

# Identifying Industry Sectors in the Northeast That Emit or Transfer Lead or Lead Compounds

Northeast Waste Management Officials' Association  
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## Introduction

In 1998, the U.S. Environmental Protection Agency (EPA) began its Persistent, Bioaccumulative and Toxic (PBT) Pollutants Initiative. The PBT Initiative is an integrated approach for addressing widespread problems associated with toxic chemicals that persist and bioaccumulate in the environment. In the three years since the Initiative began, the EPA and state environmental programs have focused much attention on reducing risks to human health and the environment from exposure to PBT chemicals.

Recently, the Northeast Waste Management Officials' Association (NEWMOA)<sup>1</sup> analyzed the EPA's 1998 and 1999 Toxic Release Inventory Data for its member states with regard to releases and transfers of PBT chemicals. Lead and lead compounds were released and transferred in amounts larger than any other PBT chemical in the NEWMOA-member states. NEWMOA performed a brief study to determine the most common industry sectors where lead and lead compounds were being released or transferred. This report presents the results of the study, and can be used to determine if additional work on the topic is warranted.

## Background on Lead and Lead Compounds

Lead is mined primarily in Australia, the United States and Kazakhstan. According to the United States Geological Survey (USGS), in 1999 approximately 1,760,000 metric tons (1,940,463 tons or 3,880,136,000 pounds) of lead were used by the United States. In the same year, the United States recovered approximately 1.1 million tons of lead from post-consumer scrap of which approximately 1 million tons was recovered from used batteries.

In manufacturing, lead is used in the metallic form, in combination with other metals in an alloy, and in combination with other chemicals forming lead compounds. According to the USGS, in the U.S., the transportation industry is the major user of lead, consuming 76 percent of the total lead used. In the transportation industry, lead is used for batteries, fuel tanks, solder, seals, bearings, and wheel weights. Electrical, electronic and communications industries used approximately 22 percent of the U.S. total to produce batteries, ammunition, television glass, radiation shielding for construction, and protective coatings. The remaining U.S. lead was used

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<sup>1</sup> The Northeast Waste Management Officials' Association (NEWMOA) is a non-profit, non-partisan interstate governmental association. The membership is composed of state environmental agency directors from the pollution prevention, hazardous and solid waste, and waste site cleanup programs in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont. Karen Thomas, NEWMOA Project Manager was the primary author of this report.

to produce ballast and counterweights, ceramics and crystal glass, tubes and containers, type metal, foil, wire and specialized chemicals. The major lead compounds used in commerce are lead oxide, lead tetraoxide, lead carbonate, lead sulfate, and lead phthalate.

In its July 1999 report, *Toxicological Profile for Lead*, the Agency for Toxic Substances and Disease Registry (ASTDR) examined 1996 TRI data and found that 1,476 U.S. facilities<sup>2</sup> produced or processed lead. Of these 1,476 facilities, 199 were located in the Northeast states (Connecticut - 28, Massachusetts - 35, Maine - 1, New Hampshire - 11, New Jersey - 46, New York - 58, Rhode Island - 15 and Vermont - 5).

## **Exposure Routes and Health Effects**

The primary routes of exposure to lead and lead compounds are by ingestion and inhalation. Once in the body, lead affects the nervous system and can damage the brain and kidneys. Lead is most well known as a developmental hazard, especially for children exposed to lead from leaded paint chips and leaded pipes that carry drinking water. Lead can also affect the reproductive systems in both males and females and is classified as a probable teratogen. Lead and inorganic lead compounds are in Category 2B of the International Agency for Research on Cancer (IARC), meaning that they are possibly carcinogenic to humans.

## **Emissions and Transfers of Lead and Lead Compounds in the Northeast**

Using the U.S. EPA's 1999 Toxics Release Inventory (TRI) data, NEWMOA determined the total reported releases and transfers for lead and lead compounds in the Northeast states in the following TRI categories:

- Total Air Emissions
- Surface Water Discharges
- Releases to Land
- Total Off-site Releases
- Transfers to POTWs
- Recycled On-site
- Recycled Off-site
- Treated On-site
- Treated Off-site

The results can be found in Table 1. Because lead and lead compounds are reported separately under TRI, NEWMOA presents the data separately in this report.

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<sup>2</sup> This number includes only those facilities that are subject to reporting under SARA Title III, TRI and therefore is not complete.

Table 1: Total Amounts of Lead and Lead Compounds Released and Transferred in the Northeast States

TRI Category	Total Amount for <b>Lead</b> in the 8 Northeast States (lbs)	Total Amount for <b>Lead Compounds</b> in the 8 Northeast States (lbs)
Total Air Emissions	9,521	17,896
Surface Water Discharges	476	4,290
Releases to Land	6	2,006,795
Total Off-site Releases	210,583	5,677,803
Transfers to POTWs	0	0
Recycled On-site	431,487	6,808,730
Recycled Off-site	3,279,569	13,818,480
Treated On-site	460	476,844
Treated Off-site	104,495	1,857,472
1999 TRI data; Totals provided are the sums of all SIC codes, including Multiple Codes 20-39, 4953/7389 RCRA/Solvent Recovery, 39 Miscellaneous, and 5169 Chemical Wholesalers.		

Subsequently, NEWMOA identified the two-digit standard industrial classification (SIC) codes that reported the largest emissions and transfers of lead and lead compounds from facilities in the Northeast in each of those TRI categories. Table 2 provides these data.

