

## PVC AT PAINESVILLE

### A. Compliance Efforts to Date

In 1965 new Federal legislation was enacted which made many new requirements of industry. As a result, we were required to install water pollution control equipment and to begin planning for air pollution control equipment. Soon afterward the OSHA Act of 1970 required that we survey and begin to upgrade to new federal standards all aspects of the workplace. By the end of 1973 we were operating a primary water waste treatment plant, had made estimates for several alternative schemes for compliance with boiler emission regulations, had conducted a detailed plant survey for compliance with the OSHA Act of 1970 and had made considerable progress toward correcting the deficiencies determined by this survey.

In January 1974 the vinyl chloride problem gave a new set of concerns which we had to add to a continued effort to satisfy those items mentioned previously. We quickly became expert in the terminology and equipment for monitoring levels of VC in our work areas and in the breathing zone of each of our employees. Preliminary equipment and process modifications were made and protective equipment ordered to reduce employee exposure. An educational program was begun to convince our employees that precautions were necessary for protection against both VC monomer and PVC dust. We attempted to gain a rational perspective in the discussions involving NIOSH, OSHA and our own people regarding the true nature of the hazards of these materials. The OSHA hearings provided very little additional insight into the technical nature of the problem. We tried, at this point, to guess where the permanent standard would be set and made engineering studies on what we would do to bring the plant into compliance. It was quickly apparent that major capital expenditures would be necessary.

At this point, we decided we must conduct our compliance program on two levels. First, we should do those things which could be done within the scope of the plant technical, production and engineering departments capabilities to reduce high exposures in the quickest way possible. The other level is full compliance to the standard, which requires considerable capital commitment and, therefore, should be treated as a long range rather than short range consideration.

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Table A lists those major items which we have completed to date which are a significant contributor to reducing employee exposure to VCM in the Painesville Plant. The approach was to make an estimate of the intent of the regulation and then determine how we could most effectively comply with that intent. It was necessary to determine for ourselves the best estimate of intent since conflicting and often changing interpretations of VC regulations were all we had to go by. At all times our primary objective has been to reduce direct employee exposure. Where we could not reduce the exposure sufficiently by engineering controls, the use of respirators was required for certain operations. As funds became available from UNIROVAL with the improving economic picture in 1975, we obtained various allocations to make operational changes. The effectiveness of the program is reflected by the reduction in the average building levels from something greater than 20 ppm in early 1974 to less than 10 ppm today. (See Table E). The average building level on a weekly basis covers many excursions to a much higher level during that period of 168 hours. The week of 4/20/75, for instance, showed a peak of 50 ppm in Bldg. 107 and a peak of 39 ppm in Bldg. 117. At present a mask is required anytime there is an exposure greater than 25 ppm of VC. On April 1, 1976, a mask must be worn anytime exposure is greater than 5 ppm. Most of our employees would be wearing a mask the majority of their workday after April 1, 1976.

A major blow was the OSHA inspection of May 5, 6, & 7, 1975. The citation issued as a result of this inspection indicated that it was the expectation of OSHA that full compliance with the regulations should have been achieved by April 1, 1975. Conversations with the area director indicated that the changes made to that point and the engineering planning for compliance by April 1, 1976 were only mitigating circumstances in considering the penalty for not being in compliance as of April 1, 1975.

Not included in the engineering and operational approaches were the studies made of the current state of each employee's health. These studies, which found no health effect directly traceable to VC or PVC exposure, nevertheless produced traumatic experiences for many people as various other health problems were uncovered by the detailed studies made. We conducted a program for educating the employee and the employee's family as to the reported hazards, the intent of our compliance projects and the significance of the various reports that were producing local headlines.

In summary, we attempted every step of the way to October 1, 1975 to provide for the health, well-being and employment of all of our plant employees as best we could with available resources. We feel that this short term program was successful in light of the many problems. The long term program to maintain a viable operation for the future is a separate subject.

