

MINUTES

VINYL CHLORIDE SAFETY ASSOCIATION MEETING

Boston, Massachusetts

May 15-16, 1975

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EPA Discussion of Proposed Standard W. W. Madden - Firestone

The new EPA proposed standard allows for a fugitive emission of 10 ppm max. in vent streams. Stripped suspension slurry must have a concentration no greater than 400 ppm max. The specification for dispersion resin is to be changed from 400 ppm max. in slurry to 2000 ppm. EPA stated we cannot use dilution techniques to obtain the goals. Water from plants would have maximum RVCM levels, but the centrifuge water streams would be excluded from this regulation.

No one has successfully demonstrated the VCM removal from dilute streams using the carbon absorption techniques, chemical reaction, or incineration methods. However, Tenneco described a system where the nitrogen-padded blend tank vents and the concentrated recovery vents are purged through a carbon absorber.

General Tire is planning to investigate the burning of 300-400 pounds per day of VCM in their conventional boilers. One of the problems would be the generation of HCl and a possible replacement of the stacks.

The German EPA standard has been suggested as 0.3 milligrams per cubic meter (0.12 ppm) at the fence line for 99% of the year. Wacker said they cannot live with this standard. The U.K. proposed standards are as follows. For purging of reactors, etc., 0.1% of productivity, recovery vents 0.4% of production, and dryers 0.1% of the production of the plant. They are currently installing higher stacks to disperse the VCl over larger areas and they have approximately two to three years for compliance. The Ontario, Canada proposed EPA standard is as follows. 0.1 ppm at the boundary line and/or 0.2 ppm for any 15-minute period.

Variances to the OSHA Standard R. L. Toole - B. F. Goodrich

Variances to the OSHA standard were discussed by Bob Toole representing B. F. Goodrich. We briefly reviewed what experience Goodrich had meeting with OSHA on the 13th of the month and obtaining agreement on the use of a half-mask respirator to be used with either a cannister or supplied air system. It was indicated that OSHA was in agreement with the concept and that they would handle it as a clarification rather than as a legal variance. Ray McClure, the Chief of OSHA Compliance Office, indicated he would issue a letter to all the directors indicating this agreement. Under this proposal Goodrich would equip employees with half-face respirators. Those employees requesting protection under 25 ppm would use approved cannisters. When the concentration increased to 10 ppm, they would switch to an air line source. It was indicated that this approach would

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preserve both options even though in the long term it may be desirable to rely almost exclusively on supplied air mode.

A pertinent comment made by OSHA during the Goodrich variance discussion was that industry in general had overreacted to the standard. They further indicated that they would be inclined to look favorably on any variation request that had a strong technical background, even if the recommended change had not been approved by NIOSH.

Nine companies reported that people have requested masks to use. However, less than 1% of all the workers requested masks for their personal protection during the first year of the new standard.

J. R. Mudd of General Tire has adopted air supplied respirators as the standard method of operation in his plant. All employees must wear this as a condition of employment. In their polymerization plant, the control room is not regulated; therefore, mask wearing is not required and the worker spends 5 of 8 hours generally in this area. If below 5 ppm or the task takes less than 10 minutes, he is not required to wear respiratory protection.

Ten companies report that their employees carry their masks with them at all times. Stauffer reported that they received a temporary variance on continuous alarm systems since their equipment would not be installed by April 1st. In the meantime all employees must have Type C air mask respirators to use during that time. In addition, Keysor-Century Chemical has applied to be granted relief under the same variance.

Dow has requested a variance on labeling of products less than one part RVCM. They were told to submit this as a request for an exemption, rather than a variance.

Breathing Air

J. R. Mudd - General Tire

Joe Mudd reported that originally they were using bottle air to supply masks for poly cleaning. The cleaners complained of dehydration of face and throat and they have since gone to water compressors for air supply and have installed four small Nash water-sealed compressors supplying 70 SCFM each, using 30 horsepower motors. Supply pressure is 60 psig and the system will support a maximum of 50 people. However, normally only one compressor is required to handle the load. The Dew Point is maintained at about +21°F. They have been unable to find in the literature what a desirable Dew Point is for breathing air. They made reference to an AEC device for humidifying air used at Los Alamos. Further information was not available at this meeting.

In the winter time the air was too cold and water would condense out in the carbon steel lines. To eliminate some of these problems they have installed a Selas unit which consists of a ceramic entrainment separator followed by a carbon bed. The carbon bed was roughly described as an 8" diameter and 3' in height and is generally replaced after six months of use. In addition the carbon steel lines have been traced to prevent condensation in cold areas and to

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reduce the complaints from mask wearers concerning cold air. The plant oiler goes on a routine cycle and drains moisture from several traps placed at convenient spots in the line.

