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January 24, 1977

File: Enc. - EC - Baton Rouge with Encl.

Mr. J. M. Devoe
Allied Chemical Corporation
P. O. Box 1139 R
Morristown, New Jersey 07960

Dear Mr. Devoe:

Pursuant to the request we received from your secretary on Wednesday, January 19, 1977, we have enclosed herewith a copy of the Guidelines for the Enforcement of the Vinyl Chloride Regulations. If you should need any further information or if you have any questions or comments about any other aspect of the vinyl chloride regulations, please do not hesitate to let us know.

Cordially yours,

Enclosure

cc: Mr. John R. Lawrence w/o encl.

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ASI 00006193

S-25 GUIDELINE FOR THE ENFORCEMENT OF THE VINYL CHLORIDE REGULATIONS

This guideline is being issued to assist the regional offices in the enforcement of the regulations for the control of vinyl chloride emissions. Three types of facilities are required to be controlled by these regulations; (1) ethylene dichloride plants, (2) vinyl chloride plants and (3) polyvinyl chloride plants. Included in these major categories are potentially numerous points of emissions. The regulations, due to the nature of the facilities, are very complex and should be examined very carefully.

SOURCE NOTIFICATION

Vinyl chloride was declared a hazardous air pollutant on December 24, 1975. Simultaneously regulations were proposed for the control of vinyl chloride under Section 112 of the Act, National Emission Standards for Hazardous Air Pollutants (NESHAPS) 40 FR 59532. Since this regulatory framework has been previously utilized for the control of asbestos, beryllium, and mercury, additional helpful information is available in Guidelines S-17 thru S-20, which should also be consulted.

The regional offices should notify all affected sources immediately following the promulgation of the vinyl chloride regulations, or immediately upon identification of affected sources anytime after promulgation (see guideline S-17 for example notification). A list of all known ethylene dichloride, vinyl chloride and polyvinyl chloride production plants is attached. However, since some new plants may have been constructed and no research and development facilities are included in this listing, some additional investigation should be made to complete the list. All affected sources are to be coded into CDS.

ASI 00006194

EXEMPTIONS FOR RESEARCH AND DEVELOPMENT FACILITIES

Polyvinyl chloride reactors and associated equipment are exempted from applicability of all parts of the standard if the reactors are used in research and development and have a capacity of no more than $0.19m^3$ (50 gal.). Reactors in this size range can generally be found in a laboratory.

Also exempted are research and development facilities containing reactors greater than $0.19m^3$ (50 gal.) and no more than $4.07m^3$ (1,100 gal.) in capacity from all parts of the standard except the 10 ppm limit for reactors, strippers, monomer recovery systems, and mixing, weighing and holding containers.

The following discussion concerns itself with those portions of the regulations most critical to the enforcement of these requirements. Frequent referral to the regulations is recommended for detailed explanation of the remainder of the regulations.

A. Initial Submittals - Waiver Requests, Equivalent Methods, Monitoring Plans

1. Waiver of Compliance

Guideline S-19 should be consulted for administrative procedures for the review of waivers of compliance. Attached is a list of control alternatives which can be applied to the vinyl chloride/polyvinyl chloride industry. Included in this attachment are projected times needed for installation of these various control options. While some of these alternatives appear to last beyond the two-year compliance period allowed under S112(c)(1)(B) of the Clean Air Act, it is the opinion of the Emission Standards and Engineering Division that the two-years should be sufficient in most cases. All sources have been put on notice since the time of proposal that control of vinyl chloride emissions will be necessary. Therefore, it is safe to assume that the additional time frame from proposal to promulgation will provide the additional time which may be necessary in some instances.

Source owners or operators may apply for use of equivalent control techniques (§61.66). Owners or operators should be directed to make application for a waiver of compliance at the same time application is made for the equivalent control option. The waiver request should be for the time necessary to come into compliance with the regulations should the application for the equivalent method be denied. Should the regional office fail to respond to an equivalency request within the initial 90 day period, the waiver of compliance would automatically take effect for the period necessary to act on the request. If it is determined that the equivalency request is not satisfactory the regional office should consider granting the source a waiver for the time necessary to install the required control equipment. However, in no case will the waiver of compliance be extended beyond two years from the date of promulgation.

