, with full or half facepiece, helmet or hood.
(iv) Not over 100 ppm	(A) Combination type C supplied air respirator demand type, with full facepiece, and auxiliary self-contained air supply; or (B) Open-circuit self-contained breathing apparatus with full facepiece, in demand mode; or (C) Type C supplied air respirator, demand type, with full facepiece.
(v) Not over 25 ppm	(A) A powered air-purifying respirator with hood, helmet, full or half facepiece, and a canister which provides a service life of at least 4 hours for concenrations of vinyl chloride up to 25 ppm, or (B) Gas mask, front- or back-mounted canister which provides a service life of at least 4 hours for concentrations of vinyl chloride up to 25 ppm.
(vi) Not over 10 ppm	(A) Combination type C supplied-air respirator, demand type, with half facepiece, and auxiliary self-contained air supply; or (B) Type C supplied-air respirator, demand type, with half facepiece; or (C) Any chemical cartridge respirator with an organic vapor cartridge which provides a service life of at least 1 hour for concentrations of vinyl chloride up to 10 ppm.

[Section 1910.93q (4) amended at 39 FR 41848, December 3, 1974 and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(5) (i) Entry into unkown concentrations or concentrations greater than 36,000 ppm (lower explosive limit) may be made only for purposes of life rescue; and

(ii) Entry into concentrations of less than 36,000 ppm, but greater than 3,600 ppm may be made only for purposes of life rescue, firefighting, or securing equipment so as to prevent a greater hazard from release of vinyl chloride.

(6) Where air-purifying respirators are used:

(i) Air-purifying cannisters or cartridges shall be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first, and

(ii) A continuous monitoring and alarm system shall be provided where concentrations of vinyl chloride could reasonably exceed the allowable concentrations for the devices in use. Such system shall be used to alert employees when vinyl chloride concentrations exceed the allowable concentrations for the devices in use.

(7) Apparatus prescribed for higher concentrations may be used for any lower concentration.

(h) *Hazardous operations.* (1) Employees engaged in hazardous operations, including entry of vessels to clean polyvinyl chloride residue from vessel walls, shall be provided and required to wear and use;

(i) Respiratory protection in accordance with paragraphs (c) and (g) of this section; and

(ii) Protective garments to prevent skin contact with liquid vinyl chloride or with polyvinyl chloride residue from vessel walls. The protective garments shall be selected for the operation and its possible exposure conditions.

(2) Protective garments shall be provided clean and dry for each use.

(i) *Emergency situations.* A written operational plan for emergency situations shall be developed for each facility storing, handling, or otherwise using vinyl chloride as a liquid or compressed gas. Appropriate portions of the plan shall be implemented in the event of an emergency. The plan shall specifically provide that:

(1) Employees engaged in hazardous operations or correcting situations of existing hazardous releases shall be equipped as required in paragraph (h) of this section;

(2) Other employees not so equipped shall evacuate the area and not return until conditions are controlled by the methods required in paragraph (f) of this section and the emergency is abated.

(j) *Training.* Each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use.

(1) The program shall include:

(i) The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard;

(ii) The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps;

(iii) The purpose for, proper use, and limitations of respiratory protective devices;

[Section 1910.93q(j)(1)(iu) amended at 39 FR 41848, December 3, 1974, and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(iv) The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps:

(v) The purpose for and a description of the monitoring program;

(vi) The purpose for, and a description of, the medical surveillance program;

(vii) Emergency procedures;

(viii) Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride; and

(ix) A review of this standard at the employee's first training and indoctrination program, and annually thereafter.

(2) All materials relating to the program shall be provided upon request to the Assistant Secretary and the Director.

(k) *Medical surveillance.* A program of medical surveillance shall be instituted for each employee exposed, without regard to the use of respirators, to vinyl chloride in excess of the action level. The program shall provide each such employee with an opportunity for examinations and tests in accordance with this paragraph. All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee.

(1) At the time of initial assignment, or upon institution of medical surveillance;

(i) A general physical examination shall be performed, with specific attention to detecting enlargement of liver, spleen or kidneys, or dysfunction in these organs, and for abnormalties in skin, connective tissues and the pulmonary system (See Appendix A).

(ii) A medical history shall be taken, including the following topics:

(A) Alcohol intake;

(B) Past history of hepatitis;

(C) Work history and past exposure to potential hepatotoxic agents, including drugs and chemicals;

(D) Past history of blood transfusions; and

(E) Past history of hospitalizations.

(iii) A serum specimen shall be obtained and determinations made of:

(A) Total bilirubin;

(B) Alkaline phosphatase;

(C) Serum glutamic oxalacetic transaminase (SGOT):

(D) Serum glutamic pyruvic transaminase (SGPT); and

(E) Gamma glustamyl transpeptidase.

(2) Examinations provided in accordance with this paragraph shall be performed at least:

(i) Every 6 months for each employee who has been employed in vinyl chloride or polyvinyl chloride manufacturing for 10 years or longer; and

(ii) Annually for all other employees.

(3) Each employee exposed to an emergency shall be afforded appropriate medical surveillance.

(4) A statement of each employee's suitability for continued exposure to vinyl chloride including use of protective equipment and respirators, shall be obtained from the examining physician promptly after any examination. A copy of the physician's statement shall be provided each employee.

(5) If any employee's health would be materially impaired by continued exposure, such employee shall be withdrawn from possible contact with vinyl chloride.

(6) Laboratory analyses for all biological specimens included in medical examinations shall be performed in laboratories licensed under 42 CFR Part 74.

(7) If the examining physician determines that alternative medical examinations to those required by paragraph (k)(1) of this section will provide at least equal assurance of detecting medical conditions pertinent to the exposure to vinyl chloride, the employer may accept such alternative examinations as meeting the requirements of paragraph (k)(1) of this section, if the employer obtains a statement from the examining physician setting forth the alternative examinations and the rationale for substitution. This statement shall be available upon request for examination and copying to authorized representatives of the Assistant Secretary and the Director.

(l) *Signs and labels.* (1) Entrances to regulated areas shall be posted with legible signs bearing the legend:

CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY

[Section 1910.93q (l) (1) amended at 39 FR 41848, December 3, 1974 and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(2) Areas containing hazardous operations or where an emergency currently exists shall be posted with legible signs bearing the legend:

CANCER-SUSPECT AGENT IN THIS AREA
PROTECTIVE EQUIPMENT REQUIRED
AUTHORIZED PERSONNEL ONLY

[Section 1910.93q (l)(2) amended at 39 FR 41848, December 3, 1974 and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(3) Containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride shall be legibly labeled:

CONTAMINATED WITH
VINYL CHLORIDE
CANCER-SUSPECT AGENT

[Section 1910.93q (l) (3) amended at 39 FR 41848, December 3, 1974 and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(4) Containers of polyvinyl chloride shall be legibly labeled:

POLYVINYL CHLORIDE (OR TRADE NAME)
Contains
VINYL CHLORIDE
VINYL CHLORIDE IS A CANCER-SUSPECT AGENT

(5) Containers of vinyl chloride shall be legibly labeled either:

(i)

VINYL CHLORIDE
EXTREMELY FLAMMABLE GAS UNDER PRESSURE
CANCER-SUSPECT AGENT

or (ii) In accordance with 49 CFR Parts 170-189, with the additional legend:

CANCER-SUSPECT AGENT

applied near the label or placard.

[Section 1910.93q (l) (5) (ii) amended at 39 FR 41848, December 3, 1974 and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(6) No statement shall appear on or near any required sign, label or instruction which contradicts or detracts from the effect of, any required warning, information or instruction.

(m) *Records.* (1) All records maintained in accordance with this section shall include the name and social security number of each employee where relevant.

(2) Records of required monitoring and measuring, medical records, and authorized personnel rosters, shall be made and shall be available upon request for examination and copying to authorized representatives of the Assistant Secretary and the Director.

(i) Monitoring and measuring records shall:

(A) State the date of such monitoring and measuring and the concentrations determined and identify the instruments and methods used;

(B) Include any additional information necessary to determine individual employee exposures where such exposures are determined by means other than individual monitoring of employees; and

(C) Be maintained for not less than 30 years.

(ii) Authorized personnel rosters shall be maintained for not less than 30 years.

(iii) Medical records shall be maintained for the duration of the employment of each employee plus 20 years, or 30 years, whichever is longer.

(3) In the event that the employer ceases to do business and there is no successor to receive and retain his records for the prescribed period, these records shall be transmitted by registered mail to the Director, and each employee individually notified in writing of this transfer.

(4) Employees or their designated representatives shall be provided access to examine and copy records of required monitoring and measuring.

