

Site Review And Update

LODI MUNICIPAL WELLFIELD

BOROUGH OF LODI, BERGEN COUNTY, NEW JERSEY

CERCLIS NO. NJD980769301

SEPTEMBER 29, 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**

Site Review and Update: A Note of Explanation

The purpose of the Site Review and Update is to discuss the current status of a hazardous waste site and to identify future ATSDR activities planned for the site. The SRU is generally reserved to update activities for those sites for which public health assessments have been previously prepared (it is not intended to be an addendum to a public health assessment). The SRU, in conjunction with the ATSDR Site Ranking Scheme, will be used to determine relative priorities for future ATSDR public health actions.

SITE REVIEW AND UPDATE
LODI MUNICIPAL WELLFIELD
BOROUGH OF LODI, BERGEN COUNTY, NEW JERSEY
CERCLIS NO. NJD980769301

Prepared by:

New Jersey Department of Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

SUMMARY OF BACKGROUND AND HISTORY

The Lodi Municipal Well site is located in the Borough of Lodi, Bergen County, New Jersey. The Borough is highly developed and densely populated. The Lodi Municipal Wellfield consists of eleven municipal wells, and are named by their street locations; Arnot Street, Columbia Avenue, Garfield Avenue, Corabelle Avenue, Home Place, Kimmig Avenue (Four wells), Lawrence Avenue, and Terrace Avenue. Figure 1 depicts the location of the Lodi Municipal Wells.

From the early 1900's to the beginning of the 1980's, the Lodi Water Department supplied the majority of the Borough's residential and commercial water needs from the series of municipal wells which tapped the bedrock aquifer. The first of these, the Arnot Street well, was installed in 1923; the eleventh and last, the Home Place well, was installed in 1965. Two of the eleven wells, Corabelle Avenue and Kimmig Avenue #6, were abandoned shortly after their installation in the 1920's because they failed to produce sufficient amounts of water, leaving nine wells to comprise the Lodi Municipal Wellfield.

In April 1981, contamination with volatile organic compounds (VOC's) was first detected in Arnot Street, Garfield Avenue, and Home Place wells during the New Jersey Department of Environmental Protection and Energy's (NJDEPE) water sampling. Total VOC's exceeding the NJDEPE Division of Water Resources (DWR) guidance for potable water in the Arnot Street and Garfield Avenue wells. The compounds found at the highest concentrations were trichloroethylene (TCE) and carbon tetrachloride. In June 1981, the Arnot Street and Garfield Avenue wells were closed at the request of NJDEPE.

In October 1981, water from the Kimmig Avenue #4 well was found to contain VOC's exceeding the NJDEPE-DWR guidance for potable water (primarily TCE). However, VOC's in the combined flow from the Kimmig Avenue pump station, including Kimmig Avenue well #'s 4, 5, and 7, did not exceed the guidelines. Kimmig Avenue well # 4 remained in operation.

In December 1982, NJDEPE recommended that the Borough of Lodi implement a treatment system for the contaminated wells (Arnot Street, Garfield Avenue, and Kimmig Avenue # 4 wells). The Borough of Lodi did not follow these recommendations.

In January 1983, the Arnot Street well was placed back into service as contaminant levels declined in this well water.

In September 1983, NJDEPE tested the Home Place, Garfield Avenue, Kimmig Avenue, and Lawrence Avenue wells for radiological contamination as part of a remedial investigation (RI) which was being conducted at the Maywood Chemical site (approximately two miles north of the Borough of Lodi). Levels of gross alpha and beta activity above federal water quality standards were detected in the Home Place well. Additional radiological sampling of the Lodi wells by NJDEPE was conducted in late 1983 and early

1984. The highest gross alpha radiation activity was detected at the Kimming Avenue pump station during September 1983 sampling.

In April 1984, the United States Environmental Protection Agency (USEPA) performed a hazard ranking of the Home Place Well, and the well was proposed for inclusion in the National Priority List (NPL) in October 1984.

In June 1985, a tap water sample collected by the Lodi Water Department from a local business showed the presence of VOC's including tetrachloroethylene (PCE), trichloroethylene (TCE), and carbon tetrachloride. Consequently, the seven operating Lodi wells were sampled and detectable levels of VOC's were found in all of the wells.

