

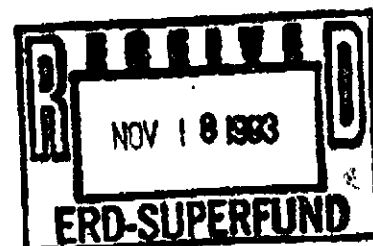
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Site Review And Update

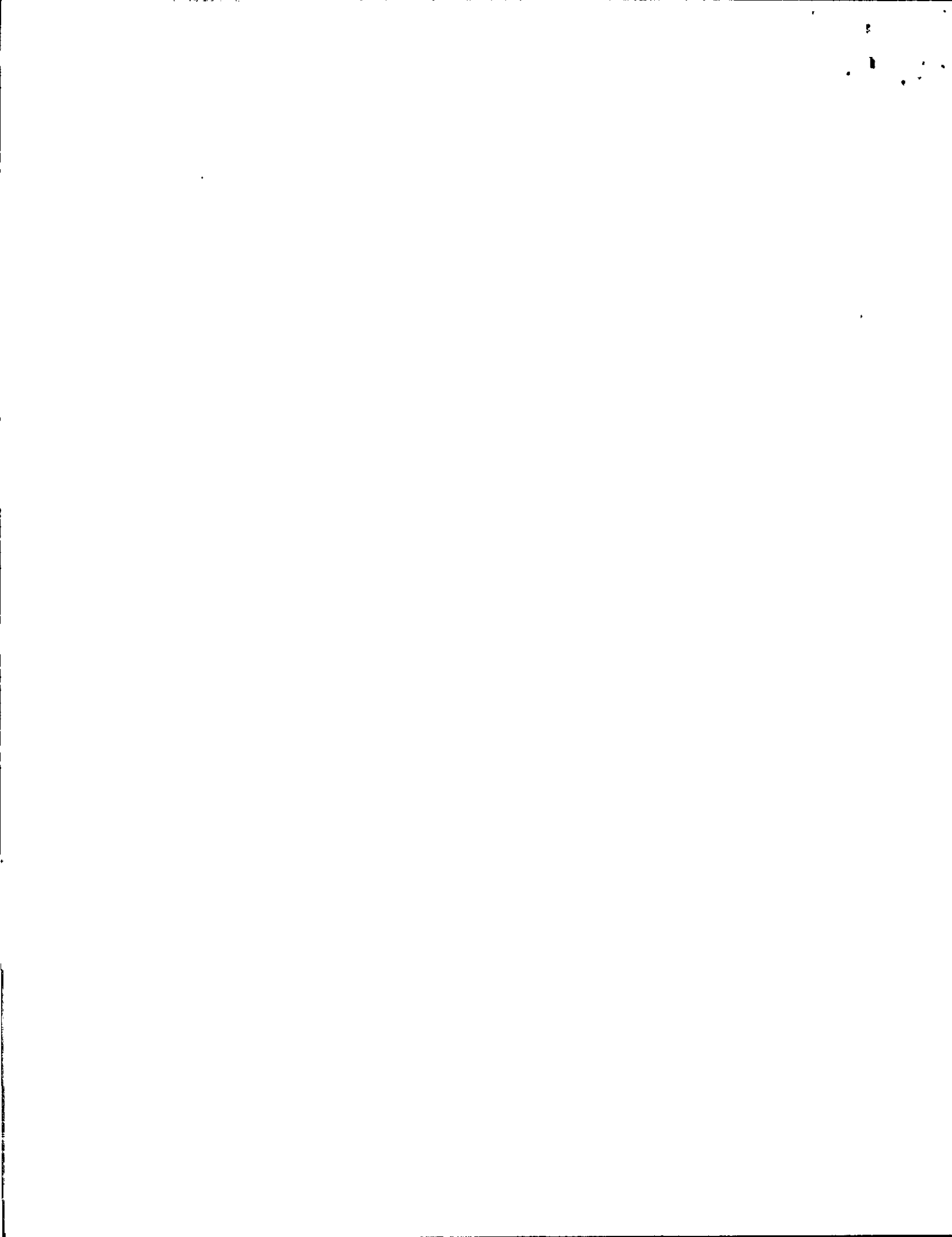
VELSICOL CHEMICAL MICH
ST. LOUIS, GRATIOT COUNTY, MICHIGAN

CERCLIS NO. MID000722439

SEPTEMBER 30, 1993



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333



SUMMARY OF BACKGROUND AND HISTORY

The Velsicol Chemical Corporation (VCC) site was placed on the U.S. Environmental Protection Agency (U.S. EPA) National Priorities List (NPL) on September 8, 1983. This 52 acre site is located at 500 Bankson Street, St. Louis, Michigan. It is bordered by the Pine River on the west and north; Watson Street and North Avenue on the east and Washington Avenue on the south (Figure 1).

