

Health Assessment for

PEPPER STEEL & ALLOY COMPANY

CERCLIS NO. FLD032544587

MEDLEY, FLORIDA

SEPTEMBER 29, 1983

Agency for Toxic Substances and Disease Registry
U.S. Public Health Service



Memorandum

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From EIS Officer, CEH, CDD, SSB

Subject Pepper Steel & Alloy Company Data Review

To Frank S. Lisella, Ph.D.
Assistant Director for Programs, CDD, CEH
Through: Edwin Kilbourne, M.D.

As requested, I have reviewed the newly submitted documents on the Pepper Steel site, Medley, Florida. The specific questions raised by Mr. Pietrosewicz, CDC/SIG representative to EPA Region IV, are:

- (1) What is the potential public health threat emanating from the site?
- (2) Should CDC conduct a study on the workers of Pepper Steel?

Background

Pepper Steel & Alloy Company (Pepper Steel) is a scrap metal and recovery facility. In 1975 mineral oil and grease spillage in the ground was detected. In 1977 polychlorinated biphenyls (PCBs) were detected in soil samples. The Dade County Environmental Resource Management Agency (DERM) has taken measures to evaluate the extent and magnitude of the contamination and the health effects on Pepper Steel workers. Meanwhile, EPA has become involved and a Superfund cleanup of selected contaminated areas will be performed.

The Site

Pepper Steel is a small company with 27-30 employees and is located between 104th Street and the Miami Canal in Medley, Florida. The facility is located in an area containing light industries. In the vicinity are a few apartments and a mobil home park. A portion of Pepper Steel's activities has been the recycling of transformers from Florida Power & Light (FPL). Waste transformer oil containing PCBs was reportedly dumped at several locations at and around the Pepper Steel site.

Following the detection of PCBs in the soil in 1977, several sampling surveys were performed in 1980 and 1982-1983 to assess the extent and magnitude of contamination.

1. In 1978, DERM sampled 14 wells and found no PCBs (at a detection level of 0.1 ppb in 13 wells) and found 0.15 ug/l Arochlor 1200 in a well far south of Pepper Steel.

2. In 1978, CLARK, Inc., (environmental consultant to Pepper Steel) examined soil and water in the area using a sampling design approved by DERM. All five water samples contained less than 0.2 ppb PCBs. However, it is unclear from the table presented whether this finding implies that PCBs were found at a level lower than 0.2 ppb, or that PCBs were not found at a detection level of 0.2 ppb. Seven surface soil samples were taken and six of these contained PCBs in concentration of 0.5 to 23 ppm. The seventh sample was an outlier with 144 ppm. It was taken from area A at the Miami Battery site, northeast of Pepper Steel and adjacent to the Miami Canal.
3. DERM repeated soil sampling of area A in January 1983 and found PCB (Arochlor 1200) levels of 7.3 - 37.8 ppm.
4. In May 1983, the EPA FIT-contractor, the NUS Corporation, sampled the area as part of an EPA remedial action plan. An analysis of 23 water samples showed no PCBs in 22 samples (detection level of 1 ppb) and 7.1 ug/l PCB (Arochlor 1200) in a ground water sample collected from a ditch at 105th Street. The only well found positive by CLARK in 1978 no longer had detectable PCBs. Results of soil samples are not included in the NUS report, but have been cited by FPL (see below). The levels were 0.017, 13 and 72 ppm. The latter value was from an area A sample. No PCBs were found in NUS samples of Miami Canal sediments.
5. FPL received duplicates and splits from the NUS samples and collected its own samples as well. None of the water samples had detectable PCBs. Two soil samples outside area A had 23.7 and 38 ppm total PCBs, while three soil samples of area A had concentrations of 87-112 ppm.

Summarizing the sampling data, the following comments can be made:

- a. The most heavily contaminated area is area A at the Miami Battery site and not the Pepper Steel site. Concentrations outside area A are well below the 50 ppm EPA soil standard.
- b. There is no horizontal or vertical gradient in concentrations from Pepper Steel to other areas, or between the various sampling sites.
- c. There is a considerable decline in the concentration of PCBs if the soil sample is taken at 14-18" depth instead of from the surface.
- d. Contamination of natural water by PCBs, if any, is only slightly above the detection limit of 1 ppb. No PCBs were found in water and sediment of the Miami Canal.

Toxicity

PCBs are biphenyls with various degrees of chlorination, extremely low solubility in water, high affinity to soil particles, and very little tendency to be leached vertically or horizontally. The compounds are stable in nature, are accumulated in fat tissue, and transplacental passage to the fetus and excretion in breast milk have been shown. Routes of entry are by inhalation, oral intake or by skin absorption.