In April 1986, all of the Lodi municipal wells, except the Terrace Avenue well, were closed. On June 1, 1987, the Terrace Avenue well was also closed due to the elevated levels of tetrachloroethylene(PCE).

The phase I Remedial Investigation (RI) was completed in 1989, and concluded that groundwater at the Home Place well is contaminated with elevated levels of uranium, thorium, and radium. Volatile Organic Compounds (VOCs) were detected in all the municipal wells tested. The extent of contamination indicated that the presence of VOC's is attributable to multiple sources upgradient and appears to be a regional problem.

The Feasibility study (FS) was completed in December 1989, and the addendum to the Phase I RI was completed in 1990.

In March 1991, NJDEPE conducted a private well user survey in Borough of Lodi and tested all the private wells for contamination.

A supplemental RI report was completed in November 1992, to determine the source of radionuclides in the Home Place well, specifically to determine whether the radionuclides are naturally occurring or are derived from contamination at the Maywood Chemical site located approximately two miles north of Lodi. Activities at the Maywood site included the processing of monazite (a rare earth element phosphate mineral) to extract thorium (a radioactive element) and rare earth oxides. A Record of Decision (ROD) is expected to be signed in the fall of 1993.

In December 1987, the New Jersey Department of Health (NJDOH) completed and published a report on Drinking Water Contamination and the incidence of leukemia. This epidemiological study was conducted to assess the possible relationship between the incidence of leukemia and the contamination of drinking water supplies with VOCs. Six years of incidence data (1979 - 1984) on leukemia were collected from the New Jersey Cancer Registry. The populations served by community water supplies were classified into exposure categories according to VOCs contamination status based on 1984 - 1985 sampling data and historical information. The Borough of Lodi was included in the study.

The study concluded that drinking water contaminated with VOCs may increase the incidence of leukemia among exposed females, but limitations inherent in the ecological study design preclude causal inference.

In June 1990, the ATSDR and NJDOH completed a Health Assessment for the site. The primary completed exposure pathway identified involves the past exposure of residents to volatile organic compounds (VOCs) in municipal well water through ingestion, inhalation, and direct contact. It also concluded that some residents and local industries still rely on water supplied from private wells which may tap into the Passaic Member, the aquifer which supplied the Lodi Municipal wellfield.

The 1990 Health Assessment identified the following community health concerns: 1) The potential adverse health effects of the past exposure to contaminated municipal well water prior to their closures. 2) The residents feels that they have higher than normal cancer rates due to use of contaminated drinking water in the past. Cancer rates among females are thought to be especially high. 3) The residents complained of unpleasant taste and odors about the present quality of public water even after utilization of alternate sources.

The 1990 Health Assessment identified the following public health concerns: 1) The Borough of Lodi residents using municipal well water have probably been exposed to VOCs in the past at concentrations that may result in adverse health effects. 2) Local residents and businesses who still rely on private wells for their drinking water supply may be at risk.

In summary, in 1990 the ATSDR and NJDOH categorized the site as a potential public health concern because human exposures to VOC's and radionuclide contamination, specifically uranium (234 and 235) is likely to have occurred in the past. In addition, NJDOH concluded that further information is needed to adequately assess the impact of the site on public health. Recommendations were made to conduct the following activities: 1) An identification and characterization of the sources of contamination; 2) All private well users in the region should have their water supplies tested for possible chemical and radiological contamination; 3) The site be considered by the NJDOH for inclusion in a larger scale retrospective epidemiological study to evaluate the potential relationship between public drinking water contamination and the incidence of leukemia and non-Hodgkin's lymphoma; 4) To characterize the potentially sensitive subpopulations in the Borough of Lodi that may be more susceptible to adverse health effects as a result of exposure to contaminated drinking water supplies; and, 5) A comprehensive groundwater analysis should be conducted in order to determine whether the Maywood site is the primary source of contamination.

