



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

5 POST OFFICE SQUARE, SUITE 100

BOSTON, MA 02109-3912

CONTAINS ENFORCEMENT-SENSITIVE INFORMATION

MEMORANDUM

DATE: June 25, 2013

SUBJ: Request for funding and a 12-Month Exemption to Conduct a Time-Critical Removal Action at the Raymark Industries OU6 – Airport Property Site, Stratford, Fairfield County, Connecticut - **Action Memorandum and Exemption from the Statutory 12-Month Limit on Removal Actions**

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TO: James T. Owens III, Director
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I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the proposed removal action at the Raymark Industries OU6 – Airport Property Site (the “Airport Property”), which is located along the north side of Main Street (State Route 113) in Stratford, Fairfield County, Connecticut, generally opposite of Runway 24 of the Igor I. Sikorsky Memorial Airport (the “Airport”). Hazardous substances present in soils at the Airport Property, if not addressed by implementing the response actions selected in this Action Memorandum, will continue to pose a threat to human health and the environment. This Action Memorandum also requests and documents the approval of a “Consistency” exemption from the 12-month statutory limit for removal actions under the National Contingency Plan.

EPA is currently negotiating with a Potentially-Responsible Party (PRP), the City of Bridgeport, to conduct the removal action under an administrative order. It is the City of Bridgeport’s intention to remove all of the waste originating from the former Raymark Industries Inc. plant

(Raymark Waste) from this property for off-site disposal to facilitate the safety improvements at the Airport and the partial relocation of State Route 113 (SR113). In the event that the PRP fails to complete the work in a timely manner, EPA will take over the remainder of the project as a fund-lead action and implement response actions consistent with the interim actions identified in the *Record of Decision (ROD) for Final Source Control Actions at Four Properties within Operable Unit 6 (Additional Properties) and Interim Actions at Other Locations Containing Raymark Waste*. The Interim Actions are temporary measures that would prevent potential direct exposure to Raymark Waste, which could include access restrictions such as signage, physical barriers like fencing, geo-fabrics, or similar controls for stabilizing actively eroding areas. The City of Bridgeport will be obligated to perform the Raymark Waste removal pursuant to an Administrative Agreement. There are no nationally significant or precedent-setting issues associated with this action, and there has been no use of the OSC's \$200,000 warrant authority.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID# : CTD001186618

SITE ID# : 01H3

CATEGORY : Time-Critical

A. Site Description

1. Removal site evaluation

On May 9, 2013, EPA's Remedial Program requested that EPA's Removal Program evaluate the Airport Property as a potential removal site due to the impending transportation safety improvement project slated for the Airport. Because of numerous aircraft accidents over the past several years, the Connecticut Department of Transportation (CTDOT) and the City of Bridgeport are proposing to construct improvements to the Runway Safety Area (RSA) adjacent to Runway 24 at the Airport in Stratford, Connecticut. A partial relocation of SR 113 is required to accommodate the RSA improvements. These safety improvements include the construction of an Engineered Material Arresting System (EMAS) beyond the Runway 24 threshold.

The partial relocation of SR 113 will impact a portion of the Airport Property that contains materials classified as Raymark Waste. Some of the characteristics of Raymark Waste include requisite concentrations of chrysotile asbestos, lead, and either copper and/or polychlorinated biphenyls (PCBs) – Aroclor 1268 only. For the exact profile utilized to delineate Raymark Waste, refer to EPA's Remedial Investigation reports for a more detailed definition.

This vacant Airport Property currently contains no buildings and is owned by the City of Bridgeport. The proposed airport safety improvements and partial relocation of SR113 will be funded by the Federal Aviation Administration (FAA).