The VCC facility began production as the Michigan Chemical Company in 1936 extracting bromine and various salts from natural brine obtained from local wells. From the mid 1800's to 1936, this site had been used by a variety of industries, including a lumber mill, an oil refinery and a chemical plant. Michigan Chemical Company merged with the Velsicol Chemical Corporation in 1977. Between 1936 and 1978, various chemical compounds including 1,1,1-trichloro-2,2-bis(p-chlorophenol)ethane (DDT), 2,3-dibromo-1-propanol phosphate (TRIS, a flame retardant), and industrial bromides, such as polybrominated biphenyls (PBB) and hexabromobenzene (HBB), were produced at the VCC- plant site. In September 1978, VCC ceased all operations at the site.

In 1974, the Michigan Department of Public Health (MDPH) issued a fish consumption advisory for fish caught within a 29 mile stretch of the Pine River. The advisory area includes the Pine River Impoundment in St. Louis and continues downstream to the confluence of the Pine River and the Chippewa River. This area encompasses portions of Gratiot and Midland Counties. Of the samples taken from various species of fish from the Pine River in 1974 and 1976, carp had the highest maximum PBB concentrations of 1.33 and 0.75 parts per million (ppm), respectively. Although polybrominated biphenyl (PBB) levels in fish have decreased since then, the advisory is still in effect due to the continued presence of PBB and other chemicals at elevated levels.

The most recent fish testing in the affected area was in 1989 when the Michigan Department of Natural Resources (MDNR) sampled three species of fish (black crappie, carp and largemouth bass) from the Pine River Impoundment. Ten of each fish species were analyzed for various organic compounds, pesticides and mercury. Maximum concentrations for DDT and its metabolites in black crappie, carp and largemouth bass were 23.9 ppm, 35.5 ppm and 20.4 ppm, respectively. Maximum concentrations for PBBs in the three species were 0.811 ppm for black crappie, 0.425 ppm for carp and 0.314 ppm for largemouth bass.

Sediments sampled from the Pine River in the mid 1970's showed maximum PBB concentrations of 77.0 ppm in a sediment sample taken adjacent to the site. PBB concentrations in sediments showed a gradual decline from 6.2 ppm immediately below the nearby St. Louis dam to 0.1 ppm 29 miles downstream. River water sampled near the site in 1974 showed PBB concentrations as great as 9.8 parts per billion (ppb) and as much as 0.07 ppb as far as twelve miles downstream. PBB was not detected in any water samples collected in 1979. Biota (mice, earthworms, a raccoon, deer and ducks) in the area were found to be contaminated with PBB and/or DDT in 1974 and 1979.

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In 1973, PBB was accidentally mixed with livestock feed, contaminating farm produce and tens of thousands of animals throughout Michigan. The MDPH initiated a long-term study and registry in 1976, which includes formerly exposed VCC workers and farmers, to assess the long-term health effects of PBB. At this time, the study is still ongoing.

In January 1978, VCC hired Dames and Moore to assess the nature and extent of on-site contamination and to assess the integrity of an on-site dredge pond which had been used to store dredge material from the Pine River. The "Assessment Report" which was completed in April 1979, concluded that the shallow groundwater system was contaminated, but the presence of thick clayey deposits beneath the entire site made the downward migration of any on-site contaminants unlikely. The aquifer serving the City of St. Louis municipal water system has not shown evidence of contamination.

PBBs were found in high concentrations in surface soils throughout the VCC-plant site. Even though direct discharges of PBB to the Pine River were halted when operations at the facility were terminated, surface soil erosion continued to carry contamination into the river. Other environmental contaminants (phenols, copper, chromium, zinc and magnesium) were also found in high concentrations in soil samples at the VCC site, but these were confined to the waste drum storage area.

