INVESTIGATIONS OF HEALTH HAZARDS IN STYRENE BUTADIENE RUBBER FACILITIES

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MR. LEMEN:
Mr. Young and I will briefly go through what we did on our site visit. On March 31st, Dr. Wagoner, Mr. Young, Dr. Lucas of our staff in Cincinnati, and I visited the B. F. Goodrich plant and the Texas–U.S. Chemical facility in Port Neches, Texas.

We went to the B. F. Goodrich plant on April 1 and to the Texas–U.S. Chemical facility on April 3. Both plants produce synthetic rubber using the styrene-butadiene process and both were originally built and operated for the U.S. Government in 1943.

The government had foreseen shortages of natural rubber and established a government corporation known as the Rubber Reserve Company in 1940. Under the aegis of this Company, the government financed the construction of 15 SBR rubber plants, 16 butadiene production facilities, and 5 styrene plants. Between 1946 and 1955, these plants were sold to various private companies that continued to utilize them.

Mr. Young will now give you a brief description of our meeting with the company and our walk-through visits of the two facilities, and then I will give a description of the cases.

MR. YOUNG
Being an industrial hygienist, I would like to give some industrial hygiene observations on the SBR facilities.

In this slide (Figure 1), you will see that the materials are manually dumped into blend tanks and used for the process. Note the series of tanks (Figures 2 and 3). The material is pumped out of these 55-gallon drums into smaller containers and then manually poured into the openings that you saw.

This is what the reactor chain looks like (Figure 4). At the end of the reactor chain there is a radiation density meter that's used to ascertain the degree of polymerization. The housekeeping in these facilities is rather poor; also there is eating in areas where toxic materials are stored and handled (Figures 5 and 6).

In this scene we have vessel entry to clean out these reactors and stripping columns with no respiratory protection being worn (Figure 7). Maintenance leaves quite a bit to be desired. Here's a case of a leaking pump — the vapors were very strong in this area.

Contrary to popular belief, chemical plants are not always closed systems and there are several areas where it's more of an open system and there are opportunities for exposures. Figures 8 through 17 illustrate this.

NIOSH plans to conduct an industrial hygiene in-depth study of these facilities to characterize the specific compounds that are present.

MR. LEMEN:

Mr. Young has given you a visual picture of what the facilities look like on the inside. Now I will briefly go through the cases. I feel that the person who can really correct me if I make any mistakes on this is Dr. Hanby, who is the physician representing both B. F. Goodrich and the Texas–U.S. Chemical facility and is here in the audience. There are five known cases of leukemia at the B. F. Goodrich facility.

The first case was a 59-year-old man who had

Figure 1. Pigment blend tank. As can be seen, materials are manually dumped into these mixing vessels for use in the process.

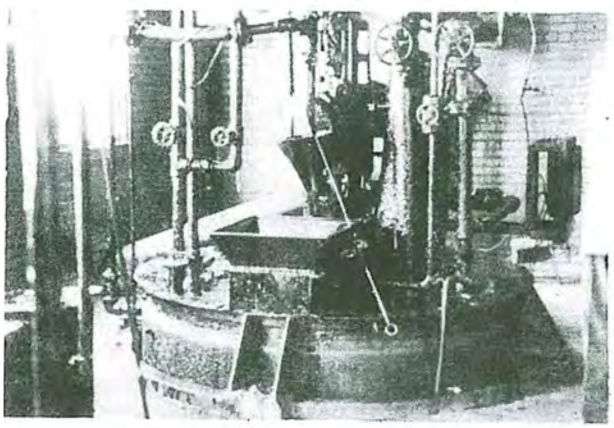

Figure 2. Antioxidant mix tank.
(Spillage of raw materials and poor housekeeping.)

