M-772

Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey

US Army Corps of Engineers®

HEALTH CONSULTATION

MAYWOOD CHEMICAL COMPANY SITE

RESIDENTIAL AND MUNICIPAL VICINITY PROPERTIES

MAYWOOD, BERGEN COUNTY, NEW JERSEY

CERCLIS NO. NJD980529762

DECEMBER 1995

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Federal Facilities Assessment Branch
Energy Section
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

HEALTH CONSULTATION

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CERCLIS# NJD980529762
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December 1995

prepared by

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY
DIVISION OF HEALTH ASSESSMENT AND CONSULTATION
FEDERAL FACILITIES ASSESSMENT BRANCH
ENERGY SECTION

STATEMENT OF ISSUES

On July 30, 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) released a public health assessment for the Maywood Chemical Company Site in Bergen County, New Jersey. Staff members of the New Jersey Department of Environmental Protection and the New Jersey Department of Health prepared the assessment [1]. The public health assessment concluded that humans had probably been exposed to hazardous substances at this site at concentrations that may result in adverse health effects and that characterization and remedial projects should incorporate off-site evaluation and assessments of the potential effects these contaminants could have on the surrounding population. Extensive radiological surveys and characterizations have been done on the vicinity properties in Maywood, Lodi, and Rochelle Park since the data were reviewed for the assessment.

Local governments and residents in these three communities have expressed health concerns related to past and present exposures to the radiological and chemical contaminants on the vicinity properties. To address the immediate health concerns of residents living on or near the properties that have been designated for remediation and the health concerns of residents living on properties remediated before 1987, we evaluated 1980s and 1990s environmental sampling data for residential and municipal properties. We used worst-case exposure scenarios to determine whether current radiological contaminants could pose a health risk to residents of the area. We also considered public works employees who may be exposed to contamination while performing their normal duties. Data for chemical contaminants on these properties were limited; however, we performed evaluations for chemical contaminants when possible. The scope of this consultation does not cover exposures prior to the 1980s.

Our findings are as follows:

1. *Current levels of radiological contaminants in surface soils on residential properties do not pose a public health hazard. Most of the surface soil contamination is in discrete spots, and the properties are well vegetated or covered. Although this surface soil contamination is not considered a significant health concern, the concentrations exceed the current clean-up levels agreed to by the Department of Energy (DOE) and the Environmental Protection Agency (EPA) [2], and contamination could be spread to other properties. Therefore, we agree with Alternative 2 (expedited removal of contaminated materials from the vicinity properties and permanent disposal at an appropriately licensed commercial facility) proposed by DOE in "Engineering Evaluation/Cost Analysis for the Cleanup of Residential and Municipal Vicinity Properties at the Maywood Site, Bergen County, New Jersey" [2].*

2. *Under current conditions, levels of radiological contaminants in subsurface soils on residential properties do not pose a public health hazard.*

3. *Under the current conditions at the Lodi (Jet Age) Municipal Park, the Fireman's Memorial Park, Fire Station No. 2, and the John F. Kennedy Municipal Park, the radiological contaminants in the surface and subsurface soils do not pose a health hazard as long as soil-disturbing activities do not occur. Persons planning to dig on any of these properties or work on the storm sewers under the properties should notify the DOE or its contractor. Mowing grass and maintaining these properties without significant soil-disturbing activities should not be a health concern.*

4. *Although it does not appear that chemical contaminants are currently flowing down Lodi or Westerly brooks in a manner that would contaminate residential or municipal properties, anyone who has a need to enter the underground culverts should notify DOE or its contractor and should be properly trained by their employer to enter confined spaces.*

5. *The DOE chose three residential properties in Lodi to perform limited chemical analysis of the soils. A soil sample collected at 0 to 2 feet deep on one of the residential properties had 1,000 milligrams of lead per kilogram of soil(mg/kg). This concentration of lead in surface soils on a residential property could be a health hazard. We do not believe it is related to the Maywood Chemical Company Site, since these levels of lead are not found in other areas contaminated with waste from the former Maywood Chemical Company operations. Since there are children living at the residence and the concentration of lead could be higher in the surface soil (0 to 3 inches), we forwarded information on the lead levels to the Bergen County Health Department for follow-up. County representatives agreed to arrange for blood-lead level testing of the children.*

Following the completion of this health consultation, DOE informed ATSDR that five additional properties in Lodi have been remediated for the radioactive contamination: 90 Avenue C, 79 Avenue B, 108, 112 and 113 Avenue E. One of the properties contained the elevated lead concentrations in the soil (described above). No reports containing surveys or sampling of these properties have been reviewed by ATSDR at this time.

We recommend the following:

1. *Continue removal of contaminated materials from the residential and municipal vicinity properties and permanent disposal of the contaminated materials at an appropriately licensed commercial facility.*

2. *Notify DOE (or its contractor) before digging on any of the designated properties or working on the storm sewers under these properties. Radioactive contaminated soils should not be removed or disposed of except by representatives of DOE or by its contractor.*

3. *Train anyone who has a need to enter the underground culverts in accordance with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations cited in Title 29 of the Code of Federal Regulations, Part 1910.120, Hazardous Waste Operations and Emergency Response, and Part 1910.146 for entry into confined spaces. This training should be provided by the individual's employer.*

4. *Follow up to assure that children living on the property with elevated lead in the soil have not been adversely affected.*

This health consultation is based on data and information made available to ATSDR. The conclusions and recommendations are based on current levels of contaminants in the surface and subsurface soils of characterized properties and surface water and sediment in Lodi Brook headwaters and Westerly Brook. If additional information is received, ATSDR scientists will evaluate it. The analyses of additional data could alter the conclusions and recommendations presented here.

BACKGROUND

From 1916 until 1959, the former Maywood Chemical Company extracted thorium and rare earth metals from monazite sands for the manufacturing of gas lantern mantles and other industrial products [3,4]. The company also produced other chemical compounds. Process waste from the thorium and other chemical processes was piped to diked areas west of the plant. Although the process removed some of the thorium, unextracted thorium, other naturally occurring radioactive materials, and rare earth metals were still present in the waste. Radioactive contaminants were spread to neighboring properties when the waste products were used as mulch and fill material and by apparent migration associated with the drainage of Lodi Brook. Highway 17, which separates the disposal area to the west from the rest of the property, was built in 1932. The Stepan Company bought the company in 1959 but never processed any radioactive materials. Stepan removed waste from west of Highway 17 in 1966, 1967, and 1968, but it was later discovered that not all the waste had been removed. An aerial radiological survey and subsequent ground surveys in 1981 identified additional contamination north and south of the plant. The contaminated areas included commercial, residential, and municipal properties in Maywood, Lodi, and Rochelle Park [3,4].

The Energy and Water Development Appropriations Act of 1984 authorized the DOE to undertake a decontamination project at the Maywood site [3]. As part of this project, DOE had numerous properties in the three communities surveyed and characterized for radioactive contamination [5 - 48]. Some of the residential properties were remediated before 1987, and the waste was stored at DOE's Maywood Interim Storage Site in Maywood [3,5,6 and 7]. Some properties were designated for cleanup but have not yet been remediated, and some properties were surveyed but were not designated for cleanup. (Refer to Attachments 1 and 2.) DOE representatives chose three residential properties to test for metals, polychlorinated biphenyls, and total petroleum hydrocarbons [3]. The remaining residential and municipal properties have not been tested for any chemicals. DOE is only responsible for chemicals used during the processing of thorium ores. Other chemicals are the responsibility of EPA.

During ATSDR site visits and public availability sessions, residents in these three communities and local government officials have expressed health concerns related to past and present exposures to the radiological and chemical contaminants on the vicinity properties [49,50,51]. Some families with young children were unaware that they were living on contaminated properties and had immediate concerns about the health of their children. ATSDR staff members addressed these concerns in separate letters to these individuals. To address the health concerns of residents living on or near the contaminated properties and residents living on properties that were remediated before 1987, we evaluated 1980s and 1990s sampling data for residential and municipal properties [5 - 43,45,47 and 48].

DISCUSSION

ATSDR staff members analyzed the available environmental sampling data for soils and outdoor gamma rate measurements for residential and municipal properties, indoor gamma rate and radon-222 measurement results for residential properties, and sampling data for surface water and sediments in Westerly Brook and the headwaters of Lodi Brook [3,5 - 48]. Thorium-232 (Th-232), radium-226 (Ra-226), and uranium-238 (U-238) were the three predominant radioactive contaminants identified. We reviewed data for 25 residential properties previously remediated, 8 residential properties characterized but not requiring remediation, 31 residential properties scheduled for remediation, 4 municipal properties in Lodi scheduled for remediation, and 20 municipal properties and 5 streets in Maywood also not requiring remediation. We also reviewed chemical analysis data for soils from three residential properties in Lodi that were tested during DOE's remedial investigation [3].

Residential Properties

ATSDR staff members reviewed survey reports for 25 properties remediated in Maywood, Lodi, and Rochelle Park before 1987 [5,6,7]. The soil samples were collected from the surface of the bottom of the excavations before clean soil was brought in to replace the removed soils. The radioactive contaminant concentrations and gamma rate levels were not a health hazard.