In February 1980, the U.S. EPA Region V requested the National Enforcement Investigations Center (NEIC) to investigate the VCC plant site. The NEIC investigation found that surface soils throughout the plant site were contaminated with pesticides, PBB, hexabromobenzene (HBB), DDT (and its metabolites) and 2,3-dibromo-1-propanol phosphate (TRIS). The shallow groundwater throughout the VCC-plant site was contaminated with DDT (and its metabolites), chlorobenzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,1-dichloroethylene, and trichloroethylene (TCE).

It was also found that the sediments in the Pine River Reservoir were contaminated by DDT and its metabolites, PBB, HBB, chlorobenzene and oils. The DDT, PBB and HBB were attributed to former VCC plant site operations. Although measurable concentrations of HBB, PBB and DDT were not detected in the Pine River water, Michigan Department of Natural Resources (MDNR) data showed that Pine River fish had accumulated DDT and PBB above acceptable levels for human consumption.

In 1982, a Consent Agreement among the U.S. EPA, MDNR and Velsicol provided for the demolition, salvage and removal or burial of all former on-site building materials and scrap; construction of a two foot thick slurry wall groundwater containment system; construction of a clay cap; implementation of a groundwater collection system with deep well injection; and establishment of a long term maintenance and monitoring program. According to the agreement, on-site groundwater elevations were not to exceed 724.13 feet above mean sea level, which is below off-site groundwater levels, to prevent off-site migration of contaminants. Implementation of these remedies as required by the Consent Decree began in 1983, and were completed in December 1984. Velsicol continues to submit quarterly



maintenance and monitoring reports to the MDNR. Exceedances of the groundwater level requirement have been documented.

The Michigan Department of Public Health (MDPH), working under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), prepared a Preliminary Health Assessment (PHA) for the site in November 1988. The PHA concluded that the site was of potential public health concern due to possible human exposure to hazardous substances at levels that may result in adverse human health effects over time. More specifically, human exposure to harmful contaminants, including PBBs and DDT, has occurred and exposure may possibly still be occurring via ingestion of contaminated fish and wildlife.

Recommendations stated in the PHA included periodic sampling and analyses of site area fish and wildlife (especially game species) for contaminants of concern, and periodic monitoring of groundwater on and off-site to identify and monitor any contaminant plumes that may occur. The PHA also recommended that the sediments of the Pine River not be disturbed nor the downstream dam removed without careful consideration of the potential redistribution of contaminants in sediment deposits.

CURRENT CONDITIONS OF SITE

On August 2, 1993, Michael Lee from the MDPH visited the site, accompanied by two representatives from the MDNR, two representatives from Memphis Environmental Center, Inc. (the site maintenance contractor for Velsicol), and the site's custodian. They accessed the site by vehicle through the entrance gate on the south side of the site. The site was completely surrounded by an 8 foot chain-linked fence. Warning signs were observed on the entrance gate as well as along the perimeter of the fence. To the northwest of the entrance gate there was an open holding tank located in the former decontamination area. Steel-cylinder gas vents marked with yellow flags and blue tops were observed throughout the site. On-site groundwater monitoring wells were observed. The older wells, located throughout the site, were marked with yellow flags; newer wells, installed by the U.S. EPA in July 1992 and located between the perimeter fencing and the slurry wall, were marked with stakes and orange flags.

The group drove along the site border. Warning signs were posted all along the perimeter of the fence with exception of where the river bank borders the site (to the north and west). They saw minor signs of erosion along the riverbank and noticed that, though the entire site is fenced, there was adequate space for entry by small animals beneath the fence in some areas.

Toward the north end of the site, a yellow pipeline was observed; it passes under the river to an off-site, deep injection well. MDPH was advised that the pipeline and deep injection well were constructed to maintain on-site water table levels, however, they are currently not

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in use. Just south of the pipeline, there is an open holding tank which receives excess water that accumulates on-site. The water is pumped from manholes, which are located along the riverbank edge of the site. Water and unidentifiable debris were observed in the tank. The holding tank area is fenced.

In general, the site surface is well maintained with vegetative ground cover that reaches approximately 1 foot in height. Areas around the fence near the riverbank consist of dense vegetation, small trees and large bushes. After touring the site, MDPH and MDNR personnel walked the riverbank outside the site perimeter. Evidence of access to this area included the presence of garbage such as wrappers and napkins. It appeared as though burrowing by small animals had created the small gaps below the fence which had been observed from the other side. The gaps were not large enough to allow passage by humans.