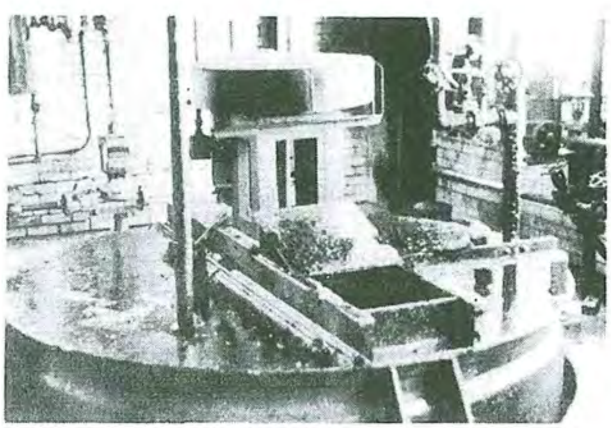

Figure 3. Feed tank.
(Spillage of raw materials and poor housekeeping.)

Figure 4. Reactor chain.

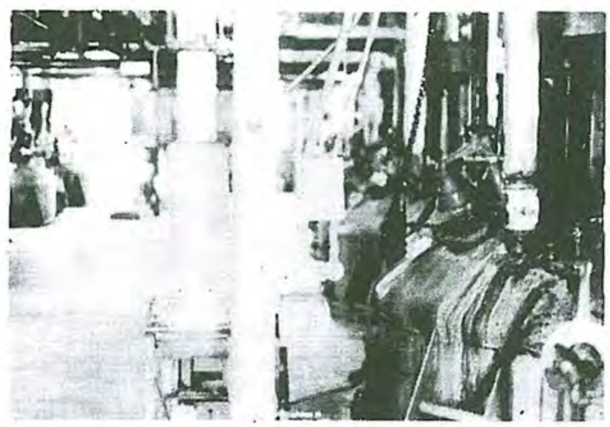

Figure 5. Radiation density meter.

Figure 6. Poor housekeeping under antioxidant tanks.

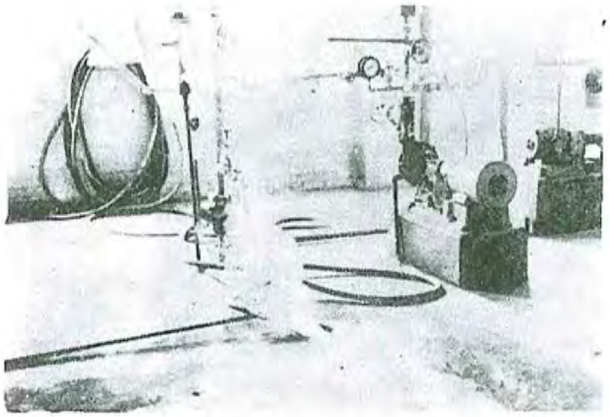

Figure 7. Poor housekeeping in pump house.

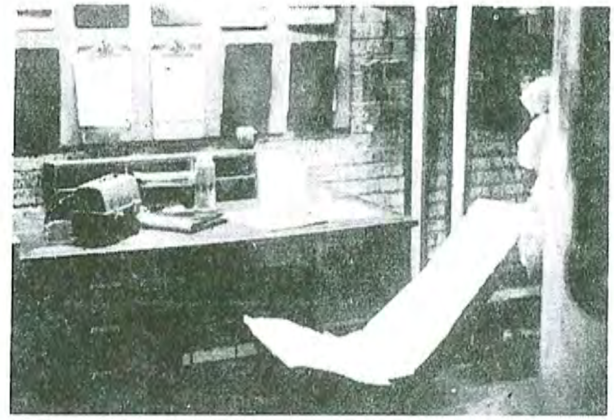

Figure 10. Operator's desk (Pigment). Eating in areas where toxic materials are stored or handled.

