

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

**PUBLIC HEALTH ADVISORY
FOR
RAYMARK INDUSTRIES/STRATFORD ASBESTOS SITES
STRATFORD, FAIRFIELD COUNTY, CONNECTICUT**

May 26, 1993

INTRODUCTION

This Public Health Advisory is to advise the U.S. Environmental Protection Agency (EPA), the State of Connecticut, the town of Stratford, and the public of an imminent public health hazard. This hazard is associated with past, present, and potential future exposures to waste from past operations and disposal practices of the Raymark Industries facility (Raymark facility) located in Stratford, Connecticut. The known contaminants of health concern are asbestos, lead, and polychlorinated biphenyls (PCBs). This Public Health Advisory is issued as a result of actions taken by the Agency for Toxic Substances and Disease Registry (ATSDR) in response to an EPA Region I request for a health consultation, as well as a petition request for a Public Health Assessment from the town of Stratford. ATSDR has concluded that former operations at the Raymark facility and the waste disposal practices at the facility and throughout the town of Stratford warrant the issuance of a Public Health Advisory.

The areas included in this Advisory are the Raymark facility; the 15 known locations in the town of Stratford where facility waste was used as fill material; any additional locations (yet to be identified) where the waste was used as fill material and where there is a potential for human exposure; and any locations where Raymark waste may have contaminated other areas (e.g., surface water runoff, air). Of urgent concern are the following eight known locations where waste is present on or near the ground surface (not in order of health risk): (1) Wooster Junior High School playing field; (2) Short Beach Park recreational area; (3) 4th and 5th Avenue; (4) Spada property; (5) Morgan/Francis property; (6) Lot K/Elm Street property; (7) Housatonic Boat Club; and (8) one identified residence bordering the Raybestos Memorial Field. Based on EPA Region I, Connecticut Department of Environmental Protection (CTDEP), and Connecticut Department of Health Services (CTDOH) surface soil screening analysis of the above-mentioned locations (April and May 1993) for asbestos, lead, and PCBs, ATSDR has determined that there is an urgent health hazard to the public associated with these locations.

Feasible routes of human exposure to site-related contaminants include inhalation, direct dermal contact, ingestion of waste present in the soil, and consumption of potentially contaminated area seafood. For these reasons, ATSDR recommends that actions be taken to:

1. Dissociate the public from areas where exposure to Raymark waste at levels of health concern can occur.
2. Continue surface soil (0-3 inches) sampling/screening efforts for asbestos, lead, and PCBs in residential yards adjacent to areas where waste has been identified on or near the ground surface. If contaminants are found at levels of health concern, implement measures to cease exposure.
3. Continue efforts to identify other locations where Raymark waste was used as fill material and conduct appropriate sampling and mitigation if necessary.
4. Sample interiors of homes adjacent to areas of exposed waste and/or where yard soil screening results indicate contaminants at levels of health concern for free asbestos fibers, lead, and PCBs. If contaminants are found at levels of health concern, implement measures to cease exposure.
5. Conduct sediment sampling of Ferry Creek and its junction with the Housatonic River and seafood sampling to determine if site-related contaminants are present at levels of health concern. The sampling plan should be a cooperative effort among all agencies involved to ensure that the results can be used for public health and regulatory/enforcement purposes.
6. Conduct an area well survey to ensure that groundwater is not in use for potable purposes. If private wells are found, ensure that well users are not exposed to site-related contaminants at levels of health concern.
7. Establish controls to require soil sampling and analyses in areas of Stratford where Raymark waste material may have been placed prior to conducting any invasive activities (e.g., water line installation, sewage line installation, maintenance of buried line, construction, grading) to avoid health hazards to workers or others by bringing buried waste material to the ground surface. If waste material is found and invasive activities are necessary, all regulations for worker protection and hazardous material handling and disposal should be followed.

8. Consider the Raymark facility property and other locations where Raymark waste is present at levels of health concern for inclusion on the EPA National Priorities List, and/or use other statutory or regulatory authorities as appropriate to characterize the areas of concern and take necessary action.