(5) Former employees shall be provided access to examine and copy required monitoring and measuring records reflecting their own exposures.

(6) Upon written request of any employee, a copy of the medical record of that employee shall be furnished to any physician designated by the employee.

(n) *Reports.* (1) Not later than 1 month after the establishment of a regulated area, the following information shall be reported to the OSHA Area Director. Any changes to such information shall be reported within 15 days.

(i) The address and location of each establishment which has one or more regulated areas; and

(ii) The number of employees in each regulated area during normal operations, including maintenance.

(2) Emergencies, and the facts obtainable at that time, shall be reported within 24 hours to the OSHA Area Director. Upon request of the Area Director, the employer shall submit additional information in writing relevant to the nature and extent of employee exposures and measures taken to prevent future emergencies of similar nature.

(3) Within 10 working days following any monitoring and measuring which discloses that any employee has been exposed, without regard to the use of respirators in excess of the permissible exposure limit, each such employee shall be notified in writing of the results of the exposure measurement and the steps being taken to reduce the exposure to within the permissible exposure limit.

[Section 1910.93q (n) (3) amended at 39 FR 41848, December 3, 1974; Section 1910.93q was redesignated 1910.1017 at 40 FR 23072, May 28, 1975]

(o) *Effective dates.* (1) Until April 1, 1975, the provisions currently set forth in Sec. 1910.93q of this Part shall apply. [Ed. note: This paragraph refers to the emergency temporary standard published at 39 FR 12343]

(2) Effective April 1, 1975, the provisions set forth in Sec. 1910.93q of this Part shall apply.

[Section 1910.93q(o)(1) and (2) amended at 40 FR 13211, March 25, 1975; Section 1910.93q was redesignated 1910.1017 at 40 FR 23072, May 28, 1975]

APPENDIX A—SUPPLEMENTARY MEDICAL INFORMATION

When required tests under paragraph (k)(1) of this section show abnormalities, the tests should be repeated as soon as practicable, preferably within 3 to 4 weeks. If tests remain abnormal, consideration should be given to withdrawal of the employee from contact with vinyl chloride, while a more comprehensive examination is made.

Additional tests which may be useful:

A. For kidney dysfunction: urine examination for albumin, red blood cells, and exfoliative abnormal cells.

B. Pulmonary system: Forced vital capacity, Forced expiratory volume at 1 second, and chest roentgenogram (posterior-anterior, 14 x 17 inches).

C. Additional serum tests: Lactic acid dehydrogenase, lactic acid dehydrogenase isoenzyme, protein determination, and protein electrophoresis.

D. For a more comprehensive examination on repeated abnormal serum tests: Hepatitis B antigen, and liver scanning.

(Secs. 6 and 8, 84 Stat. 1596, 1599 (29 U.S.C. 655, 657); Secretary of Labor's Order No. 12-71, 36 FR 8754)

[Section 1910.93q added at 39 FR 12343, April 5, 1974, as emergency temporary standard; issued as permanent standard at 39 FR 35896, October 4, 1974; Section 1910.93q was redesignated 1910.1017 at 40 FR 23072, May 28, 1975]

ENVIRONMENTAL PROTECTION AGENCY

■

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Standard For Vinyl Chloride

NOTICE: The text of the regulation reproduced here represents the Federal regulation as of June 1, 1977. Amendments, additions and corrections occur frequently. Up-to-date information can be obtained from the Environmental Protection Agency or from publications such as the *Environment Reporter* published by The Bureau of National Affairs, Inc., 1231 25th Street N.W., Washington, D.C. 20037.

Subpart F—National Emission Standard for Vinyl Chloride

[41 FR 46559, October 21, 1976]

§ 61.60 Applicability.

(a) This subpart applies to plants which produce:

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

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

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

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

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

[42 FR 29005, June 7, 1977]

§ 61.61 Definitions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[42 FR 29005, June 7, 1977]

§ 61.62 Emission standard for ethylene dichloride plants.

[42 FR 29005, June 7, 1977]

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

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

§ 61.63 Emission standard for vinyl chloride plants.

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

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

§ 61.64 Emission standard for polyvinyl chloride plants.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) Fugitive emission sources:

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

[42 FR 29005, June 7, 1977]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[42 FR 29005, June 7, 1977]

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

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

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

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

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

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

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

[41 FR 53017, December 3, 1976]

§ 61.66 Equivalent equipment and procedures.

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

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

§ 61.67 Emission tests.

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

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

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

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

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

(d) [Reserved]

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

[42 FR 29005, June 7, 1977]

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

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

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

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

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

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

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

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

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

where:

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

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

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

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

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

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

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

where:

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

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

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

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

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

Z = Production rate (kg/hr).

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

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

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

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

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

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

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

(i) Test Method 106 is to be used to determine atmospheric emissions from all of the process equipment simultaneously. The requirements of paragraph (g)(1) of this section are to be met.

(ii) Test Method 107 is to be used to determine the concentration of vinyl chloride in each inprocess wastewater stream subject to the emission limit prescribed in § 61.64(e). The mass of vinyl chloride in kg/100 kg product in each in process wastewater stream is to be determined by using the following equation:

$$C_{BX} = \frac{[C_w\,R\,10^{-6}]\,[100]}{Z}$$

where:

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

C_w = the concentration of vinyl chloride as measured by Test Method 107.

R = water flow rate in l/hr, determined in accordance with a method which has been submitted to and approved by the Administrator.

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

Z = Production rate (kg/hr), determined in accordance with a method which has been submitted and approved by the Administrator.

(5) The reactor opening loss for which an emission limit is prescribed in § 61.64 (a) (2) is to be determined. The number of reactors for which the determination is to be made is to be specified by the Administrator for each individual plant at the time of the determination based on the plant's operation. For a reactor that is also used as a stripper, the determination may be made immediately following the stripping operation.

(i) Except as provided in paragraph (g) (5) (ii) of this section, the reactor opening loss is to be determined using the following equation:

$$C = \frac{W\ (2.60)\ (10^{-6})\ (Cb)}{YZ}$$

Where:

C = kg vinyl chloride emissions/kg product.
W = Capacity of the reactor in m^3.
2.60 = Density of vinyl chloride at one atmosphere and 20° C in kg/m^3.
10^{-6} = Conversion factor for ppm.
Cb = ppm by volume vinyl chloride as determined by Test Method 106 or a portable hydrocarbon detector which measures hydrocarbons with a sensitivity of at least 10 ppm.
Y = Number of batches since the reactor was last opened to the atmosphere.
Z = Average kg of polyvinyl chloride produced per batch in the number of batches since the reactor was last opened to the atmosphere.

(A) If Method 106 is used to determine the concentration of vinyl chloride (Cb), the sample is to be withdrawn at a constant rate with a probe of sufficient length to reach the vessel bottom from the manhole. Samples are to be taken for 5 minutes within 6 inches of the vessel bottom, 5 minutes near the vessel center, and 5 minutes near the vessel top.

(B) If a portable hydrocarbon detector is used to determine the concentration of vinyl chloride (Cb), a probe of sufficient length to reach the vessel bottom from the manhole is to be used to make the measurements. One measurement will be made within 6 inches of the vessel bottom, one near the vessel center and one near the vessel top. Measurements are to be made at each location until the reading is stabilized. All hydrocarbons measured are to be assumed to be vinyl chloride.

(C) The production rate of polyvinyl chloride (Z) is to be determined by a method submitted to and approved by the Administrator.

(ii) A calculation based on the number of evacuations, the vacuum involved, and the volume of gas in the reactor is hereby approved by the Administrator as an alternative method for determining reactor opening loss for postpolymerization reactors in the manufacture of bulk resins.

§ 61.68 Emisison monitoring.

(a) A vinyl chloride monitoring system is to be used to monitor on a continuous basis the emissions from the sources for which emission limits are prescribed in § 61.62(a) and (b), § 61.63(a), and § 61.64(a) (1), (b), (c), and (d), and for any control system to which reactor emissions are required to be ducted in §61.64(a) (2) or to which fugitive emissions are required to be ducted in §61.65 (b) (1) (ii), and (b) (2), (b) (5), (b) (6) (ii), and (b) (9) (ii).

[41 FR 53017, December 3, 1976]

(b) The vinyl chloride monitoring system(s) used to meet the requirement in paragraph (a) of this section is to be a device which obtains air sampels from one or more points on a continuous sequential basis and analyzes the samples with gas chromotography or, if the owner or operator assumes that all hydrocarbons measured are vinyl chloride, with infrared spectrophotometry, flame ion detection, or an equivalent or alternative method. The vinyl chloride monitoring system used to meet the requirements in § 61.65(b) (8) (i) may be used to meet the requirements of this section.