2. Equivalent Equipment and Procedures (§61.66)

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 these requirements. Requests for using equivalent methods as the initial measure of control are 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 with the application for approval of construction or modification required by §61.07.

Many existing vinyl chloride/polyvinyl chloride plants are currently minimizing or are considering minimizing their emissions of vinyl chloride through methods other than those specified in the regulations. If these methods of control can be demonstrated to have an equivalent effect on vinyl chloride emissions they will be allowed. Requests for assistance in determining equivalent control capability should be directed to: Director, Emission Standards and Engineering Division (ESED), U.S. Environmental Protection Agency, Research Triangle Park, N. C. 27711.

D. Monitoring Program

Section 61.65(b)(8) requires the owner or operator to institute a formal leak detection and elimination program. The owner or operator must submit a description of the program to the regional office for approval, within 45 days of promulgation, unless a waiver of compliance is granted. In that case the regional office would then schedule a submittal date for the program. This leak detection program should include:

(a) a reliable and accurate vinyl chloride monitoring system for detection of major leaks and identification of the general area of the plant where the 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.

(b) 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.

(c) 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 §61.65(b)(8)(vi). The calibration is to be done with either:

(1) a calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.3 of Test Method 106, or

(2) A calibration gas cylinder containing the appropriate concentration of vinyl chloride. If a calibration gas cylinder is used, the analysis must be traceable to the National Bureau of Standards or to a gravimetrically calibrated vinyl chloride permeation tube.

(d) 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;

(e) an acceptable plan of action to be taken when a leak is detected; and

(f) a definition of leak which is acceptable when compared with the background concentration of vinyl chloride in the areas of the plant to be monitored by the vinyl chloride monitoring system. 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. The background level should not be so high so that any leak would be masked by the high background level and therefore go undetected.

B. DETERMINATION OF COMPLIANCE

1. Initial Report (§61.69)

An owner or operator of a source must submit a written statement notifying the Administrator (regional office) that the equipment and procedural specifications to control fugitive emissions [§61.65 (b)(1), (b)(2), (b)(3), (b)(4), (b)(5), (b)(6), (b)(7), and (b)(8)] are being implemented.

Existing sources or new sources which have an initial startup date preceding the effective date must submit the statement within 90 days of the effective date. If a waiver is granted to an existing

source the regional office will establish a date for submission of this report. New sources having an initial startup date on or after the effective date must submit the statement within 90 days of the initial startup date.

The statement should contain the following information:

(a) A list of equipment installed for compliance.

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

(c) 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)(3)(i).

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

2. Emission Tests (§61.67)

Within 90 days of the effective date of the regulations in the case of an existing source, the owner or operator shall test emissions from the source, unless a waiver of emission testing is obtained under §61.13. This time may also be extended if a waiver of compliance is granted. (See S-19 and S-20.)

The owner or operator shall provide the regional office at least 30 days prior notice of an emission test.

Emission tests are to be conducted while the equipment being tested is operated at the maximum production rate at which the equipment will be operated and under other relevant conditions as may be specified by the regional office.

All samples are to be analyzed within 24 hours, and vinyl chloride emissions are to be determined within 30 days after the emission test. The owner or operator must report the determinations by a registered letter before the close of the next business day following the determination.

The owner or operator must retain for two years records of emission test results and other data needed to determine emissions.

There are four general testing procedures required by this standard. They are as follows:

(a) Stack Test - Ethylene dichloride, vinyl chloride, and polyvinyl chloride plants - Test Method 106.

Each emission test is to consist of three consecutive runs. The average is to be computed on a time weighted basis.

(b) Reactor Opening - Polyvinyl chloride plants, Test Method 106 or portable hydrocarbon detector.