In April 1992, the New Jersey Department of Health (NJDOH) completed and published a report on Public Drinking Water Contamination and Birthweight, Fetal Deaths, and Birth Defects (Cross-Sectional Study). In May, 1992 the New Jersey Department of Health (NJDOH) completed and published a report on Public Drinking Water Contamination and Birthweight, and Selected Birth Defects (Case-Control Study).

These studies were initiated in cooperation with Centers for Disease Control (CDC) in response to considerable public health concern in New Jersey (NJ) about the quality of drinking water. The Borough of Lodi was included in both studies to evaluate the potential relationship between public drinking water contamination and adverse reproductive outcomes. The studies utilized data from birth certificates, fetal death certificates, New Jersey Birth Defects Registry forms, and data obtained from NJDEPE's A-280 Program which requires all public water purveyors to sample their water distribution system twice annually for 14 volatile organic chemicals (VOCs), polychlorinated biphenyls (PCBs), and chlordane. In addition, phone interviews were conducted of the mothers of the cases and controls for case-control study. The study period was January 1, 1985 to December 31, 1988, the four years commencing when the Birth Defects Registry was initiated and the New Jersey drinking water monitoring statute took effect. After the data were analyzed for cross-sectional and case-control study positive statistically significant associations were found between increased prevalence of the adverse reproductive outcomes and exposure to the drinking water contaminants.

In May 1993, the NJDOH completed and published a report on drinking water contamination and the incidence of leukemia and non-Hodgkin's lymphoma.

The NJDOH previously conducted an exploratory study of leukemia incidence in a part of the state with a broad range of contamination. Comparison of data from the New Jersey State Cancer Registry (NJSCR) with the water testing results from 1984 - 1985 demonstrated a statistically significant association between the concentrations of TCE and PCE and the overall leukemia rate among females from 1979 to 1984 in 27 towns including the Borough of Lodi.

The current investigation expands the earlier NJDOH study from 27 to 75 towns for the 1979 - 1987 period and also includes non-Hodgkin's lymphomas as well as leukemia. The study showed associations between towns "ever" contaminated with both TCE and PCE and the incidence of childhood Acute Lymphocytic Leukemia (ALL) and non-Burkitt's high grade NHL among females.

CURRENT CONDITIONS OF SITE

On May 18, 1993 Narendra P. Singh, and Jeffrey J. Winegar of the NJDOH conducted a site visit of Lodi Borough Municipal Wellfield accompanied by the ATSDR Regional Representative, Steven L. Jones, the U.S. Environmental Protection Agency (USEPA) site manager, and a representative of the Bergen County Department of Health Services. The site visit included a formal presentation by the USEPA.

The Lodi Municipal Wellfield site was found to be a group of 11 separate wells. Most of the wells are housed in small wooden or concrete buildings surrounded by a chain link fence. The structures were secure and there was no evidence of any trespassing on the site.

As noted in the site documents, the surrounding area is largely residential. Conditions at the site have not changed since the 1990 public health assessment.

A Supplemental Remedial Investigation released in November 1992, contained additional site data. It was unclear whether the source of the radioactivity is from natural causes or are a result of exogenous contamination of the bedrock aquifer from the Maywood Chemical Site. However, the Supplemental RI determined that the source of radioactivity was naturally occurring from rocks in the Passaic Formation and not from the Maywood Chemical site.

CURRENT ISSUES

The NJDEPE private well user survey indicated that presently only commercial and industrial users are utilizing groundwater for non-potable applications. Currently, there are no completed exposure pathways associated with the site. However, the ATSDR and the NJDOH have public health concerns regarding past exposures to residents who were exposed to the contaminated municipal well water. Municipal water is now available to all residents.

Community concerns are associated with the potential health risks resulting from past exposure to the contaminated municipal well water. This is exacerbated since it is not known, prior to 1981, when contamination occurred.