BACKGROUND

The town of Stratford is located on Long Island Sound between Bridgeport, Connecticut, and the Housatonic River. The 1990 census data indicated a population of approximately 50,000. In 1990, 14 percent of the population was comprised of children between 5 and 7 years of age. The community has been characterized as working class, with principal industries including manufacturing of aircraft, air conditioning, brake linings, cheese, chemicals, plastic, paper, rubber goods, electrical and machine parts, and toys. In Stratford there are two senior high schools, three middle schools, numerous grammar schools, five recreational parks, and two municipal beaches. The source of potable water for Stratford is the Trapp Falls reservoir located in Trumbull (north of Stratford). It is unlikely that area groundwater is currently used for potable purposes. However, no well survey has been conducted to confirm that there are no potable water supply wells currently in use.

Raymark Industries, Inc., owns and operated a facility on 75 East Main Street in Stratford, Connecticut, from 1919 until September 1989 when operations ceased. The facility is 33.4 acres in size and produced brakes, clutch parts, and other friction based products. During the manufacturing process, wastes generated included ignitable and corrosive wastes, solvents, liquid adhesives, phenolic resins, alcohol, caustic, phenolic mixtures, lead, asbestos, PCBs, and dioxins/furans [1]. On-site groundwater is known to be contaminated with solvents, mainly toluene [1].

Raymark routinely disposed of its waste on the facility property and at other locations in Stratford. From 1919 to July 1984, Raymark used a system of lagoons to attempt to capture the waste lead and asbestos. Over this 65 year period, these lagoon systems were located at numerous locations on the western and central portions of the facility. As the lagoons filled up with sludge, they were often dredged and the material was used as fill in locations around Stratford. Currently, a series of four lagoons remain on the site. Three of these four lagoons have been temporarily capped. These lagoons stopped receiving waste in 1984. Lagoon #4 remains uncapped and continues to serve as a collection basin and final discharge point for the facility's storm water runoff system. This lagoon drains into Ferry Creek, which flows south and east 0.5 miles to the Housatonic River.

EPA Region I has been involved with the Raymark facility since 1984. In the fall of 1992, Raymark was ordered by EPA Region I to stabilize its facility and the property; to limit the potential for human contact to on-site contamination; and to limit the potential for release of hazardous substances and contaminants from the site. Since that time, public access to the property has been restricted as long as the entrance gate remains secured; tanks have been identified, characterized and assessed; approximately 80 percent of hazardous materials have been removed from the tanks; and a study has begun to assess the potential off-site migration of contaminants via surface water runoff [1]. In 1989 and 1992, ATSDR provided EPA Region I with health consultations for the Raymark facility property, and for 12 areas of known asbestos waste disposal [2, 3].

In February 1993, EPA Region I requested ATSDR to evaluate dioxin analyses from soil samples collected on the Raymark facility property and to assess the potential health hazard. The samples were composites of deep core samples. The highest level of 2,3,7,8-tetrachloro dibenzo-p-dioxin toxicity equivalents was approximately 7 parts per billion (ppb) in a 0- to 10-foot composite sample [4]. ATSDR determined that because access to the property was restricted and the waste was covered with pavement or a gravel cap, that no health hazard is currently posed by the presence of dioxins on the Raymark facility [5]. However, since that time, more recent EPA Region I sampling and screening analyses from potholes on the facility property has revealed chrysotile asbestos up to 85 percent, lead up to 16,000 parts per million (ppm), and PCBs up to 240 ppm [6]. EPA Region I has since directed Raymark to cover these exposed areas [6]. According to EPA Region I, Raymark has complied with this request.

In May of 1993, EPA Region I will have completed a Removal Action at the Raybestos Memorial Field. The effort includes covering the waste material with a temporary soil cap, posting warning signs, and fencing and vegetating the field. ATSDR has provided EPA Region I with two health consultations during this Removal Action [7, 8]. EPA Region I is in the process of determining if the Raybestos Memorial Field along with the Raymark facility property should be placed on their National Priorities List (NPL).

