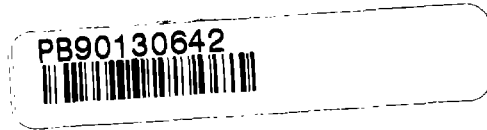


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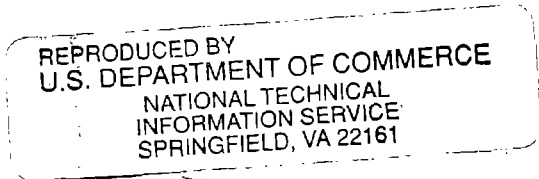


Statement of

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Before the
Subcommittee on Agricultural Research and General Legislation
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I am Dr. Bobby F. Craft, Director of the NIOSH Division of Surveillance, Hazard Evaluations, and Field Studies. I am accompanied today by Dr. Charles Xintaras, NIOSH Leptophos Project Coordinator, and Dr. Shiro Tanaka, NIOSH Medical Officer. Our Division is responsible for conducting the majority of the field investigations undertaken by NIOSH to determine how workers are affected by hazardous substances they are exposed to on the job. Some of these studies are initiated by NIOSH, and others are done at the request of the employers, representatives of employees, or other governmental agencies. Our testimony will focus on our experience in investigating the pesticide leptophos, also known by the trade name Phosvel. We will present the preliminary results of our evaluation of the health status of the workers exposed to leptophos and other chemicals at the Velsicol Chemical Company's Bayport Plant in Houston, Texas. Our final report will be available in January 1978.

In late January 1976, NIOSH was advised by a Federal EPA official of potential health problems among employees at the Velsicol Plant who were involved in the manufacture and packaging of leptophos. At that time leptophos was registered by EPA primarily for export with only limited experimental use allowed in this country. However, Velsicol was applying to EPA for full domestic use of leptophos on several crops and for further experimental use. The increased domestic use was being questioned because of scientific reports that leptophos was neurotoxic to mammals and fowl.

On February 12, 1976, a NIOSH health hazard evaluation team visited the plant and conducted a walk-through inspection which included interviews and medical screening examinations of current employees. At the time of

this visit, the plant management told NIOSH investigators that they were suspending the manufacture of leptophos and indeed no operations involving leptophos were seen during that visit. However, information later submitted by the company indicated that leptophos was handled there through March 1976.

A number of other potentially toxic chemicals were used in the manufacture of leptophos. One of these, toluene, is a suspected neurotoxic solvent. This plant also manufactured a resin called Klyrvel, about the time they produced leptophos. N-hexane, a solvent that can cause neurologic effects, was used in considerable quantities in the production of the resin during the period 1971-1975.

During the initial NIOSH visit in February 1976, only two of the 26 workers NIOSH examined had signs and symptoms of mild neurological dysfunction. What we did not know at the time was that at least 12 cases of serious neurological disorders had been identified in June, 1975, by a medical consultant to the company. However, NIOSH was not informed of these cases until September of 1976.

Since the plant had experienced a high rate of employee turnover, many workers who had been exposed to leptophos and other chemicals were no longer employed by the Velsicol Company. For example, 11 of the 12 workers reported to be seriously affected were not employed at the time of our visit. For these reasons, NIOSH announced on December 1, 1976, that we would conduct a medical study not only of all present employees at the Bayport plant, but former employees as well.

With the assistance of the Harris County Health Department and the Velsicol Chemical Company nearly all of the 301 current and former employees were notified of the availability of medical examinations. A contract was awarded to the Kelsey-Seybold Clinic in Houston, Texas to conduct a comprehensive medical examination based on an extensive protocol developed by NIOSH. Between January and April 1977, one hundred and fifty-five persons reported for comprehensive examinations that evaluated general physical status, neurological status and measures of neuromuscular, ophthalmological, psychological, and biochemical functions.

After the completion of the medical examinations, a reproductive history was elicited by NIOSH staff from 65 wives of Velsicol workers, two female office workers, and for comparative purposes, 53 women of similar age and socio-economic status who had no connection with Velsicol and no known occupational exposure to potentially toxic chemicals.

All participants and their designated physicians were notified of the medical findings within two months of the examination. Medical findings which required prompt attention were reported immediately.