(c) A daily span check is to be conducted for each vinyle chloride monitoring system used. For all of the emission sources listed in paragraph (a) of this section, except the one for which an emission limit is prescribed in § 61.62(b), the daily span check is to be conducted with a concentration of vinyl chloride equal to 10 ppm. For the emission source for which an emission limit is prescribed in § 61.62(b), the daily span check is to be conducted with a concentration of vinyl chloride which is determined to be equivalent to the emission limit for that source based on the emission test required by §61.67. The calibration is to be done with either:

[41 FR 53017, December 3, 1976]

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

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

[42 FR 29005, June 7, 1977]

§ 61.69 Initial report.

(a) An owner or operator of any source to which this subpart applies shall submit a statement in writing notifying the Administrator that the equipment and procedural specifications in §§ 61.65 (b) (1), (b) (2), (b) (3), (b) (4), (b) (5), (b) (6), (b) (7), and (b) (8) are being implemented.

(b) (1) In the case of an existing source or a new source which has an initial startup date preceding the effective date, the statement is to be submitted within 90 days of the effective date, unless a waiver of compliance is granted under § 61.11, along with the information required under § 61.10. If a waiver of compliance is granted, the statement is to be submitted on a date scheduled by the Administrator.

(2) In the case of a new source which did not have an initial startup date preceding the effective date, the statement is to be submitted within 90 days of the initial startup date.

(c) The statement is to contain the following information:

(1) A list of the equipment installed for compliance,

(2) A description of the physical and functional characteristics of each piece of equipment.

(3) A description of the methods which have been incorporated into the standard operating procedures for measuring or calculating the emissions for which emission limits are prescribed in §§ 61.65 (b) (1) (i) and (b) (6) (i),

(4) A statement that each piece of equipment is installed and that each piece of equipment and each procedure is being used.

§ 61.70 Semiannual report.

(a) The owner or operator of any source to which this subpart applies shall submit to the Administrator on September 15 and March 15 of each year a report in writing containing the information required by this section. The first semiannual report is to be submitted following the first full 6 month reporting period after the initial report is submitted.

[41 FR 53017, December 3, 1976]

(b) (1) In the case of an existing source or a new source which has an initial startup date preceding the effective date, the first report is to be submitted within 180 days of the effective date, unless a waiver of compliance is granted under § 61.11. If a waiver of compliance is granted, the first report is to be submitted on a date scheduled by the Administrator.

(2) In the case of a new source which did not have an initial startup date preceding the effective date, the first report is to be submitted within 180 days of the initial startup date.

(c) Unless otherwise specified, the owner or operator shall use the Test Methods in Appendix B to this part to conduct emission tests as required by paragraphs (c) (2) and (c) (3) of this section, unless an equivalent or an alternative method has been approved by the Administrator. If the Administrator finds reasonable grounds to dispute the

results obtained by an equivalent or alternative method, he may require the use of a reference method. If the results of the reference and equivalent or alternative methods do not agree, the results obtained by the reference method prevail, and the Administrator may notify the owner or operator that approval of the method previously considered to be equivalent or alternative is withdrawn.

(1) The owner or operator shall include in the report a record of any emissions which averaged over any hour period (commencing on the hour) are in excess of the emission limits prescribed in §§ 61.62(a) or (b), § 61.63(a), or §§ 61.64(a)(1), (b), (c), or (d), or for any control system to which reactor emissions are required to be ducted in § 61.64(a)(2) or to which fugitive emissions are required to be ducted in § 61.65 (b)(1)(ii), (b)(2), (b)(5), (b)(6)(ii), or (b)(9)(ii). The emissions are to be measured in accordance with § 61.68.

(2) In polyvinyl chloride plants for which a stripping operation is used to attain the emisison level prescribed in § 61.64(e), the owner or operator shall include in the report a record of the vinyl chloride content in the polyvinyl chloride resin. Test Method 107 is to be used to determine vinyl chloride content as follows:

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

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(ii) If continuous stripping is used, one representative sample of polyvinyl chloride resin is to be taken for each grade of resin processed or at intervals of 8 hours for each grade of resin which is being processed, whichever is more frequent. The sample is to be taken as the resin flows out of the stripper and identified by resin type and grade and the date and time the sample was taken. The corresponding quantity of material processed by each stripper over the time period represented by the sample during the eight hour period, is to be recorded and identified by resin type and grade and the date and time it represents.

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

(iv) At the prior request of the Administrator, the owner or operator shall provide duplicates of the samples required in paragraphs (c)(2)(i) and (c)(2)(ii) of this section.

(v) The report to the Administrator by the owner or operator is to include the vinyl chloride content found in each sample required by paragraphs (c)(2)(i) and (c)(2)(ii) of this section, averaged separately for each type of resin, over each calendar day and weighted according to the quantity of each grade of resin processed by the stripper(s) that calendar day, according to the following equation:

$$A_{T_i} = \frac{\sum_{i}^{n} = 1 P_{G_i} M_{G_i}}{Q_{T_i}} = \frac{P_{G_1} M_{G_1} + P_{G_2} M_{G_2} + \cdots + P_{G_n} M_{G_n}}{Q_{T_i}}$$

where:

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

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

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

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

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

G_i = Grade of resin; e.g., G_1, G_2, and G_3.

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

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

(A) The vinyl chloride content found in all the samples required in paragraphs (c)(2)(i) and (c)(2)(ii) of this section, identified by the resin type and grade and the time and date of the sample, and

(B) The corresponding quantity of polyvinyl chloride resin processed by the stripper(s), identified by the resin type and grade and the time and date it represents.

(3) The owner or operator shall include in the report a record of the emissions from each reactor opening for which an emission limit is prescribed in § 61.64(a)(2). Emissions are to be determined in accordance with § 61.67(g)(5), except that emissions for each reactor are to be determined. For a reactor that is also used as a stripper, the determination may be made immediately following the stripping operation.

§ 61.71 Recordkeeping.

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

(1) A record of the leaks detected by the vinyl chloride monitoring system, as required by § 61.65(b)(8), including the concentrations of vinyl chloride as measured, analyzed, and recorded by the vinyl chloride detector, the location of each measurement and the date and approximate time of each measurement.

(2) A record of the leaks detected during routine monitoring with the portable hydrocarbon detector and the action taken to repair the leaks, as required by § 61.65(b)(8), including a brief statement explaining the location and cause of each leak detected with the portable hydrocarbon detector, the date and time of the leak, and any action taken to eliminate that leak.

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(3) A record of emissions measured in accordance with § 61.68.

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(4) A daily operating record for each polyvinyl chloride reactor, including pressures and temperatures.

[42 FR 29005, June 7, 1977]

METHOD 106—DETERMINATION OF VINYL CHLORIDE FROM STATIONARY SOURCES

[41 FR 46559, October 21, 1976]

INTRODUCTION

Performance of this method should not be attempted by persons unfamiliar with the operation of a gas chromatograph, nor by those who are unfamiliar with source sampling, as there are many details that are beyond the scope of this presentation. Care must be exercised to prevent exposure of sampling personnel to vinyl chloride, a carcinogen.

1. Principle and Applicability.

1.1 An integrated bag sample of stack gas containing vinyl chloride (chloroethene) is subjected to chromatographic analysis, using a flame ionization detector.

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1.2 The method is applicable to the measurement of vinyl chloride in stack gases from ethylene dichloride, vinyl chloride and polyvinyl chloride manufacturing processes, except where the vinyl chloride is contained in particulate matter.

2. Range and Sensitivity.

The lower limit of detection will vary according to the chromatograph used. Values reported include 1×10^{-7} mg and 4×10^{-7} mg.

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

3. *Interferences.* Acetaldehyde, which can occur in some vinyl chloride sources, will interfere with the vinyl chloride peak from the Chromasorb 102[1] column. See sections 4.3.2 and 6.4. If resolution of the vinyl chloride peak is still not satisfactory for a particular sample, then chromatograph parameters can be further altered with prior approval of the Administrator. If alteration of the chromatograph parameters fails to resolve the vinyl chloride peak, then supplemental confirmation of the vinyl chloride peak through an absolute analytical technique, such as mass spectroscopy, must be performed.

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4. Apparatus.

4.1 Sampling (Figure 106-1).

4.1.1 Probe—Stainless steel, Pyrex glass, or Teflon tubing according to stack temperature, each equipped with a glass wool plug to remove particulate matter.

4.1.2 Sample line—Teflon, 6.4 mm outside diameter, of sufficient length to connect probe to bag. A new unused piece is employed for each series of bag samples that constitutes an emission test.