#### B. Long Range Projects

While fixing leaks, installing exhaust systems at key areas and providing air breathing respirators attack the random high exposure levels, significant reductions to a consistent low level in operating areas require major changes to our facilities. A list of these major projects is included as Table B. Briefly, the major areas are reduction in the frequency of opening vessels, stripping of the slurry before it leaves the process areas, highly sophisticated monitoring systems, greatly increased ventilation, and major expenditures to reduce losses of VCM to ambient air.

With the exception of a minor benefit from reductions in VC losses, none of these installations will contribute anything to operating effectiveness or production economies. In fact, we must anticipate productivity losses from these installations as well as major increases in energy related and maintenance related operating costs. We have employed the resources of UNIROYAL engineering personnel at all levels as well as several outside engineering firms in estimating the facilities required for compliance. To the extent possible, we have participated in information exchange within the PVC industry. The answers available through this last source indicate that there are no easy, cheap solutions. They confirm that effective answers can be had only by major capital expenditures.

#### C. Capital Not Related to VC

Many capital projects are estimated for the foreseeable future which are either indirectly related to VC or unrelated to VC usage in this plant. These are shown in Table C.

The additional steam requirements for operation of the equipment required for compliance to OSHA and EPA regulations for VC will necessitate the addition of a third coal fired boiler. This is above and beyond the operation of the two coal fired and one oil fired boiler presently in use. This, in turn, will require better coal handling facilities for the increased volume of coal.

Our insurance carrier has proposed numerous changes which must be made to the PVC plants in order to obtain future coverage. These changes will provide no operating economies:

Much of the glass lined equipment in the Area 1 plant is near the end of its useful life. If we are to continue that operation, this equipment must be replaced within the next 5-7 years.

D. Summary

1. Prior to October 1, 1975, the Painesville plant had spent about \$1.1 million in capital and operating expense specifically for compliance with the VC standard. (Sum of "to date" columns from Table A and Table B.)
2. Additional capital of \$3.2 million is estimated for OSHA compliance along with \$3.1 million for EPA compliance. These are minimum figures since the results from the changes can only be estimated. These changes will add at least \$2.1 million to the annual operating cost of PVC manufacturing. (These sums are from the appropriate columns of Tables A & B.)
3. If a commitment is made to bring the plant into compliance and continue to make PVC, an additional increment of \$6.0 million will be needed to sustain this operation. Within about 5 years, major process equipment must be replaced at a cost of nearly \$15.0 million.
4. The estimate of capital needs for the Painesville plant, if PVC manufacturing continues, is \$12.3 million for compliance with known requirements and an additional \$15.0 million for equipment replacement.
5. Postponing any of the above will only add to the cost of doing it since costs will continue to rise.
6. An estimate was made that a new plant to replace the Area 1 plant could be built for \$35-40 million.
7. In view of these estimates as well as the demand for capital money for other commodities, it was decided to tentatively announce the shutdown of the PVC plant. It is our conclusion that had the OSHA permanent standard been set at a maximum of 10 ppm rather than 1 ppm we might have provided the necessary plant changes to continue operation. However, with the evaluations that have since been made regarding alternative uses of available capital, we conclude that even a 10 ppm maximum does not now present a viable condition for UNIROYAL to continue the manufacture of PVC resins.

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**TABLE A**  
**STATUS OF PROJECTS AND ACTIVITIES AS OF OCTOBER, 1975**