Local toxic effects include irritation of the eye, nose, throat and the mucosal membranes of the lung. Systemic effects include chloracne, liver damage, vomiting and nausea, anorexia, abdominal pain, pigmentation of extremities, and sexual impotence. In two mass intoxication episodes in the Far East, peripheral nerve damage, stillbirth, and eyelid edema have been reported after consumption of PCB-contaminated cooking oil. It is unclear, however, what part of the symptoms are attributable to PCBs since the oil contained dibenzofuran as well, a compound far more toxic than PCB. Increased levels of liver enzymes and triglycerides have been found in PCB-exposed but clinically healthy people. In animal studies, PCBs have caused liver cancer, impairment of the immune system, hormonal effects and fetotoxicity. No evidence has been found for mutagenicity or teratogenicity.

The maximum no-effect level in humans is unknown. In the occupational setting, NIOSH has recommended a permissible time weighted average (10 hours) of 1 ug/m^3 air. This level is believed to be low enough to prevent systemic effects, but it is unclear whether or not local toxic effects might occur. No water standards have been issued, but EPA estimates that the daily intake of 2 liters of water containing 0.00079 ug PCB/l will increase the lifetime risk of developing cancer by 1:100,000. For soil EPA has published a 50 ppm limit.

Pepper Steel Employees

A list has been presented of 11 former employees. It is not clear whether or not this list is exhaustive. No information has been given on current employees. Of the former workers, 4 were examined medically by physicians of the University of Miami through DERM. The resulting reports disclose no symptoms attributable to PCBs. All 4 had PCBs accumulated in their subcutaneous fat tissue at levels ranging from 0.48 to 2.94 ppm. These levels are well within the range estimated for the general USA population. Blood examination reveals elevated liver enzymes and triglycerides in some of the 4 workers. These changes have been attributed to PCB exposure.

The Environment

The area is flat and the ground water level in many places is only 1-2 feet below ground level. The area drains to local canals and to the Miami Canal. There is a potential for soil contaminants to migrate to underlying shallow water layers and the Biscayne Aquifer, the source or drinking water for southeast Florida. However, the data collected by DERM, CLARK, FPL and NUS suggests the absence of such migration.

Another way of spreading PCBs from soil to water is through animals. No data have been presented to evaluate this possibility. As all natural surface water was found free of detectable PCBs, however, it is unlikely that this route may be of practical importance. Since no agricultural land exists in the area, uptake of PCBs by plants is of no concern.

Remedial Actions

Sampling by DERM and NUS is part of a remedial action strategy. DERM sampling sites were determined by CLARK's identification of high concentration sites. NUS' sampling design was based on a geographical survey of the area for location and extent of oily subsurface layers, utilizing electric resistivity and electromagnetometry.

Since soil samples of area A were repeatedly found to have high levels of PCBs, a cleanup of the soil is planned. Moreover, a consultant (CH₂M-HILL) has been hired by DERM to develop a plan to protect the Biscayne Aquifer and the environment from contamination, and to assess the feasibility of appropriate remedial actions. This project covers a very large area and several chemical waste sites.

Discussion

The concentrations of PCBs found at several locations in the area are well below the 50 ppm EPA standard for soil removal, with the exception of area A in the northeast and remote from Pepper Steel. There is general agreement that no spread of PCBs has occurred horizontally or vertically or to surface and well water. Rather, the data suggest that PCB-contaminated waste oil has been dumped at various locations. It is noteworthy, in this context, that a national survey in 1971-1974 showed that natural waters had 0.1-3 ug/l of PCBs (D.S. Dennis: PCBs in the Surface Waters and Bottom Sediments of the Major Drainage Basins of the US. In: Proc. Natl. Conf. on PCB, Chicago 1975, EPA 500/6-75-004, pp. 183-194). Hence, the local situation of PCBs not detectable or just above the detection level is consistent with the opinion that the soil contamination had not been spread to water, despite the long duration.

It is almost impossible to gain a clear picture of the physical relationships between the various sampling wells, soil sample sites, and geophysical test sites, since adequate maps have not been provided. The NUS report shows only one map (presumably figure 1) which is a portion of a USGS map from Hialeah and Opa-Loca. Sampling locations are not shown other than those on figure 1. References are made in the report to other figures, which apparently show better locations of samples and identify areas such as A through R and tracts 43-45. Without this information, a detailed report evaluation is not possible.

No data measurements have been presented to draw the conclusions reached from the resistivity and electromagnetometry (EM) testing statements made. While numerous samples (water, soil, etc.) have been taken over time, it is not clear what sampling rationale was used for sample sites and whether or not these sites were representative.

In a February 11, 1983, memo, CDC recommended sampling in expanding concentric circles and the bottom sediments of the Biscayne Aquifer. Why was this sampling scheme not used for the 1983 survey, since EPA contractor samples were taken in May 1983? On page 6 of the NUS report, a statement is made "Measurements (EM) that were extreme and/or questionable were discarded when plotting and contouring data." Why? Shouldn't the data be included along with appropriate references to why these readings might not be acceptable for use? Would it be possible that oil soaked soil containing scrap metal might yield normal resistivity and/or EM readings? Why was the CH₂M-Hill proposal not discussed in the NUS report?