Raymark Industries Superfund Site - OU6– Additional Properties consists of 24 properties located throughout the Stratford area. These properties, with commercial, recreational, or residential use, are locations where Raymark Waste was used to fill low lying areas in town. One of these 24 properties is the Airport Property located immediately north of the Runway 24 at the Airport along the north side of Main Street. The Remedial Investigation (RI), which evaluated the nature and extent of contamination at these “Additional Properties,” was completed in July of 2005; and a Feasibility Study (FS) was completed in August 2010. EPA issued a ROD on July 21, 2011 which finalized Source Control Actions at four of the properties within OU6 and Interim Actions at other locations containing Raymark Waste, including the Airport Property

During November and December 2012, URS Corporation AES (URS) began delineation sampling activities at the Airport Property for the City of Bridgeport and Connecticut Department of Transportation. The results of this initial sampling event, which further defined the nature and extent of contamination at the Airport Property, is documented in the draft *Site Assessment Report Airport Property Portion of Additional Properties Operable Unit 6 Raymark Industries, Inc., Superfund Site, Stratford, Connecticut*, dated March 28, 2013.

EPA’s Removal Program has conducted a review of the analytical results for the soil samples collected during the URS sampling event. A site reconnaissance was conducted on May 30, 2013 to observe current site conditions. Based upon the presence of elevated levels of hazardous substances at or near the surface and current site conditions, a time-critical removal action was recommended to address this release of hazardous substances in the Site Investigation Closure Memorandum dated June 6, 2013.

2. Physical location

The Airport Property is located on Main Street (SR 113) in Stratford, Fairfield County, Connecticut. The Airport Property located immediately north of the Runway 24 at Airport along the north side of Main Street. The approximate geographic coordinates for the Airport Property are 77.03655W (Longitude) and 38.89767N (Latitude).

3. Site characteristics

The Airport Property, approximately 15.1 acres of commercially-zoned land, is a vacant, grassy lot that stretches approximately 850 feet along Main Street. The lot is flat and maintained by the Airport as a clear zone for the airport runways located to the south of the property. There are no buildings located on the property, but there is a dirt driveway that runs through the southern portion which leads to residences located near the Housatonic River, which is approximately 2000 feet east of Main Street. There is also a tributary flowing toward the Housatonic River located on the southern portion of the property.

The Airport Property is bounded by Main Street to the south, a paved commercial property to west, and tidal ditches to north and east. Access to the property is not restricted.

According to the EPA's environmental justice screening and mapping tool, EJSCREEN, the Airport Property is not in an environmental justice area. Based upon 2010 Census data, the estimated population within one mile of the Airport Property is 3,458.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The RI completed in 2005 by EPA's Remedial Program has documented that Raymark Waste has been placed at the Airport Property. Raymark Waste indicator contaminants are lead, chrysotile asbestos, and either copper and/or polychlorinated biphenyls – Aroclor 1268 only. URS began additional assessment of this area for the City of Bridgeport in November and December of 2012 to further characterize the vertical and lateral extent of Raymark Waste at the Airport Property.

To date, the highest concentrations for the hazardous substances and asbestos identified during URS's November and December 2012 sampling, along with depth locations, are compared to state remediation standards identified under the Direct Exposure Criteria for Soil located in Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies and shown below:

Location (below ground surface)	Hazardous Substance/Contaminant	Highest Concentrations Detected	Direct Exposure Criteria for Soil
			Industrial/Commercial Criteria
0-2 ft	Lead	6,590 mg/kg	1,000 mg/kg
2-4 ft	Lead	16,000 mg/kg	1,000 mg/kg
4-6 ft	Lead	5,500 mg/kg	1,000 mg/kg
6-8 ft	Lead	4,930 mg/kg	1,000 mg/kg
0-2 ft	PCB-Aroclor 1268	53.2 mg/kg	10 mg/kg
2-4 ft	PCB-Aroclor 1268	8.96 mg/kg	10 mg/kg
4-6 ft	PCB-Aroclor 1268	5.06 mg/kg	10 mg/kg
0-2 ft	Chrysotile asbestos	5.25 %	N/A
2-4 ft	Chrysotile asbestos	3.75%	N/A
4-6 ft	Chrysotile asbestos	4.5%	N/A

PCBs and lead are hazardous substances as defined by Section 101(14) of CERCLA, 42 U.S.C. 9601(14). In addition to exceeding the state direct exposure criteria, the PCB concentrations present at the Airport Property exceed default cleanup standards considered protective of public health, including: EPA’s PCB Cleanup and Disposal Regulations, 40 CFR Section 761.61 (1 mg/kg for unrestricted use, and 10 to 100 mg/kg with a compliant cap); and the preliminary remediation goals specified in EPA OSWER Directive 9355.4-01 (1 mg/kg for residential areas, 10 to 25 mg/kg for industrial use).