With the exception of the open holding tank, which is completely fenced, no physical or other hazards were observed during the site visit.

In 1992, the U.S. EPA conducted a Technical Assistance (TA) investigation for the site. The purpose of the TA was to evaluate the extent and magnitude of contamination impacts to on-site and off-site groundwater and to determine whether any further remedial action is required prior to delisting the VCC site from the NPL. The specific objectives of the TA investigation included assessment of on-site and off-site groundwater quality within the upper and lower aquifers, the testing of nearby municipal water supply wells and residential wells for potential contamination, and a determination whether existing groundwater conditions warrant remediation.

On-site groundwater conditions were assessed by sampling six shallow and five deep monitoring wells. One shallow monitoring well, one deep monitoring well, five residential wells and two municipal wells were used to assess off-site groundwater quality.

Shallow monitoring well data suggested the possible presence (estimated values) of several volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and PBBs. However, the only organic compounds detected without laboratory qualifiers were benzene and trichloroethylene, with maximum concentrations in parts per billion (ppb) of 80 and 10, respectively. Both of these compounds were in on-site wells in the northern portion of the site. One shallow monitoring well (GW-14S) had far more of the organic compounds reported as "qualitatively" present than any of the other wells. This is of concern because laboratory errors would be expected to occur more randomly.

Deep monitoring well data, both on-site and off-site, also suggested the possible presence of several organic compounds. These included methylene chloride, acetone, toluene, butylbenzylphthalate, aldrin, hexachlorobenzene, and PBB. However, methylene chloride, acetone, and toluene were all detected at comparable levels in trip blanks (control samples) and therefore their actual presence in the groundwater is highly questionable. The other compounds were only reported as estimated values and/or were not analyzed for in quality

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control samples, so their actual presence in groundwater may also be questioned. None of the organic parameters exceeded health comparison values.

None of the organic compounds were detected in residential wells or municipal wells, except for methylene chloride, acetone, and toluene. These were estimated only at trace levels. Because these were reported at comparable levels in trip blanks, these findings can be attributed to laboratory error.

To assist in evaluation of the 1992 TA study inorganic chemical test results, MDPH consulted United States Geological Survey chemical data for groundwater quality in proximity to the site (1986-89) and MDPH historical data (1961) on the St. Louis municipal water supply wells for comparison purposes. The USGS and MDPH historical data are believed to be representative of natural water quality in this area. We also considered relative concentration levels between unfiltered and filtered samples in the 1992 TA data tables.

With regard to the municipal and residential wells, the 1992 TA findings were consistent with USGS and historic MDPH public water supply findings. Analysis for inorganic chemicals showed no site impact on the residential or municipal wells. There was little difference between inorganic concentrations in unfiltered vs. filtered samples, indicating that particulate levels were very low in unfiltered samples.

Unlike the residential wells and municipal wells, there were generally large differences between unfiltered and filtered samples collected from on- and off-site monitoring wells for inorganic parameters. Except for one on-site deep well (GW-1D), the filtered samples were comparable in inorganic chemical water quality to that seen in the municipal wells and USGS data. Monitoring wells GW-1D and GW-7D both showed higher levels of several inorganic chemicals in unfiltered samples than the other deep monitoring wells. These are both located in the south/southwest portion of the site and may have been influenced by brine upwelling and/or surface infiltration. Chlorides and bromides were apparently not analyzed for in any of the samples. The presence or absence of elevated levels of these parameters would have been good indicators as to the impact from brine. Data from monitoring well GW-1D differs from other wells in that many of the parameters showed very little reduction in filtered vs. unfiltered samples. This suggests a possible sample mix-up or failure to filter either sample.

Shallow well inorganic data were characterized by the majority of sample results having laboratory qualifiers as estimated values (J), found in the field blanks (B), or having the matrix spike recovery outside the control limits. Antimony was the only inorganic chemical found in shallow groundwater without laboratory qualifiers and above health comparison values in filtered samples. The maximum concentration of antimony in filtered shallow groundwater samples was 114 ppb found in shallow monitoring well GW-4S. No antimony was reported as detectable in the unfiltered sample from this location. The highest antimony level reported for unfiltered samples at other locations was 232 ppb.

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Based upon a hydrologic evaluation, the 1992 TA report concluded that the deep and shallow aquifers were distinctly separated and that the confining clay layer across the site is extensive and seemingly capable of attenuating site contaminants. The report further states that residential and municipal wells sampled showed no exceedances of Maximum Contaminant Level (MCL) guidelines for inorganic or organic compounds established by the U.S. EPA and that there was no evidence they had been impacted by the site.