For the NPL ranking process, EPA Region I has collected sediment and soil samples outside the perimeter of Raymark facility and Raybestos Memorial Field, including the Housatonic River and Ferry Creek [9]. Sampling results outside the perimeter of the Raybestos Memorial field have revealed lead contamination up to 150,000 ppm at a 12-inch depth in a residential yard. More recent surface soil screening analyses for lead and asbestos conducted by EPA Region I have detected lead up to 7,765 ppm and

PCBs up to 96 ppm. Analysis for asbestos has not yet been performed for these samples.

Results of sediment sampling have revealed lead up to 14,000 ppm, and PCBs up to approximately 150 ppm at a sample collected at the lagoon #4 culvert inlet into Ferry Creek. In a sediment sample collected in the Housatonic River at the mouth of Ferry Creek, lead was detected at approximately 718 ppm, and PCBs at approximately 4.6 ppm. An upstream Housatonic River sediment sample contained lead at approximately 10 ppm and PCBs below the analytical method detection limit (detection limit ranged from 42 ppb to 1.6 ppm) [9].

The Housatonic River discharges into Long Island Sound, which is utilized by the commercial seafood industry. The area of the Long Island Sound potentially impacted by site runoff is used to cultivate seed oysters. After reaching a certain size/age the oysters are moved to another location for maturation and harvesting. Although non-commercial harvesting of shellfish is prohibited, anecdotal information indicates that individuals may fish and harvest crabs and clams in the potentially affected areas. Anecdotal information also indicates that members of an Asian community residing north of Stratford harvest a bottom dwelling clam from the area of potential health concern and that these clams are a routine component of their diet. Because PCBs have been found in Ferry Creek, and dioxins and PCBs have been found on the Raymark facility property, a potential health hazard may exist from bioaccumulation of PCBs and dioxin in seafood. Lead and other site-related contaminants may also be present at levels of health concern.

Since April 1993, EPA Region I, CTDEP, and CTDOH have conducted surface soil sampling and screening analyses (asbestos, lead, and PCBs) at 8 of the 15 known locations around the town with high public access and where waste material is present on the ground surface (not including screening conducted on the Raymark facility). ATSDR, EPA Region I, CTDEP, CTDOH, and the Stratford Health Director agreed that these 8 locations are of highest priority because of the likelihood of public access and proximity to residential/recreational areas. EPA Region I is currently conducting laboratory analyses of surface soil samples from these locations for metals, PCBs/pesticides, dioxins/furans, and base neutral/acid extractable compounds. These results are anticipated to be available by August 1993, and will be evaluated by the health agencies to determine if additional public health hazards are present. Results of soil screening data along with a description of the locations are as follows (not necessarily in order of health risk) [9, 10]:

1. **Wooster Junior High School Playing Fields:** The north playing field consists of three baseball fields and a soccer field. The south playing field consists of two

baseball fields. Contaminants were not found at levels of health concern in samples collected in the south field. Chrysotile asbestos up to 30 percent, lead up to 1,797 ppm, and PCBs up to 44 ppm were found on the north playing field.

2. Short Beach Park Recreational Area: The recreational area consists of two softball fields, a little league field, a soccer field, and a golf range. Chrysotile asbestos up to 15 percent, lead up to 860 ppm, and PCBs up to 5 ppm were found on this area.
3. 4th/5th Avenue: This area is a vacant land parcel surrounded by residences. Chrysotile asbestos up to 80 percent, lead up to 8,409 ppm, and PCBs up to 15 ppm were found in this area.
4. Spada Property: This area is bisected by Ferry Creek. Commercial properties are located along the northwest side of the creek, residential areas are located on the opposite side. Chrysotile asbestos up to 90 percent, lead greater than 10,000 ppm (above detection limit of screening instrument), and PCBs up to 27 ppm were found on the commercial portion of the location.
5. Morgan/Francis: This location is bordered by Ferry Boulevard and East Broadway to the east, Ferry Creek to the northeast, and a residential area to the northwest. A commercial business is located on the property. Chrysotile asbestos up to 80 percent, lead up to 6,000 ppm, and PCBs up to 4 ppm were found in an area adjacent to the residences.
6. Lot K/Elm Street: This location is an occupied private residence. Chrysotile asbestos up to 90 percent, lead above 10,000 ppm, and PCBs up to 55 ppm were found in the yard.
7. Housatonic Boat Club: This boat club/marina is located between Shore Road and the Housatonic River. Raymark waste was used as a base for Shore Road. The waste also underlies a portion of the boat club property. Chrysotile asbestos up to 90 percent, lead above 10,000 ppm, and PCBs up to 108 ppm were found on the boat club property.
8. Raybestos Memorial Field: Surface soil samples were collected from one occupied residential property adjacent to the Raybestos Memorial Field and screened for lead and PCBs. Lead up to 7,765, and PCBs up to 96 ppm were found. Asbestos analysis has not yet occurred.