Eight of the properties that were characterized but not designated for cleanup do not need remediation [3,19,31,38,39,40,41 and 47]. No radioactive contaminants that would present a public health concern were found in the surface or subsurface soils of those properties. One gamma rate measurement was slightly elevated but was still below a level of health concern.

We also reviewed the available data on indoor gamma rates and indoor radon-222 gas measurements for the 31 residential properties scheduled for remediation. None of the results from the indoor radon-222 gas measurements exceeded the EPA's recommendations of 4 picocuries per liter (pCi/L)--0.15 becquerels per liter (0.15 Bq/L)--of radon-222 in air and 0.02 working levels (WL)[1] [52]. Indoor gamma rate measurements were taken in 13 of the 31 designated residences. For an initial screening of these homes, we assumed a worst-case scenario. One home that has radioactive contamination under part of the house has an

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[1] A picocurie (pCi) is equal to 2.2 disintegrations per minute. One becquerel (Bq) is equal to 1 disintegration per second or 27 pCi. Both are units used to describe radioactivity.

A working level (WL) is a unit used in measuring radon decay products. One WL is equal to any combination of short-lived radon decay products in a liter (L) of air that will result in 1.3 x 10^5 MeV (million electron volts) of potential alpha energy.

average measurement of 17 microroentgens per hour (17 μR/hr)[2] including background. For this scenario, we assumed that an individual could be continuously exposed at the average gamma rate measured for an entire lifetime. Assuming this worst-case scenario, this level of exposure would not be a public health hazard [53].

The surface and subsurface soil concentrations for the three predominant radioactive contaminants are as follows: [3,4]

	Th-232	Ra-226	U-238[5]
Maximum surface soils	112 pCi/g (4.15 Bq/g)	11.8 pCi/g (0.44 Bq/g)	51.2 pCi/g (1.9 Bq/g)
Average surface soils	6.47 pCi/g (0.24 Bq/g)	1.49 pCi/g (0.06 Bq/g)	8.73 pCi/g (0.32 Bq/g)
Maximum subsurface soils	115 pCi/g (4.26 Bq/g)	10.8 pCi/g (0.4 Bq/g)	37.4 pCi/g (1.39 Bq/g)

During our review of the residential properties, we looked at three age groups (2- to 3-year-olds, 10-year olds, and adults) because of differences in behavior patterns. We considered climatic and vegetation patterns for the area [4]. We looked at the current uses of each property [49,50,51]. We considered ingestion of soils, inhalation of indoor and outdoor dust, and external exposures [54,55]. For the worst-case scenarios, we included exposure through ingestion for a pica child[6] and exposure through inhalation for an adult working outdoors. We used maximum surface and subsurface soil concentrations . (We learned during the public availability sessions that soil-disturbing activities have occurred on some of these properties [51].) The estimated total doses to an individual were less than 100 millirem per year (mrem/yr), or 1 millisievert per year (mSv/yr),[7] except for one case [56]. In that case, the maximum concentration of radioactive contaminants in soils 0 to 6 inches is under the

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[2] A microroentgen is equal to 10^{-6} roentgen, which is a unit of exposure to ionizing radiation in air under standard conditions.

[3] A pCi of a radioactive contaminant per gram of soil is expressed as pCi/g. A Bq of a radioactive contaminant per gram of soil is expressed as Bq/g.

[4] DOE and EPA have established clean-up levels for these properties of 5 pCi/g above background at all depths for radium-226 and thorium-232 combined and 100 pCi/g above background for total uranium.

[5] The maximum and average concentrations for U-238 have to be qualified, since not all properties were tested for U-238 contamination.

[6] A pica child is a child with a craving for unnatural food, e.g. soils or ashes.

[7] A millirem (mrem) and a millisievert (mSv) are units of dose equivalent. One millirem is equal to 0.01 millisievert (1 mrem=0.01 mSv).

house, and the maximum subsurface contamination is from 5 to 6 feet deep [3]. If a pica child were chronically exposed to this soil, the child could receive an exposure of slightly higher than 100 mrem/yr (1 mSv/yr) [54,56]. This scenario would be highly unlikely under the current conditions; therefore, we evaluated a more realistic scenario using the average soil concentrations for radioactive materials in contaminated areas. Based on those criteria, the total estimated exposure for a pica child would be less than 10 mrem/yr (0.1 mSv/yr). The total estimated exposure for other individuals, including an adult working outdoors, would also be less than 10 mrem/yr (0.1 mSv/yr). The soil concentrations of radioactive contaminants are not a health hazard; however, remediation will prevent the spread of these radioactive contaminants.

Soils from three residential properties in Lodi were tested for metals, polychlorinated biphenyls, and total petroleum hydrocarbons during DOE's remedial investigation [3]. A composite core sample taken from 0 to 2 feet below the surface on one of these properties contained 1,000 mg lead/kg soil. Since the concentration of lead in the surface soil (0 to 3 inches) could be higher and since children are living on this property, we believe that this concentration of lead is a public health concern. Therefore, ATSDR staff members contacted the Bergen County Health Department for appropriate followup. ATSDR scientists do not believe this concentration of lead is related to the former Maywood Chemical Company Site, since similar lead concentrations have not been found on other parts of the site where thorium contamination was measured. Since there were no other chemical data available on the residential properties, we looked at other information to determine whether further chemical testing should be performed. Lodi Brook begins on the Sears and adjacent commercial properties, and Westerly Brook flows under the Maywood Interim Storage Site and collects surface water runoff. Therefore, we evaluated water and sediment data from samples collected at the headwaters for Lodi Brook and samples collected along Westerly Brook and its confluence with Saddle River [3,44 and 57]. Chemicals have been detected above background levels in Westerly Brook and in the headwaters of Lodi Brook ; however, they were not at levels that would be of public health concern to occupants of the neighboring residential and municipal properties. As a safety measure, anyone who has a need to enter the underground culverts should notify DOE or its contractor and should be properly trained on entry to confined spaces.

Municipal Properties

We reviewed survey reports for 20 municipal properties and 5 streets in Maywood [37,42,43]. The properties are listed in Attachment 1. Gamma rates were not elevated to a level of public health concern.

Four Lodi municipal properties are designated for cleanup [15,32,33,34]. Contamination at three of those four properties (J.F. Kennedy Park, Firemen's Memorial Park, and Fire Station #2) is predominantly subsurface. Borough officials and representatives of DOE and its contractor monitored recent modifications to the J.F. Kennedy Park. ATSDR staff members

observed those activities during two visits to Lodi. The majority of the radioactive contamination at the J.F. Kennedy Municipal Park is 4 to 7 feet deep [34]. The backyard of the fire station has a small area of surface contamination that could be remediated easily; however, the subsurface contamination would be much more difficult to address, since it is directly under the firehouse and parking lot [33]. The Firemen's Memorial Park has only subsurface contamination [32]. Under current use conditions, the soil at these properties does not pose a public health hazard. Contamination at Lodi Municipal Park (Jet Age or Redstone Lane Park) is predominantly subsurface ; however, there are also areas of surface contamination [15]. The highest concentrations of radioactive contaminants in the surface soils are toward the back of the property, away from the street. This area is well vegetated and does not appear to be used everyday. The subsurface contamination follows the low contours of the property where the storm sewer line is located. The highest gamma rates are also above the current sewer line. These elevated gamma rates are probably caused by soil contamination. Since we do not know what is in the sewer lines, no one should enter the underground culverts without first measuring gamma rates. Also, no one should enter the culverts without proper training from their employer for entry into confined spaces. Based on observations made at the park during different seasons and through conversations with local residents and public workers, it appears that the amount of time people spend on this property and the type of activities that take place on this property do not indicate that people are exposed to radiation at levels that are a public health hazard; nevertheless, the cleanup of this property should be expedited.

CONCLUSIONS

1. Current levels of radioactive contaminants in surface soils on residential properties do not pose a public health hazard.

2. Under current circumstances, levels of radioactive contaminants in subsurface soils on residential properties do not pose a public health hazard.

3. Under the current conditions at the Lodi (Jet Age or Redstone Lane) Municipal Park, the Firemen's Memorial Park, Fire Station No. 2, and the John F. Kennedy Municipal Park, the radioactive contaminants in the surface and subsurface soils do not pose a health hazard as long as soil-disturbing activities do not occur and if indoor gamma radiation levels at the fire station are not elevated. Mowing grass and maintaining these properties without significant soil-disturbing activities should not pose a health hazard.

4. Residential or municipal properties do not appear to be contaminated by chemicals flowing down Lodi or Westerly brooks.

5. A composite core sample taken at 0 to 2 feet below the surface on one of the residential properties had 1,000 mg/kg concentration of lead, which is a health hazard

for children living on this property. (According to DOE, this property has been remediated for radioactive contamination.)

RECOMMENDATIONS

1. Although current levels of radiological contaminants in surface and subsurface soils on residential properties do not pose a public health hazard, there are no controls over these properties and we agree with DOE's Alternative 2--expedite removal of contaminated materials from the vicinity properties and permanent disposal at an appropriately licensed commercial facility--proposed in the Engineering Evaluation/Cost Analysis for the Cleanup of Residential and Municipal Vicinity Properties at the Maywood Site, Bergen County, New Jersey.