The air intake for the General system is in the warehouse. The ambient VCM level for an 8-hour average over a 6-month period of data is 0.1 ppm. During this same period of time, the high observed value is 0.18 ppm (on an eight-hour average basis). Each person is expected to clean their own mask and general supervision follows this up with periodic inspections. Pantasote received a citation because the Compliance Officer thought there was not sufficient follow-up by management in mask cleaning.

Monomer Reduction

A. Godfried - Borden Chemical

Borden started out at a high ambient level of 200 to 300 ppm and were able to reduce this to 75 to 100 ppm by making numerous changes through work practices. In addition they enclosed their recovery area so that the air flow was from the polymerization area into the recovery area and then outside the building. Using this method they were able to reduce the ambient vinyl chloride content to about 10 ppm in the polymerization area. That 10 ppm level made the system air limited due to recycle of exhaust air, and they had to supply a remote outside air source for ventilation for the recovery area. This now allowed them to go to a 5 ppm level in the general polymerization building. An operator must wear a mask each time he enters the recovery area. Before these changes were initiated, they normally had a 12 change-per-hour ventilation system. Seventeen companies reported air changes in this general range, while one company reported 28 changes per hour for normal operation and 39 changes per hour for emergency conditions.

In the warehouse area Borden previously had 200 to 600 ppm and this has been reduced to a 2-5 ppm by the addition of ventilation. One company reported the installation of double mechanical seals on a Nash pump compressor. Nash now has a standard VCM design utilizing double mechanical seals with a barrier fluid between the two seals.

Short-Term Shutdown

R. Asti - Stauffer Chemical

During the last few months Stauffer has not had to operate their three polymerization units to maximum capacity. Therefore, they have elected to operate with two crews and run two units at full capacity. These two crews then alternate and will run the third unit when required. Each time the units are started up and shut down, a higher incidence of ambient VCM levels occur due to improperly torqued manheads, flanges, and especially bonnets on plug cock valves. Therefore, they have adopted the use of torque wrenches to reduce the incidence of this problem.

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Norsk Hydro Update
R. Kogstad - Norsk Hydro

Norsk Hydro currently has a capacity of 75,000 metric tons per year and to this they are adding 300,000 metric tons per year. From October 23, 1974 until February 22, 1975 the plant was shut down to do some modification to protect the workers from VC1 exposure. The value of this lost production during this time was \$12 million. These modifications during the shutdown period covered extensive changes to 10 of 24 reactors (approximately 40% of capacity). They are now able to operate by Bendix total hydrocarbon analyzer data in approximately the 1 ppm AVCM area. The mean of 90% of the personnel monitoring tests was 1 ppm. But the mean for all tests was 3 ppm.

The modifications made during the shutdown period were as follows:

- a. All drain systems were closed up.
- b. High pressure water cleaning systems were provided (BFG HRC unit).
- c. An evacuation system was provided for reactor ventilation.
- d. This same evacuation system was tied into filters and silos.
- e. The recovery system was improved.
- f. Necessary analytical equipment was purchased.
- g. Higher capacity ventilation systems were provided.
- h. A deluge system was added to the polymerization area. This will provide for 10 millimeters per minute maximum flow.
- i. Personnel monitoring equipment was purchased and provided. A half-face mask with cannisters was the primary protection and air masks are used for stand-by operations.

They expect to complete the modification for the balance of their 24 reactors by late summer. To date, Norway has one case of angiosarcoma, but it is felt that there are factors other than vinyl chloride involved in this case. Norway has made several studies concerning chromosome damage and the toxicity of vinyl chloride generally, and these papers were obtained at the meeting and will be circulated separately. These studies were run by governmental agencies, but the cost was borne by Norsk Hydro.

Norsk Hydro is using a 12-point Bendix system connected to a computer. They are using a Sippin pump with carbon tubes for personnel monitoring.

Several companies have reported to have people quit who were afraid of angiosarcoma. This was especially true at Hooker. In Sweden the girls in the lab are afraid of becoming pregnant because they fear the threat of vinyl chloride birth defects. Union Carbide has adopted a rule that no women of child-bearing age can work in areas that are exposed to vinyl chloride monomer.

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Norsk Hydro will guarantee the VCM content of resin below 20 ppm. However, they have one resin which they can manufacture below 5 ppm.

