DR. JULIUS H. BOCHINSKI: Good morning and welcome to Session III of the Symposium. I am substituting for Mr. Lou Belizsky of the United Rubber Workers, who could not participate as a moderator and speaker because of very urgent business matters. The first part of the session will cover three automatic monitoring systems in use in industry for determining concentrations of hazardous materials in the workplace. A question and answer period will follow the presentation of the papers.

Our first speaker this morning is Mark Soble. He is the Commercial Development Manager of the Hooker Chemical Corporation. He has a B.S. in Chemistry from John Carroll University, and an M.S. in Environmental Health from Temple University. Presently, he is with the Hooker Ruco Division Industry Task Force for both OSHA and EPA relations.

AUTOMATIC MONITORING SYSTEMS FOR DETERMINING TIME WEIGHTED AVERAGE WORKPLACE LEVELS:

PROCESS GAS CHROMATOGRAPHS

Mark Soble
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Uncle Sam brings you this program because if it wasn't for Uncle Sam, I don't think that Hooker Chemical would be involved in the control technology we're going to discuss. We got started in the program of monitoring because of the OSHA vinyl chloride regulation that came into effect in 1974. I am not going to review the history of the B. F. Goodrich discovery of the VCM problem. What I do want to say is that we were put into this position and we had to react to an industrial hygiene problem.

At that time we chose a gas chromatography system, specifically the Bendix System. We wanted to monitor a PVC resin plant; this is where the polymerization of monomers into polyvinyl chloride takes place.

Figure 1 is a picture of our control room. It is important to notice that there are many gauges and gadgets in it. If a company is going to put in a monitoring system, it must be capable of reacting in some way to let people know there is a problem.

I am not going to stand here and recommend what columns to use with your chromatography system. There are experts in the field who could do a better job. I am going to try to explain what we did with a system to make it work better. What we have is a control room and a GC monitoring system that is going to react. Our chromatography system is a Bendix Model 3000. We have six individual units and each unit monitors ten points; each point is monitored every minute and a half.

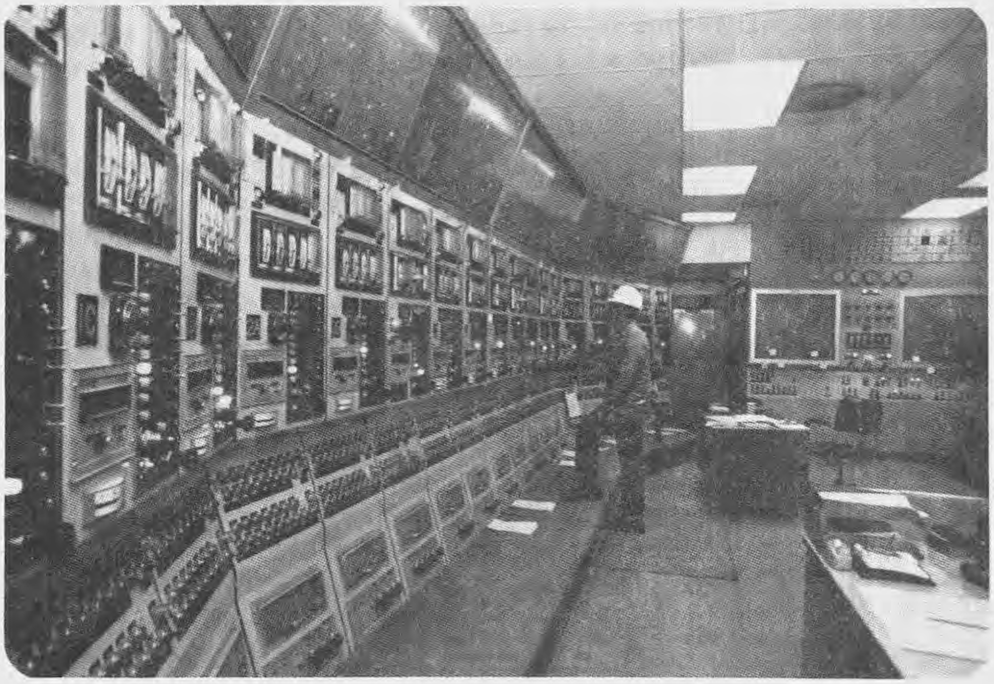

Figure 1. Control room.

Our plant is divided up into four sections. We have integrated systems for every section. We have set up a panel in the control room, which indicates how each of the 60 points looks at any particular time. It gives the control room operator--and by the way, the room is always monitored by someone--the ability to know where a leak may be severe or whether it is a mild leak and where exactly it is located.

We set up the system in our plant. The actual monitoring and the actual gas chromatography is done in the reaction areas, via a waterproof, explosion proof type system. The signal is fed back into a data acquisition system, but the actual system is located right in the plant. We wanted it right there in the plant for less potential dilution of stream.