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 regional office for each individual plant based on the plants operation. Since this test will be done on a continuous basis, the regional office may decide to test a limited number of reactors and resin combinations at the time of the compliance test. This method is outlined on pages 12 and 13.

(c) Stripping Operation - Polyvinyl chloride plants - Test Method 107.

Where a stripping operation is used to attain the emission limit in §61.64(a) emissions are to be determined as outlined on

pages 10, 11 and 12. Since this test will also be done on a continuous basis the regional office may decide to test a limited number of strippers and resin combinations at the time of the compliance test.

(d) Inprocess Wastewater Test - Ethylene Dichloride-Vinyl Chloride and Polyvinyl Chloride Plants - Test Method 107.

Section 61.65(b)(9) requires that the vinyl chloride content of all inprocess wastewater streams as they leave a piece of equipment 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 discharged untreated as a wastewater.

The Test Methods in Appendix B of Part 61 are to be used unless an equivalent method or an alternative method has been approved by the Administrator. Approval of an alternative or equivalent method must be concurred upon by the Director of the Emission Standards and Engineering Division. If the results obtained by an equivalent or alternative method are thought to be inaccurate, the regional office may require the use of a reference method. If the results obtained by the reference method do not agree with those of the alternative or equivalent method the results obtained by the reference method shall prevail.

C. EMISSION MONITORING (§61.68)

1. The vinyl chloride monitoring system required in §61.65(b)(8)(i), or equivalent is to be used to monitor on a continuous basis the emissions from these 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 vented 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).

2. The vinyl chloride monitoring system(s) used to meet these requirements is to be a device which obtains air samples 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.

3. A daily span check is to be conducted for each vinyl chloride monitoring system used. For all of the emission sources listed in paragraph (1) 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:

(a) A calibration gas mixture prepared from the gases specified in sections 5.2.1 and 5.2.3 of Test Method 106, or

(b) A calibration gas cylinder containing the appropriate concentration of vinyl chloride. If a calibration gas cylinder is used, the analysis must be traceable to the National Bureau of Standards or to a gravimetrically calibrated vinyl chloride permeation tube.

D. REPORTING

1. Semiannual Report (§61.70)

The owner or operator of any source must submit to the regional office on September 15 and March 15 of each year a written report. The first semiannual report is to be submitted following the

first full six month reporting period after the initial report is submitted. The regulations require that the report include:

(a) A record of any emissions 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). (Emissions are to be measured in accordance with §61.63.) Emissions will be averaged over a one-hour period. Excess emissions obtained through the use of a continuous monitor will not be considered a violation of the emission standard, except as provided in (b) and (c) below.

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

(1) 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 immediately after stripping is completed, 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.

(2) 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 eight 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.

(3) 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 regional office.

(4) Duplicates of samples shall be provided at the prior request of the regional office.

(5) The report is to include the vinyl chloride content found in all the samples required, 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:

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

A = 24-hour average concentration of type T_j resin, in ppm.

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

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

M = Concentration of vinyl chloride in one sample of grade G_1 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.

The standard allows an averaging time of 24 hours to allow some grades of resin which cannot be stripped to 400 ppm to be averaged with other grades of resin which can be stripped considerably lower than 400 ppm. This continuous measurement of residual vinyl chloride content is not just a reporting requirement, but a means for determining compliance with §61.64(e)(1).

(c) A record of the emissions from each reactor opening for which an emission limit is prescribed in §61.64(a)(2). For a reactor that is also used as a stripper, the determination may be made immediately following the stripping operation.

If a reactor is also used as a stripper, the resin is in the reactor when it is opened. This means that vinyl chloride in the resin which has already been stripped to acceptable levels can escape from the resin and become part of the reactor opening loss. It is the intent of the standard that once a resin has been stripped to the required levels, that additional controls are not required. Under this provision, vinyl chloride escaping from the resin after it has been stripped to acceptable levels is not counted as part of the reactor opening loss.