A wide variety of complaints or symptoms present at the time of examination or sometime during the previous five years was reported by the 155 people who underwent medical examination. Organophosphate pesticides are known to produce symptoms such as anxiety, confusion, drowsiness, increased sweating and difficulty with vision. A substantial number of workers reported that one or more of such symptoms had been present at some time during the preceding five years. Since many of these complaints are

subjective in nature, it is not always possible in individual cases to determine whether the symptoms are related to workplace exposures.

The 155 workers examined can be grouped into three categories based upon the results of neurologic examination and specialized testing. (1) Eighty-one of the workers had no significant abnormalities in any of the objective tests or examinations. (2) Eleven workers were found to have abnormalities which might be related to other conditions such as diabetes, poliomyelitis or previous injury. (3) Sixty-three workers had abnormalities in one or more of the objective tests or examinations. In addition, workers in every category, including those not found to have significant abnormalities in the objective tests, reported a variety of subjective complaints.

The objective examinations and tests included clinical examination by a neurologist who evaluated mental status, muscle function, nerve function and sensory function. Specialized tests were conducted to detect and quantify more subtle changes in muscle and nerve function. Electromyography (EMG) tests muscle functions and the relationship between peripheral nerves and the muscles they innervate. Electroneurography (ENG) tests the integrity and functioning of peripheral nerves. Psychological and performance tests focus on thinking, perceiving and carrying out standardized tasks.

Of the 63 persons having abnormalities in one or more of the objective tests or examinations, 11 were found to have abnormal neurological examinations. Most of these also had abnormalities in nerve function, psychological tests or performance tests. Although a variety of

neurological abnormalities were encountered, the most frequent involved abnormal deep tendon reflexes and some impairment of sensation in the hands and feet. More subtle abnormalities were found in the other 52 workers in this category. Twelve were found to have abnormalities limited to psychological and performance testing. These impairments involved reasoning ability, memory, manual dexterity, reaction time or visual filtering of information. Forty workers had abnormalities on electro-neurography, which was in some cases associated with abnormality in electromyography, psychological testing or performance testing. The effects in this category could possibly be attributed to prior exposure to leptophos, n-hexane or both. Since the NIOSH medical examinations were performed at least 10 months after the last known exposure to leptophos and/or hexane, the EMG/ENG findings noted above could reflect slow or incomplete recovery of nerve/muscle damage. Since most workers had other chemical exposures in addition to Leptophos or n-hexane, one cannot rule out the possible neurotoxic effect of those chemicals.

Seven of the nine workers examined by NIOSH and previously reported by the medical consultant to Velsicol were found to have abnormalities in one or more of the objective examinations. (Three others mentioned in the Velsicol report were not available for examination by NIOSH.) Initially a number of these workers had been diagnosed as having encephalitis or multiple sclerosis because their symptoms and clinical examinations were thought to be consistent with those disorders. Although there are some subtle differences, the symptoms and type of nerve damage seen in encephalitis or multiple sclerosis could mimic those caused by chemicals

encountered in the workplace. Since the sick workers had been seen by different physicians who may not have been able to elicit a good occupational history and since appropriate toxicologic information about the relevant workplace chemicals might not have been immediately available to the attending physicians, it is not surprising that the diagnosis of encephalitis or multiple sclerosis was considered rather than pesticide poisoning. The clustering of three relatively rare cases of multiple sclerosis in a small group of workers alerted the consultant to the possibility of pesticide poisoning. It is the opinion of NIOSH medical officers that the signs presented by these workers are compatible with organophosphate poisoning. However, in view of the stated history of concurrent exposure to n-hexane, it is difficult to exclude the role played by this solvent.

In summary, NIOSH's medical evaluation of the Velsicol workers has shown that a substantial number of workers examined were found to have neurological, electromyographic, electroneurographic, and psychological performance abnormalities. However, a causal association of the medical findings with worker exposure to leptophos is difficult to establish in individual cases because of the presence of other neurotoxic agents. Our investigation does lead us to conclude that workers in this plant were adversely affected by conditions that could have been prevented by more careful medical surveillance, work practices, and engineering controls.

Mr. Chairman, my colleagues and I will be pleased to respond to any questions you or members of your Subcommittee may have.