CONCLUSIONS

1. Based on the available information, the groundwater of the Lodi Borough Municipal Wellfield is grossly contaminated with VOC's and radionuclides.
2. Conclusions that were made in the 1990 health assessment regarding the site being of potential (indeterminate) public health concern (hazard) remain valid. Residents may have been exposed to contaminants in the past at levels that may cause adverse health effects. ATSDR and the NJDOH currently consider the site to have posed an indeterminate public health hazard in the past as a result of exposure of chronic duration to contaminated groundwater. No data are available indicating the nature and extent of contaminants from which to evaluate the public health significance of potential exposures prior to 1981. This information is needed to completely evaluate the community health concerns about past exposures to contaminated drinking water.
3. Under present site conditions there are no completed exposure pathways associated with the contaminated wellfield because alternate sources of drinking water are provided to the residents. However, potential for exposure does exist via use of private well water for non-potable purposes.

4. The recommendation in the health assessment that the site be considered for inclusion in the NJDOH epidemiological study on contamination of public drinking water was satisfied.
5. As recommended in the health assessment, the Supplemental RI was conducted to find the source of radiological contamination and the extent of groundwater contamination. It reported that radiological groundwater contamination was naturally occurring in the rocks of the Passaic Formation and not from the Maywood Chemical site.

RECOMMENDATIONS

After a review of the most recent documents and the current site conditions for the Lodi Borough Wellfield site, the ATSDR and the NJDOH have determined that, while no current human exposures are occurring at the present time, there is concern about past exposures. It is, therefore, recommended that the municipal well be considered as a candidate for ATSDR's exposure dose reconstruction. After the exposure dose is determined, then a health consultation should be performed to determine the public health significance of past exposure to contaminated drinking water.

Future environmental, toxicological, health outcome data or changes in the conditions as a result of implementing the proposed plan, may determine the need for additional actions at this site.

The data and information developed in the Site Review and Update have been evaluated to determine if follow-up actions may be indicated. Further site evaluation is needed to determine follow-up actions.

DOCUMENTS REVIEWED

1. Environmental Health Service, NJDOH - Report on Drinking Water Contamination and the Incidence of Leukemia and Non-Hodgkin's Lymphoma. May 1993.
2. Ebasco Services, Inc., Draft Supplemental Remedial Investigation Report for the Lodi Municipal Well Site, Lodi, Bergen County, New Jersey. November 1992.
3. Environmental Health Service, NJDOH - Report on Phase IV-B: Public Drinking Water Contamination and Birthweight, and Selected Birth Defects, a Case-Control Study. May 1992.

4. Environmental Health Service, NJDOH - Report on Phase IV-A: Public Drinking Water Contamination and Birthweight, Fetal Deaths and Birth Defects, a Cross-Sectional Study. April 1992.
5. Ebasco Services, Inc., Draft Work Plan Addendum to Phase I Remedial Investigation for the Lodi Municipal Well Site, Borough of Lodi, Bergen County, New Jersey. October 1990.
6. NJDOH Health Assessment for the Lodi Municipal Wellfield, Lodi, Bergen County, New Jersey. June 1990.
7. Ebasco Services, Inc., Draft Final Remedial Investigation Report (Phase I) for the Lodi Municipal Well Site, Borough of Lodi, Bergen County, New Jersey. December 1989.
8. Ebasco Services, Inc., Draft Feasibility Study Report for the Lodi Municipal Well Site, Borough of Lodi, Bergen County, New Jersey. December 1989.
9. Environmental Health Service, NJDOH, Drinking Water Contamination and the Incidence of Leukemia: An Ecologic Study. December 1987.
10. CDM, Inc., Final Community Relations Plan for the Lodi Municipal Well Site, Borough of Lodi, Bergen County, New Jersey. November 1987.

INTERVIEWS/PERSONAL COMMUNICATIONS:

1. USEPA:

Site Manager

2. Site Remediation Program/NJDEPE:

Site Manager

Community Relations Manager

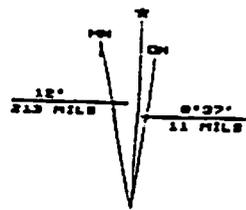
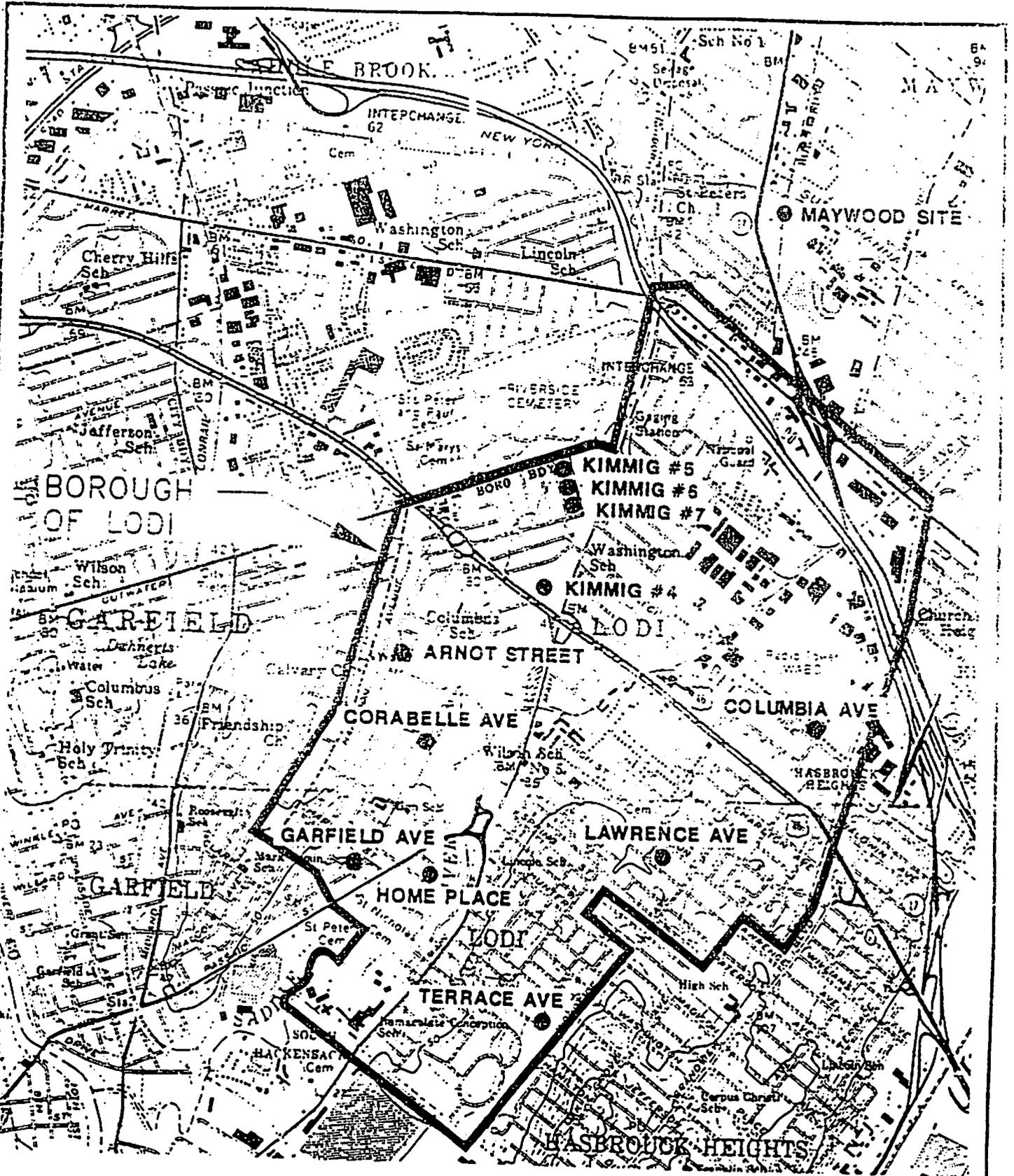
**3. Emergency Response/Hazardous Materials Unit/ Bergen County
Department of Health Services:**

Environmental Health Specialist

PREPARERS OF REPORT

Preparers of Report:

**Narendra P. Singh, M.D., M.S., C.I.H.
Research Scientist III
ATSDR Health Assessment Project
Environmental Health Service
New Jersey Department of Health**



SCALE 1:24800



U.S. ENVIRONMENTAL PROTECTION AGENCY
 LODI MUNICIPAL WELL SITE
 FIGURE 1
 LOCATIONS OF LODI MUNICIPAL WELLS AND VICINITY