5. NPL status

The site is currently on the National Priorities List.

B. Other Actions to Date

1. Previous actions

The Raymark Industries Superfund Site was formally added to the National Priorities List on April 25, 1995. EPA’s Remedial Program completed the RI for the Raymark Industries OU6 – Airport Property Site in July of 2005 and the FS in August 2010. EPA issued a ROD on July 21, 2011 which finalized Source Control Actions at four of the properties within OU6 and Interim Actions at other locations containing Raymark Waste.

2. Current actions

EPA is currently working with the City of Bridgeport, Connecticut Department of Energy and Environmental Protection (CTDEEP), and CTDOT on developing and finalizing the Raymark Waste Delineation Report and Removal Work Plan to address the Raymark Waste under an Administrative Settlement Agreement and Order on Consent between the City of Bridgeport and EPA.

C. State and Local Authorities' Roles

1. State and local actions to date

Over the past several years, CTDEEP has been working closely with EPA's Remedial Program to address issues related to the Raymark Industries Superfund Site. To comply with the mandate enacted through Congressional legislation in 2005 that statutorily requires airports certificated for commercial service to improve their Runway Safety Areas to comply with FAA design standards no later than 2015, the City of Bridgeport, CTDOT, and the Federal Aviation Administration (FAA) are proposing to construct improvements to the Runway Safety Area (RSA) adjacent to Runway 24 at the Airport. A partial relocation of State Route (SR) 113, as know as Main Street, is required to accommodate the RSA improvements. These safety improvements include the construction of an Engineered Material Arresting System (EMAS) beyond the Runway 24 threshold.

The partial relocation of SR 113 will impact an area of the Airport Property that contains materials classified as Raymark Waste. This safety improvement project, know as State Project No. 15-336, will include the removal of the Raymark Waste at the Airport Property, partial relocation of SR 113, and the improvements to the RSA at the Airport.

2. Potential for continued State/local response

CTDEEP will continue to work with EPA and the implementing agencies throughout this project to ensure state ARARs are fulfilled. The City of Bridgeport and CTDOT, along with their contractors and consultants, will implement the removal action to address the Raymark Waste to facilitate State Project No. 15-336. As previously noted, the City of Bridgeport, as current owner of the property, is entering into an Administrative Settlement Agreement and Order on Consent with EPA to perform the removal action. CTDOT will serve as the lead agency for implementing State Project No. 15-336, which will be primarily funded by FAA.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

As described below, the conditions at the Airport Property meet the general criteria for a removal action, as set forth in 40 C.F.R. §300.415(b)(1), in that “there is a threat to public health or welfare of the United States or the environment,” and in consideration of the factors set forth in 40 C.F.R. §300.415(b)(2) as described below.

POLYCHLORINATED BIPHENYLS (PCBs) Please see the Agency for Toxic Substances and Disease Registry (ATSDR), U.S. Department of Health and Human Services, Public Health Service, *ToxFAQ Fact Sheet for Polychlorinated Biphenyls, February 2001* in Attachment 1.

LEAD – Please see the ATSDR, U.S. Department of Health and Human Services, Public Health Service, *ToxFAQ Fact Sheet for Lead, August 2007* in Attachment 2.

ASBESTOS - Please see the ATSDR, U.S. Department of Health and Human Services, Public Health Service, *ToxFAQ Fact Sheet for Asbestos, September 2001* in Attachment 3.

Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants; [§300.415(b)(2)(i)];

Raymark Waste has been documented to be present at or near ground surface at the Airport Property. Access onto the property is unrestricted, thereby trespassers can come into contact with Raymark Waste. Construction activities related to this proposed airport improvement project would not only impact the contaminated soils at or near the surface, but would also potentially expose construction workers and commercial workers and abutting properties to the soils at depth that contain some of the higher lead concentrations, as well as the PCBs and Asbestos related to the Raymark Waste.