On page 4 of the NUS report, mention is made of elevated lead concentrations in water samples taken by DERM personnel. No further attention has been given to lead levels. Even though the sample site may have been at some distance from Pepper Steel, there should have been further investigation. In an earlier review by Drs. E. Welty and J. French (reference 1), a number of recommendations were made. It appears that many of these were not implemented in later site work. These recommendations appear to be still valid and would provide additional data to make future plans for remedial actions and final closure of the site.

Although no clinical symptoms attributable to PCBs have been found in former workers, a definitive conclusion of absence of manifest health effects cannot be drawn yet, since only 4 out of 11 listed employees have been examined. Of these, only one had had a prolonged exposure time. It appears that 3 of the 4 workers have been unable to have children. Concerning the fourth worker, no data on fertility was presented. The relation between age of the workers and the period of their employment does not support a conclusion of male sterility attributable to PCB. There are no reports in the literature on impaired fertility induced by PCBs, though hormonal effects and impotence have been described. A better evaluation of a possible reproductive effect would require data on all eligible workers and on their wives' reproductive histories.

No PCBs were found in serum. However, no mention was made in the medical records of the detection limit of the test.

Recommendations

1. The recommendations made earlier by Drs. Welty and French are still valid and are repeated here (see reference 1).
2. The representativeness of the NUS sampling sites should be discussed by NUS with special reference to the questions raised in this review. Moreover, Florida Power & Light might be able to provide information on the types of PCBs present and the number of transformers processed by Pepper Steel during the past

10 years. FPL might also be able to present data on the usual concentrations of PCBs in the discarded transformers. Using such information, one might better estimate the total amount of PCBs to be accounted for, and thus judge whether or not undetected PCB sites might still exist.

3. The anomalies found in the geophysical investigation should be further explored, particularly those in the 12-foot zone.
4. The CH₂M-Hill proposal for remedial action should be discussed in the context of the local sampling design and remedial action plan.
5. During remedial actions, precautions should be taken to control dusts and to protect workers from exposure to PCB-contaminated dust by inhalation or ingestion. Soil removal activities will pose the highest risk, as PCB concentration is highest in the superficial soil layer.
6. Since PCB contamination of soil occurred at multiple sites, OSHA should be informed of the situation in order to ensure that all workers in the area, not only Pepper Steel workers, are aware of possible exposure.
7. The medical examination of Pepper Steel workers should be continued to cover all former workers with special attention for the fertility status of the employees and their spouses, including the age of the spouse as well. Preferably, the medical survey should be extended to current employees. Information on the detection level of PCB in serum is needed.
8. Since the contaminated area seems to pose a possible hazard to the occupationally involved population only, NIOSH is the more appropriate entity within CDC for an investigation rather than the Center for Environmental Health. However, whether such an investigation is indicated depends on the availability of more information than is provided with the reviewed documents.

Summary

The soil of an area at and around the Pepper Steel and Alloy Co. facility is contaminated with PCBs, a toxic agent with carcinogenic properties. The highest concentrations found, well above the EPA 50 ppm soil removal standard, are in the northeastern part at the Miami Battery site. Contamination appears to occur at a number of locations where transformer oil has been dumped. There is apparently no migration from the locations in horizontal or vertical direction and there is no evidence that well water and surface water contain PCBs. However, there may be some doubt on the efficacy and representativity of the sampling design with regard

to horizontal spread. Medical examination of four former exposed workers did not reveal clinically manifest adverse health effects. As the only exposure is apparently exposure to contaminated soil and directly to transformer oil, both in an occupational setting, the appropriate control measures would be removing the contaminated soil and controlling work conditions through OSHA. Whether a study should be done on the possibility of reproductive and other health effects is, in my opinion, an issue for NIOSH.

Documents reviewed

1. Memo from C. Pietrosewicz to J. Orban, February 11, 1983.
2. Correspondence between EPA, Dade County and University of Miami regarding the medical examination of Pepper Steel workers.
3. Medical records on four Pepper Steel workers.
4. "Review of data on the presence of PCBs in the area of Pepper Steel and Alloys, Inc., Medley, Florida;" June 24, 1983, by Florida Power & Light.
5. "Project for performance of remedial response activities at uncontrolled hazardous substance facilities - Zone 1;" March 1983, by NUS Corporation.
6. First review of the Pepper Steel data by E. Welty and J. French, which includes the reports from CLARK, Inc., (1978) and CH₂M-Hill (1983) as well.
7. Memo of R. Kay to S. Freni, August 23, 1983, on the subject of geophysical testing.
8. "PCBs in human adipose tissue and mother's milk," draft by R. M. Lucas et al, August 1982, from the Research Triangle Institute.

Reviewers

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Secondary - Lee Tate

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