This measurement of reactor opening loss is to be used for determining compliance with §61.64(a)(2). The reactor opening loss is to be determined using the following equation:

$$C = \frac{W(2.60)(10^{-6})(C_b)}{V_z}$$

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.

B = Average kg of polyvinyl chloride produced per batch in the number of batches since the reactor was last opened to the atmosphere.

(d) For both reactor opening and improved stripping, it is possible that the relationship between the emissions measured and the corresponding operating procedures used to attain the emissions measured can be established as follows:

(1) For improved stripping, for example, it may be established that for a given resin grade (each resin would have to be done separately), a given set of operating conditions (temperature, residence time, and pressure) will result in a certain concentration of vinyl chloride in the resin which is below the standard.

(2) Source owners may elect to comply with the standard for reactor opening by pulling a vacuum on the reactor, purging it with nitrogen or displacing the vinyl chloride with water and/or reducing the number of reactor openings. For example, for a given resin in a given reactor type it may be established that a given procedure such as water displacement coupled with a given frequency of reactor openings will result in an emission level below the standard. As another example, for a given resin in a given reactor the owner or operator may demonstrate

that by pulling a vacuum to a specified pressure for a certain number of times and/or purging the system sufficiently will also result in emission levels below the standard.

2. Special Reports

A zero emission limit is the standard for relief valve discharges which can be prevented. In most cases, such discharges from reactors can be prevented by measures including, but not limited to, properly instrumenting the reactors to detect upset conditions, injecting chemicals to stop the polymerization reaction during upset conditions venting the reactor contents to a gasholder during upset conditions and ultimately to a recovery system, providing employees with improved training on preventing and handling upset conditions, and utilizing a stand-by source of power. For other pieces of equipment, increasing pressure due to inert gases in the system can be relieved by manual venting to a gasholder or recovery system. The conditions which lead to discharges can also be prevented in most cases by proper handling and transfer of vinyl chloride or materials containing vinyl chloride.

One of the methods listed above for preventing relief valve discharges from a reactor is manual venting of part of the reactor contents for purposes of cooling and reduction in pressure within the reactor. The contents of a reactor can be manually vented to a gasholder, another empty reactor, or other holding vessel. However, in some cases, such as during severe weather conditions, several reactors may be out of control at one time. There would be insufficient holding capacity under these conditions to manually vent the contents of all the reactors to a gasholder. Therefore, a zero emission limit applies to manual venting of gases to the atmosphere from reactors except under those emergency conditions. And even under these conditions, manual venting to the atmosphere will be permitted only when all other measures to prevent relief valve discharges have been exhausted and manual venting to the atmosphere is a last resort before the relief valve opens.

It should be pointed out that the emergency manual venting provision applies only to reactors. There is to be no manual venting of gases to the atmosphere from other equipment.

The specific regulations for relief valve discharges and manual venting are stated as follows:

(a) Relief valve discharge (applies to ethylene dichloride, vinyl chloride and polyvinyl chloride plants).

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, such as those caused by natural disasters. Within 10 days of any relief valve discharge, the owner or operator of the source from which the relief valve discharge occurs must submit to the regional office 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) Manual Vent Valve Discharge (applies to polyvinyl chloride plants)

The owner or operator of a poylvinyl chloride plant must comply with the following requirement:

Except for an emergency manual vent valve discharge, there is to be no discharge to the atmosphere from any manual vent valve of any 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 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.

Upon examination of these reports the regional office should determine the following:

(1) was the discharge unavoidable

(2) if so, were the measures taken to prevent and/or remedy it sufficient;

(3) if not should any additional action be taken.

Any avoidable discharge is a violation of the standard and can be directly enforced.

In order to determine whether a relief valve discharge or a manual vent valve discharge has occurred, the regional office upon inspection of the source should examine the operating parameters associated with the relief valve or the polyvinyl chloride reactor. Discharges are normally preceded by abnormally high temperatures and pressures in the apparatus. Venting is performed in order to relieve this pressure and to lower the temperature of the reaction.