2. Ensure that anyone planning to dig on any of the designated properties or work on the storm sewers under those properties notify the DOE or its contractor before doing so and that only representatives of DOE or its contractor remove or dispose of radioactive contaminated soils.

3. Ensure that anyone who has a need to enter the underground culverts be trained by their employer in accordance with Title 29 of the Code of Federal Regulations, Part 1910.120, Occupational Safety and Health Administration's (OSHA) hazardous waste operations and emergency response regulations and Part 1910.146, OSHA regulations for entry into confined spaces.

4. Follow up to determine whether children living on the property with elevated lead in the soil have been adversely affected.

The interpretation, conclusions, and recommendations provided are based on the data and information referenced. Additional data could alter those conclusions and recommendations. The conclusions and recommendations are site specific and should not be considered applicable to any other situation.

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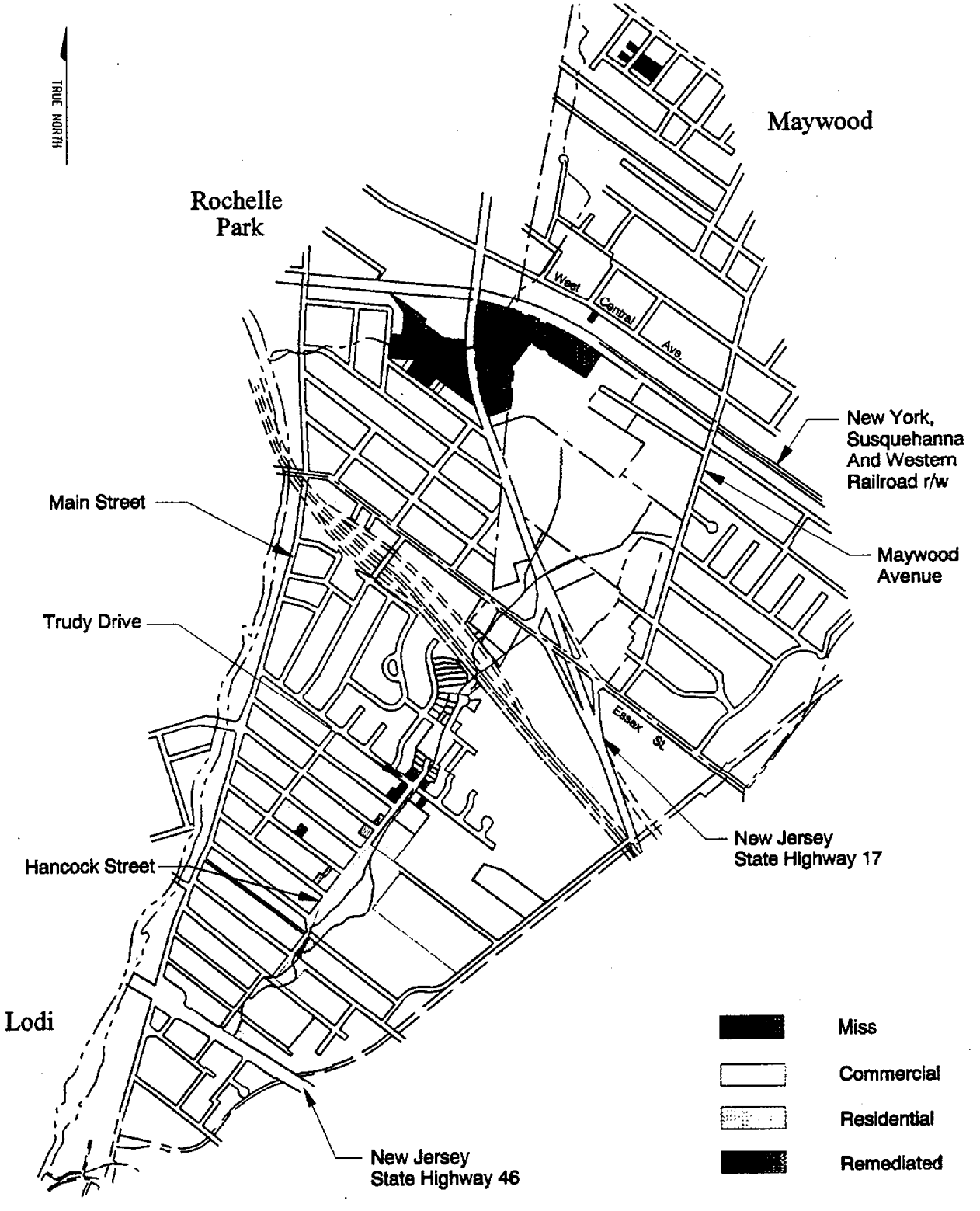
Attachment 1

137898

Locations of Vicinity Properties [58]



ATTACHMENT 2

RESIDENTIAL PROPERTIES PREVIOUSLY REMEDIATED

Lodi

(1) 58 Trudy Drive
(2) 59 Trudy Drive
(3) 61 Trudy Drive
(4) 64 Trudy Drive
(5) 3 Hancock Street
(6) 121 Avenue F
(7) 123 Avenue F
(8) 59 Avenue C

Maywood

(9) 454 Davison Street
(10) 459 Davison Street
(11) 460 Davison Street
(12) 464 Davison Street
(13) 468 Davison Street
(14) 459 Latham Street
(15) 461 Latham Street
(16) 467 Latham Street

Rochelle Park

(17) 10 Grove Avenue
(18) 22 Grove Avenue
(19) 26 Grove Avenue
(20) 30 Grove Avenue
(21) 34 Grove Avenue
(22) 38 Grove Avenue
(23) 42 Grove Avenue
(24) 86 Parkway
(25) 90 Parkway

PROPERTIES SURVEYED BUT NOT REQUIRING REMEDIATION

Maywood - Borough-owned properties:

(1) Pumping station, Spring Valley Ave.
(2) Memorial School, 764 Grant Ave.
(3) Public Library/Municipal Office, 459 Maywood Ave.
(4) Maywood Avenue School, 425 Maywood Ave.
(5) Municipal Pool, Brook Ave.
(6) Public Safety Bldg. & Parking areas, 15 Park Ave.
(7) Dept. of Public Works Garage, 205 E. Hunter Ave.
(8) Pistol Range, E. Hunter Ave.
(9) Playground & School Parking Lot, Fairmont Ave.
(10) Fetzer Park, Cedar & Locust Aves.
(11) Grove Avenue Park, Grove Ave.
(12) Duvier Park, Duvier Place
(13) Parking Lot, Albert Street
(14) Parking Lot, Maywood Ave. & Passaic St.
(15) Vacant Land, Thoma Ave. & Maple Lane
(16) Vacant Land, Brook Ave. & Magnolia Lane
(17) Vacant Land, Duvier Place & Magnolia Lane
(18) Vacant Land (off frontage), Central Ave & Hergesell
(19) Vacant Land, Ward St.
(20) Vacant Land, Brookdale St.

Portions of 5 streets in Maywood

(1) West Central Ave.
(2) Lenox Ave.
(3) West Magnolia Ave.
(4) Thoma Ave.
(5) Taplin Ave.

70 West Hunter Avenue

Lodi

(1) 19 Redstone Lane
(2) 9 Hancock Street

Rochelle Park

(1) 27 Schlosser Drive
(2) 31 Schlosser Drive
(3) 37 Schlosser Drive
(4) 48 Schlosser Drive

Hackensack

(1) 441 Central Avenue

RESIDENTIAL & MUNICIPAL PROPERTIES DESIGNATED FOR REMEDIATION

Lodi

(1) 14 Long Valley Road
(2) 16 Long Valley Road
(3) 18 Long Valley Road
(4) 20 Long Valley Road
(5) 22 Long Valley Road
(6) 24 Long Valley Road
(7) 26 Long Valley Road
(8) 2 Branca Court
(9) 4 Branca Court
(10) 6 Branca Court
(11) 7 Branca Court
(12) 11 Branca Court
(13) 11 Redstone Lane
(14) 17 Redstone Lane
(15) Lodi (Jet Age or Redstone Lane) Municipal Park
(16) 4 Hancock Street
(17) 5 Hancock Street
(18) 6 Hancock Street
(19) 7 Hancock Street
(20) 8 Hancock Street
(21) 10 Hancock Street
(22) 60 Trudy Drive
(23) 62 Trudy Drive
*(24) 108 Avenue E
*(25) 112 Avenue E
*(26) 113 Avenue E
*(27) 90 Avenue C
*(28) 79 Avenue B
(29) 106 Columbia Lane
(30) 99 Garibaldi Avenue
(31) Fireman's Memorial Park
(32) Fire Station #2
(33) John F. Kennedy Municipal Park

* DOE has informed ATSDR that these properties have been remediated for radioactive contaminants. No reports containing surveys or sampling data following remediation activities at these addresses have been reviewed by ATSDR at this time.