Actual or potential contamination of drinking water supplies or sensitive ecosystems [§300.415(b)(2)(ii)];

There are tidal ditches located adjacent to the delineated Raymark Waste area. During adverse weather conditions that generate high tidal surges, possible erosion of the tidal embankments could potentially release Raymark Waste materials. These tidal ditches lead into the Marine Basin, which leads into the Housatonic River.

High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate [§300.415(b)(2)(iv)];

As noted previously, Raymark Waste has been documented to be present at or near ground surface and those materials are subject to migration.

Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released [§300.415(b)(2)(v)];

There are tidal ditches located adjacent to the Raymark Waste area. The embankments of these ditches contain Raymark Waste and erosion could occur during adverse weather conditions that generate high tidal surges, thus potentially releasing hazardous substances.

The availability of other appropriate Federal or State response mechanisms to respond to the release [§300.415(b)(2)(vii)];

EPA is the lead agency for this action because the Airport Property is part of the Raymark Superfund Site. Accordingly, EPA is the most appropriate agency to oversee and/or conduct this removal action. In addition, EPA is currently negotiating with a Potentially-Responsible Party (PRP), the City of Bridgeport, to conduct the removal action under an administrative order

Other situations or factors that may pose threats to public health or welfare of the United States or the environment [§300.415(b)(2)(viii)].

Construction activities related to this impending airport improvement project would not only impact the contaminated soils at or near the surface, but would also potentially expose construction workers and commercial workers and abutting properties to the soils at depth that contain some of the higher lead concentrations, as well as the PCBs and Asbestos related to the Raymark Waste.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances or pollutants or contaminants from the Airport Property, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

CERCLA § 104(c) states that removal actions can exceed the 12-month and \$2 million statutory limits if conditions meet either the “emergency exemption” criteria or the “consistency exemption” criteria. The consistency exemption requires that the proposed removal action be appropriate and consistent with the remedial action to be taken. As described below, conditions at the Airport Property meet the criteria for the consistency exemption.

A. Appropriateness

EPA OSWER directive 9360.0-12 states that an action is appropriate if the activity is necessary for any one of the following reasons:

1. To avoid a foreseeable threat;
2. To prevent further migration of contaminants;
3. To use alternatives to land disposal; or,
4. To comply with the off-site policy.

As noted previously, Raymark Waste has been documented to be present at or near ground surface at the Airport Property. Access onto the property is unrestricted, thereby trespassers can come into contact with Raymark Waste. Construction activities related to this proposed airport improvement project would not only impact the contaminated soils at or near the surface, but would also potentially expose construction workers and commercial workers and abutting properties to the soils at depth that contain some of the higher lead concentrations, as well as the PCBs and Asbestos related to the Raymark Waste.

The proposed removal action by the City of Bridgeport will meet criteria 1, 2, and 4 because the action will remove the Raymark Waste and will be transported off-site for proper disposal at EPA-approved disposal facilities.

B. Consistency

The Site is currently listed on the NPL. The proposed removal action by the PRP, where the entire Raymark Waste area will be removed for off-site disposal at EPA-approved disposal facilities, will facilitate a permanent Site remedy and is thus consistent with any appropriate long-term remedial action.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed action description

EPA is currently negotiating with a PRP, the City of Bridgeport, to conduct the removal action under an administrative order. It is the City of Bridgeport's intention to remove all of the Raymark Waste from this property for off-site disposal. In the event that the PRP fails to complete the work in a timely manner, EPA will take over the remainder of the project as a fund-lead action and implement response actions consistent with the interim actions identified in the *ROD for Final Source Control Actions at Four Properties within Operable Unit 6 (Additional Properties) and Interim Actions at Other Locations Containing Raymark Waste*. However, the absence of a removal action by the City of Bridgeport will cause the return of oversight responsibilities for this Site to the Remedial Program. Should a fund-lead action be necessary, specific removal activities by EPA will include the following:

- Conduct a site walk with the cleanup contractor;
- Establish a command post and staging area, and connect necessary utilities;
- Secure the Airport Property, including installation of security fencing if necessary and posting of warning signs;
- Clear vegetation and debris as needed;
- Excavate Raymark Waste, if determined needed to stabilize area;
- Conduct air monitoring and implement dust control measures as appropriate;
- Stabilize the Raymark Waste area with control measures consistent with the Interim Measures identified in the ROD, possibly including physical barriers to prevent immediate contact threats;
- Dispose of hazardous substances at EPA-approved off-site disposal facilities, as needed;
- Repair response-related damages.