4.1.3 Male (2) and female (2) stainless steel quick-connects, with ball checks (one pair without) located as shown in Figure 106-1.

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4.1.4 Tedlar bags, 100 liter capacity—To contain sample. Teflon bags are not acceptable. Aluminized Mylar bags may be used, provided that the samples are analyzed within 24 hours of collection.

4.1.5 Rigid leakproof containers for 4.1.4, with covering to protect contents from sunlight.

4.1.6 Needle valve—To adjust sample flow rate.

4.1.7 Pump—Leak-free. Minimum capacity 2 liters per minute.

4.1.8 Charcoal tube—To prevent admission of vinyl chloride to atmosphere in vicinity of samplers.

4.1.9 Flow meter—For observing sample flow rate; capable of measuring a flow range from 0.10 to 1.00 liter per minute.

4.1.10 *Connecting tubing.* Teflon, 6.4 mm outside diameter to assemble sample train (Figure 106-1).

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4.1.11 Pitot tube—Type S (or equivalent), attached to the probe so that the sampling flow rate can be regulated proportional to the stack gas velocity.

4.2 Sample recovery.

4.2.1 Tubing—Teflon, 6.4 mm outside diameter, to connect bag to gas chromatograph sample loop. A new unused piece is employed for each series of bag samples that constitutes an emission test, and is to be discarded upon conclusion of analysis of those bags.

4.3 Analysis.

4.3.1 Gas chromatograph—With flame ionization detector, potentiometric strip chart recorder and 1.0 to 5.0 ml heated sampling loop in automatic sample valve.

4.3.2 *Chromatographic column.* Stainless steel, 2 m×3.2 mm, containing 80/100 mesh Chromasorb 102. A secondary column of GE SF-96, 20 percent on 60/80 mesh AW Chromasorb P, stainless steel, 2 m×3.2 mm or Porapak T, 80/100 mesh, stainless steel, 1 m×3.2 mm is required if acetaldehyde is present. If used, a secondary column is placed after the Chromasorb 102 column. The combined columns should then be operated at 120° C.

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4.3.3 Flow meters (2)—Rotameter type, 0 to 100 ml/min capacity, with flow control valves.

4.3.4 Gas regulators—For required gas cylinders.

4.3.5 Thermometer—Accurate to one degree centigrade, to measure temperature of heated sample loop at time of sample injection.

4.3.6 Barometer—Accurate to 5 mm Hg, to measure atmospheric pressure around gas chromatograph during sample analysis.

4.3.7 Pump—Leak-free Minimum capacity 100 ml/min.

4.4 Calibration.

4.4.1 Tubing—Teflon, 6.4 mm outside diameter, separate pieces marked for each calibration concentration.

4.4.2 Tedlar bags—Sixteen-inch square size, separate bag marked for each calibration concentration.

4.4.3 Syringe—0.5 ml, gas tight.

4.4.4 Syringe—50μl, gas tight.

4.4.5 Flow meter—Rotameter type, 0 to 1000 ml/min range accurate to ±1%, to meter nitrogen in preparation of standard gas mixtures.

4.4.6 Stop watch—Of known accuracy, to time gas flow in preparation of standard gas mixtures.

5. Reagents. It is necessary that all reagents be of chromatographic grade.

5.1 Analysis.

5.1.1 Helium gas or nitrogen gas—Zero grade, for chromatographic carrier gas.

5.1.2 Hydrogen gas—Zero grade

5.1.3 Oxygen gas, or Air, as required by the detector—Zero grade.

5.2 *Calibration.* Use one of the following options: either 5.2.1 and 5.2.2, or 5.2.3.

5.2.1 *Vinyl chloride, 99.9+ percent.* Pure vinyl chloride gas certified by the manufacturer to contain a minimum of 99.9 percent vinyl chloride for use in the preparation of standard gas mixtures in Section 7.1. If the gas manufacturer maintains a bulk cylinder supply of 99.9+ percent vinyl chloride, the certification analysis may have been performed on this supply rather than on each gas cylinder prepared from this bulk supply. The date of gas cylinder preparation and the certified analysis must have been affixed to the cylinder before shipment from the gas manufacturer to the buyer.

5.2.2 *Nitrogen gas.* Zero grade, for preparation of standard gas mixtures.

5.2.3 *Cylinder standards (3).* Gas mixture standards (50, 10, and 5 ppm vinyl chloride in nitrogen cylinders) for which the gas composition has been certified by the manufacturer. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the gas manufacturer to the buyer. These gas mixture standards may be directly used to prepare a chromatograph calibration curve as described in section 7.3.

5.2.3.1 *Cylinder standards certification.* The concentration of vinyl chloride in nitrogen in each cylinder must have been certified by the manufacturer by a direct analysis of each cylinder using an analytical procedure that the manufacturer had calibrated on the day of cylinder analysis. The calibration of the analytical procedure shall, as a minimum, have utilized a three-point calibration curve. It is recommended that the manufacturer maintain two calibration standards and use these standards in the following way: (1) a high concentration standard (between 50 and 100 ppm) for preparation of a calibration curve by an appropriate dilution technique; (2) a low concentration standard (between 5 and 10 ppm) for verification of the dilution technique used.

5.2.3.2 *Establishment and verification of calibration standards.* The concentration of each calibration standard must have been established by the manufacturer using

reliable procedures. Additionally, each calibration standard must have been verified by the manufacturer by one of the following procedures, and the agreement between the initially determined concentration value and the verification concentration value must be within ± 5 percent: (1) vertification value determined by comparison with a calibrated vinyl chloride permeation tube, (2) verification value determined by comparison with a gas mixture prepared in accordance with the procedure described in section 7.1 and using 99 9+ percent vinyle chloride, or (3) verification value obtained by having the calibration standard analyzed by the National Bureau of Standards. All calibration standards must be renewed on a time interval consistent with the shelf life of the cylinder standards sold.

[42 FR 29005, June 7, 1977]

6. Procedure.

6 1 Sampling. Assemble the sample train as in Figure 106–1. Perform a bag leak check according to Section 7 4. Observe that all connections between the bag and the probe are tight Place the end of the probe at the centroid of the stack and start the pump with the needle valve adjusted to yield a flow of 0 5 lpm. After a period of time sufficient to purge the line several times has elapsed, connect the vacuum line to the bag and evacuate the bag until the rotameter indicates no flow Then reposition the sample and vacuum lines and begin the actual sampling, keeping the rate proportional to the stack velocity. Direct the gas exiting the rotameter away from sampling personnel At the end of the sample period, shut off the pump, disconnect the sample line from the bag, and disconnect the vacuum line from the bag container. Protect the bag container from sunlight.

6.2 *Sample storage.* Sample bags must be kept out of direct sunlight. When at all possible analysis is to be performed within 24 hours, but in no case in excess of 72 hours of sample collection.

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6 3 Sample recovery. With a piece of Teflon tubing identified for that bag, connect a bag inlet valve to the gas chromatograph sample valve Switch the valve to withdraw gas from the bag through the sample loop Plumb the equipment so the sample gas passes from the sample valve to the leak-free pump, and then to a charcoal tube, followed by a 0–100 ml/min rotameter with flow control valve.

6 4 Analysis. Set the column temperature to 100° C the detector temperature to 150° C and the sample loop temperature to 70° C. When optimum hydrogen and oxygen flow rates have been determined verify and maintain these flow rates during all chromatograph operations. Using zero helium or nitrogen as the carrier gas, establish a flow rate in the range consistent with the manufacturer's requirements for satisfactory detector operation. A flow rate of approximately 40 ml/min should produce adequate separations. Observe the base line periodically and determine that the noise level has stabilized and that base line drift has ceased. Purge the sample loop for thirty seconds at the rate of 100 ml/min, then activate the sample valve. Record the injection time (the position of the pen on the chart at the time of sample injection), the sample number, the sample loop temperature, the column temperature, carrier gas flow rate, chart speed and the attenuator setting. Record the laboratory pressure. From the chart, select the peak having the retention time corresponding to vinyl chloride, as determined in Section 7.2. Measure the peak area, A_m, by use of a disc integrator or a planimeter. Measure the peak height, Hm. Record Am, Hm and the retention time. Repeat the injection at least two times or until two consecutive vinyl chloride peaks do not vary in area more than 5%. The average value for these two areas will be used to compute the bag concentration.

Compare the ratio of H_m to A_m for the vinyl chloride sample with the same ratio for the standard peak which is closest in height. As a guideline, if these ratios differ by more than 10%, the vinyl chloride peak may not be pure (possibly acetaldehyde is present) and the secondary column should be employed (see Section 4 3.2).