Maywood

(34) 136 West Central Avenue
(35) 200 Brookdale Street

DEPARTMENT OF HEALTH & HUMAN SERVICES

097136

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

Mr. William Wisenbaker
Director, Program Support Division
EM-43 Trevion II
Office of Environmental Restoration
U.S. Department of Energy
Washington, D.C. 20585-0002

Dear Mr. Wisenbaker:

The Agency for Toxic Substances and Disease Registry (ATSDR) has completed a Site Review and Update (SRU) on Maywood Chemical Company. The purpose of the SRU 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 will be used in conjunction with the ATSDR Site Ranking Scheme for the Maywood Chemical Company site. The ranking scheme is used to assign a relative rank to the sites for which ATSDR has determined there is a reasonable basis for performance of future public health actions. Sites judged to be a greater public health concern will have a higher priority for ATSDR action. [FR 57 (160): 37382-37389, Tuesday, August 18, 1992]

Under the terms set forth in the Interagency Agreement, ATSDR is providing you and the appropriate Department of Energy personnel with copies of this SRU.

If you have any further questions concerning this SRU, please contact Ms. Carol Connell, Energy Facilities Assessment Section, at (404)639-6068.

Sincerely yours,

Julie J Rayes /for

Robert C. Williams, P.E., DEE
Director
Division of Health Assessment
and Consultation

Enclosure

cc:
Harry J. Pettengill, M.D.
Ms. Gale Turi
Mr. James w. Wagoner, II, Director
Mr. Les Price, Director

Site Review And Update

MAYWOOD CHEMICAL COMPANY

MAYWOOD/ROCHELLE PARK, BERGEN COUNTY, NEW JERSEY

CERCLIS NO. NJD980529762

SEPTEMBER 11, 1992

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

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

MAYWOOD CHEMICAL COMPANY

MAYWOOD/ROCHELLE PARK, BERGEN COUNTY, NEW JERSEY

CERCLIS NO. NJD980529762

Prepared by

Federal Programs Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

SUMMARY OF BACKGROUND AND HISTORY

The Maywood Chemical Company Site, which includes the Stepan Chemical Company (formerly the Maywood Chemical Company) property, Maywood Interim Storage Site (MISS), the Ballod property, the Scanel site, the Sears warehouse and adjacent properties, and residential/governmental properties, is in Maywood, Rochelle Park, and Lodi in Bergen County, New Jersey. It is approximately 13 miles northeast of Newark, New Jersey (Figure 1). According to the 1990 Census, the population of Maywood was 9,473, the population of Rochelle Park was 5,587, and the population of Lodi was 22,355. The local economy is based predominantly on light industry.

From 1916 until 1956, the Maywood Chemical Company extracted thorium and rare earth metals from monazite sands for the manufacturing of gas lantern mantles. The company also manufactured other chemical compounds. All process waste was pumped to a diked area west of the facility. Some of the waste was used off site by residents as mulch and fill dirt. Other waste was spread during the construction of New Jersey Route 17 through the waste area (1932). Waste also was spread through water runoff to the old Lodi Brook. In 1959, Stepan Chemical Company bought the Maywood Chemical Company property and began cleanup of the waste area west of Route 17. Under a license issued by the Atomic Energy Commission (AEC), the waste was buried in three locations on the Stepan Chemical Company's property. The area cleaned was released for unrestricted use by AEC in 1969 and is now the site of a senior citizens home. In 1980, residual radioactive contamination was found on residential and commercial property north and south of the area originally cleaned. In 1982, the U.S. Environmental Protection Agency (EPA) began investigating the site; it was listed on the EPA National Priorities List (NPL) in 1983. Also in 1983, Congress authorized the U.S. Department of Energy (DOE) to clean up the contamination (predominantly radiologic) associated with the thorium processing. DOE purchased 11.7 acres of land from Stepan Chemical in 1985 to use as an interim storage site during remediation efforts.

By 1988, the contaminated properties were identified and were at different investigative, characterization, or remedial stages under the auspices of EPA for chemical characterization/clean-up operations and of DOE for radiologic analysis/remediation. There was substantial evidence of radiologic (predominantly thorium-232) and chemical contamination in the surface soils and sediment on the Sears property, MISS, the Scanel site, and some residential properties, although characterization of the sites was not complete. There was also some evidence of subsurface soil contamination from thorium-232, radium-226, gasoline, and

fuel oils on the Sears property. There was evidence of groundwater contamination on the MISS property, as well as in 11 public water wells in Lodi, which were closed. (Lodi municipal wells are listed separately on the NPL.)

Twenty-four properties (mainly residential) had been fully remediated. In 1984 and 1985, approximately 35,000 yd^3 of contaminated materials were removed from private properties in Maywood and Rochelle Park, and approximately 500 yd^3 had been removed from Lodi. Remediation was halted in 1986 because of opposition on the part of the citizens of Maywood.

Past public health and community concerns at the site included the health effects of radioactive and chemical wastes in the area's soils and groundwater; public resistance to and outrage about the construction of an interim storage site in a relatively densely populated area; a perceived lack of comprehensive characterization of the nature and extent of contamination in the area; and dissatisfaction with the remedial investigation and risk assessments prepared by DOE and DOE contractors.

A health assessment, prepared by the New Jersey Department of Health, Environmental Health Service, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), dated July 30, 1990, concluded that the site was of public health concern because of the risk to human health caused by the likelihood of human exposure to hazardous substances at concentrations that could result in adverse health effects. The assessment also indicated that people probably had been in the past and were probably currently being exposed to chemical and radiologic contamination from their use of contaminated groundwater and contact with contaminated soils. The assessment recommended that both on- and off-site contamination be fully evaluated, and that a coordinated assessment of the total impact of characterization and remedial projects be performed to determine the potential health effects on the surrounding population. Because of the possible human exposure to on- and off-site contaminants, the site was being considered for follow-up health studies.

CURRENT SITE CONDITIONS

ATSDR representatives Carol Connell, Rita Ford, Jack Hanley, Jeff Kellam, and James Walker visited the Maywood-Rochelle Park-Lodi area on July 20-24, 1992. On July 21, 1992, the ATSDR regional representative (Arthur Block), the EPA remedial project manager (Jeff Gratz), the New Jersey Department of Health project manager (Jim Pasqualo), and the New Jersey Department of Environmental Protection and Energy representative (Robert Hayton) accompanied the ATSDR representatives on a tour of the site, which included a

tour of the Stepan Chemical Company property. The MISS property was not toured because a DOE representative was not present. Because remedial actions stopped in 1986, there has been little change in the physical appearance of the properties since the 1990 health assessment was issued.

During the site visit, ATSDR personnel made the following observations:

- Part of the old Lodi Brook remains on the Sears and vicinity property; access is not restricted. During the site visit, it was noted that workers from the nearby DeSaussure Plant ate lunch while sitting on the grass and by the trees along this brook. Also, individuals were seen picking cattails and green apples in the area.

- Although remediation has been halted, DOE has continued to identify and characterize additional properties. Several of the homes in Lodi, which have been characterized, apppear to have recent home improvements. One home in Lodi was partially remediated in 1991 because contaminants potentially posed an immediate risk. DOE has identified other properties as needing remediation, but does not believe they pose an immediate risk. DOE's draft remedial investigation (RI) was completed in July 1992; the draft risk assessment is scheduled for August 1992; the draft feasibility study (FS) for December 1992; the final RI/FS for June 1993; and the record of decision (ROD) for January 1994. Stepan's draft RI is scheduled for late spring 1993, and the draft FS for the summer of 1993.

- Maywood, Rochelle Park, and Lodi are now receiving alternative water supplies. According to the county health department, the water is supplied by Hackensack, which is east of Maywood.

CURRENT ISSUES

There is a high level of public concern about the Maywood Chemical Company site, especially on the part of the citizens of Maywood. The citizens remain opposed to the MISS being located in the area and are concerned that it may be permanent instead of interim.

Public health concerns expressed by state, county, and local agencies include the effects of the contaminants on the communities' health over a long period of time. Specifically, there is concern about the health effects of thorium-232 and its

decay products, which have been identified in soil, and about the potential for exposure at residences by way of ingestion and inhalation.

The 1990 health assessment concluded that the site was of public health concern and should be considered for health studies. In 1991, the Division of Health Studies recommended that ATSDR not conduct a follow-up health study at the site. James Walker, Division of Health Studies, participated in the site visit. Most of the comments and questions during meetings with public health officials were about that issue. The health officials are very interested in having a health study performed.

CONCLUSIONS

In certain areas of Maywood, Rochelle Park, and Lodi, people have been exposed to and will continue to be exposed to low levels of contaminants (mainly thorium-232 and its decay products) in surface soils. Remediation was halted in 1986, and there is no indication that it will begin again. It does not appear that radiologic contaminants threaten groundwater; however, other contaminants have been identified in groundwater, and the communities are receiving alternative water supplies.

The Maywood Chemical Company Health Assessment was reviewed by the Health Activities Recommendation Panel (HARP) in 1990. In December 1990, after review of additional information, it was determined that a public health investigation (a health statistics review) is indicated for the site, and that the health statistics review should focus on cancers. The Maywood Chemical Company site is eligible for funding of the public health investigation under Announcement 230.