How did we decide where to put the sensing points? To say that it was easy would not be accurate. We had to put our sensors in 60 specific locations. It is important to make sure the lines are portable lines, because as soon as you think you have a point well located, you then think of changing the location because other factors change. We also put in a ventilation system which changes the air in the plant about 39 or 40 times per hour. After we put the ventilation system in, we found that the air vents carried the leaks to different locations. What we then had to do was readjust our monitoring in the different areas.

Figure 2 illustrates exhaust stacks coming from our plant. We have gas chromatography unit detector points at the exhaust points. If there is a sizeable leak in the process area, somehow the stream goes right to the exhaust and the gas chromatography system can then trace the problem leak. We can then work on the leak.

We have also been able to modify the system and bring the sensor points outside the plant to monitor unloading of VCM railcars. We have also tied our system into our EPA unit so we can monitor the stacks to help determine what the emissions are. Our data acquisition system, is a Hewlett-Packard computer. The chromatography system works well, and the printer works well. However, they don't always work well together. It is important to realize that when you spend between a quarter of a million dollars and a million dollars, that you must hire and train a technician who is going to be dedicated to maintaining this system. We did so in our case.

I must tell you that in the last three or four years the program has been modified every year. It is critically important to train people. These units have to be calibrated, sometimes daily, and it is not an easy thing. All the units are very intricate.

Figure 3 is an emergency light that we have in the reaction area. This light goes on if the VCM concentration in the area is above a certain level in parts per million. In our particular case, we chose five parts per million to activate this light. For the training of

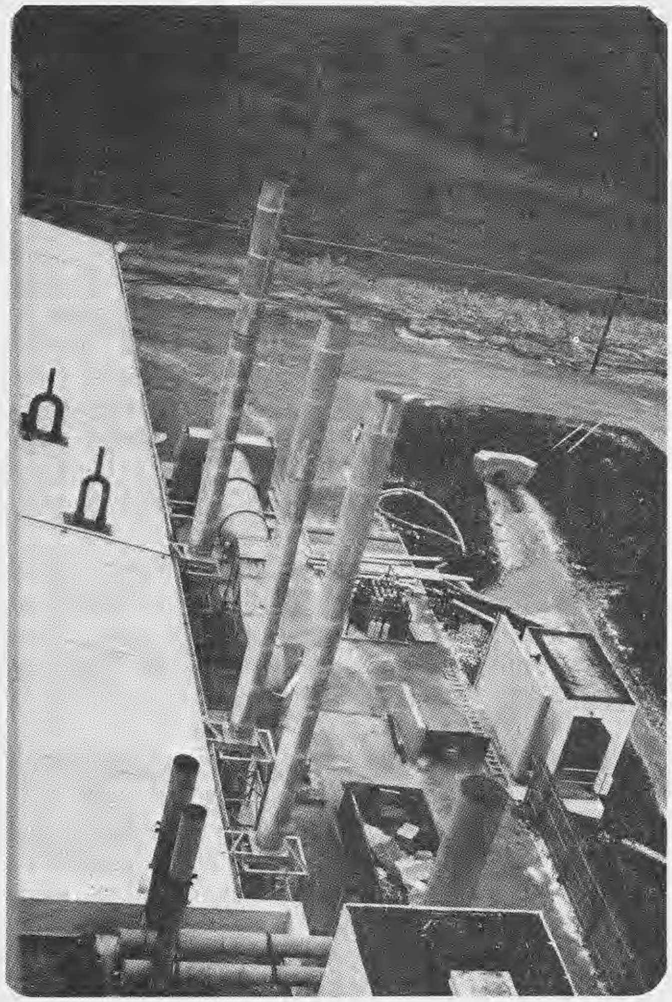

Figure 2. Exhaust stacks.

Figure 3. Emergency light.