CURRENT ISSUES

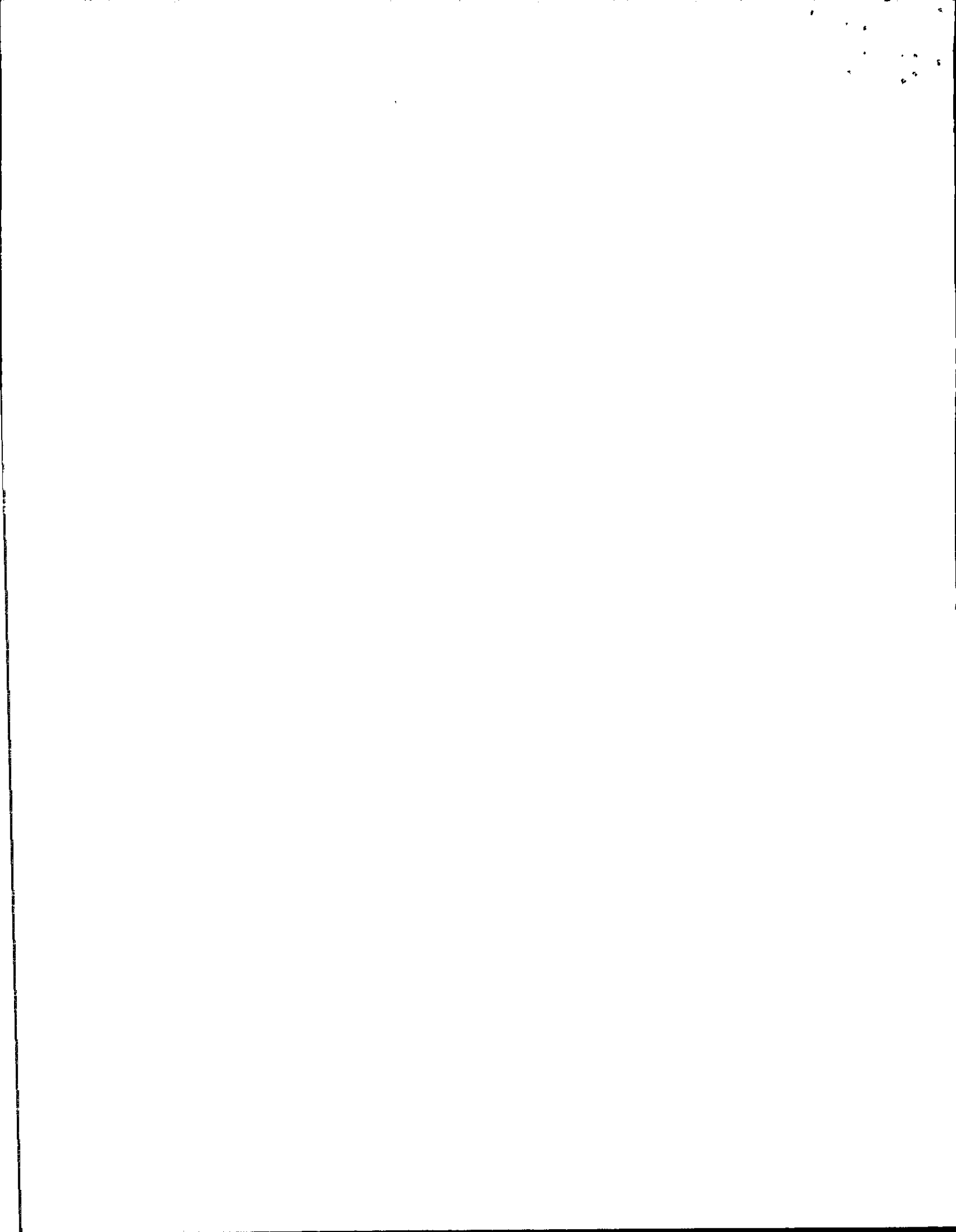
The qualitative identification of several organic contaminants in shallow and deep monitoring wells, despite the 1992 TA study conclusion that the shallow and deep aquifers are distinctly separated, is somewhat troubling. Because of the low concentrations of these chemicals in deep wells, and the fact that trip blanks were not analyzed for several of these parameters, there is a strong possibility that the estimated values are laboratory artifacts. This was apparently true for methylene chloride, toluene, and acetone which were indeed present in trip blanks at comparable levels. This issue should be resolved to confirm that the deep aquifer has not been impacted by surface contaminants.