As was recommended in the 1990 health assessment, it appears that identification and characterization of on- and off-site contaminants has been and is continuing to be accomplished; EPA is acting as a recipient of information from both DOE and Stepan.

The data and information developed in this site review and update have been evaluated to determine if follow-up actions may be indicated. Further site evaluation is needed to determine public health actions.

RECOMMENDATIONS

1. Continue to gather technical information about the site on a timely basis as the DOE and Stepan Chemical Company schedules progress.

2. The Federal Programs Branch (FPB) will prepare health

consultations of the radiologically contaminated sections of the site. Those consultations will address the public health concerns of the state and local agencies and citizen groups.

3. Upon completion and approval of the remedial investigations by DOE and Stepan Chemical, ATSDR will re-evaluate the need to conduct an additional public health assessment of the site.

DOCUMENTS REVIEWED

1. ATSDR Health Assessment for Maywood Chemical Company, Maywood, New Jersey, CERCLIS NO. NJD980529762, July 30, 1990.

2. Maywood Interim Storage Site Annual Environmental Report for Calendar Year 1990, Maywood, New Jersey, September 1991. DOE/OR/21949-287.

3. DOE's Maywood Fact Sheets, FUSRAP Activities at Maywood, New Jersey, October 1991.

4. Summary of the Radiological Characterization of Residential, Commercial and Municipal Properties in Lodi, New Jersey, prepared by Bechtel National Inc.

5. 1990 Census of Population and Housing, U.S. Bureau of the Census, prepared by New Jersey State Data Center, New Jersey Department of Labor, May 1992.

6. FUSRAP Maywood Interim Storage Site Administrative Record Index, compiled by Bechtel National Inc., April 13, 1992.

097135

MAYWOOD CHEMICAL COMPANY

CERCLIS NO. NJD980529762

MAYWOOD, BERGEN COUNTY, NEW JERSEY

JUL 30 1990

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

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

HEALTH ASSESSMENT
MAYWOOD CHEMICAL COMPANY SITES
BERGEN COUNTY
MAYWOOD, NEW JERSEY

Prepared by:
Division of Science and Research
New Jersey Department of Environmental Protection (NJDEP)
and
Environmental Health Service
New Jersey Department of Health

Prepared For:
Agency for Toxic Substances and Disease Registry (ATSDR)

BACKGROUND

The Health Assessment for the Maywood Chemical Company Site includes the Maywood Interim Storage Site (MISS), the Ballod property, the Scanel site, residential properties, and the Sears warehouse and its adjacent properties, all of which are located in the towns of Maywood and Rochelle Park of Bergen County, New Jersey (see Figure 1). These sites are at different investigative or remediation stages under the auspices of both the US Environmental Protection Agency (EPA) and the US Department of Energy (DOE). The EPA is responsible for chemical characterization and cleanup operations, whereas the DOE is primarily in charge of radiologic analysis and remediation. —

For 40 years, the Maywood Chemical Works Company processed thorium ore for the manufacturing of gas lanterns and mantles. Until cessation of plant operations in 1956, all process wastes were pumped to diked areas west of the facility. In 1932, New Jersey Route 17 was built through the disposal area. Some of these radioactive waste materials were removed from the site and used as fill dirt and mulch for nearby properties. As a result, the Maywood site has led to radioactive and chemical contamination of much of the local area. The site of the former Maywood Company is now owned by the Stepan Chemical Company.

After an accidental discovery of radiologic contamination on property formerly owned by the Stepan Chemical Co. in 1980, testing by the State of New Jersey and the Nuclear Regulatory Commission (NRC) revealed extensive, low level radiologic contamination at several different locations. The 1984 Energy and Water Appropriations Act mandated the DOE to conduct a

decontamination project at the former Maywood Chemical Company (Stepan Chemical Co.) property. As part of this effort, the DOE now owns 11.7 acres of land along the Stepan Chemical Co. property and has constructed the Maywood Interim Storage Site (MISS). The contaminated soils that have been removed from the various Maywood sites are stored at the MISS until a permanent storage facility can be identified.

The Health Assessment for the Maywood site is highly complex due to the inclusion of five different properties, each with different chemical, radiologic and human exposure characteristics. For evaluation purposes, the on-site contamination for each property will be discussed separately in order to clarify the overall analysis.

COMMUNITY CONCERNS

The concerns of the communities involved with the MISS and its associated environmental issues have been extensively documented by DOE, EPA, New Jersey Department of Health (NJDOH), New Jersey Department of Environmental Protection (NJDEP), and through the media. The interests of the municipalities of Lodi, Maywood, and Rochelle Park are interactive and complex in nature, and often the focus of intense discussion and debate. This site is generally considered by concerned citizens to be an ongoing and active threat to the public health and safety.

The general issues of public concern regarding the MISS may be summarized as follows:

* The presence of radioactive and chemical wastes in area soils and groundwater. Although not yet proven, contamination of the Lodi wells is commonly attributed by the public to have originated from the old Maywood Chemical works. Additionally, there is contamination of private and commercial properties in the vicinity of the site.

* The decision to construct an interim storage site for contaminated soils in a relatively densely populated area has met with public resistance and outrage. Governmental assurances of the safety and necessity of this decision have been rejected by area residents and officials.

* The perceived lack of comprehensive characterization of the nature and extent of the radiological and chemical contamination present on the Stepan Chemical Co. property and other suspect areas.

* A dissatisfaction with the remedial investigation and risk assessments performed regarding the site, in light of a publicly perceived condition of incomplete characterization of the nature and extent of contamination.

At a recent meeting (July 1987), that was conducted by NJDOH, the following issues of concern were identified:

* Residents called for the termination of additional storage at the MISS to prevent further contamination of the site. Residents perceive the site as a continuous and growing hazard.

* The immediate commencement of remedial actions.

* The identification of areas within the Stepan property which were utilized for final disposal of hazardous wastes.

* The identification of areas outside the Stepan property which were utilized for the disposal of process wastes.

* Determination of the nature and extent of eight known buried waste deposits associated with the site.

* The identification and remediation of buried drummed wastes cited by members of the community.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

A. On-Site Contamination for the Sears Property

Sears, Roebuck and Co. presently owns a long-term lease on 31 acres of property that is bounded on the west by NJ Route 17, on the north by the MISS and Stepan Co. and by other commercial facilities to the east and south (see Figure 1). One third of the property is occupied by the Sears warehouse which is surrounded by concrete parking and storage areas. Approximately 225 employees work at this location, most of whom spend the majority of their work day inside the warehouse. The remaining area is grass covered with a swampy section off to the east of the building. The southern portion of the property houses several commercial facilities, including two gasoline stations and additional warehouse facilities. Through a consent agreement between the Stepan Company and the EPA, a Remedial Investigation/Feasibility Study (RI/FS) will be

conducted on the Sears property. The Stepan Co. and their contractor, CH2M Hill, are presently developing the RI/FS work plan.

Gamma radiation levels on the property ranged from background levels (5,000 counts per minute (cpm)) to 244,000 cpm. Radioactivity was detected in an area of approximately 940,000 square feet. Sediment samples were also taken from the swamp areas which contained standing water. Water in these locations contained low levels of gross alpha contamination which fell below DOE guidelines. In addition, tests for radiologic contamination were conducted in the subsurface soils below the Sears facility. The maximum contamination level detected in the various soil samples are compared below to the Department of Energy's remedial action guidelines.

TABLE 1: RADIOLOGIC CONTAMINATION OF SOIL MEDIA AT THE SEARS SITE

Radionuclide	Location	Maximum Concentration (pCi/g)	DOE Guideline
Thorium-232	surface soil	70.0+8	5
Thorium-232	sediment	93.0+2	5 (a)
Thorium-232	bldg. soil	180.0+13	15 (b)
Radium-226	surface soil	10.0+1	5
Radium-226	sediment	9.0+2	5 (a)
Radium-226	bldg. soil	37.0+10	15 (b)

Footnotes:
(a) There are no DOE guidelines for radiologic contamination of sediment; guidelines for soil are used for comparison purposes.
(b) The DOE guideline for any 15 cm. thick soil layer below the surface layer.

Chemical analysis of the Sear's soil using soil boring techniques revealed primarily six classes of contaminants: 1) volatiles; 2) base/neutral compounds; 3) pesticides (primarily organochlorines); 4) heavy metals; 5) gasoline and fuel oil contaminants; 6) essential and ethereal oils and caffeine. Almost all contaminants were detected at surface level in the northwest quadrant of the site and the grassy area located across from the Sears building areas. The exception was the gasoline and fuel related contaminants which were found subsurface in the 3- to 11-foot depth range. Table 2 below illustrates the maximum soil contamination levels which exceeded the applicable or relevant and appropriate requirements (ARARs).

TABLE 2: CHEMICAL CONTAMINATION OF SOIL AT SEARS/MAYWOOD SITE

Contaminant	Maximum Concentration (ppm)	ARARS (ppm) a
Methyl ethyl ketone	6.2	1.0
Total Petroleum Hydrocarbons		100.0
Benzene	81	
Toluene	9.4	
Ethylbenzene	55	
Xylene	120	
Arsenic	27	20.0
Cadmium	4.3	3.0
Chromium	439	100.0
Lead	8420 (R)	250-1,000
Mercury	30	1.0

Footnotes:
(R) Rejected for exceeding of laboratory hold time (see QA/QC section for explanation).