[41 FR 53017, December 3, 1976]

6 5 Measure the ambient temperature and barometric pressure near the bag. (Assume the relative humidity to be 100 percent.) From a water saturation vapor pressure table, determine the record and water vapor content of the bag.

7. Calibration and Standards.

7.1 *Preparation of vinyl chloride standard gas mixtures.* Evacuate a sixteen-inch square Tedlar bag that has passed a leak check (described in Section 7 4) and meter in 5 liters of nitrogen. While the bag is filling, use the 0.5 ml syringe to inject 250μl of 99.9+ percent vinyl chloride through the wall of the bag. Upon withdrawing the syringe needle, immediately cover the resulting hole with a piece of adhesive tape. The bag now contains a vinyl chloride concentration of 50 ppm. In a like manner use the other syringe to prepare gas mixtures having 10 and 5 ppm vinyl chloride concentrations. Place each bag on a smooth surface and alternately depress opposite sides of the bag 50 times to further mix the gases. These gas mixture standards may be used for 10 days from the date of preparation, after which time preparation of new gas mixtures is required. (CAUTION,—Contamination may be a problem when a bag is reused if the new gas mixture standard contains a lower concentration than the previous gas mixture standard did.)

[42 FR 29005, June 7, 1977]

7 2 Determination of vinyl chloride retention time This section can be performed simultaneously with Section 7.3. Establish chromatograph conditions identical with those in Section 6 3, above. Set attenuator to X 1 position. Flush the sampling loop with zero helium or nitrogen and activate the sample valve. Record the injection time, the sample loop temperature, the column temperature, the carrier gas flow rate, the chart speed and the attenuator setting Record peaks and detector responses that occur in the absence of vinyl chloride. Maintain conditions. With the equipment plumbing arranged identically to Section 6 3, flush the sample loop for 30 seconds at the rate of 100 ml/min with one of the vinyl chloride calibration mixtures and activate the sample valve. Record the injection time. Select the peak that corresponds to vinyl chloride Measure the distance on the chart from the injection time to the time at which the peak maximum occurs. This quantity, divided by the chart speed, is defined as the retention time Record.

7 3 *Preparation of chromatograph calibration curve.* Make a gas chromatographic measurement of each gas mixture standard (described in section 6 2.2 or 7.1) using conditions identical with those listed in sections 6.3 and 6.4. Flush the sampling loop for 30 seconds at the rate of 100 ml/min with each standard gas mixture and activate the sample valve. Record C_c, the concentration of vinyl chloride injected, the attenuator setting, chart speed, peak area, sample loop temperature, column temperature, carrier gas flow rate, and retention time. Record the laboratory pressure. Calculate A_c, the peak area multiplied by the attenuator setting Repeat until two injection areas are within 5 percent, then plot these points v. C_c When the other concentrations have been plotted, draw a smooth curve through the points. Perform calibration daily, or before and after each set of bag samples, whichever is more frequent.

[42 FR 29005, June 7, 1977]

7.4 Bag leak checks. While performance of this section is required subsequent to bag use, it is also advised that it be performed prior to bag use. After each use, make sure a bag did not develop leaks as follows. To leak check, connect a water manometer and pressurize the bag to 5–10 cm H_2O (2–4 in H_2O). Allow to stand for 10 minutes. Any displacement in the water manometer indicates a leak. Also check the rigid container for leaks in this manner.

(NOTE: An alternative leak check method is to pressurize the bag to 5–10 cm H_2O or 2–4 in. H_2O and allow to stand overnight. A deflated bag indicates a leak.) For each sample bag in its rigid container, place a rotameter in-line between the bag and the pump inlet. Evacuate the bag. Failure of the rotameter to register zero flow when the bag appears to be empty indicates a leak.

8. Calculations.

8.1 Determine the sample peak area as follows:

$$A_c = A_m A_f$$

Equation 106–1

where:

A_c = The sample peak area.
A_m = The measured peak area.
A_f = The attenuation factor.

8.2 Vinyl chloride concentrations. From the calibration curve described in Section 7.3, above, select the value of C_c that corresponds to A_c, the sample peak area. Calculate C_b as follows:

$$C_b = \frac{C_c P_r T_s}{P_s T_r (1 - B_{ws})}$$

Equation 106–2

Where:

B_{ws} = The water vapor content of the bag sample, as analyzed.
C_b = The concentration of vinyl chloride in the bag sample in ppm.
C_c = The concentration of vinyl chloride indicated by the gas chromatograph, in ppm.
P_r = The reference pressure, the laboratory pressure recorded during calibration, mm Hg.
T_s = The sample loop temperature on the absolute scale at the time of analysis, °K.
P_s = The laboratory pressure at time of analysis, mm Hg.
T_r = The reference temperature, the sample loop temperature recorded during calibration, °K.

9. References.

1. Brown, D. W., Loy, E. W. and Stephenson, M. H. "Vinyl Chloride Monitoring Near the B. F. Goodrich Chemical Company in Louisville, Kentucky." Region IV, U.S. Environmental Protection Agency, Surveillance and Analysis Division, Athens, Georgia, June 24, 1974.

2. "Evaluation of A Collection and Analytical Procedure for Vinyl Chloride in Air," by G. D. Clayton and Associates, December 13, 1974. EPA Contract No. 68–02–1408, Task Order No. 2, EPA Report oN. 75–VCL–1.

3. "Standardization of Stationary Source Emission Method for Vinyl Chloride," by Midwest Research Institute, 1976. EPA Contract No. 68–02–1098, Task Order No. 7.

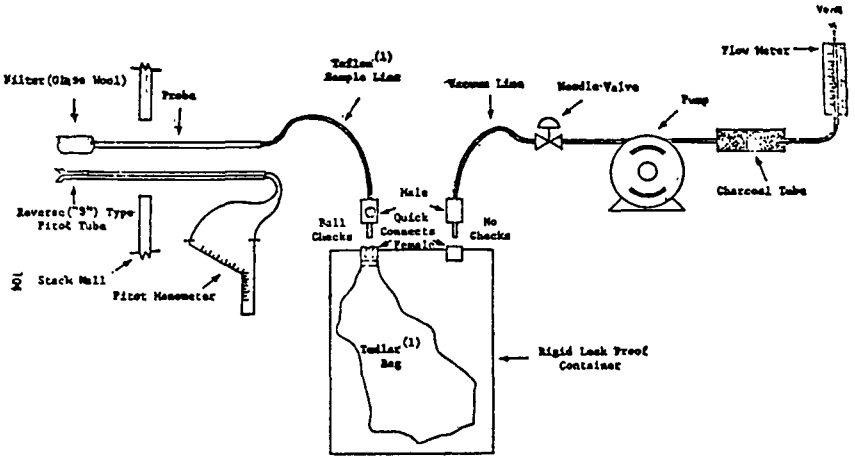

Figure 106-1. Integrated bag sampling train.

(1) Mention of trade names on specific products does not constitute endorsement by the Environmental Protection Agency.

METHOD 107—DETERMINATION OF VINYL CHLORIDE CONTENT OF INPROCESS WASTEWATER SAMPLES, AND VINYL CHLORIDE CONTENT OF POLYVINYL CHLORIDE RESIN, SLURRY, WET CAKE, AND LATEX SAMPLES

[41 FR 46559, October 20, 1976]

INTRODUCTION

Performance of this method should not be attempted by persons unfamiliar with the operation of a gas chromatograph, nor by those who are unfamiliar with sampling, as there are many details that are beyond the scope of this presentation. Care must be exercised to prevent exposure of sampling personnel to vinyl chloride, a carcinogen.

1. Principle and Applicability.

1.1 The basis for this method relates to the vapor equilibrium which is established between RVCM, PVC, resin, water, and air in a closed system. It has been demonstrated that the RVCM in a PVC resin will equilibrate in a closed vessel quite rapidly, provided that the temperature of the PVC resin is maintained above the glass transition temperature of that specific resin.

1.2 This procedure is suitable for determining the vinyl choride monomer (VCM) content of inprocess wastewater samples, and the residual vinyl chloride monomer (RVCM) content of polyvinyl chloride (PVC) resins, wet cake, slurry, and latex samples. It cannot be used for polymer in fused forms, such as sheet or cubes. If a resolution of the vinyl chloride peak is not satisfactory for a particular sample, then chromatograph parameters may be altered provided that the precision and reproducibility of the analysis of vinyl chloride cylinder standards are not impaired. If there is reason to believe that some other hydrocarbon with an identical retention time is present in the sample, then supplemental confirmation of the vinyl chloride peak through an absolute analytical technique, such as mass spectroscopy, should be performed.