E. RECORDKEEPING (§61.71)

The owner or operator of any vinyl chloride source must retain for a minimum of two years the following information:

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 monitoring system including the location of each measurement and the date and approximate time of each measurement. Also a statement of the cause of the leak, if known, action taken to eliminate the leak, and time it took to correct the leak.

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 cause of each leak detected the date and time of each leak and any action taken to eliminate that leak.

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

4. For the relief discharges from reactors subject to the provisions of §61.65(a), a daily operating record for each reactor, including pressures and temperatures. This information will alert the regional office as to when a discharge may have occurred.

Attachment A

REGION	TYPE	PRODUCING COMPANY	PLANT LOCATION	CAPACITY (MILLIONS KILOGRAMS/YR)
I	PVC	Borden, Inc.	Leominster, MA	800
	PVC	Great American Chemical Corp.	Fitchburg, MA	30
	PVC	Borden, Inc.	Springfield, MA	30
II	EDC	Pittsburgh Plate Glass	Guayanilla, PR	380
	VC	Pittsburgh Plate Glass	Guayanilla, PR	225
	PVC	B.F. Goodrich Co.	Pedricktown, NJ	65
	PVC	Goodyear Tire Co.	Niagara Falls, NY	45
	PVC	Jennat Corporation	Somerset, NJ	2
	PVC	Occidental Petroleum Corp.	Burlington, NJ	75
	PVC	Occidental Petroleum Corp.	Hicksville, NJ	7
	PVC	Pantasote Co.	Passaic, NJ	25
	PVC	Tenneco Chemicals, Inc.	Burlington, NJ	75
	PVC	Tenneco Chemicals, Inc.	Flemington, NJ	30
III	PVC	Diamond Shamrock Corp.	Delaware City, DL	45
	PVC	Firestone Tire Co.	Perryville, MD	105
	PVC	Firestone Tire Co.	Pottstown, PA	75
	PVC	Pantasote Co.	Point Pleasant, WV	45
	PVC	Stauffer Chemical Co.	Delaware City, DL	80
	PVC	Union Carbide Corp.	S. Charleston, WV	25
IV	EDC	B.F. Goodrich Co.	Calvert City, KY	455
	VC	B.F. Goodrich Co.	Calvert City, KY	455
	PVC	Air Products, Inc.	Calvert City, KY	60
	PVC	Air Products, Inc.	Pensacola, FL	35
	PVC	B.F. Goodrich Co.	Louisville, KY	65
	PVC	Continental Oil Co.	Aberdeen, MS	120
	PVC	Jennat Corporation	Tucker, GA	3
V	PVC	B.F. Goodrich Co.	Avon Lake, OH	120
	PVC	B.F. Goodrich Co.	Henry, IL	100
	PVC	Borden, Inc.	Illiopolis, IL	65
	PVC	Dow Chemical Co.	Midland, MI	45
	PVC	General Tire Co.	Ashtabula, OH	55
	PVC	Robintech, Inc.	Painesville, OH	115
VI	EDC	Allied Chemical Co.	Baton Rouge, LA	295
	EDC	Continental Oil Co.	Westlake, LA	455
	EDC	Diamond Shamrock Corp.	Deer Park, TX	120
	EDC	Dow Chemical Co.	Freeport, TX	590