In Sweden the ambient levels before correction were in the range of 20-40 ppm in the polymerization areas. A number of modifications were made to reduce these levels. Water drains from the recovery system were piped outside, all compressors were put in rooms or additional spot ventilation added, 12 meter high stacks were installed, ventilation was provided to a level of 9-10 air changes per hour, and recovery of monomer from each batch was made in the poly rather than transferring to stripping areas. (Previously, the line became clogged and required frequent openings and, thus, higher AVCM levels.)

In 1974 the total cost of these modifications were approximately \$200,000. They have two suspension polymerization lines at about 25,000 metric tons per year and one emulsion polymerization line at 15,000-20,000 tons per year. The estimated expenditure in 1975 was \$2,000,000 to modify all three of these lines. Included in this modification will be the addition of a gas holder and more recovery capacity outside the polymerization building. They have now reduced the ambient VCI level in the building to about 2-3 ppm level. For the first quarter of 1975 the average of all personnel monitoring samples was about 1.5 ppm in both the new and the old plants. Sweden reports data to their OSHA agency on a quarterly basis. They monitor one to two people each day for at least a six-hour period of time. This monitoring is done by a pump and a bag to collect the sample. The bag is then sent to the lab where it is analyzed quickly. They felt that immediate analysis was critical to determine the cause of high exposures.

New Plant Construction and Start-Up E. T. Biehl - Atlantic Tubing & Rubber

Atlantic Tubing is rebuilding their plant containing small polymerizers on 80 acres of ground in New Bedford, Massachusetts. Their biggest problem has been one of satisfying the insurance company who insists on 250 feet separation between all operation and 250 feet separation between the building and the property line. They have installed a 0.25 gallon/minute/sq. ft. deluge system with a back-up of 1.2 million gallons of water supply. They have two sources of water. They plan to use a shortstop system with emergency power. Their building is extensively grounded, and they are installing lightning protection. They will have a 30-40 ft. mast located on the top of the building on each corner with connecting antenna wires between masts. This whole system is then grounded to a buried grid system located in each corner of the building. Several other companies indicated that they have installed grid grounding systems around equipment. Goodyear, for example, have installed a grounding system around some of their polymerization equipment. Numerous people mentioned they installed lightning rods on gas holders.

Ed went on to say that he plans to have two sources for electric power and will eliminate all day tanks. The construction of the building was chosen to be reinforced concrete over the alternative of 4-hour fireproof steel. The ventilation system in the building is from the top to the bottom and normally will be 12 changes per hour. At 20% of the lower explosive limit, it will change to 25 changes per hour.

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The plant is located close to Polaroid Company (one mile away) and they plan to do a study of environmental concentrations before and after start-up. The Clayton Consulting Company will do this study. They do not plan to hire women because of the fear of vinyl chloride causing birth defects. Current timing appears for 1/1/76 start-up.

Bob Babbitt outlined the start-up operations at the new Georgia-Pacific (Wacker licensed technology) PVC plant. This plant was started up in February, 1975. It is located in Plaquemine, Louisiana and has no walls or roof. It was started up with approximately 18% of their people having previous operating experience with vinyl chloride handling. The plant is computer controlled and consists of large reactors. Before start-up three changes were made to live within current OSHA standards. All welds were ultrasonically tested, breathing air stations were installed, and some ventilation changes were made. Prior to start-up, the plant was run for a significant time on water to simulate actual operating conditions and to permit confirmation of process logic.

Even though the people were trained, they had a general reluctance to start up. In fact, several quit before actual start-up became a reality. Finally, several people with experience were found to unload their first tank car of vinyl chloride monomer.

One of the problems was defining boundary limits for regulated areas without prior experience. Since start-up many areas which were classified as regulated have now been deregulated. They set up gates with barriers and fences (composed of stakes and cables) to mark off regulated areas. There are two entrances to the reactor area, while there are four entrances to the main plant. A card reader to log people in and out is located at each gate but is not linked to the operation of the gate. Georgia-Pacific is using a 24-point Bendix gas chromatograph to compute and log ambient vinyl chloride levels and obtain personnel monitoring data. They get generally a good correlation between calculated personnel data compared to actual measured personal monitoring data. However, the personal monitoring data as obtained with carbon tubes is generally slightly higher. Their current levels are 0.5 to 1.0 ppm now. They expect to be able to operate below the 1 ppm level in 1976 with the exception of such jobs as vessel entry and changing filters, in which case masks will be used.