[42 FR 29005. June 7, 1977]

2. Range and Sensitivity.

The lower limit of detection of vinyl chloride will vary according to the chromatograph used. Values reported include 1×10^{-7} mg and 4×10^{-7} mg. With proper calibration, the upper limit may be extended as needed.

3. Precision and Reproducibility.

An interlaboratory comparison between seven laboratories of three resin samples, each split into three parts, yielded a standard deviation of 2.63% for a sample with a mean of 2.09 ppm, 4.16% for a sample with a mean of 1.66 ppm, and 5.29% for a sample with a mean of 62.66 ppm.

4. Safety.

Do not release vinyl chloride to the laboratory atmosphere during preparation of standards. Venting or purging with VCM/air mixtures must be held to a minimum. When they are required, the vapor must be routed to outside air. Vinyl chloride, even at low ppm levels, must never be vented inside the laboratory. After vials have been analyzed, the pressure within the vial must be vented prior to removal from the instrument turntable. Vials must be vented into an activated charcoal tube using a hypodermic needle to prevent release of vinyl chloride into the laboratory atmosphere. The charcoal must be replaced prior to vinyl chloride breakthrough.

5. Apparatus.

5.1 Sampling.

5.1.1 Bottles—60 ml (2 oz), with waxed lined screw on tops, for PVC samples.

5.1.2 Vials—50 ml Hypo-vials,[1] sealed with Teflon faced Tuf-Bond discs for water samples.

5.1.3 Electrical tape—or equivalent, to prevent loosening of bottle tops.

5.2 Sample recovery.

5.2.1 Vials—With seals and caps, Perkin-Elmer Corporation No. 105–0118, or equivalent.

5.2.2 Analytical balance—Capable of weighing to ±0.001 gram.

5.2.3. Syringe, 100 µl—Precision Series "A" No. 010025, or equivalent.

5.2.4 Vial Sealer, Perkin-Elmer No. 105–0106 or equivalent.

5.3 Analysis.

5.3.1 Gas chromatograph—Perkin-Elmer Corporation Model F–40, head-space analyzer, No. 104–0001, or equivalent.

5.3.2 *Chromatographic column.* Stainless steel, 2 m × 3.2 mm, containing 0.4 percent Carbowax 1500 on Carbopak A, Perkin-Elmer Corporation No. 105–0133, or equivalent. Carbopak C can be used in place of Carbopak A. If methanol and/or acetaldehyde is present in the sample, a pair of Poropak Q columns in series (1 m × 3.2 mm followed by 2 m × 3.2 mm) with provision for backflush of the first column has been shown to provide adequate separation of vinyl chloride.

[42 FR 29005, June 7, 1977]

5.3.3 Thermometer—0 to 100° C, accurate to ±0.1° C, Perkin-Elmer No. 105–0109 or equivalent.

5.3.4. Sample tray thermostat system—Perkin-Elmer No. 105–0103, or equivalent.

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

5.3.5 Septa—Sandwich type, for automatic dosing, 13 mm, Perkin-Elmer No. 105-1008, or equivalent.

5.3.6 Integrator - recorder — Hewlett - Packard Model 3380A, or equivalent.

5.3.7 Filter drier assembly (3)—Perkin-Elmer No. 2230117, or equivalent.

5.3.8 Soap film flowmeter—Hewlett Packard No. 0101-0113, or equivalent.

5.4 Calibration.

5.4.1 Regulators—for required gas cylinders.

6. Reagents.

6.1 Analysis.

6.1.1 Hydrogen gas—zero grade.

6.1.2 Nitrogen gas—zero grade.

6.1.8 Air—zero grade.

6.2 *Calibration.*

[42 FR 29005, June 7, 1977]

6.2.1 *Cylinder standards (4).* Gas mixture standards (50, 500, 2,000, and 4,000 ppm vinyl chloride in nitrogen cylinders) for which the gas composition has been certified by the manufacturer. Lower concentration standards should be obtained if lower concentrations of vinyl chloride samples are expected, as the intent is to bracket the sample concentrations with standards. The manufacturer must have recommended a maximum shelf life for each cylinder so that the concentration does not change greater than ±5 percent from the certified value. The date of gas cylinder preparation, certified vinyl chloride concentration and recommended maximum shelf life must have been affixed to the cylinder before shipment from the manufacturer to the buyer.

6.2.1.1 *Cylinder standards certification.* The concentration of vinyl chloride in nitrogen in each cylinder must have been certified by the manufacturer by a direct analysis of each cylinder using an analytical procedure that the manufacturer had calibrated on the day of cylinder analysis. The calibration of the analytical procedure shall, as a minimum, have utilized a three-point calibration curve. It is recommended that the manufacturer maintain two calibration standards and use these standards in the following way: (1) a high concentration standard (between 4,000 and 8,000 ppm) for preparation of a calibration curve by an appropriate dilution technique; (2) a low concentration standard (between 50 and 500 ppm) for verification of the dilution technique used.

6.2.1.2 *Establishment and verification of calibration standards.* The concentration of each calibration standard must have been established by the manufacturer using reliable procedures. Additionally, each calibration standard must have been verified by the manufacturer by one of the following procedures, and the agreement between the initially determined concentration value and the verification concentration value must be within ±5 percent: (1) verification value determined by comparison with a gas mixture standard generated in a similar manner to the procedure described in section 7.1 of Method 106 for preparing gas mixture standards using 99.9+ percent vinyl chloride, or (2) verification value obtained by having the calibration standard analyzed by the National Bureau of Standards. All calibration standards must be renewed on a time interval consistent with the shelf life of the cylinder standards sold.

7. Procedure.

7.1 Sampling.

7.1.1 PVC sampling—Allow the resin or slurry to flow from a tap on the tank or silo until the tap line has been well purged. Extend a 60 ml sample bottle under the tap, fill, and immediately tightly cap the bottle. Wrap electrical tape around the cap and bottle to prevent the top from loosening. Place an identifying label on each bottle, and record the date, time, and sample location both on the bottles and in a log book.

7.1.2 Water sampling—Prior to use, the 50 ml vials (without the discs) must be capped with aluminum foil and muffled at 400°C for at least one hour to destroy or remove any organic matter that could interfere with analysis. At the sampling location fill the vials bubble-free, to overflowing so that a convex meniscus forms at the top. The excess water is displaced as the sealing disc is carefully placed, Teflon side down, on the opening of the vial. Place the aluminum seal over the disc and the neck of the vial and crimp into place. Affix an identifying label on the bottle, and record the date, time, and sample location both on the vials and in a log book. All samples must be kept refrigerated until analyzed.

7.2 Sample recovery. Samples must be run within 24 hours.

7.2.1 Resin samples—The weight of the resin used must be between 0.1 and 4.5 grams. An exact weight must be obtained (±0.001 gram) for each sample. In the case of suspension resins a volumetric cup can be prepared which will hold the required amount of sample. The sample bottle is opened, and the cup volume of resin is added to the tared sample vial (including septum and aluminum cap). The vial is immediately sealed and the exact sample weight is then obtained. Report this value on the data sheet as it is required for calculation of RVCM. In the case of relatively dry resin samples (water content <0.3 weight %), 100 μl of distilled water must be injected into the vial, after sealing and weighing, using a 100 μl syringe. In the case of dispersion resins, the cup cannot be used. The sample is instead weighed approximately in an aluminum dish, transferred to the tared vial and weighed accurately in the vial. The sample is then placed in the Perkin-Elmer head space analyzer (or equivalent) and conditioned for one hour at 90°C.

NOTE: Some aluminum vial caps have a center section which must be removed prior to placing into sample tray. If not removed, serious damage to the injection needle will occur.

7.2.2 Suspension resin slurry and wet cake samples—Slurry must be filtered using a small Buchner funnel with vacuum to yield wet cake. The filtering process must be continued only as long as a steady stream of water is exiting from the funnel. Excessive filtration time could result in some loss of VCM. The wet cake sample (0.10 to 4.5 grams) is added to a tared vial (including septum and aluminum cap) and immediately sealed. Sample weight is then determined to 3 decimal places. The sample is then placed in the Perkin-Elmer head space analyzer (or equivalent) and conditioned for one hour at 90°C. A sample of wet cake is used to determine TS (total solids). This is required for calculating the RVCM.

7.2.3 Dispersion resin slurry samples.—This material should not be filtered. Sample must be thoroughly mixed. Using a tared vial (including septum and aluminum cap) add approximately 8 drops (0.25 to 0.35 grams) of slurry or latex using a medicine dropper. This should be done immediately after mixing. Seal the vial as soon as possible. Determine sample weight accurate to 0.001 grams. Total sample weight must not exceed 0.50 grams. Condition the vial for one hour at 90°C in the analyzer. Determine the TS on the slurry sample (Section 7.3.5).

