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MEETING REPORT

Part 1: Vinyl Chloride Review Study

I. Purpose

The purpose of the meeting was to discuss the review study being conducted by TRW with emphasis on input to the following four areas of concern:

- Existing and new air pollution control technologies.
- Existing sources identified during the original study but not regulated by the standard.
- Potential new sources of vinyl chloride emissions.
- Enforcement experience with the vinyl chloride NESHAP.

Several other subjects were discussed as indicated by the attached agenda.

II. Place and Date

U.S. Environmental Protection Agency
Region V
Air Enforcement Branch
Federal Building
230 S. Dearborn Street
Chicago, Ill. 60604
August 19, 1980

III. Attendees

Bruce Varner - EPA

Jim Bodamer - TRW
Marge Cassidy - TRW

IV. Discussion

There are seven vinyl chloride sources in Region V. Five of these sources are polyvinyl chloride (PVC) plants, one of which produces copolymer only and another produces a combination of copolymer and homopolymer. The other three plants only produce homopolymer. The other two sources are PVC R & D facilities with reactor capacities greater than 50 gallons and less than 1,100 gallons. They are only subject to the sections named in 40 CFR Section 61.60(c). Following is a brief description of each source:

- Dow Chemical operates a copolymer plant in Midland, Michigan.

  Dow batch strips the copolymer slurry in the reactor.

  Region V approved a combined resin residual-reactor opening loss standard for the Dow plant. The approved methods insure that the sum of resin residual and reactor opening emissions do not exceed the sum of the resin residual standard (400 ppm for suspension resin and 2,000 ppm for dispersion resin) and the 20 ppm reactor opening standard, and that the resin residual standard is not exceeded. Dow has demonstrated the capability to strip their copolymer suspension resin to 100 ppm RVCM and their copolymer dispersion resin to 1,200 ppm RVCM.

- B. F. Goodrich operates two PVC plants in Region V, one in Henry, Illinois and the other in Avon Lake, Ohio. The Henry and Avon Lake plants operate suspension and dispersion process lines for production of homopolymer. Avon Lake also produces latex by the dispersion process. The suspension slurry is continuously stripped. This stripping technology developed by B. F. Goodrich operates at high temperatures (180-190°F) and short residence times. Some suspension and all dispersion resin grades cannot be continuously stripped because of their thermal instability. This has been a concern of many sources - the VC NESHAP only requires an RVCM level for the type of resin (i.e., suspension, dispersion and other), not the various individual grades.

For dispersion resins and those grades of suspension resin thermally unstable, B. F. Goodrich uses two methods of batch stripping to remove RVCM. Stripping can be done in the reactor where the polymerization reaction took place, or the slurry can be transferred to a blowdown tank for steam sparging. Stripping in the reactor only occurs at the Henry plant dispersion line. B. F. Goodrich developed "steam-sweeping" technology for attaining the reactor-opening standard when stripping does not occur in the reactor.

The advantage to these two control techniques for reactor-opening loss is that very little water is used, eliminating the need for a large wastewater stripper.

- Borden Chemical Company operates a PVC plant in Illiopolis, Illinois. The plant has an old and a new suspension homopolymer line with continuous stripping technology, and an old dispersion and an old suspension copolymer line with batch stripping technology. Borden utilizes "steam piston" technology for control of reactor opening emissions.

This technique, as well as steam sweep, are considered to be as effective as water piston for reducing reactor-opening loss emissions. Borden has had some difficulty in attaining the 400 ppm residual VCM (RVCM) level for their suspension copolymer and currently reaches this level by taking a daily time-weighted average which includes suspension homopolymer production.

- General Tire & Rubber (GTR Chemical) operates an older PVC suspension homopolymer plant in Ashtabula, Ohio. Batch stripping is done external to the reactor and the plant just meets the resin residual standard. This plant was used as a model during the original standard support study to develop the reactor-opening standard. The plant uses the "water piston" method to purge the reactor prior to opening. The reactor is hydraulically filled with water, a vacuum is pulled off the top, and vapors in the head space are exhausted to the recovery system while the water goes to a wastewater stripper. The problem with this method is the large amount of wastewater generated. The plant has experienced leakage of VCM through valves back into the reactor prior to opening, but this is not inherent to water piston. This suspension plant may not have been a representative model on which to base the standard, because several batches of suspension resin can be produced between openings, while dispersion resin plants must open each reactor after every batch.

- B. F. Goodrich operates a PVC R & D facility at the Avon Lake Technical Center that is adjacent to the Avon Lake plant. Diamond Shamrock operates a PVC R & D facility at the T. R. Evans Research Center in Concord, Ohio. These facilities are not subject to the resin residual and reactor opening standards.

Control Technology for Exhaust Gases

Three of the five PVC plants in Region V have parallel back-up emission control systems that operate only when the primary control is inoperative. There are no secondary or in-series control techniques being used. No carbon adsorption units are currently operating in Region V.