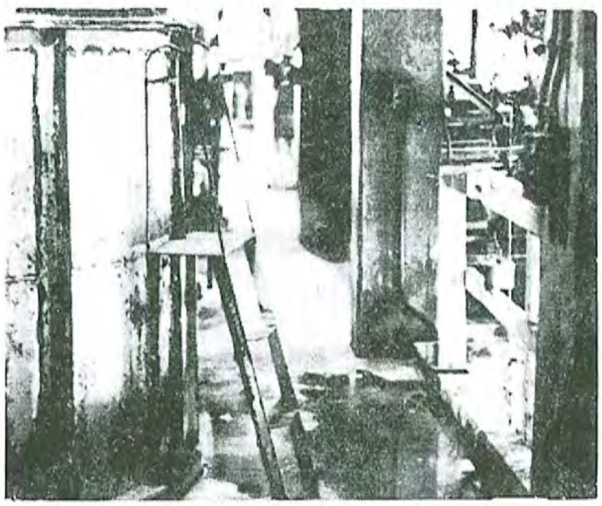

Figure 8. Soap mix tank.

Figure 11. Open reactor manhead.

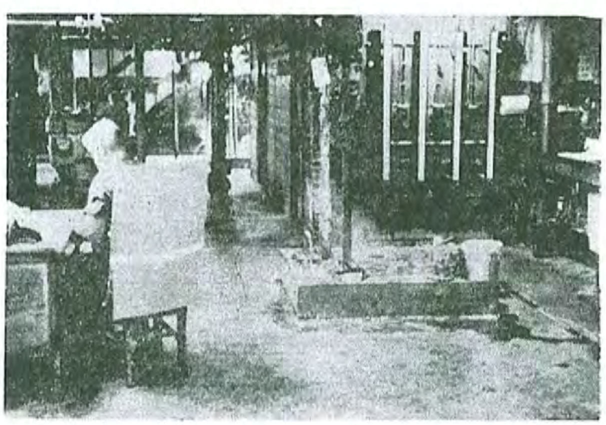

Figure 9. Operator's desk-blend tank.

Figure 12. Inside reactor. Workers are required to enter vessels for cleaning and maintenance.

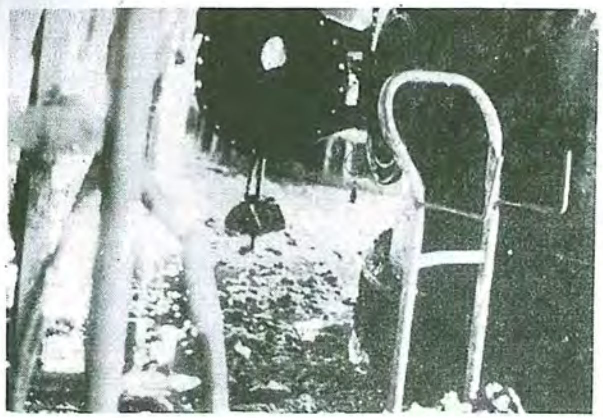

Figure 13. Cleaning a stripping column.

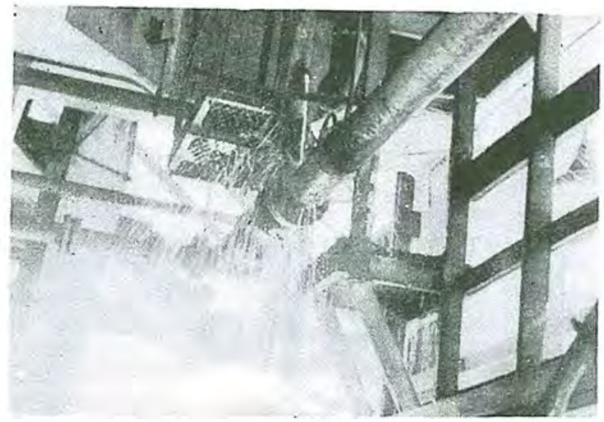

Figure 15. A leaking pipe, indicative of poor maintenance.

