Health Assessment for

TOWER CHEMICAL COMPANY

CERCLIS NO. FLD004065545

ORLANDO, FLORIDA

JULY 23, 1986

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

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date JUL 23 1986

From Acting Director
Office of Health Assessment

Subject Tower Chemical Company, SI-86-136

To Mr. Chuck Pietrosewicz
Public Health Advisor
EPA Region IV

EXECUTIVE SUMMARY

The Tower Chemical Company operated a pesticide manufacturing facility about 15 miles west of Orlando, Florida, from 1957 to 1981. In 1980, the wastewater pond at the main facility overflowed into an unnamed stream, north of site, adversely affecting the vegetation and aquatic animals in the downstream area. An immediate removal action was carried out in 1983, based in part on the recommendation of CDC (Centers for Disease Control). An RI (Remedial Investigation) has shown the surface, subsurface, and sediment on and under the site, and the groundwater under the site to contain elevated levels of the chemicals attributable to operations at the Tower Chemical Company. A FS (Feasibility Study) has been prepared to define possible future actions to remove some of the chemicals from the site. The chemicals detected at the site are either presently inaccessible to the public, or the levels are not sufficient to indicate an imminent threat to public health at this time.

BACKGROUND

The Tower Chemical Company site is located in eastern Lake County, Florida, about 15 miles west of Orlando. The company manufactured and formulated both chlorinated and organophosphate insecticides, as well as a copper-salt based fungicide from 1957 to 1981. The site consists of a 14-acre main facility and a spray irrigation field located about 2,000

feet southwest of the main facility. The main facility contains a 0.5 acre wastewater pond and a 1.5 acre area for burning and subsurface burial of waste. The spray irrigation field consists of four parallel lines of sprayheads across a gently sloped field. An unnamed stream on the north of the disposal area drains a nearby swamp, including surface runoff from the main facility and discharges into Lake Apopka about 1.5 miles downstream from the site. The main facility site is currently occupied by a fishing lure manufacturing firm and a potting soil blending and packaging firm. The spray irrigation field is currently owned and occupied by three residents, and is used for goat and cattle grazing, cultivation of sugar cane, and growing wholesale nursery plants.

The burn/burial site was operated throughout the life of the facility. The wastewater pond was constructed in the mid-1970's and was used to dispose of chlorobenzilate production wastewater, general plant floor washdown, and surface runoff from the process areas.

In 1980, the wastewater pond overflowed into the adjacent swamp and entered the unnamed stream north of the site. The acidic wastewater reached as far as Gourd Neck of Lake Apopka, and vegetation and aquatic animals were severely stressed. The spray irrigation field, which had been issued a permit to construct, but not to operate, was used briefly at this time and resulted in a defoliated area around the sprayheads. By 1981, the plant was decommissioned and the two new companies now on the site began operations.

In 1983, EPA (Environmental Protection Agency) completed an immediate removal action, based in part on a recommendation from CDC. Removal activities included dewatering and treatment of the wastewater pond, removal of an average of 2 feet of sediment from the pond bottom, excavation of part of the burn/burial area, backfilling and grading, and

placement of a chain-link fence around the two former disposal areas at the main facility. The site was placed on the National Priorities List in 1983.

The ATSDR (Agency for Toxic Substances and Disease Registry) was asked to comment on the RI and the FS for the above NPL site. Our comments are specifically directed toward the health implications of this site and the alternatives proposed for removing any hazards to human health.

DOCUMENTS REVIEWED

Final Draft, Remedial Investigation, Tower Chemical Company Site, Lake County, Florida, May 1986, NUS Corporation.

Draft Feasibility Study, Tower Chemical Company Site, Lake County, Florida, May 1986, NUS Corporation.

Final Draft, Remedial Investigation Appendices, Tower Chemical Company Site, Lake County, Florida, May 1986, NUS Corporation.

Draft Feasibility Study, Tower Chemical Company Site, Lake County, Florida, Appendices, May 1986, NUS Corporation.

Memorandum from Chuck Pietrosewicz to George Buynoski, May 29, 1986.