With regard to inorganic chemicals in groundwater, unfiltered sample data for one deep monitoring well was not in agreement with the other wells. This could indicate an error or a localized hotspot, and should be investigated. Otherwise, the deep aquifer does not appear to be affected.

The effectiveness of the slurry wall and surface water collection system in preventing contaminants from entering the Pine River needs closer evaluation. Currently available data are not adequate for this determination.

At this time, the primary public health concern regarding the VCC site involves potential exposure of humans to contaminants via the food chain (primarily fish). The MDPH has issued an advisory against consumption of fish taken from the Pine River due to elevated PBB and DDT levels. Various fish species taken from the Pine River by the MDNR in 1989 have shown that unacceptable levels of DDT (and its metabolites) and PBB are still present in the fish. Levels of PBB have decreased relative to prior sampling periods. A potential health risk still exists for persons who catch and eat fish from the affected zone of the Pine River. PBB contamination in wildlife was very localized, was generally at lower levels than in fish, and was in species not frequently consumed.

There have been no community health concerns expressed to the MDPH, MDNR or the local health department regarding the VCC site since distribution of the Preliminary Health Assessment in November 1988.



CONCLUSIONS

The PHA concluded that the site was of potential public health concern due to the possibility of exposure to hazardous substances that could result in adverse health effect over time. Potential exposure routes included ingestion of contaminated fish from the Pine River and occupational exposure to harmful chemicals such as PBB and DDT. Most current data on contaminant concentrations in Pine River fish suggest that consumption of fish from the affected zone of the river may still represent a health threat.

Occupational exposure to site-related chemicals no longer exists but studies into potential health effects on workers are continuing.

Based on the recent analysis of groundwater conditions associated with the site, on-site contamination does exist in the shallow aquifer. Benzene and trichloroethylene were detected in concentrations that exceeded the health comparison values. The Consent Judgement in 1982 called for a two foot thick slurry wall groundwater containment system and construction of a clay cap as well as control of water levels to prevent off-site migration of groundwater. Though the recommended on-site water table levels have been exceeded on some occasions since remediation, there has been no evidence of off-site migration of the contaminants of concern.

Residential wells and municipal wells show no evidence of site-related contamination. All contaminant levels are below drinking water criteria as established by the U.S. EPA. Recommendations stated in the PHA included periodic sampling and analyses of fish and wildlife in the area for contaminants of concern and periodic monitoring of groundwater on and off-site to identify and track any contaminant plumes that may occur. The PHA further recommended that potential redistribution of contaminated sediment deposits in the Pine River be carefully considered if the downstream dam was to be removed.

Subsequent to the PHA, sampling of fish from the Pine River (1989) was conducted indicating that PBB levels had decreased relative to previous analyses. However, DDT and its metabolites were found at unacceptable levels. Although Pine River sediments have not been recently sampled, concern for redistribution of sediments remains an issue if removal or modification of the St. Louis dam comes under consideration.

RECOMMENDATIONS

Status of Previous ATSDR Recommendations

1. The MDPH and ATSDR support continuation of the recommendation in the PHA for periodic monitoring of local fish and wildlife.

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2. With regard to groundwater, further analysis of the deep aquifer is needed to confirm that it is not being impacted by site-related contaminants. Furthermore, the potential quality control/quality assurance problems noted about the 1992 TA Study should be taken into consideration in any new studies. Chlorides and bromides should be added to the list of inorganic parameters to be evaluated in future groundwater investigations.

New Recommendations

The MDPH and ATSDR further recommend that:

1. In concurrence with the 1982 Consent Judgement, on-site groundwater levels be maintained at or below a level of 724.13 feet above mean sea level to reduce potential for off-site migration of contaminated groundwater.
2. The effectiveness of the slurry wall and surface water collection system in preventing contaminants from entering the Pine River be closer evaluated.

As more information becomes available, the MDPH and ATSDR may perform a health consultation on the VCC site based upon the results of any new data.

Health Activities Recommendation Panel Statement

The data and information used in developing this Site Review and Update have been evaluated to determine if follow-up actions may be indicated. No further public health actions are indicated at this time.

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