The town of Stratford submitted a petition for a Public Health

Assessment to ATSDR in February 1993 [11]. ATSDR has determined that a public health assessment and a health consultation will be conducted in response to this petition.

A site visit was conducted by ATSDR on April 6 and 7, 1993, with representatives of EPA Region I, U.S. Coast Guard, CTDOH, the Stratford Health Director, and the Stratford Department of Public Works [12]. At the request of EPA Region I and CTDEP, ATSDR and CTDOH have jointly reviewed all soil screening and analytical data for the eight high priority locations. These evaluations have been verbally provided to EPA Region I, the State of Connecticut, and the Stratford Health Director [13]. Based on these evaluations, the town of Stratford has attempted to restrict access to the Wooster Junior High School northern playing field, the Short Beach Park recreational area, and the Housatonic Boat Club. The CTDEP is currently in the process of designing and installation of interim covers/caps as a temporary measure to cease human exposure to contaminants at these 8 areas.

CTDOH and the Stratford Health Director have initiated health education efforts for both area health professionals and the public. CTDOH and ATSDR are initiating a review of available health data to evaluate the occurrence of adverse health outcomes in the community that may be plausible from exposure to asbestos, PCBs, lead, and other contaminants that may be present from Raymark waste.

BASIS FOR THE ADVISORY

This Public Health Advisory is being issued based on the following:

1. An imminent public health hazard is posed from past, current, and potential future exposures via inhalation, ingestion, and direct dermal contact with Raymark waste containing asbestos, lead, and PCBs.
2. The potential for asbestos, lead, PCBs, and other possible contaminants found in Raymark waste to be carried into homes on shoes, in clothing, and from pets may pose a health hazard via ingestion and inhalation.
3. A potential public health concern is posed by consumption of seafood caught in or near Ferry Creek that may contain Raymark waste contaminants at levels of health concern.

The contaminants found to date above levels of health concern are asbestos, lead, and PCBs. The most significant human exposure routes of health importance for these contaminants when they are

found on the ground surface are as follows: inhalation (asbestos and lead); ingestion (lead and PCBs); and dermal absorption (PCBs).

Asbestos is a group of six naturally occurring fibrous minerals. Chrysotile is the fibrous form of serpentine and is the most abundant form of asbestos produced for commercial usage. Through the inhalation route of exposure, asbestos is a known human carcinogen and is one of the primary causes of mesothelioma. Mesotheliomas are tumors arising from the thin membrane surrounding internal organs. Inhalation of asbestos fibers may lead to fibrotic lung disease (asbestosis), cancer of the lung, the pleura, and the peritoneum. There is some evidence that inhalation and ingestion of asbestos fibers may lead to an increased risk of gastrointestinal cancer [14].

Typically, a latency period of between 10 and 30 years exists between exposure to asbestos and the occurrence of apparent health effects. In order for exposure to occur (via inhalation), the asbestos must exist as free fibers capable of becoming airborne. The length and diameter of the asbestos fiber is a factor in determination of the adverse health outcomes of exposure. Fibers less than 0.5 microns in diameter appear to be most active in producing tumors, purportedly because they can readily penetrate into alveolar regions of the lung. Fibers longer than 5 to 10 microns appear to be most active in inducing increased risks of pulmonary fibrosis and lung cancer. However, based on human epidemiological and animal studies, evidence indicates that all types of asbestos, including chrysotile, can cause cancer [14, 15].