True Confessions - Accidents and Incidents General Group

Goodyear reported some problems in their mass polymerization system. The mass compressor was pulling a vacuum on the autoclave. They had reached the level of approximately 400 millimeters, and found the relief valve on the compressor was smoking. Also at this time approximately 100 psig was observed on the day tank. The valve was thought to be partly open on the header between the autoclave and the compressor and they had sucked air into the compressor. This caused an overheated situation. The reason the valve was partially opened was that the spring loaded valve operators did not close all the way. To get out of the problem they had to vent vinyl chloride monomer in the day tank to get down to normal operating procedures. Other companies mentioned that they

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have had trouble with spring loaded valves in cases where the springs get old and do not close the valves properly. It was generally recommended that air operation for both opening and closing valves is a better answer to this situation.

Tenneco reported several excursions at the reactors due to gasket failures. They were using a lead shielded asbestos gasket and vinyl chloride got through the lead shield into the asbestos. For some reason the company that supplied the gaskets had changed the binder and vinyl chloride now attacked the asbestos allowing vinyl to escape into the room.

There were several catalyst decomposition incidents reported at the meeting. One involved Union Carbide and the other one involved Diamond. In the Diamond incident, 7,000 lbs. of peroxide were lost. The key point here was the catalyst was stored too close to the walls of the freezer eliminating proper circulation. They have since put in racks or a system to keep the catalyst away from the walls to improve circulation and to reduce decomposition problems.

Great American reported on a case where vinyl chloride contaminated their steam distribution system. They had a low pressure steam line connected to a decanter tank drain, the purpose of which was to sparge the water discharge from this tank. Apparently, the pressure in the tank became high enough to allow monomer to back up to the steam condensate system. They discovered the problem by detecting higher ambient vinyl chloride levels in the area where the condensate tank and pump were located. In their particular case, the vinyl chloride backed all the way up to the boiler in their plant. They have since gone to a jacketed tank for heating up water drained from the day tank. One other company reported that they no longer return condensate from vinyl chloride reboilers to the boilerhouse for this specific reason.

OSHA Compliance Directive Discussion
J. T. Barr - Air Products

John Barr presented Air Products' approach to the OSHA standard. Among the many points raised by John Barr were the following. Airco uses a magnetic card to limit entrance into regulated areas. These cards operate a turnstyle. This system is tied into the computer program which handles medical surveillance as well. Area monitoring is based on the Bendix chromatograph. It also reports to the same computer program as does the personnel monitoring which is based on Sippen pumps and carbon tubes. All persons entering regulated areas must carry their personal air supplied respirator. Any person not carrying the required respirator is subject to termination. Each floor in the operating area is separated into two separate zones. Their alarm system, based on the Bendix chromatograph, provides a red light alarm at the 20 ppm level. The alarm remains on until all points within the system are below the 20 ppm level. To date most of their excursions have lasted 20-22 minutes and they have averaged several excursions per shift.

Their respirator protection system is based on an air line respirator; however, they do use cannisters for points where air is not available. All authorized employees are required to sign a slip indicating their choice of respirator use during the voluntary period. Each day an employee is required to sign a slip

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indicating how much he has worn respirator protection during the day. Any employee choosing to use respiratory protection during the voluntary period is required to wear a red-striped symbol on his hat. Such persons are required to use a respirator at all times and if caught without using the respirator, he will be immediately discharged.

John discussed the medical program used by Air Products. They employ outside doctors and outside medical supervision to control the vinyl chloride program. The total cost of this medical program is estimated at \$200 per year per employee as an out-of-pocket expense. All employees must have a physical exam before entering a regulated area. However, they do make an exception for casual visitors, in which case they will be allowed entrance, but this will be immediately followed up by a physical exam. He indicated that overseas visitors are considered not to be covered by OSHA procedures and are not restricted from entrance into regulated areas. Regular contractor employees working in Airco's regulated areas are provided physical exams at Airco's expense. He indicated they have not yet found any employee that was not approvable under the medical requirements.

Air Products furnishes pants and long-sleeved shirts to reactor cleaners only. No work clothes are provided for other employees. Their policy dictates that impervious rain gear be worn until the first flange is broken on opening up vinyl chloride equipment. They have experienced one emergency to date. This situation involved a spill of several hundred pounds of monomer and it was indicated that the ambient level reached several hundred ppm. It was indicated that Air Products' policy would result in the discharge of any employee who refused medical surveillance. New employees and transfers into vinyl chloride regulated areas must be normal in all respects.