2. Community relations

Over the past several years, EPA's Remedial Program has been working closely with its community involvement coordinator (CIC) on disseminating information regarding the Raymark Industries Superfund Site to the Town of Stratford and the immediately impacted community. The OSC will work with the CIC to ensure that on-going communication efforts are continued during the removal action.

3. Contribution to remedial performance

The cleanup proposed in this Action Memorandum is designed to mitigate the threats to human health and the environment posed by the Airport Property. The actions taken at the Airport Property will be consistent with and will not impede any future responses.

4 Description of alternative technologies

The use of alternative technologies with regard to disposal options will be further examined as the Airport Property work progresses. On-site field screening and analytical techniques may be utilized during the removal action.

5. Applicable or relevant and appropriate requirements (ARARs)

Federal ARARs:

40 CFR Part 262 Standards Applicable to Generators of Hazardous Waste:

Subpart B - The Manifest

- 262.20 : General requirements for manifesting
- 262.21 : Acquisition of manifests
- 262.22 : Number of copies of manifests
- 262.23 : Use of the manifest

Subpart C - Pre-Transport Requirements

- 262.30 : Packaging
- 262.31 : Labeling
- 262.32 : Marking

Subpart D - Recordkeeping and Reporting

- 262.40 : Recordkeeping

40 CFR Part 264 Standards for Owners and Operators of Hazardous waste Treatment, Storage, and Disposal Facilities:

Subpart I - Use and Management of Containers

- 264.171 : Condition of containers
- 264.172 : Compatibility of waste with containers
- 264.173 : Management of containers
- 264.174 : Inspections
- 264.175 : Containment
- 264.176 : Special requirements for ignitable or reactive waste
- 264.177 : Special requirements for incompatible wastes

40 CFR Part 264 Hazardous Waste Regulations - RCRA Subtitle C:

- 268-270 : Hazardous and Solid Waste Amendments Land Disposal Restrictions Rule

40 CFR Part 300.440 Procedures for Planning and Implementing Off-Site Response Actions (Off-Site Rule)

40 CFR Part 761.61: TSCA requirements for cleanup and disposal of PCBs

40 CFR Part 761.79: TSCA decontamination of equipment used

40 CFR Part 61: Clean Air Act standards for controlling dust

40 CFR Sections 122.26(c)(ii)(C) and 122.44(k): Clean Water Act NPDES regulations for storm water control and management

State ARARs:

The OSC will coordinate with State officials to identify additional State ARARs, if any. In accordance with the National Contingency Plan and EPA Guidance Documents, the OSC will determine the applicability and practicability of complying with each ARAR that is identified in a timely manner.

6. Project schedule

Pending permit approvals and FAA funding availability, the removal action is expected to commence in the spring of 2014.

B. Estimated Costs

COST CATEGORY		CEILING
<i>REGIONAL REMOVAL ALLOWANCE COSTS:</i>		
ERRS Contractor		\$1,000,000.00
Interagency Agreement		\$ 0.00
<i>OTHER EXTRAMURAL COSTS NOT FUNDED FROM THE REGIONAL ALLOWANCE:</i>		
START Contractor		\$300,000.00
Extramural Subtotal		\$1,300,000.00
Extramural Contingency	20%	\$260,000.00
TOTAL, REMOVAL ACTION CEILING		\$1,560,000.00

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The impending safety improvements to the Airport, which are mandated by congressional legislation, are required to be completed by 2015. Construction activities related to this proposed airport improvement project would not only impact the contaminated soils at or near the surface, but would also potentially expose construction workers and commercial workers and abutting

properties to the soils at depth that contain some of the higher lead concentrations, as well as the PCBs and Asbestos related to the Raymark Waste. The absence of a removal action described herein will cause conditions at the Airport Property to remain unaddressed, and threats associated with the presence of hazardous substances will continue to pose a threat to human health and the environment.

VIII. OUTSTANDING POLICY ISSUES

There are no precedent-setting policy issues associated with this action.