Human inhalation studies using several concentrations of airborne asbestos fibers have shown an excess cancer risk [15]. A marked enhancement of the risk of lung carcinoma in exposed workers or populations who also smoke cigarettes has been noted in human epidemiology studies. This increase in risk may be as high as ten times or more than that of a non-smoker [14].

Exposure to lead on or near the ground surface can occur via ingestion and, if the lead becomes airborne, via inhalation. The most sensitive sub population for adverse health effects resulting from lead exposure are fetuses, infants, and young children. Factors accounting for this susceptibility include: (1) the immaturity of the blood brain barrier which allows entry of lead into the immature nervous system; (2) hand-to-mouth behavior and pica behavior (extreme hand-to-mouth activity) which leads to the consumption of lead from contaminated media; (3) enhanced gastrointestinal absorption of lead (affected by the nutritional status of the child); (4) low body weight; and (5) the ready transfer of lead across the placenta to the developing fetus [16]. These factors put children exposed to lead at a much higher risk of developing adverse health effects.

Since lead readily crosses the placental barrier, exposure of women to lead during pregnancy results in uptake by the fetus. Prenatal exposure to lead (4-8 micrograms per deciliter (ug/dl) maternal cord blood lead level) is associated with premature delivery, decreased birth weight, impaired postnatal neuro-behavioral development, and decreased postnatal growth rate [16]. Information from the Centers for Disease Control and Prevention (CDC) indicates that some adverse health effects (possible subtle neuro-behavioral deficiencies) could occur in children with blood lead levels as low as 10 ug/dl [17].

Blood lead levels are raised above background, on average, about 5 ug/dl for every 1,000 ppm of lead in soil or dust, and may increase 3 to 5 times higher depending on play habits and mouthing behavior [17]. Even lower soil levels of lead have been suggested as contributing to excessive blood lead levels in some children [18].

PCBs are environmentally persistent and concentrate upward in the food chain. The chemical stability and resistance to biodegradation of PCBs accounts for their persistence in the environment [19]. Exposure to PCBs can occur from ingestion of contaminated soil and food, inhalation of contaminated dusts, and dermal absorption. Excretion of PCBs is slow, causing bioaccumulation of the contaminant in humans even at low exposure levels. PCBs are stored in the fat of the body [19].

Fetuses and neonates are potentially more sensitive to PCBs than adults because of the contaminant distribution across the placenta and because fetuses and neonates lack enzymes which are normally found in the liver that make the breakdown and excretion of PCBs easier. In addition, PCBs accumulate in breast milk.

Exposure to PCBs has been shown to cause the following: elevations in blood fats (i.e., triglycerides, cholesterol); increases in certain liver and kidney enzymes; chloracne in humans; and may have reproductive effects. Animal studies indicate that ingestion of PCBs can lead to adverse immunological effects, including a decrease in antibody levels. The Department of Health and Human services has determined that PCBs may reasonably be anticipated to be carcinogens [19].

Food can be a major source of PCB exposure, usually from fish and animal fat. PCBs preferentially separate from water and adsorb to sediment. PCBs bioconcentrate upward in the food chain. The Food and Drug Administration (FDA) mandates tolerances of 0.2 to 3 ppm PCBs for all foods, with a tolerance level in fish of 2 ppm. This tolerance level is intended to be used as a guideline. Lower levels of PCBs in fish are necessary for subsistence fishing populations and sensitive populations [19].

CONCLUSIONS

The ATSDR has determined that:

1. There is an imminent public health hazard from past, current, and potential future exposures to Raymark waste containing asbestos, lead, PCBs, and other possible contaminants.
2. A potential public health hazard is posed by indoor exposure to asbestos, lead, PCBs, and other possible Raymark waste contaminants that may have been tracked inside residences via clothing, shoes, and pets.
3. A potential public health concern is posed by consumption of seafood caught in or near Ferry Creek that may contain Raymark waste contaminants at levels of health concern.