In particular, the Sears on-site contamination patterns associated with benzene, toluene, xylene and ethylbenzene, which are common octane-boosting additives to gasoline, lead one to surmise that much of the chemical contamination may be due to a nearby underground gasoline storage tank. There are several gasoline stations nearby which may have either surface spillage or a leaking underground gasoline tank. All on-site contaminants were near surface, with the exception of gasoline-related contaminants, which indicates contamination was due to surface spillage or the use of contaminated fill. Most surficial contamination is located in the grassy areas across from the Sears parking lot.

During the boring operations for soil samples at the Sears site, buried drums containing sludge-like material were discovered. Analysis revealed high levels of benzene, toluene, xylene, and bis (2-ethylhexyl) phthalate in the containers. After drums were pierced from the bores, the holes were temporarily plugged to prevent further volatile release of the contaminants. Through both drilling and the use of metal detectors, it appears that barrels had previously been discarded in former creek channels on the property.

To date, no groundwater samples have been taken from this site. These samples are necessary to accurately characterize the site.

Quality Assurance/Quality Control

All chemical contamination data for the Sears site was validated by Ebasco using EPA data validation guidelines for organic, pesticides/PCBs and inorganic compounds. In the case of lead, data that may have been rejected because it exceeded laboratory holding time requirements was included in this document because it would only result in a lower estimate of chemical concentration. Since the levels are still high, this data is reported even though it reflects an underestimation of the actual concentration.

B. On-Site Contamination of the Maywood Interim Storage Site

The Maywood Interim Storage Site (MISS) has been designated by the Department of Energy as a temporary storage facility for the radioactive waste gathered from the Maywood-related remedial action operations. The MISS is a fenced vacant lot occupying 11.7 acres. An on-site storage pile of low-level radioactive waste covers approximately two acres of land and an additional area has been prepared for use as a second storage pile. The MISS is located in a highly developed residential and industrial area which runs along the border of the towns of Maywood and Rochelle Park. The population density of the area is approximately 10,000 people per square mile. Residential areas lie north of the site roughly 300 yards from the railroad that bounds the MISS property. The waste presently stored on the site is from remedial actions performed in 1984 and 1985 at several nearby properties, including twenty-five Maywood, Lodi and Rochelle Park residential properties and portions of the Ballod property in Rochelle Park.

The Department of Energy's characterization of the site reveals the presence of both radiologic and chemical contamination. Near surface gamma radiation measurements on the property ranged from a background level of 5000 cpm to approximately 994,000 cpm. (A gamma reading of 11,000 cpm is approximately equal to the DOE's guideline of 5 pCi/g). Subsurface measurements from borehole sampling revealed radiological contamination ranging between 2000 cpm and 4,300,000 cpm. (A gamma reading of 40,000 cpm is equivalent to the DOE guideline of 15 pCi/g for subsurface contamination.) Thorium-232 was identified as the primary radioactive material on-site with elevated levels of radium-226 and uranium-238 also detected. Table 3 reports the maximum soil values which exceed the DOE's remediation action guidelines.

TABLE 3: RADIOLOGIC CONTAMINATION OF THE MISS SOIL

Radionuclide	Location	Maximum Concentration (pCi/g)	DOE Guidelines
Radium-226	surface	7.9+1.9a	5
Thorium-232	surface	95.2+9.4	5
Thorium-232	sediment	18.3+2.6	5
Radium-226	subsurface (c)	447.0+10.0	15
Thorium-232	subsurface (c)	1699.0+512.0	15

Footnotes:

(a) The level of detectability varied with these soil samples because it is proportionally based on the quantity of the sample, its heterogeneity, the moisture content, and the counting geometry.

(b) There are no DOE guidelines for radiologic contamination of sediment; soil guidelines are used for comparison purposes.

(c) Samples were taken between 1 and 15 feet below the MISS surface.

Volatile organic compounds, such as benzene and toluene, were detected in soil samples but not at levels above NJ Recommended Soil Guidelines. Certain heavy metal concentrations were detected in the soils above the NJDEP Cleanup Objectives, as illustrated below.

TABLE 4: SOIL CONTAMINATION OF MAYWOOD INTERIM STORAGE SITE

Compound	Maximum Concentrations (ppm)	ARARs (ppm)
Arsenic	51	NJ Soil Guideline: 20
Cadmium	20	NJ Soil Guideline: 3
Chromium	3920	NJ Soil Guideline: 100
Lead	790	NJ Soil Guideline: 250-1000
Mercury	93	NJ Soil Guideline: 1

The DOE monitoring activities at the site, as required by the NJ Pollution Discharge Elimination System permits, included installation of eleven groundwater monitoring wells. Some of the higher levels of contamination were detected in a monitoring well upgradient from the site, indicating that another contamination source may exist. These groundwater samples were tested only for chemical contamination in 1985 and 1986; the

maximum reported results which surpassed New Jersey's Standards for drinking water are shown in Table 5.

TABLE 5: CHEMICAL CONTAMINATION IN GROUNDWATER AT THE MISS

Contaminant	Maximum Conc. (ppb)	Standards (ppb) (a)
Methylene chloride	1087	2
Trichloroethylene	66	1
Benzene	1240	1
Tetrachlorethylene	170	1
t-1,2-Dichloroethylene	2964	10
Vinyl chloride	220	2
Arsenic	381	50
Cadmium	47.1	10
Chromium	372	50
Lead	325	50
Mercury	229	2
Selenium	29.4	10
Zinc	12,900	5,000 (b)

Footnotes:

(a) New Jersey Safe Drinking Water Act, NJAC 7:10-5 and 7:10-16.7

(b) New Jersey Safe Drinking Water Act, NJAC 7:10-7, Secondary Drinking Water Regulations.

Quality Assurance/Quality Control

QA/QC procedures were followed for both the sampling and laboratory analysis. Method/reagent blanks were simultaneously analyzed to avoid false positives and duplicates were performed to demonstrate the reproducibility of results.

C. On-Site Contamination of the Ballod Properties

Waste sludge produced from Maywood's thorium processing operations was originally pumped to settling lagoons located on the present Ballod property. When the Stepan Company purchased the Maywood Chemical Co. works, these waste materials were removed from the southern portion of the property and and the property was approved for unrestricted use by the Atomic Energy Commission. It was accidentally discovered in 1980 that elevated levels of radiation still existed on the property. A follow-up survey by the Nuclear Regulatory Commission revealed radiologic

contamination in excess of DOE guidelines. NJDEP analysis revealed low levels of chemical compounds which fell below state and federal guidelines.

Remediation efforts were initiated in 1985 in areas which were contaminated above guideline levels. Contaminated soils were removed in the northern section of Ballod and stored at the MISS. Control measures were employed to avoid human exposure to contaminants during excavation via inhalation of dusts, including continual moistening of soil during the removal procedures. The DOE states that there is no area [at Ballod] where radioactive contamination still exists in excess of the remedial action guidelines. The Ballod property was cleared for unrestricted use, even though low level radiation is still detectable on-site, and a senior citizen's home was built on it.

D. On-Site Contamination of the Scanel Property

The Scanel property is located in the city of Maywood, east of the Sears site. It is believed that waste material from the Maywood Chemical Works thorium processing operation was either disposed or included in fill at the Scanel site. Investigations conducted in 1981 and 1983 noted elevated concentrations of thorium-232 and radium-228 and -226 in the Scanel soils. The Department of Energy is conducting a radiologic survey of the property which will include analysis for chemical contaminants.

E. On-Site Contamination of Residential Properties

Certain residential properties (8 along Davison and Latham Street in Maywood, New Jersey and 9 on Grove and Parkway in Rochelle Park, NJ) were identified by NRC surveys as having radiologic contamination. Contamination consisted primarily of thorium-232, with lower levels of uranium and radium-226 also detected. These sites had become contaminated when "organic mulch" -- which actually contained thorium residues -- was removed from the Maywood Chemical Works facility and used as fill for nearby residences. Excavation procedures, similar to the Scanel clean-up operation, were employed to minimize possible human exposure to radiologically contaminated soils. These sites have been certified for unrestricted use by the DOE because radiologic levels are now below remediation action guidelines.

F. On-Site Contamination of the Stepan Chemical Co. Property

As part of their monitoring of the MISS, the DOE has drilled monitoring wells on the Stepan Co. property. Results

of these monitoring operations are currently undergoing a QA/QC review and not available, but early indications are that this area is also contaminated by radionuclides and chemical materials. There is currently no official investigation at the Stepan Co. property even though its proximity to the MISS and its status as the former site of the Maywood Chemical Works would make it a likely candidate for contamination.

G. Off-Site Contamination of the Maywood Area

1. Lodi, New Jersey

The Maywood sites have been implicated as a possible source of the extensive chemical and radiologic contamination in the Lodi Municipal wells, a site on the National Priority List. All eleven of the public water wells in Lodi, New Jersey have been permanently closed and residents are now supplied by an alternative water purveyor. Other local industries, aside from the neighboring Maywood Superfund site, are under investigation as possible sources of contamination. Table 6 lists the maximum concentration of contaminants found in the underground water - supplies of Lodi, including both private and public wells, and compares them to appropriate government standards.