IX. ENFORCEMENT ... For Internal Distribution Only

See attached Enforcement Strategy.

The total EPA costs for this removal action based on full-time accounting practices that will be eligible for cost recovery are estimated to be \$1,560,000 (extramural costs) + \$300,000 (EPA intramural costs) = \$1,860,000 X 1.4485 (regional indirect rate) = **\$2,694,210.**¹

X. RECOMMENDATION

This decision document represents the selected removal action for the Raymark Industries OU6 – Airport Property Site in Stratford, Connecticut, developed in accordance with CERCLA, as amended, and is not inconsistent with the National Contingency Plan. The basis for this decision will be documented in the administrative record to be established for the Airport Property.

Conditions at the Airport Property meet the NCP Section 300.415 (b) (2) criteria for a removal action due to the following:

Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants [§300.415(b)(2)(i)];

¹Direct Costs include direct extramural costs \$1,560,000 and direct intramural costs \$300,000. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site specific costs 44.85% x \$1,860,000 consistent with the full accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will affect the United States' right to cost recovery.

Actual or potential contamination of drinking water supplies or sensitive ecosystems [§300.415(b)(2)(ii)];

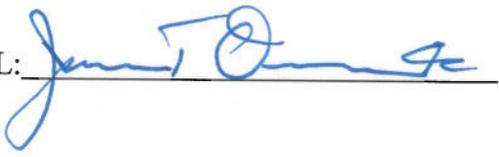
High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate [§300.415(b)(2)(iv)];

Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released [§300.415(b)(2)(v)];

The availability of other appropriate Federal or State response mechanisms to respond to the release [§300.415(b)(2)(vii)];

Other situations or factors that may pose threats to public health or welfare of the United States or the environment [§300.415(b)(2)(viii)].

I recommend that you approve the proposed removal action. The total extramural removal action project ceiling if approved will be \$1,560,000.

APPROVAL: 

DATE: 6/26/13

DISAPPROVAL: _____

DATE: _____

Attachments 1-3: ATSDR Tox FAQs Fact Sheets

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

- PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these

aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

- Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- Breathing air near hazardous waste sites and drinking contaminated well water.
- In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported. In most cases, the benefits of breastfeeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

- You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
- Children should be told not play with old appliances,

electrical equipment, or transformers, since they may contain PCBs.

- Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
- If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,272 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.

How might I be exposed to lead?

- Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.

- Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
- Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.
- Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services

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(DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

How can families reduce the risks of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew on mouth surfaces that may have been painted with lead-based paint.
- If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.
- Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children
- If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces

often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to determine whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter ($\mu\text{g}/\text{dL}$). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3–6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a blood lead level of $10 \mu\text{g}/\text{dL}$ to be a level of concern for children.

EPA limits lead in drinking water to $15 \mu\text{g}$ per liter.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for lead (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about asbestos. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, individual susceptibility and personal habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to asbestos usually occurs by breathing contaminated air in workplaces that make or use asbestos. Asbestos is also found in the air of buildings that are being torn down or renovated. Asbestos exposure can cause serious lung problems and cancer. This substance has been found at 83 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is asbestos?

Asbestos is the name given to a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in the environment. Asbestos minerals have separable long fibers that are strong and flexible enough to be spun and woven and are heat resistant. Because of these characteristics, asbestos has been used for a wide range of manufactured goods, mostly in building materials (roofing shingles, ceiling and floor tiles, paper products, and asbestos cement products), friction products (automobile clutch, brake, and transmission parts), heat-resistant fabrics, packaging, gaskets, and coatings. Some vermiculite or talc products may contain asbestos.

What happens to asbestos when it enters the environment?

Asbestos fibers can enter the air or water from the breakdown of natural deposits and manufactured asbestos products. Asbestos fibers do not evaporate into air or dissolve in water. Small diameter fibers and particles may remain suspended in the air for a long time and be carried long distances by wind or water before settling down. Larger diameter fibers and particles tend to settle more quickly.

Asbestos fibers are not able to move through soil. Asbestos fibers are generally not broken down to other compounds and will remain virtually unchanged over long periods.

How might I be exposed to asbestos?