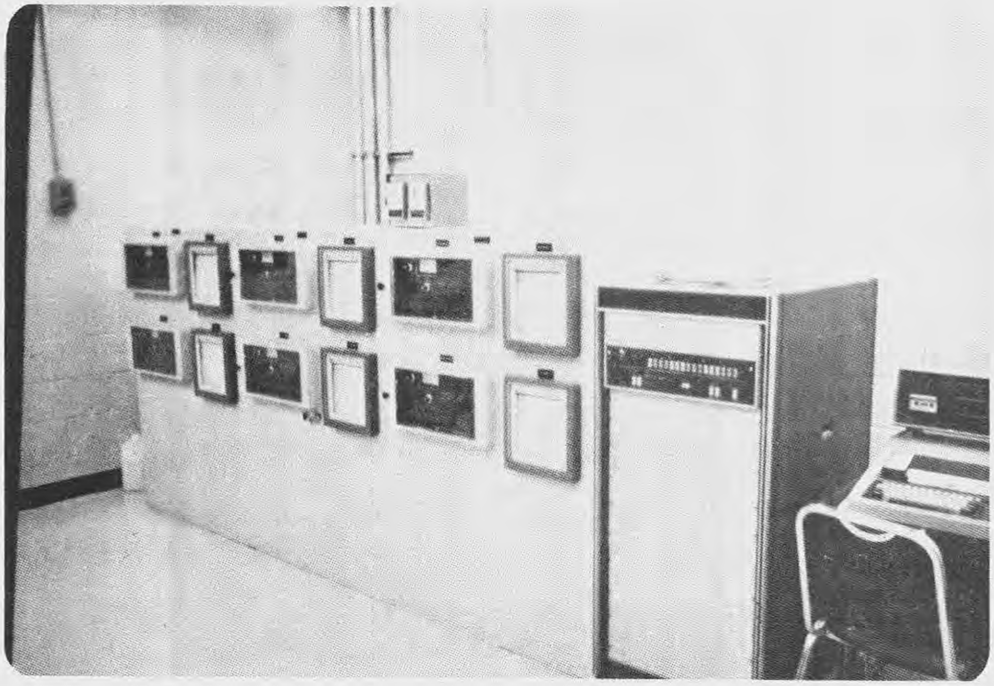

Figure 4. Chromatography system.

employees, it is also important that they recognize the significance of this light and know how to react to it. When you put a warning light in the reaction area, each light should represent a problem in that area, and only in that area. It is important of course to know where to locate these lights, because sometimes an employee will walk into the area and say, "I can't see the light".

Figure 4 is our chromatography system. Throughout the system, we know what the VCM levels in the plant are. We have 60 points monitoring continuously. Recorders indicate the high levels for the day, the low level, average, and mean and where the high points are. We can easily determine where we are at any particular time. When the regulations first went into effect in 1974, I guess, we had levels of VCM that would average in the plant at 1-2 parts per million. On implementing controls, VCM levels in our plant averaged under one part per million. We have also used the system in the auxilliary plants, which use PVC and might come under the regulations.

It is also important that the data stored can be easily retrieved. We have a point monitored every minute and a half. Multiply that by 24 hours a day, seven days a week, 365 days a year. You have to keep all that data. You can't put in a data system without an acquisition system. Some companies have tried, and that's not the way to do it anymore.

Hooker Chemical was willing to spend the money, in the beginning, to put in a system which we believed would work. I am sure that some systems are now available that exceed our capabilities. But, ours is a system that does work. Gas chromatography is a viable way to determining parts per million of vinyl chloride, and it protects the employees, and we're happy with it.

* * *

DISCUSSION:

MR. R. NICHOLAS WHEELER: Have you been able to use the system to find exposure levels of individual employees, in determining where they go to different parts of the plant, the TWAs and other exposures?

MR. MARK N. SOBLE: No. We have the capability; we have not done it. We monitor every employee once a month. Considering the number of employees we have working under different job classifications, they would have to be monitored at least every day. That is how we could get TWAs. It is possible to do this; we have hoped not to do that right now.

MR. WHEELER: Do they use some kind of telemetry on employees to note where they go?

MR. SOBLE: I think Pantasote has a computerized card for each one, and that monitors each one.

MR. WHEELER: How many columns do you have on your chromatograph?

MR. SOBLE: One.

MR. WHEELER: You haven't had any interference, have you?

MR. SOBLE: None at all.

MR. WHEELER: We had. We had to go to three columns because we were picking up solvents.

MR. JOHN L. HENSHAW: You mentioned that you keep the data; for what reason? If you have the TWA data, why do you have to keep the gas chromatograph data?

MR. SOBLE: We keep the data to try to correlate high readings. Sometimes single point data is misleading, and if we have to go back and analyze the situation on a particular day, we would like to have the whole picture.

MR. HENSHAW: This is not required by law?

MR. SOBLE: Not by EPA.

MR. WHEELER: How about OSHA?

MR. SOBLE: I don't think so.

MR. HENSHAW: First, why do you have to have so many changes in your system; secondly, how do you handle the maintenance and calibration?

MR. SOBLE: I think we bought a bummer software system when we put it in three, four years ago. The technology was very new. We were sold the system, and it didn't work exactly to our expectations. I am sure there are programs out right now that will solve these problems. What was the second question?

MR. HENSHAW: How do you handle the maintenance and calibration?

MR. SOBLE: We do the maintenance and calibration daily. We have hired and trained an instrument technician whose responsibility includes the chromatograph and all environmental equipment like portable monitor dosimeters.

DR. JULIUS H. BOCHINSKI: If you have additional questions, would you save them for the end of the panel discussion? The next speaker is Dr. Raymond Sawyer. This talk was prepared by Dr. Raymond R. Sawyer and Mr. Joseph Cappola for Pantasote Company. Dr. Sawyer has his Ph.D. in Physics from the University of Iowa. He is the Director of Marketing and System Application of EOCOM Corporation. He is involved in directing systems engineering concepts of new product involvements. He has more than 25 years experience in program management.

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