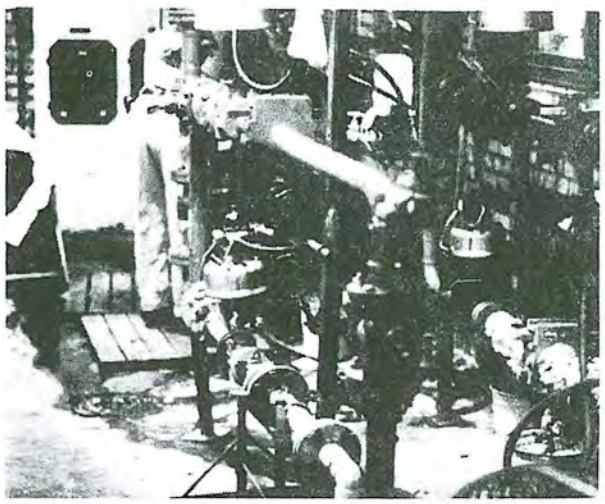

Figure 14. Reactor charge area. A pump was in repair. The material on the floor is an activator.

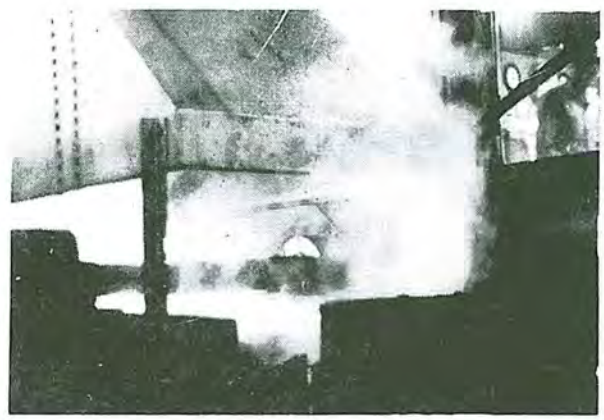

Figure 16. Poor engineering design of exhaust systems.

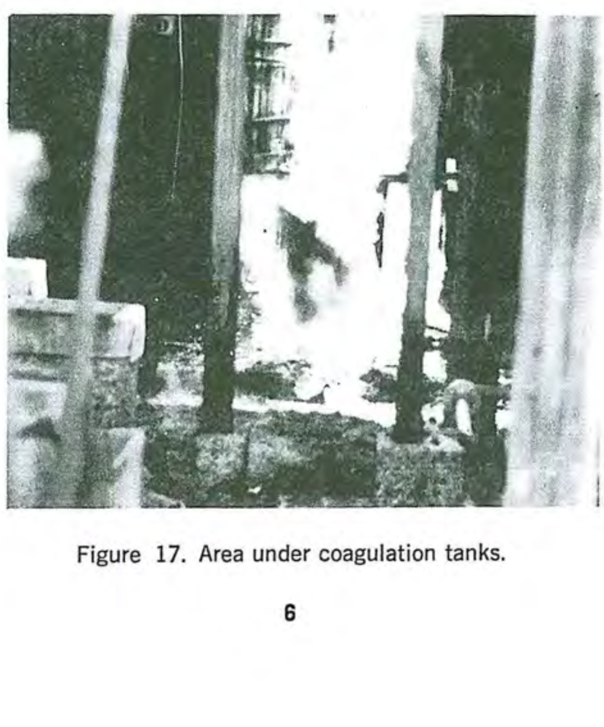

Figure 17. Area under coagulation tanks.

acute myelocytic leukemia and died in January 1976. He had worked as a laborer, a column cleaner, and a fork truck operator prior to his death. The second case was a retired employee who had retired in 1960 and died in September 1972 at the age of 77 of acute lymphoblastic leukemia. Prior to death, he had been treated for several years with the drug chloramphenicol, which has some bearing on the cause of aplastic anemia.

Case number three was an individual who died in 1971 of granulocytic leukemia at the age of 64. He had worked in the processing department. Case four is a man who is still alive and under treatment at the present time for acute myelocytic leukemia. He had worked at the plant as a pipe fitter.