We are all exposed to low levels of asbestos in the air we breathe. These levels range from 0.00001 to 0.0001 fibers per milliliter of air and generally are highest in cities and industrial areas.

People working in industries that make or use asbestos products or who are involved in asbestos mining may be exposed to high levels of asbestos. People living near these industries may also be exposed to high levels of asbestos in air.

Asbestos fibers may be released into the air by the disturbance of asbestos-containing material during product use, demolition work, building or home maintenance, repair, and remodeling. In general, exposure may occur only when the asbestos-containing material is disturbed in some way to release particles and fibers into the air.

Drinking water may contain asbestos from natural sources or from asbestos-containing cement pipes.

How can asbestos affect my health?

Asbestos mainly affects the lungs and the membrane that surrounds the lungs. Breathing high levels of asbestos fibers for a long time may result in scar-like tissue in the lungs and in the pleural membrane (lining) that surrounds the lung. This disease is called asbestosis and is usually found in workers exposed to asbestos, but not in the general public. People with asbestosis have difficulty breathing, often a cough, and in severe cases heart enlargement. Asbestosis is a serious disease and can eventually lead to disability and death.

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Breathing lower levels of asbestos may result in changes called plaques in the pleural membranes. Pleural plaques can occur in workers and sometimes in people living in areas with high environmental levels of asbestos. Effects on breathing from pleural plaques alone are not usually serious, but higher exposure can lead to a thickening of the pleural membrane that may restrict breathing.

How likely is asbestos to cause cancer?

The Department of Health and Human Services (DHHS), the World Health Organization (WHO), and the EPA have determined that asbestos is a human carcinogen.

It is known that breathing asbestos can increase the risk of cancer in people. There are two types of cancer caused by exposure to asbestos: lung cancer and mesothelioma. Mesothelioma is a cancer of the thin lining surrounding the lung (pleural membrane) or abdominal cavity (the peritoneum). Cancer from asbestos does not develop immediately, but shows up after a number of years. Studies of workers also suggest that breathing asbestos can increase chances of getting cancer in other parts of the body (stomach, intestines, esophagus, pancreas, and kidneys), but this is less certain. Early identification and treatment of any cancer can increase an individual's quality of life and survival.

Cigarette smoke and asbestos together significantly increase your chances of getting lung cancer. Therefore, if you have been exposed to asbestos you should stop smoking. This may be the most important action that you can take to improve your health and decrease your risk of cancer.

How can asbestos affect children?

We do not know if exposure to asbestos will result in birth defects or other developmental effects in people. Birth defects have not been observed in animals exposed to asbestos.

It is likely that health effects seen in children exposed to high levels of asbestos will be similar to the effects seen in adults.

How can families reduce the risk of exposure to asbestos?

Materials containing asbestos that are not disturbed or deteriorated do not, in general, pose a health risk and can be left alone. If you

suspect that you may be exposed to asbestos in your home, contact your state or local health department or the regional offices of EPA to find out how to test your home and how to locate a company that is trained to remove or contain the fibers.

Is there a medical test to show whether I've been exposed to asbestos?

Low levels of asbestos fibers can be measured in urine, feces, mucus, or lung washings of the general public. Higher than average levels of asbestos fibers in tissue can confirm exposure but not determine whether you will experience any health effects.

A thorough history, physical exam, and diagnostic tests are needed to evaluate asbestos-related disease. Chest x-rays are the best screening tool to identify lung changes resulting from asbestos exposure. Lung function tests and CAT scans also assist in the diagnosis of asbestos-related disease.

Has the federal government made recommendations to protect human health?

In 1989, EPA banned all new uses of asbestos; uses established before this date are still allowed. EPA established regulations that require school systems to inspect for damaged asbestos and to eliminate or reduce the exposure by removing the asbestos or by covering it up. EPA regulates the release of asbestos from factories and during building demolition or renovation to prevent asbestos from getting into the environment.

EPA has proposed a concentration limit of 7 million fibers per liter of drinking water for long fibers (lengths greater than or equal to 5 μm). The Occupational Safety and Health Administration has set limits of 100,000 fibers with lengths greater than or equal to 5 μm per cubic meter of workplace air for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological Profile for Asbestos. Update. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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