7.2.4 Inprocess wastewater samples—Using a tared vial (including septum and aluminum cap) quickly add approximately 1 cc of water using a medicine dropper. Seal the vial as soon as possible. Determine sample weight accurate to 0.001 gram. Condition the vial for two hours at 90°C in the analyzer.

7.3 Analysis.

7.3.1 Preparation of gas chromatograph—Install the chromatographic column and condition overnight at 150°C. Do not connect the exit end of the column to the detector while conditioning.

7.3.1.1 Flow rate adjustments—Adjust flow rates as follows:

a. Nitrogen carrier gas—Set regulator on cylinder to read 50 psig. Set regulator on chromatograph to 1.3 kg/cm². Normal flows at this pressure should be 25 to 40 cc/minute. Check with bubble flow meter.

b. Burner air supply—Set regulator on cylinder to read 50 psig. Set regulator on chromatograph to supply air to burner at a rate between 250 and 300 cc/minute. Check with bubble flowmeter.

3. Hydrogen supply—Set regulator on cylinder to read 30 psig. Set regulator on chromatograph to supply approximately 35±5 cc/minute. Optimize hydrogen flow to yield the most sensitive detector response without extinguishing the flame. Check flow with bubble meter and record this flow

7.3.1.2 Temperature adjustments—Set temperatures as follows:

a. Oven (chromatographic column), 50° C.

b. Dosing line, 140° C.

c. Injection block, 140° C.

d. Sample chamber, water temperature 90° C±1.0° C.

7.3.1.3 Ignition of flame ionization detector—Ignite the detector according to the manufacturer's instructions.

7.3.1.4 Amplifier balance—Balance the amplifier according to the manufacturer's instructions.

7.3.2 Programming the chromatograph—Program the chromatograph as follows:

a. I—Dosing time—The normal setting is 2 seconds

b. A—Analysis time—The normal setting is 8 minutes. Certain types of samples contain high boiling materials which can cause interference wtih the vinyl chloride peak on subsequent analyses. In these cases the analysis time must be adjusted to eliminate the interference. An automated backflush system can also be used to solve this problem.

c. B—Flushing—The normal setting is 0.2 minutes.

d. W—Stabilization time—The nomal setting is 0.2 minutes.

e. X—Number of analyses per sample—The normal setting is 1.

7.3.3 Preparation of sample turntable—Before placing any sample into turntable, be certain that the center section of the aluminum cap has been removed. The numbered sample bottles should be placed in the corresponding numbered positions in the turntable. Insert samples in the following order:

Positions 1 & 2—Old 2000 ppm standards for conditioning. These are necessary only after the analyzer has not been used for 24 hours or longer.

Position 3—50 ppm standard, freshly prepared.

Position 4—500 ppm standard, freshly prepared.

Position 5—2000 ppm standard, freshly prepared.

Position 6—4000 ppm standard, freshly prepared.

Position 7—Sample No. 7 (This is the first sample of the day, but is given as 7 to be consistent with the turntable and the integrator printout.)

After all samples have been positioned, insert the second set of 50, 500, 2000, and 4000 ppm standards. Samples, including standards must be conditioned in the bath of 90° C for 1 hour (not to exceed 5 hours).

7.3.4 Start chromatograph program—When all samples, including standards, have been conditioned at 90° C for 1 hour, start the analysis program according to the manufacturers' instructions. These instructions must be carefully followed when starting and stopping program to prevent damage to the dosing assembly.

7.3.5 Determination of total solids (TS). For wet cake, slurry, resin solution, and PVC latex samples, determine TS for each sample by accurately weighing approximately 3 to 4 grams of sample in an aluminum pan before and after placing in a draft oven (105 to 110° C). Samples must be dried to constant weight. After first weighing return the pan to the oven for a short period of time and then reweigh to verify complete dryness. TS is then calculated as the final sample weight divided by initial sample weight.

8. Calibration.

Calibration is to be performed each eight-hour period when the instrument is used. Each day, prior to running samples, the column should be conditioned by running two of the previous days 2000 ppm standards.

8.1 Preparation of Standards.

Calibration standards are prepared by filling the vials with the vinyl chloride/nitrogen standards, rapidly seating the septum and sealing with the aluminum cap. Use a stainless steel line from the cylinder to the vial. Do not use rubber or tygon tubing. The sample line from the cylinder must be purged (into hood) for several minutes prior to filling vials. After purging, reduce the flow rate to approximately 500–1000 cc/min. Place end of tubing into vial (near bottom) and after one minute slowly remove tubing. Place septum in vial as soon as possible to minimize mixing air with sample. After the standard vials are sealed, inject 100μl of distilled water.

8.2 Preparation of chromatograph calibration curve.

Prepare two 50 ppm, two 500 ppm, two 2000 ppm, and two 4000 ppm standard samples. Run the calibration samples in exactly the same manner as regular samples. Plot A_s, the integrator area counts for each standard sample vs C_c, the concentration of vinyl chloride in each standard sample. Draw a line of best fit through the points.

9. Calculations.

9.1 Response factor.

From the calibration curve described in Section 8.2, above, select the value of C_c that corresponds to A_s for each sample. Compute the response factor, R_f, for each sample, as follows:

$$R_f=\frac{A_s}{C_c} \quad \text{Equation 107-1}$$

9.2 Residual vinyl chloride monomer concentration, or vinyl chloride monomer concentration.

Calculate C_{vc} as follows:

$$C_{vc}=\frac{A_s P_a}{R_f T_1}\left(\frac{M_v V_g}{m_t R}+K T_2\right)$$

Equation 107-2

where:

C_{vc} = Concentration of vinyl chloride in the sample, in ppm.

P_a = Laboratory atmosphere pressure, mm Hg.

T_1 = Room temperature, °K.

M_v = Molecular weight of VCM (62.5).

V_g = Volume of vapor phase (vial volume less sample volume).

m_t = Weight of sample, grams.

R = Gas constant [62,360 (cc-mm-mole-degrees Kelvin)]

K = Henry's Law constant. For VCM in PVC at 90° C, $K=6.52\times10^{-6}=K_p$. For VCM in 1 cc (approximate) wastewater sample at 90° C, $K=5.0\times10^{-6}=K_w$.

T_2 = Equilibration temperature, °K.

If the following conditions are met, Equation 107-2 can be simplified as follows:

1. $T_1=22°$ C (295° K)
2. $T_2=90°$ C (363° K)
3. $P_a=750$ mm Hg.
4. $V_g=V_v-\frac{m_t}{1.4}=23.5-\frac{m_t}{1.4}$

where

V_v = Vial volume, cc (23.5).

5. Sample contains less than 0.5 percent water.

$$C_{vc}=\frac{A_s}{R_f}\left(4.197\times10^{-3}+\frac{5.988\times10^{-2}}{m_t}\right) \quad \text{Equation 107-3}$$

The following general equation can be used for any sample which contains VCM, PVC and water.

$$C_{vc}=\frac{A_s P_a}{R_f T_1}\times\left[\frac{M_v V_g}{R m_t}+K_p(TS)T_2+K_w(1-TS)T_2\right]$$

Equation 107-4

where:

TS = Total solids.

NOTE: K_w must be determined for samples with a vapor volume to liquid volume ratio other than 22.5 to 1. This ratio can be obtained by adjusting the sample weight through giving consideration to the total solids and density of the PVC.

Results calculated using Equation 107-4 represent concentration based on the total sample. To obtain results based on dry PVC content, divide by TS.

For a 1-cc wastewater sample (that is, 22.5 to 1 vapor volume to liquid volume ratio), K_w is 5.0×10^{-6}. Thus, Equation 107-4 can be simplified to the following:

$$C_{vc}=\frac{A_s}{R_f}\left[\frac{5.988\times10^{-2}}{m_t}+(2.066\times10^{-3})\right] \quad \text{Equation 107-5}$$

[42 FR 29005, June 7, 1977]

10. References.

1. Residual Vinyl Chloride Monomer Content of Polyvinyl Chloride Resins and Wet Cake Samples, B. F. Goodrich Chemical Co. Standard Test Procedure No. 1005-T. B. F. Goodrich Technical Center, Avon Lake, Ohio. January 30, 1975.

2. Berens, A. R., "The Solubility of Vinyl Chloride in Polyvinyl Chloride," ACS-Division of Polymer Chemistry, Polymer Preprints *15* (2): 197, 1974.