RECOMMENDATIONS AND PROPOSED ACTIONS

The ATSDR recommends that the regulatory/enforcement agencies (EPA, CTDEP, and the town of Stratford) take the following actions with continued cooperation and coordination with the health agencies (ATSDR, CTDOH, and the town of Stratford):

1. Dissociate the public from areas where exposure to Raymark waste at levels of health concern can occur.
2. Continue surface soil (0-3 inches) sampling/screening efforts for asbestos, lead, and PCBs in residential yards adjacent to areas where waste has been identified on or near the ground surface. If contaminants are found at levels of health concern, implement measures to cease exposure.
3. Continue efforts to identify other locations where Raymark waste was used as fill material and conduct appropriate sampling and mitigation if necessary.
4. Sample interiors of homes adjacent to areas of exposed waste and/or where yard soil screening results indicate contaminants at levels of health concern for free asbestos fibers, lead, and PCBs. If contaminants are found at levels of health concern, implement measures to cease exposure.
5. Conduct sediment sampling of Ferry Creek and its junction with the Housatonic River and seafood sampling to determine if site-related contaminants are present at levels of health concern. The sampling plan should be a

cooperative effort among all agencies involved to ensure that the results can be used for public health and regulatory/enforcement purposes.

6. Conduct an area well survey to ensure that groundwater is not in use for potable purposes. If private wells are found, ensure that well users are not exposed to site-related contaminants at levels of health concern.
7. Establish controls to require soil sampling and analyses in areas of Stratford where Raymark waste material may have been placed prior to conducting any invasive activities (e.g., water line installation, sewage line installation, maintenance of buried line, construction, grading) to avoid health hazards to workers or others by bringing buried waste material to the ground surface. If waste material is found and invasive activities are necessary, all regulations for worker protection and hazardous material handling and disposal should be followed.
8. Consider the Raymark property and other locations where Raymark waste is present at levels of health concern for inclusion on the EPA National Priorities List, and/or use other statutory or regulatory authorities as appropriate to characterize the areas of concern and take necessary action.

ATSDR and CTDOH will continue the following actions:

1. Provide recommendations for environmental sampling to enforcement/regulatory agencies to ensure that sampling results can be used to identify appropriate public health actions and exposure mitigation.
2. Continue to evaluate environmental and other sampling data to determine if other sources of exposure to Raymark waste contaminants are of public health concern.
3. Assist the enforcement/regulatory agencies in determining whether the proposed remedies and the contingency plans during remedy implementation for the areas of concern will be protective of public health.
4. Conduct a public health assessment and continue to provide health consultations to review environmental, health outcome, and community health concern information and determine appropriate additional follow-up actions.

On May 19, 1993, the information in this Public Health Advisory underwent review by the ATSDR Health Activities Recommendation Panel (HARP) and the CTDOH to determine appropriate follow-up health activities for the potentially affected residents of Stratford. Based on HARP recommendations, ATSDR, CTDOH, and the town of Stratford, will:

1. Conduct blood lead testing to determine if pregnant women, infants, and young children who live adjacent to or frequent the locations where waste has been identified have been exposed to lead at levels of public health concern. If elevated blood leads are found, ATSDR and the CTDOH will make recommendations regarding health follow-up. ATSDR and CTDOH will coordinate with EPA Region I, CTDEP, and the town of Stratford to identify and eliminate the site-related source of lead. If the lead is from a non site-related source, ATSDR and CTDOH will coordinate with the town of Stratford to ensure that the source is eliminated.
2. Review available health data to evaluate the occurrence of adverse health outcomes in the community that may be plausible from exposure to asbestos, PCBs, lead, and other possible contaminants from Raymark waste.
3. Based on the results of the health data review, determine appropriate follow-up health actions.
4. Develop a comprehensive community health education strategy to continue community health education efforts.
5. Continue health professional education efforts to advise local health care providers and public health professionals of the nature and possible consequences of exposure to contaminants in Raymark waste. The education effort will include providing such information as the contaminants of concern, pathways and routes of exposure, symptoms of exposure, and testing and treatment, if known.

For additional information, please contact the ATSDR at the following address:

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