| <u>PROJECT<br/>NUMBER</u> | <u>DESCRIPTION</u>                             | <u>EXPENDED<br/>TO DATE \$M</u> |                | <u>ADDITIONAL<br/>REQUIRED \$M</u> |                    |
|---------------------------|------------------------------------------------|---------------------------------|----------------|------------------------------------|--------------------|
|                           |                                                | <u>CAPITAL</u>                  | <u>EXPENSE</u> | <u>CAPITAL</u>                     | <u>ANNUAL EXPI</u> |
| A-1                       | Respirators, Air Purification & Distribution   | -                               | 52.3           | -                                  | 26.4               |
| -2                        | Leak Detection and Leak Correction             | 22.0                            | 61.4           | -                                  | 91.0               |
| -3                        | Personnel Monitoring and Record Keeping        | -                               | 56.3           | -                                  | 75.0               |
| -4                        | Monitoring and Warning Systems for 107,117,414 | -                               | 23.5           | -                                  | -                  |
| -5                        | Operator Enclosure, Bldg. 414 (AR-5222)        | 15.9                            | -              | -                                  | -                  |
| -6                        | Exhaust System for 3 Screeners (AR-5339)       | 11.6                            | -              | -                                  | -                  |
| -7                        | Exhaust System for W M Centrifuge & Hopper     | 7.2                             | -              | -                                  | -                  |
| -8                        | Extend A-1 Air Compressor Intake Stack         | -                               | 5.8            | -                                  | -                  |
| -9                        | VC Medical Testing                             | -                               | 22.1           | -                                  | 20.5               |
| -10                       | Breathable Air Compressor (AR-5317)            | 31.1                            | -              | 93.7                               | -                  |
| -11                       | Portable Reactor Evacuation (AR-5343)          | 3.8                             | 18.8           | -                                  | -                  |
| -12                       | Remove Bldg. Siding - Ventilation Improvement  | -                               | 29.5           | -                                  | 14.7               |
| -13                       | Revisions to Seals-VCH Compressors 414         | -                               | 37.3           | -                                  | -                  |
| -14                       | Reactor Modifications 107 & 117                | -                               | 33.3           | -                                  | -                  |
|                           |                                                | <u>91.6</u>                     | <u>340.3</u>   | <u>93.7</u>                        | <u>227.6</u>       |
|                           |                                                | 431.9                           |                |                                    |                    |

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**TABLE B**  
**MAJOR PROJECTS UNDERWAY OR PLANNED**

| <u>PROJECT<br/>NUMBER</u> | <u>DESCRIPTION</u>                            | <u>CAPITAL \$M<br/>TO DATE</u> | <u>CAPITAL \$M<br/>ADDITIONAL</u> | <u>ANNUAL<br/>OPER. EXPENS</u> |
|---------------------------|-----------------------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| B-1                       | Solvent Cleaning of Reactors (AR-5195)        | 604.5                          | 560.0                             | 45.0                           |
| -2                        | Ventilation of Bldg. 414 (AR-5319)            | 24.9                           | 175.0                             | 140.0                          |
| -3                        | Recovery Compressor Seal Improvements (A-1)   | -                              | 88.0                              | -                              |
| -4                        | Ventilation of Bldgs. 107, 117, 108           | -                              | 848.0                             | 206.0                          |
| -5                        | Tank for H1-Boiler Disposal                   | -                              | 7.0                               | 13.2                           |
|                           | Compliance Program OSHA (AR-P-5357)           | -                              | -                                 | -                              |
| -6                        | Item 1 Experimental Stripper                  | 11.5                           | -                                 | -                              |
| -7                        | Item 2 Ventilation of 107 & 117 Control Rooms | 5.4                            | -                                 | -                              |
| -8                        | Item 3 Ventilation at Bagging Stations        | -                              | 45.0                              | -                              |
| -9                        | Item 4 Replace Recovered Monomer Pump         | -                              | 1.2                               | -                              |
| -10                       | Item 5 Fetterolf Valves for 414 Reactors      | 4.2                            | 50.2                              | -                              |
| -11                       | Item 6 Reactor Evacuation                     | 25.0                           | 157.0                             | -                              |
| -12                       | Item 7 Transfer Piping - 414                  | -                              | 100.0                             | -                              |
| -13                       | Item 8 Better Breathing Air                   | -                              | 685.0                             | -                              |
| -14                       | Item 9 Additional Area Monitoring             | 7.1                            | 127.9                             | -                              |
| -15                       | Canister Program for 5-25 ppm Range           | -                              | -                                 | 210.0                          |
| -16                       | Purge VC Unloading Lines                      | -                              | 66.0                              | -                              |
| -17                       | Control VC Release @ Unit Operations          | -                              | 74.0                              | -                              |
| -18                       | Paracrill OZO Finishing Ventilation           | -                              | 80.0                              | -                              |
| -19                       | Warehouse Ventilation                         | -                              | 63.0                              | 80.0                           |
| -20                       | PVC Slurry Stripping                          | -                              | 1245.0                            | 784.0                          |
| -21                       | Gas Holder and Collection Systems (2)         | -                              | 1200.0                            | -                              |
| -22                       | Stripping of Water from Process Area          | -                              | 200.0                             | 200.0                          |
| -23                       | Auxiliary Power for Process Area              | -                              | 167.0                             | -                              |
| -24                       | High Pressure Alarms for Pressure Vessels     | -                              | 119.0                             | -                              |
| -25                       | Activated Carbon for all Vents                | -                              | 100.0                             | 150.0                          |
| -26                       | Required Sampling Program                     | -                              | 15.0                              | 55.0                           |
|                           |                                               | <hr/>                          | <hr/>                             | <hr/>                          |
|                           |                                               | 682.6                          | 6173.3                            | 1883.2                         |