Table 6: Maximum Contamination Detected in Lodi Water Wells and the Drinking Water Standards

CONTAMINANT	Maximum Concentration (ppb)	Standards (ppb) (a)
Carbon tetrachloride	49.0	2
Chlorobenzene	200.0	4
1,2-Dichloroethane	3.34	2
trans-1,2-Dichloroethene	220.0	10
Methylene chloride	4.7	2
Tetrachloroethylene	32.0	1
Trichloroethylene	324.0	1
Total Trihalomethanes	115.8	100 (b)

Footnotes:

(a) New Jersey Safe Drinking Water Act, NJAC 7:10-5 and 7:10-16.7

(b) US Safe Drinking Water Act Maximum Contaminant Levels; MCL for total trihalomethanes applies only to chlorinated water.

Elevated levels of gross alpha and beta radiation have been detected in several of the well sites and in a few samples taken from the tap water at commercial establishments located in Lodi. The alpha contamination is attributed primarily to uranium isotopes (U-234, U-235, U-238) and Radium-226 which may have been a result of either manmade or natural sources. The sites where radiologic contamination exceed existing federal Safe Drinking Water Act (SDWA) standards are listed in Table 7.

Table 7: Radiologic Contaminants in the Lodi Area Water Supplies

Water Site	Range of Gross Alpha Contamination (pCi/L)	Federal SDWA Standard (pCi/L)
PUBLIC WELL (a)	ND - 150 +/-50	15
PRIVATE WELL (b)	ND - 210 +/-105	15
COMMERCIAL TAP (c)	10.2 - 51 +/-32	15

ND = nondetectable

Footnotes:

(a) Sample dates were between 9/13/83 and 7/15/84.
(b) Analysis of Inmont Chemical Co. Monitoring Well, 7/15/84.
(c) Analysis of the tap water at a commercial eating establishment in Lodi, 7/15/84.

2. Maywood Municipal Pool

Because of the concern about contaminated groundwater supplies in Maywood, the NJDEP received a request from the Maywood Board of Health in 1986 to test the Maywood Municipal Pool during its annual multi-day filling process. While no radiologic contamination was found in the water being piped into the pool, three volatile organic compounds were detected: tetrachloroethene (42 ppb); trans-1,2-dichloroethene (3.7 ppb); and trichloroethene (3.9 ppb). No standards or guidelines exist for nonpotable recreational waters but a risk assessment performed by the NJDEP indicated that these levels may be unacceptable. Due to this concern, the City of Maywood now has the pool filled by the Hackensack Water Company and no longer uses the public water supply.

3. Maywood Residential Area

The groundwater supplies of the city of Maywood have not been tested for chemical or radiologic contamination as part of

any site investigation. A residential well in the vicinity of the Maywood site was tested originally to determine conditions upgradient from the site. Analysis revealed a contamination profile similar to the Maywood municipal pool. One volatile organic compound exceeded the New Jersey Maximum Contaminant Level for drinking water; tetrachloroethylene was found at a concentration of 52.2 ppb. This data was reviewed and accepted by the NJDEP's Office of Quality Assurance.

As part of the DOE investigation of Maywood, the Saddle River, which is the major water body in the Maywood/Rochelle Park area, was tested for radionuclide contamination. All results were negative. None of the brooks which actually run through the MISS, Sears, or other satellite site have been tested for possible contamination. These surface waterways eventually feed into the Saddle River.

There is some concern that low levels of volatile organics may be migrating through the soil in certain residential areas in Maywood, possibly from volatilization of contaminated groundwater. In one case, benzene and ethyl acetate were tentatively detected in the low ppb range in soil gas above a residential property. Soil gas may be occurring in other areas, exposing residents to low levels of hazardous airborne substances.

POTENTIAL ENVIRONMENTAL AND HUMAN EXPOSURE PATHWAYS

A. Environmental Pathways

There is substantial evidence of radiologic and chemical soil contamination, both above and below the surface, at the various Maywood sites. Soil contamination appears to have led to pollution of the local aquifer, as demonstrated by the results from the monitoring wells located on the MISS property. It is further suspected that this contamination may have migrated across town boundaries to contaminate the local water supplies of neighboring Lodi and other communities. For this same reason, there is a potential for surface waters in the area, such as the Westerley and Lodi Brook which run through the Maywood sites, to be contaminated by leachate from the site.

B. Human Exposure Pathways

Because of the extensive soil contamination around the Maywood site, dermal exposure to chemical and low-level radiologic materials is possible. While the MISS is properly fenced so that access to the public is restricted, there are other contaminated areas around the Sears site, and possibly around the Stepan Co. sites, that are accessible. The grassy

areas to the north of the Sears warehouse, which employs approximately 225 people, are known contamination spots. Dermal and oral exposure are possible, especially to workers eating lunch or relaxing in the area. In addition, since these areas are not fenced, there is a potential for local children to play in these areas and become exposed to chemical and radiologic contaminants.

There is evidence that the Maywood sites have caused contamination of the underground aquifer, which would lead to human exposure if this water is tapped for public or private well use. Exposure could occur through dermal contact while bathing or swimming, ingestion of drinking water, inhalation of chemicals during showering. The extent of exposure through this media is uncertain and will depend on numerous factors, including the number of well users in the area, the municipal supply source for water, and the extent of the contaminant plume.

Exposure to hazardous substances associated with the Maywood sites can also occur through the inhalation route. Although MISS is currently covered with a tarpaulin (which appreciably reduces dust resuspension), dust or soil particulates with radiologic contamination could potentially become airborne from the sites. Furthermore, there is limited evidence that volatile organic chemical gases have been emanating from soils in residential areas where the shallow aquifers have been contaminated by Maywood-related leachate. Since highest concentrations of these gases would be found at ground level, children may have the greatest levels of exposure to these substances.

C. Demographics

Presently there is little information provided regarding the demographic make-up of the Maywood area. The only information that could be found for this health assessment was the 1980 census. According to this census the populations of Maywood Borough, Lodi Borough, and Rochelle Park Township are 9,895, 23,956, and 5,603, respectively.

More demographic information is needed to accurately characterize the sites, determine appropriate remedial actions, and conduct a health assessment. This information, which needs to be presented in the remedial investigation report(s), includes the size of the population within a 2-3 mile radius of each site (or within a radius that could be effected by the site), the number of potable wells within a 2-3 mile radius of each site (or within a radius that could be effected by the site), the closest residence and the closest downgradient well to each site, and a characterization of the population around each site (i.e. identification of sensitive populations, playgrounds, schools, etc.).

D. Site Visit

Representatives from the New Jersey DOH and the DEP visited the Maywood Sears site and the Maywood Interim Storage Site on October 5, 1988. The MISS is highly secured from the public with a fence surrounding the facility and security guards nearby at the Stepan Chemical site. The site, which contains primarily radiologically contaminated soil from the Ballod property clean-up operation, is structurally engineered to prevent leachate from escaping into the environment. This temporarily stored pile of waste material is completely encased with a synthetic cover and leachate collection devices are fully employed. A pile of organic material removed from the Ballod site -- which consists of trees, shrubbery and boulders -- is left uncontained on the MISS. This was not placed in the contained area of the MISS and is left uncovered because it was considered too bulky for the site and not of concern. There was no information available about this material's radioactivity.

The Stepan Chemical Co. which owns the property leading into the MISS is responsible for the security around the site. As the original site of the Maywood Chemical Works, it is highly probable that this facility was contaminated from past thorium-processing operations. While the MISS, Sears, Ballod and numerous residential locations have been investigated for chemical and radiologic contamination, the Stepan site has not come under the same scrutiny. Both the EPA and DOE have initiated preliminary surveys of the property, but the results are undergoing a QA/QC review and have not been officially released.

The day after the site visit, the DOH was notified by a Maywood resident that a large children's party, sponsored by a local newspaper and the Stepan Co., was to be held that weekend (Oct. 8, 1988) on the company's parking lot. The event, involving several hundred children, was scheduled to take place in an area officially under investigation as a Superfund site. Though no official contamination information was available, it was considered inappropriate by the staffs of the DOH and DEP for children to be brought onto an uncharacterized Superfund site. Stepan initially declined to relocate the party until a NJDEP radiation assessment team went to the facility and detected above background levels of radiation along cracks in the asphalt of the parking lot. Stepan then voluntarily moved the children's balloon-launching to the Maywood Fire Department property.

The Sears property was a large commercial facility with substantial truck activity at the warehouse. The outside grassy areas do not appear to be likely locations for lunch/recreational

activities. Nor is this area likely for children's activities. Most activity appears to occur inside the facility though there are numerous truck drivers found sitting around the parking lot in their cabs. Access to the site is fairly simple though a guard is stationed at one of the facility's numerous entries.