There was a fifth case — a 46-year-old man who had worked in the facility until 1955 and transferred to another similar facility in West Virginia where he died in 1967 of acute myoblastic leukemia.

At the B. F. Goodrich plant, there was really no apparent job site association so far as we can see at the present time. The cases seemed to have occurred randomly throughout the company.

The second set of leukemia cases were from the Texas–U.S. Chemical Plant.

The first case was a 62-year-old man who died of malignant lymphoma in 1971. The second case was a 46-year-old man who died in 1976 of acute myelogenous leukemia. The third case is a case now in remission of a 44-year-old man with lymphocytic leukemia.

There are two other non-leukemia cases that were mentioned as being possibly relevant: one in the Texas–U.S. Chemical Plant in a 62-year-old man; the other in a 66-year-old man who died in 1975 of thrombocytopenia.

This fairly well summarizes the cases we have to date. It's interesting to note that seven of the eight cases have died since 1971 — this was in a workforce of approximately 2,000 people. The current workforce in both plants combined is now less than 1,000.

The cases identified by the company were from retired individuals and from currently employed individuals only; and therefore, a larger segment of those who are at risk from leukemia are still untraced as far as determining vital status and cause of death for those deceased. This is why the week after our site visit, we began to microfilm the employment histories for all employees in both the B. F. Goodrich and the Texas–U.S. Chemical Plants. This included everyone who had ever been employed in either plant from the beginning of the plant — at B. F. Goodrich Plant since 1943 and at the Texas–U.S. Chemical Plant only since 1950.

The process of microfilming will be completed at the B. F. Goodrich Plant, probably by the end of this week, and if not, by the early part of next week. The process of microfilming at the Texas–U.S. Chemical Plant will probably be completed within the next two weeks. After this process is complete, we will begin to trace all of the individuals that have ever worked in those facilities to determine vital status and obtain causes of death on those who are deceased. The mechanisms that we use to trace these individuals are rather conventional. We have a very good rapport with the State of Texas Health Department and will cycle the names of these individuals through their Vital Statistics Office and through the Texas State Motor Vehicle record department. We will also be going to the Social Security Administration to get information as to the current vital status of each of these individuals. It will probably take from 6 to 8 months to completely do the follow-up process.

Basically, this is what we know at the present time from the facilities that we have been in contact with. And, I think at this time it's best to let Dr. Wagoner finish; then Dr. Spirtas can tell us much more based on his report of the styrene-butadiene rubber industry that was published in a recent issue of the Journal of Occupational Medicine and is really the hardest data that we currently have on leukemia and hematopoietic disease among styrene-butadiene workers.

DR. BLEJER:

I am Hector Blejer. Could you go over the age, date, cause of death, or year of death for the seven cases involved?

MR. LEMEN:
I will start with the B. F. Goodrich cases. The first case was 59 years of age; he died on 1-5-1976. His cause of death on the death certificate was gastrointestinal hemorrhage due to thrombocytopenia, due to acute myelocytic leukemia. The second case was age 77; he died on 9-9-72. He had septicemia due to acute lymphoblastic leukemia.

Case number three was 64 years of age; he died on 12-6-71 of granulocytic leukemia. Case four is alive; he was born in 1926; he has acute myelocytic leukemia. The fifth case was the case that moved in 1955 from the Port Neches facility to West Virginia. He died in 1966 at the age of 46, of acute myoblastic leukemia.

There were three cases at the Texas–U.S. Chemical facility. The first case died at age 62 on 10-31-71. He had malignant lymphoma with well differentiated lymphocytic-type with lymphocytic leukemia. Case number two died at age 46 on 1-29-76; he had acute myelogenous leukemia and lumbar pneumonia. Case number three is the one currently in remission at age 44. He has lymphocytic leukemia.

As I mentioned earlier, if any of these are incorrect, maybe Dr. Hanby might have a statement at the present time. I can give a complete work history on each of these eight men if you would like.

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