Fifteen companies reported they had transferred employees from vinyl chloride regulated areas into other jobs at the advice of their medical department. Diamond stated they have not made the physical examination program mandatory. They have had one incident of greater than 100 ppm since the standard went into effect and reported this to the OSHA co-ordinator who has requested a letter outlining the conditions of the incident. Several companies have had people who refused to take medical exams. Seventeen companies have had to add people to the staff to administer OSHA-related activities.

Bob Toole briefly reported on the recent ORC meetings in Washington, D.C. In general, it was reported it was OSHA's feeling that industry had overreacted to the vinyl chloride standard. They felt that industry often took a legalistic approach to the vinyl chloride standard. A principal point of discussion at the recent meeting was a definition of massive release. In general OSHA appreciated the problem of defining massive release by a concentration value only. It was indicated that there will probably be an additional program directive further clarifying this point. Employee exposure was considered an essential requirement for a massive release. It was further indicated that the plant definition of massive release was apt to hinge on their identifying a condition such that their emergency program was put into effect. It was indicated that OSHA was particularly interested in looking at the emergency programs and the engineering program to reduce exposures as an important part of each plant's compliance activities.

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It was reported that five different locations have had OSHA inspections since April 1, 1975's standard went into effect. John Floros reported on the OSHA inspection at the Great American plant. They did not receive a citation; however, the OSHA inspector was particularly interested in their record keeping. He looked at their records but was only interested in summaries and not details. In fact, they felt they were keeping too much detail. He was also interested in determining whether masks were available for the employees and if the employees had been given an opportunity to elect to wear them during the interim period. He was surprised at the low level of dust in the finishing areas.

Joe Mudd reported on the OSHA inspection at General Tire. The man was an industrial hygienist and took 22 samples. General took samples at the same time. There will be no citation unless the samples indicated General was in violation of the standard. ~~This man was extremely knowledgeable and checked in detail the medical records.~~ He talked to the union people separately from the management people.

Walt Iliff reported on the inspection at Uniroyal. There was one trained OSHA inspector and three trainees. The plant people were informed prior to the inspection and, therefore, everyone had a mask at the time of the inspection. ~~They were especially interested in the training program, the medical exams, and the record keeping system.~~ The OSHA inspectors did not have masks with them, but were supplied masks by Uniroyal. They took 50 15-minute carbon tube samples. Walt feels the plant may be cited since no area monitoring alarms had been connected yet due to the unavailability of the equipment.

Mel Trowbridge reported on the inspection at Goodyear. The OSHA inspectors took a series of eight-hour time weighted samples by changing the tubes each hour for a period of eight hours. Six people were sampled using this method. They examined the regulated areas, the Bendix alarm systems, and the leak detection systems. They did not wear respirator equipment nor did they bring such. The personnel selected for monitoring was chosen by the union representative. The closing interview was both formal and informal. The informal presentation involved a question-and-answer session. No citations are expected unless one of the carbon tube samples is greater than one ppm. A citation was previously given to a man in the compounding plant who had 1.4 ppm personnel monitoring sample value.

Vinyl Chloride Vapor Test Report Bill Doyle

Bill Doyle gave a brief update on the vinyl chloride vapor test report. This report has now been completed and should be sent out within the next two weeks. He stressed that these figures should not be used for engineering design. Bill Lauderback of Texas Eastman, now deceased, had written the report that should be published soon relating to the use of water curtains to dispel vapor clouds of organic materials.

Proposed NFPA Initiator Storage Standard W. Keim -- PPG Industries

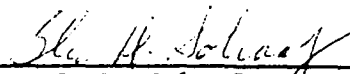
There appears to be nothing new in the program which should affect PVC manufacturers at this time.

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Shortstops - New Developments
A. Peterson - Union Carbide

Union Carbide has found sodium nitrite to be a very effective shortstop in PVC polymerization for suspension and emulsion methods. The material is water soluble and apparently reacts with peroxides to stop the polymerization. They have not tried this system with the agitator off, but they have been successful in shortstopping copolymerizations with this system. They inject the sodium nitrite solution by using a nitrogen pressure bottle. They use a 25% solution in water and the sodium nitrite concentration is in equal proportion to the initial catalyst concentration. Mr. Peterson reported this shortstop is more effective than styrene or BPA and during the last several years 8-10 charges have been successfully saved. Borden is also utilizing this shortstop system, and report that they have restarted polymerizations that have been shortstopped by the addition of more catalyst. Borden has indicated that this shortstop is completely effective in all stages of the polymerization. Contamination of recycled vinyl chloride presents no problems.

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G. D. Schaaf



R. L. Toole

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