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**TABLE C**  
**ADDITIONAL CAPITAL FOR FUTURE OPERATIONS**  
**NOT DIRECTLY RELATED TO VC**

| <b><u>PROJECT<br/>NUMBER</u></b> | <b><u>DESCRIPTION</u></b>                       | <b><u>CAPITAL<br/>\$M</u></b> |
|----------------------------------|-------------------------------------------------|-------------------------------|
| C-1                              | Remove Particulate, Boiler 2 (w/PVC Operation)  | 495.0                         |
| -2                               | Install 3rd Coal Fired Boiler (w/PVC Operation) | 1500.0                        |
| -3                               | Upgrade Coal Handling Facilities                | 480.0                         |
| -4                               | Insurance Requirements for PVC Plants           | 3500.0                        |
| -5                               | Replace A-1 Poly Area (5 Year Project)          | 15000.0                       |
| -6                               | Secondary Water Waste Treatment                 | ?                             |
| -7                               | Tertiary Water Waste Treatment (by 1983)        | ?                             |
|                                  |                                                 | <hr/>                         |
|                                  |                                                 | 20975.0+                      |

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**TABLE D**  
**SUMMARY OF FUTURE NEEDS**

| <b><u>ITEMS</u></b> | <b><u>DESCRIPTION</u></b> | <b><u>CAPITAL NEEDED</u></b><br><b><u>\$M</u></b> | <b><u>ANNUAL OPERATING</u></b><br><b><u>COSTS, \$M</u></b> |
|---------------------|---------------------------|---------------------------------------------------|------------------------------------------------------------|
| 1.                  | Projects from Table A     | 93.7                                              | 227.6                                                      |
| 2.                  | Projects from Table B     | 6,173.3                                           | 1,883.2                                                    |
| 3.                  | Projects from Table C     | 20,975.0                                          |                                                            |
|                     |                           | <u>27,242.0</u>                                   | <u>2,110.8</u>                                             |

**TABLE E**  
**AVERAGE WEEKLY VCM LEVELS**

| <b><u>WEEK BEGINNING 5-5-74</u></b> |    | <b><u>4-20-75</u></b> | <b><u>10-19-75</u></b> |
|-------------------------------------|----|-----------------------|------------------------|
| <b><u>BLDG.</u></b>                 |    |                       |                        |
| 107 PROCESS                         | 22 | 12                    | 7                      |
| 117 PROCESS                         | 18 | 14                    | 7                      |
| 108 FINISHING                       | 14 | 12                    | 7                      |
| 414 PROCESS                         | 22 | 10                    | 8                      |
| 415 FINISHING                       | 14 | 9                     | 7                      |

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