CONTAMINANTS OF CONCERN

A list of selected contaminants was developed using the methodology in the EPA Draft Superfund Public Health Evaluation Manual. Other chemicals were added to this list as necessary to ensure that the chemicals of primary

importance at this site would be evaluated. The selected contaminants were:

4,4'-DDT
4,4'-DDE
4,4'-DDD
Alpha-BHC
Beta-BHC
Gamma-BHC (Lindane)
Delta-BHC
Ethion
Chlorobenzilate
Dicofol
Xylene
Ethyl Benzene
Chromium
Copper

DISCUSSION

Soil Contamination

The RI documented surface and subsurface contamination. The primary chemical of concern was DDT and its derivatives and metabolites. The levels of DDT and its derivatives vary from nondetected to 163 mg/kg in the surface soil. These levels compare with those typically found in soils previously treated with DDT, such as in onion fields (123.51 mg/kg max., 15.10 mg/kg mean.) [1], city turf (96.02 mg/kg max., 2.72 mg/kg mean) [1], and mixed cropping (78.36 mg/kg max., 0.31 mean)[1]. Levels of total 4,4'-DDT and derivatives were measured at the main facility at the 2- and 7-foot levels and found to be a maximum of 85 mg/kg at the 2-foot level and 121 mg/kg at the 7-foot level. Since there is no likely means

of regular exposure of the nearby population to subsurface soils, these soils do not appear to be a significant health threat. Dicofol was found at the 7-foot level at a maximum of 390 mg/kg. DDT and its derivatives, as well as xylene, ethyl benzene, chromium, and copper were also detected at this level at elevated concentrations. Some of these chemicals may contribute to groundwater contamination due to their solubility.

Concentrations of selected contaminants were measured in the soil at the sprayfield at several levels. The maximum concentrations of total 4,4'-DDT and its derivatives at the surface and subsurface was 1.8 mg/kg. This level does not pose a health threat.

Surface Water

Samples taken from surface waters near the site showed levels of DDT in excess of the levels recommended for drinking water; however, the surface water is not used for drinking or culinary purposes. It appears that only surface waters nearest the site contain measureable levels of chemicals attributable to the site. Samples taken farther downstream toward Lake Apopka did not show any of the selected contaminants.

Sediments

The sediments in areas surrounding the main facility have been adversely affected by runoff from the Tower site. The maximum concentration of total 4,4'-DDT and its derivatives in the sediment in the unnamed stream north of the main facility is 0.316 mg/kg. The level of copper (53 mg/kg) is not excessive when compared to typical concentrations in soil[2]. The overflow area from the former wastewater pond was affected more than the rest of the site. The concentrations of these chemicals found in the sediment are not sufficient to pose a threat to human health.

The concentrations of selected contaminants in the sediments at the sprayfield do not appear to be related to the Tower operations.

Air

Levels of contamination attributable to the site were measured prior to the cleanup activities in 1983 near the wastewater pond and near the burn/burial area. Prior to the beginning of the cleanup activities, an assessment revealed no air contamination. During the cleanup, pesticides were detected. Sampling during the RI was done only for the protection of the workers and was accomplished using the HNU photoionizer and draeger tubes. Only hydrogen sulfide was detected in the well headspace. It appears that there is no appreciable level of air contamination emanating from the site as a result of the Tower activities. Previous cleanup activities resulted in a release of pollutants. This must be considered in any future cleanup activities.

Groundwater

The groundwater under the site is found in two aquifers. The upper aquifer, called the surficial aquifer in the RI, is an unconfined, shallow aquifer which is in contact with the contaminated soil beneath the site. As stated earlier, this soil is contaminated with elevated concentrations of the selected contaminants, including dibromochloropropane, which is highly mobile in groundwater.

The lower aquifer, the Floridan aquifer, is separated from the surficial aquifer by the Hawthorne formation. The Hawthorne formation is a low permeability layer of clayey, silty sand which provides some resistance to the flow between the upper and lower aquifers. However, the Hawthorne appears to be discontinuous due to relic sinkholes which have developed

due to the dissolution of the limestone of which the Floridan aquifer is composed. It appears that one of these relic sinkholes is directly under the former wastewater pond.

The main concern with the contaminants in the surficial aquifer is that they may migrate into the Floridan aquifer, which is a sole source aquifer, or that they may seep into nearby surface waters. The surficial aquifer is not used as a potable water source. The migration into the Floridan aquifer appears to be a valid concern and removal of the contaminants from the surficial aquifer is appropriate if migration through the sink holes in the area will occur. However, it has not been shown that the contaminated water now in the surficial aquifer will reach the Floridan aquifer, and if so, what the concentration of the various contaminants might be. At the time of the Remedial Investigation, none of the nearby water supply wells, screened in the Floridan aquifer, contained any of the chemicals attributable to the Tower site, even though the wastewater pond, which has now been drained and filled with sand, sat directly over the relic sink hole where the Hawthorne aquiclude was reportedly missing. For the above reasons, the presence of the contaminants in the surficial aquifer has not been shown to be a threat to human health.

A determination must be made of whether the contaminants below the water table will migrate out of their present location and affect either the groundwater used for drinking or if they will migrate to the surface through a spring or seep and contaminate surface soil or surface water at levels which are a public health concern. Apparently, some contamination of surface waters is now occurring. If the levels which reach a human population are at or above levels of concern, or could reach levels of concern, the material should be removed.