At Henry and at Avon Lake, B. F. Goodrich uses its own solvent absorption technology for primary control of exhaust gases, backed up by a Brule' incinerator. The incinerator and stack are lined with a ceramic material that allows the unit to reach 1600°F within a couple of hours. A large surge tank is used to hold the exhaust gases until the incinerator comes up to temperature. Since the incinerator operates less than five percent of the time, no scrubber is used for control of HCl. Exhaust gas from the Avon Lake Technical Center is controlled by the absorber and incinerator at the Avon Lake plant.

Dow, Borden, Diamond Shamrock, and General Tire all use incineration as their primary emission control. Dow experimented with a catalytic oxidation unit, but had problems caused by a lack of surge capacity. The batch polymerization process causes uneven flow of vinyl choride to the incinerator, which results in temperature variations that sintered, or glazed, the catalyst. The current primary control is an oil and natural gas fired thermal incinerator. Dow has installed a surge tank to get uniform flows, and to avoid bypassing the incinerator when it is inoperative and thereby violating the exhaust gas standard. Dow plans to again attempt to operate the catalytic oxidation unit. If they are successful, they plan to use it as primary control, backed up by the thermal incinerator, since catalytic oxidation requires only 1/3 as much energy. Borden and Diamond Shamrock have no back-up control system and General Tire uses a boiler for back-up control.

Enforcement Experience

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The following specific enforcment problems were discussed:

1. Emergency relief valve discharges.

Discharges from relief valves represent the most significant enforcement problem. There needs to be a better definition of when an emergency release is preventable.

B. F. Goodrich put in pressurized containment (not a gasholder) which is capable of containing one reactor's emergency release. The gas is contained at greater than atmospheric pressure but less than the PVC reactor pressure. Containment lowers the probability of release but does not eliminate the possibility, since it depends on mechanical or pneumatic activation.

Region V has looked carefully at all known external controls to prevent the run-away polymerization reaction and has discerned no pattern. For some discharges, they could not pinpoint a specific reason. These facts suggest that something may exist in the process chemistry which makes certain reactions more vulnerable to the run-away reaction resulting in an emergency discharge.

A common cause of emergency releases is overcharging the reactor. There is apparently no reliable instrumentation that can be used for level indication. Dual metering of vinyl chloride and water can help prevent overcharging.

Additional suggestions for control of these releases include:

- Documentation of the calculated discharge magnitude, not just a description of the method of calculation, should be required.

- Clarification that the emergency release standard applies to rupture disc discharges also is needed. Under current wording of the regulation, if a rupture disc, not in combination with a relief valve, ruptures and discharges, there is no reporting requirement.

2. Reactor opening standard. There needs to be a separate standard for reactors that are also being used for resin stripping. There is no provision in the standard for measuring and/or calculating the emissions from a reactor opening when the slurry is sitting in the reactor. This problem has been resolved on a case-by-case basis in each Region.

3. Reactor opening records. The records of all reactor openings should be maintained for a minimum of two years. The standard does not specify any time limit. This was an oversight during development of the standard.

4. Daily wastewater sampling. Daily sampling of the inprocess wastewater following stripping should be required to ensure proper stripper operation and maintenance. The standard only

requires an initial sampling and analysis of the wastewater to show compliance. Once compliance is demonstrated, no further sampling is required. Borden currently gives a weekly summary of their wastewater analysis voluntarily. It is important to require more sampling due to the large amounts of water being used (e.g., water piston method of reactor purge). In the development of the vinyl chloride regulations, wastewater was not considered to be a major source. However, compliance with the regulations has drastically increased the quantity of inprocess wastewater discharged from many plants.

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5. Semi-annual reporting. The semi-annual reporting requirement delays any enforcement action that may be taken. If there were more reporting of fewer data, enforcement would be easier and data more reliable. The minimum frequency should be quarterly. Also, there is no way to tell how effectively exhaust gas controls are operating since only emission levels greater than 10 ppm are reported, but the levels may be much less than this most of the time.

6. Testing methods. There is no performance specification for exhaust gas continuous emission monitors. Only an actual stack test shows how reliably the continuous monitor is operating.

7. Alternative continuous monitoring. There are no provisions in the standard for alternative continuous monitoring requirements, although alternatives (e.g. incinerator operating parameters) seem justified for back-up exhaust gas controls.

Other Suggestions and Concerns

The following other suggestions and concerns were discussed:

- For those PVC plants that have come into compliance with the VC NESHAP, the current major sources of emissions from these plants are fugitive emissions and process units following the stripper (e.g., 20 to 40 times as much VCM allowed to escape as compared to reactor opening losses and the 10 ppm level in exhaust gases). This calculation is from a PSD BACT analysis done by Region V, and is based on information in the standards support document.

- Borden Chemical is under the impression that RVCM losses from the drier are equivalent to the 10 ppm standard for exhaust gases, and OAQPS had an ambient level in mind when they chose the 10 ppm standard. This point needs clarification.

- Transportation of VCM for PVC production is mainly by railcar in Region V. Railroad strikes have occurred and sources may need emergency storage of VCM for stock-piling purposes at sites other than the PVC plant. Should there be some provision for including such storage sites under the standard?

- Diamond Shamrock used to operate a VCM R & D facility at Concord, Ohio which was subject to all sections of the standard. Is there a need to exempt EDC and VCM R & D facilities from certain sections, as was done with PVC R & D facilities?