3. Berens, A. R., "The Diffusion of Vinyl Chloride in Polyvinyl Chloride," ACS-Division of Polymer Chemistry, Polymer Preprints *15* (2): 203, 1974.

4. Berens, A. R., L. B. Crider, C. J. Tomanek and J. M. Whitney, Analysis for Vinyl Chloride in PVC Powders by Head-Space Gas Chromatography," to be published.

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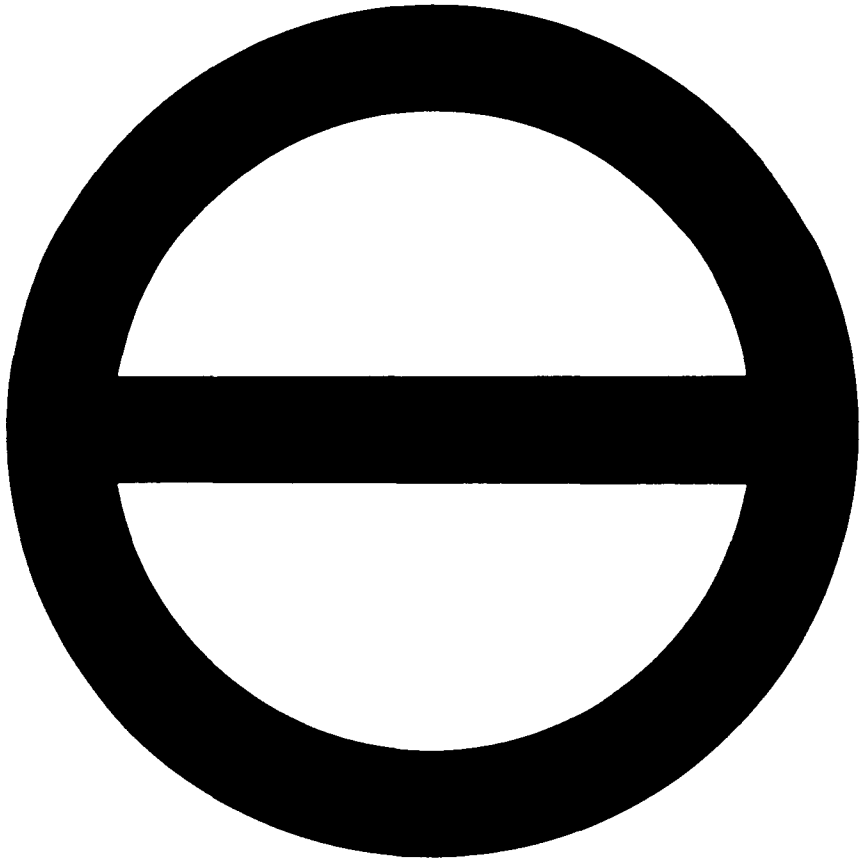

For technical information on vinyl chloride monomer, contact:

Organic chemical technical service
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CTL009506

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THE VINYL INSTITUTE GROUP ON RECYCLING (VIGOR)
STATUS REPORT

I. DURABLES

A. Bottles-To-Pipe

PW Pipe is continuing to use post-consumer bottle material as feedstock for their landfill vent pipes and sewer lines in Santa Barbar and San Diego. This project initiated by VIGOR and the PCR continues to be supplied by VI member companies. Significant publicity has been achieved and this project is now an ongoing part of PW's product line. As a result, it is in the phasedown stage as far as VIGOR is concerned.

B. Automotive and Business Equipment

VIGOR is represented in ongoing efforts to encourage recycling and design for recyclability in these two areas.

C. Building and Construction

The APC siding program in North Carolina continues to flourish with six centers in operation and projections to 20. Current collection rates are 10M/site/month.

D. Tool Pool

VIGOR is working with Turtle Plastics on a truck bed mat made of PVC bottle material and with Toggle Tube on vinyl coin wrappers with post-industrial content. Each have received VIGOR loans to assist in tooling.

II. PACKAGING

A. Clearvue

This is a mature VIGOR project which has been successful in that Clearvue is now a commercial operation to source washed post-consumer vinyl for ultimate sale back into the marketplace to meet needs for post-consumer content. Loans are outstanding to VIGOR.

B. Waste Alternatives

This company is in chapter 11 and the VI-owned MSS unit on site pending VIGOR selection of an alternative site. As one of the original MSS designs, it does not represent current technology.

C. Envirothene

Envirothene's bottle sortation program is in operation with VI member companies taking the post-consumer vinyl bottle stream.

D. Other

VIGOR is carefully monitoring state legislation affecting the vinyl packaging business through its liaison with the VI's Issues Management Committee and the APC. We are also pro-actively providing speakers to education legislator and public groups in affected states as to the merits of PVC and its recyclability.

Richard G. Ryder, Chairman, VIGOR
August 14, 1994

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CALIFORNIA ENVIRONMENTAL IMPACT REPORT

Report for Vinyl Institute Executive Board Meeting

September 13, 1994

On August 9, 1994, SPI advised the State of California Department of Housing and Community Development (HCD) that it was suspending work on the project aimed at completing an Environmental Impact Report to allow expanded uses of plastic pipe in California. Further details can be found in a letter from Lew Freeman of SPI to Kenneth Kobrin, Chief Counsel/Deputy Director of the Department of Housing and Community Development, a copy of which is on the following page.

Unless the project is reinstated at some future date, this item will no longer be reported on at future Vinyl Institute Executive Board Meetings.

Roy T. Gottesman
August 10, 1994

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Dear Ken:

I believe you are aware from conversations over the past several months with our attorney, Marcus Lo Duca of Weintaub Genshlea and Sproul, that SPI and the other parties interested in the pending Environmental Impact Report (EIR) on plastic pipe began searching early this year for an "EIR packager" to hire, pursuant to our agreement with you last year. Unfortunately, the best proposal we were able to obtain for such an undertaking was two to three times as much as our original cost estimates. Under those circumstances, we are unable to proceed with the project of hiring an outside party to complete the EIR.

SPI and those who have composed the coalition of interested companies and associations continue to believe that the ultimate responsibility for completing the EIR rests with the State of California. We have fulfilled all legal and financial obligations under the contract originally signed several years ago. Our attempt in early 1993 to fund additional work by an outside party so that the EIR could be certified was in recognition of the reality that 1) the Department of Housing and Community Development (HCD) did not have sufficient expertise or resources to do the work, and that 2) SRI International was not willing to do further work on the project, feeling the product it had produced met the letter of its agreement with HCD. However, we can no longer justify committing additional funds to the project when there is such uncertainty of the amount of funds needed and the outcome of any additional expenditures.

Effective immediately, SPI is suspending work on the project. In turn, we ask that HCD do nothing more in pursuit of an EIR on plastic pipe until you hear from us. If you have any questions please feel free to contact me directly.

Sincerely,

cc: California Pipe Group
Marcus Lo Duca, Weintaub Genshlea & Sproul
Peter de la Cruz, Keller and Heckman
Sue Fitchen, SRI International

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THE VINYL INSTITUTE ANNUAL MEETING

TENTATIVE SCHEDULE

Sunday, May 21
Reception

Monday, May 22
VIGOR Meeting
HSE/Legal Meeting
Golf/Tennis Tournaments
Informal Dinner

Tuesday, May 23
Executive Board Meeting
General Session
Technical Meeting
Affiliate Meeting
Reception/Awards Dinner

Wednesday, May 24
Issues Management Meeting

HOTELS

Four Seasons Resort and Club
Las Colinas
Dallas, Texas

Rate: $185.00

Evergreen Conference Center
One Lakeview Drive
Stone Mountain, Georgia 30086

Rate: $218 single/$332 double
Rate includes room. 3 meals, services charges, gratuities, breaks, A/V, entrance to stone mountain park. The amount can be split-billed with any portion beign designated to individuals and the master account.

Lakeside 249 rom conference center located in Stone Mountain Park is 16 miles east of Atlanta, 30 minutes from Hartsfield Airport. They have 36 holes of golf (green fees $38), 10 tennis courts, indoor and outdoor pools.

Sea Palms Golf and Tennis Resort
5445 Frederica Road
St. Simons Island, Georgia 31522

Rate: $90.00

Sea Palms is located on St. Simons Island, a 60 minute drive from Jacksonville Airport. They offer 27 holes of golf, 12 tennis courts, and two pools.

The Registry Resort
475 Seagate Drive
Naples, Florida 33940

Rate: $155.00

This 424 room resort is located on Gulf of Mexico and is 30 minutes from Southwest Regional Airport with 3 outdoor pools, 15 tennis courts and 27 hole sof golf nearby.

NOTE: These rates have NOT been negotiated. This information is from initial phone contact only.