Cleanup Levels

Discussion of any contaminant in the surficial aquifer in terms of a cancer risk appears to be an improper use of the cancer risk factor approach. The development of the cancer risk is based on the assumption that there is ingestion or contact with the contaminated media. In the case of the surficial aquifer, no one is using this water. Based on the presence of hydrogen sulfide in the test wells in the surficial aquifer, it is not likely that this water is aesthetically suitable for use. Without this exposure pathway, the cancer risk is not a factor.

The cancer risks calculated for the surface soil, surface water, and sediment indicate that, with the exception of the surface soil in the overflow area, the threat posed by these media is minimal. Studies have shown soil levels for residues of DDT and related compounds in areas which have been treated with this chemical to vary from zero up to a maximum of over 123 mg/kg. Mean values for DDT in such areas are comparable to those found on the surface of this site, with the exception of the 163 mg/kg found in the estimated overflow area.

While the DDT concentration in the overflow area is above that found in other portions of the site, it is not high enough to cause a concern, when (1) the average concentration of DDT in the surface soil over the entire site, and (2) the industrial use of the site are considered.

The EPA has not developed guidance on the calculation of a cancer risk for ingestion of contaminated soil or for dermal absorption of contaminants in soil or in water. The methods proposed by NUS Corporation follow methodology found in references and are logical approaches to calculating a cancer risk; however, the assumptions used in the calculations are not of sufficient strength to justify a cleanup action for the levels of contamination shown at this site.

The tanks on-site contain levels of pesticides and by-products which are sufficiently high to cause a health concern should the material be released. Good judgment dictates that these tanks be removed from the site, since they are no longer being managed. There is a potential for release of high concentrations of the pesticides and intermediates which have been shown to be toxic.

Because of the physical separation between the main site and the spray irrigation site, these sites should be evaluated separately. None of the levels of contaminants at the sray site either on the surface, or in the subsurface, sediment, or groundwater appear to be high enough to be of concern with regard to human health. Any calculations for cancer risk done on the spray site and main facility should not be considered cumulatively.

COMMENTS ON ALTERNATIVES

Alternative #1.

This alternative would not address the issue of the removal of the abandoned process tanks. It would would also not address the problem of determining the fate of contaminants in the surficial aquifer.

Alternative #2.

This alternative would ensure that no matter what happened to the contaminants in the groundwater, the nearby population would not consume any of the chemicals in their drinking water. Again, the hazard due to the abandoned tanks would remain.

Alternative #3.

This would also address the issue of an alternate source of drinking water. However, the tanks would be left.

Alternatives #4, #5, #6, and #7 provide for the removal of the abandoned tanks, along with a number of other actions. These actions would remove much of the contaminated material from the main facility and from the spray field.

Since Alternatives #2 through #7 will all protect the drinking water of the nearby population, and since this is the medium of primary concern, any of these alternatives will accomplish the necessary result. A major concern with regard to the alternative chosen is the effect on the nearby population of the removal and treatment activities. Will the population be exposed to chemicals during the remedial action which may cause a health problem? Removal of the soil, either surface or subsurface, appears to be unnecessary.

CONCLUSIONS

1. The cleanup action in 1983 removed the bulk of the contaminants from the main facility site.

2. The concentrations of contaminants in the surface soils at the main facility and at the spray field are not sufficiently high to pose an imminent health threat.

3. The contaminated subsurface soils are inaccessible to human contact and, therefore, do not pose a health threat apart from their possible contribution to groundwater contamination, as discussed above, and in (5), below.

4. The surface water and sediment are accessible to the human population, but do not contain concentrations of contaminants which are of concern.

5. The groundwater in the surficial aquifer is contaminated with pesticides and intermediates; however, the water in the surficial aquifer is not being used as a potable water source and hence does not represent a public health threat at this time. A public health threat may result if contaminated groundwater from the surficial aquifer enters the Floridan aquifer.

6. Contaminants in the surficial aquifer have not been found in the Floridan aquifer, although the RI identified potential cross connections between the two.

7. The abandoned process tanks contain elevated levels of contaminants which are a health hazard.

RECOMMENDATIONS

1. Prior to any action to remove contaminated soils or remove and treat contaminated groundwater, determine whether the contamination is likely to get into the Floridan aquifer in quantities which will pose a health threat to the nearby population.

2. Protect the nearby population from the effects of spillage or contact with the abandoned process tanks.

3. Evaluate the effects on the nearby population due to removal actions taken on the contaminated soil and removal and treatment of the contaminated groundwater.

4. Continue to monitor nearby drinking water wells, regardless of the corrective action.

Jeffrey A. Lybarger, M.D.

Attachment

REFERENCES

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