EVALUATION AND DISCUSSION

Limited environmental characterization data is available on most of the Maywood sites. The Sears and the MISS sites both have evidence of radiologic and chemical contamination of the soil. Thorium-232 and radium-226 were the primary radionuclides found whereas chemical contamination consisted of heavy metals and some petroleum hydrocarbons. For the MISS, monitoring wells around the site indicate that extensive chemical and heavy metal contamination of the groundwater is occurring in that area. Methylene chloride, benzene, trans-1,2-dichloroethylene, and zinc were detected at the highest levels, all of which exceeded NJ drinking water standards. It is uncertain as to how far this contaminant plume has migrated into the aquifer and how the drinking water supply of local communities may have been affected. The environmental data available for both the Sears and the MISS sites focuses only on on-site conditions; off-site contamination information is essentially nonexistent.

The Stepan Co. site has not been fully investigated for potential radiologic and chemical contamination even though this area was likely the original location of the pollution source. Characterization efforts should be expedited for this site, especially since there is a significant working population on-site. The preliminary survey results from the EPA and the DOE on contamination in this area should be included in the Health Assessment as soon as it is available.

Limited information is available on the Ballod and residential properties that have been remediated by the DOE for radiologic contamination. This contamination resulted from use of fill dirt which had been gathered from the waste piles of the Maywood thorium processing operation. The DOE has certified these properties for unrestricted use. A senior citizen home was built on the Ballod property. It was never determined if these contaminated lands had any off-site impact via surface water run-off or groundwater contamination. In addition, it has also not been determined if other residential sites still need to be remediated.

While characterization efforts have focused on site specific concerns, there is minimal information available on groundwater or surface water contamination. All the Maywood Superfund sites have focused solely on the individual on-site contamination.

With the exception of DOE's current sampling of the former creek channel on the Maywood/Lodi border, potential off-site impacts have not been evaluated. Even though the Maywood Superfund site consists of numerous properties around the town, there is no overall summary, report, or characterization of the environmental effect this site has had on the nearby and surrounding communities via air, groundwater, or surface water contamination.

Human exposure to these contaminants may occur from a variety of routes. Exposure via ingestion is possible through contaminated drinking water supplies. Dermal contact may occur with soils and surface/pool/bathing waters. Inhalation of radiologically contaminated dust particles, volatilized chemicals during showering, and volatilized gases released from contaminated groundwater are all possible exposure routes. These potential exposure routes for the nearby populations have not been appropriately investigated and represent a significant gap in the assessment work for the Maywood sites.

Problems with the investigations of these sites have been exacerbated by the involvement of many different government agencies and their outside contractors with the Maywood project. As a federal lead, EPA and DOE have been responsible for the respective chemical and radiologic characterization and remediation at the sites. NJDEP and NJDOH have also been involved to varying degrees. Each federal agency has a separate contractor (EPA: Ebasco; DOE: Bechtel) performing characterization and remediation work plan development. In addition, through a consent decree, the Stepan Co. is responsible for the remediation of the Sears site and has hired the CH2M Hill Co. as its outside contractor.

When no one group assumes the oversight role, there is a high potential for overlap, redundancy, or omission. The most recent example of this problem was the scheduled children's event on the Stepan Chemical property. Although there was general agreement that the activity should not occur, some of the agencies were unclear as to their role/authority in stopping the event. Many groups are also involved in the characterization and cleanup of the Maywood sites; there is no one group responsible for the overall contamination problem.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information reviewed, ATSDR and NJDOH have concluded that the Maywood Chemical site is of public health concern because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. As noted in the Environmental Contamination and Physical Hazards section above, human exposure to chemical and

radiological contamination is probably occurring and has probably occurred in the past via the use of contaminated groundwater and contact with contaminated soils.

As noted previously, high levels of volatile organic and radionuclides have been found or are suspected to be in the soils of several sites in the Maywood vicinity. Results from analysis of the monitoring wells at the Maywood Interim Storage Site, local private wells, and the Lodi municipal wellfield indicate that extensive groundwater contamination is occurring in the area. In addition, the Maywood municipal swimming pool, when being filled with groundwater, was found to have high levels of tetrachloroethylene.

Before suspected areas of contamination are developed, both on-site contamination and the potential off-site migration of contaminants need to be fully evaluated. Developing an area, without characterizing potential contamination could lead to an adverse impact on the public health.

The independent investigations for each of the different Maywood sites highlight the need for a coordinated assessment of the total impact the individual sites have on the Maywood community and vicinity groups. It is essential that remedial and characterization projects currently underway incorporate off-site evaluation and assessments of the potential effects these contaminated sites have on the surrounding population. This includes an extensive evaluation of the groundwater quality in the area, demographic analysis, and an assessment of the surrounding water supply usage (i.e. private well v. public well).

In accordance with CERCLA as amended, the Maywood Chemical Company site has been evaluated for appropriate follow-up with respect to health effects studies. Since human exposure to on-site and off-site contaminants may currently be occurring and may have occurred in the past, this site is being considered for follow-up health studies. After consultation with Regional EPA staff and State and local health and environmental officials, the Division of Health Studies, ATSDR and NJDOH, will determine if follow-up public health actions or studies are appropriate for this site.

This Health Assessment was prepared by the State of New Jersey, Department of Health, Environmental Health Service, under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry. The Division of Health Assessment and Consultation and the Division of Health Studies of ATSDR have reviewed this Health Assessment and concur with its findings.

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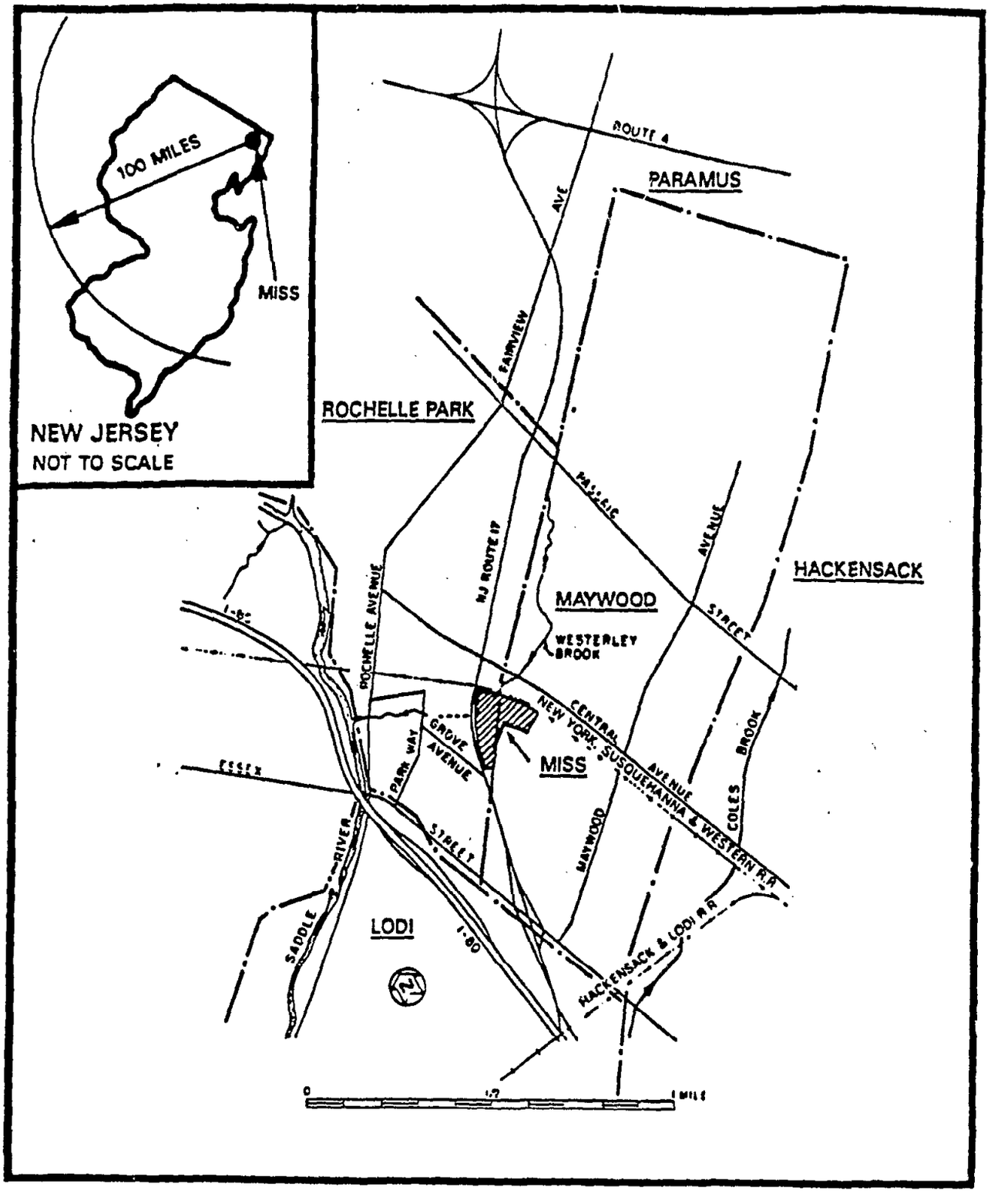

LOCATION OF MISS

FIGURE I