	EDC	Dow Chemical Co.	Oyster Creek, TX	500
	EDC	Dow Chemical Co.	Plaquemine, LA	525
	EDC	Ethyl Corp.	Baton Rouge, LA	250
	EDC	Ethyl Corp.	Houston, TX	120
	EDC	Pittsburgh Plate Glass Co.	Lake Charles, LA	455
	EDC	Shell Oil Co.	Deer Park, TX	545
	EDC	Shell Oil Co.	Norco, LA	530
	EDC	Union Carbide Corp.	Texas City, TX	70
	EDC	Vulcan	Geismar, LA	110
	VC	Allied Chemical Corp.	Baton Rouge, LA	155
	VC	Continental Oil Co.	Westlake, LA	330
	VC	Dow Chemical Co.	Freeport, TX	80
	VC	Dow Chemical Co.	Oyster Creek, TX	320
	VC	Dow Chemical Co.	Plaquemine, LA	155
	VC	Ethyl Corp.	Baton Rouge, LA	120
	VC	Ethyl Corp.	Houston, TX	70
	VC	Monochem, Inc.	Geismar, LA	135
	VC	Pittsburgh Plate Glass Co.	Lake Charles, LA	135
	VC	Shell Oil Co.	Deer Park, TX	410
	VC	Shell Oil Co.	Norco, LA	320
	VC	Tenneco, Inc.	Houston, TX	115
	PVC	Borden, Inc.	Geismar, LA	To begin operation 1976
	PVC	Continental Oil Co.	Oklahoma City, OK	100
	PVC	Diamond Shamrock Corp.	Deek Park, TX	125
	PVC	Ethyl Corp.	Baton Rouge, LA	80
	PVC	Georgia-Pacific Corp.	Plaquemine, LA	100
	PVC	Goodyear Tire Co.	Plaquemine, LA	50
	PVC	Shintech, Inc.	Freeport, TX	100
	PVC	Tenneco Chemicals, Inc.	Pasadena, TX	110
	PVC	Union Carbide Corp.	Texas City, TX	135
IX	EDC	Stauffer Chemical Co.	Long Beach, CA	135
	VC	Stauffer Chemical Co.	Long Beach, CA	135
	PVC	Dennis Corporation	Torrance, CA	2
	PVC	Keystone-Century Corp.	Saugus, CA	15
	PVC	B.F. Goodrich Co.	Long Beach, CA	50
	PVC	Stauffer Chemical Co.	Long Beach, CA	70

ATTACHMENT B

ICCI DATA, SNELL DATA, AND THE CONTROL TECHNIQUES

Size**	General Fire*	Improved Stripping*	Solvent Cleaning*	Carbon Adsorption** Medium	Carbon Adsorption** Med-Large	Carbon Adsorption** Large	Solvent Adsorption** Medium	Solvent Adsorption** Med-Large	Solvent Adsorption** Large	Thermal Incineration** Medium	Thermal Incineration** Med-Large	Thermal Incineration** Large
Time Components												
Design w/ICCI				8-10wks	10-12wks	12-16wks	8-10wks	10-12wks	12-16wks	8-10wks	10-12wks	12-16wks
Design w/o ICCI				10-14wks	16-22wks	22-30wks	10-14wks	16-22wks	22-30wks	10-14wks	16-22wks	22-30wks
Bid				6-8	8-10	10-12	6-8	8-10	10-12	6-8	8-10	10-12
Contractor Selection				4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6
Equipment Delivery				20-30	20-30	20-30	30-40	30-40	30-40	40-60	40-60	40-60
Financial Capital Acquisition				4-6	4-6	4-6	6-8	6-8	6-8	6-8	6-8	6-8
Total Compliance time from design through installation	18-24mos	24mos	18-30mos	30mos	42-62wks	46-74wks	50-90wks	52-72wks	56-84wks	60-100wks	62-92wks	66-104wks	70-120wks
					10-14mos	11-17mos	12-21mos	12-17mos	13-19mos	14-23mos	14-21mos	15-24mos	16-28mos

*E.D. Snell Report

**ICCI

***The distribution of PVC Company sizes by sales and net incomes is given by "Fortune 500".

Rank	SALES # of Comp.	SALES % of Ind.	NET INCOME # of Comp.	NET INCOME % of Ind.
1-100 largest	14	47	11	47
101-200 largest	3	10	9	30
201-300 largest	3	10	3	10
301-400 largest	2	7	--	--
401-500 largest	1	3	--	--
over	7	23	7	23
TOTALS	30	100	30	100

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