Table 2: SIC Codes Reporting the Largest Releases or Transfers in Each TRI Category for the Northeast States Combined

TRI Release or Transfer Category <sup>a</sup>	SIC code reporting the largest amount for <b>lead</b> for all 8 states combined	Amount (pounds)	SIC code reporting the largest amount for <b>lead compounds</b> for all 8 states combined	Amount (pounds)
Total Air Emissions	33 Primary Metals	5,658	33 Primary Metals	5,440
Surface Water Discharges	32 Stone/Clay/Glass	250	28 Chemicals	2,363
Releases to Land	N/A	N/A	10 Metal Mining	1,154,320
Total Off-site Releases	36 Electrical Equipment	67,323	33 Primary Metals	3,364,495
Transfers to POTWs	N/A	NA	N/A	N/A
Recycled On-site	33 Primary Metals	429,780	33 Primary Metals	3,333,664
Recycled Off-site	33 Primary Metals	1,119,974	36 Electrical Equipment	11,572,385
Treated On-site	34 Fabricated Metals	310	4953/7389 RCRA/Solvent Recovery	424,100
Treated Off-site	37 Transportation Equipment	29,999	28 Chemicals	1,749,750

<sup>a</sup> See Notes section at the end of the report for definitions of these categories.

N/A = Not applicable, in this case, there were no releases reported in those categories.

The following eight<sup>3</sup> two-digit SIC codes account for all the reported lead and lead compound released and transferred in the Northeast states.

- 10 Metal mining
- 28 Chemicals
- 30 Plastics
- 32 Stone/Glass/Clay
- 33 Primary metals
- 34 Fabricated metals
- 36 Electrical equipment
- 37 Transportation

By examining both the four-digit SIC codes of the facilities that report releases and transfers of lead and lead compounds and the definitions of the SIC codes, NEWMOA was able to surmise the potential processes and products where lead or lead compounds are used. Tables 3 and 4 provide summaries of this information for the Northeast states.

Following the table is a more detailed description of these two-digit SIC codes and the facilities and products that are included in them.

Table 3: Industry Sectors (or Product Categories) Where **Lead** is Reported as Emitted or Transferred in the Northeast States

SIC Code	Northeast States that have Facilities that Report on <b>Lead</b>	Industry Sector or Product Category where the Lead Originates
28 Chemicals	NJ	Organic dyes and pigments
30 Rubber & Plastics	NJ	Unsupported plastics profiles
32 Stone/Clay/Glass	NY	Pressed and blown glass and glassware products
33 Primary Metals	ME, MA, NH, NY, RI	Nonferrous wire drawing and insulation, copper rolling and drawing, blast furnaces and steel mills, copper foundries, nonferrous foundries, metal heat treating, primary nonferrous metals, aluminum, and cold finishing of steel shapes
34 Fabricated Metal Products	CT, NH, NY	Metal foil, plumbing fittings, nonferrous forgings, plating and polishing, metal coating, hardware, sheet metal, fabricated wire products, glass, small arms ammunition, screw machine products, and fabricated metal products
36 Electrical Equipment	CT, MA, NH, NY, VT	Cathode ray TV picture tubes, electric lamps, and semiconductors and related devices
37 Transportation Equipment	CT, NY, VT	Electric boats, motor vehicle parts, aircraft engines

<sup>3</sup> The following five codes did not account for large releases and transfers and were ignored for the purposes of this study: 29 Petroleum, 35 Machinery, 49 Electric Utilities, 39 Miscellaneous, Multiple Codes 20-39 and 5169 Chemical Wholesalers. SIC Code 4953/7389 RCRA/Solvent was also ignored.



Table 4: Industry Sectors (or Product Categories) Where **Lead Compounds** Are Reported as Emitted or Transferred in the Northeast States

SIC Code	Northeast States that have Facilities that Report on <b>Lead Compounds</b>	Industry Sector or Product Category where the Lead Compounds Originate
10 Metal Mining	NY	Lead and zinc ores
28 Chemicals	CT, NJ	Explosives, paints and allied products, organic chemicals, inorganic chemicals
30 Plastics	MA, NJ, RI	Plastics resin blending, miscellaneous rubber and plastic products
32 Stone/Clay/Glass	NY, MA	Pressed and blown glass and glassware products
33 Primary Metals	CT, ME, MA, NH, NY, RI, VT	Nonferrous wire drawing and insulation, copper rolling and drawing, gray iron foundries, blast furnace and steel mills, and secondary nonferrous metals
34 Fabricated Metal Products	CT, ME, MA, NH, NY, RI	Valves and pipe fittings, screw machine products, hardware, plating and polishing, metal coating, and fabricated metal products
36 Electrical Equipment	MA, NH, NJ, NY, VT	Telephone and telegraph apparatus, batteries, electron tubes, electronic capacitors, electronic connectors, cathode ray TV picture tubes and current-carrying wire devices
37 Transportation Equipment	NY	Motor vehicle parts

### *10 Metal Mining*

This group includes establishments primarily engaged in mining, developing mines or exploring for metallic minerals (ores). It includes mills which crush, grind, wash, dry, sinter, calcine or leach ore, or perform gravity separation or flotation operations.

The only Northeast state that reports lead compound emissions in this SIC code is New York, and the releases come primarily from one plant, ZCA Mines, Inc.

### *28 Chemicals*

This group includes establishments producing basic chemicals and establishments manufacturing products by predominantly chemical processes. The establishments that report lead emissions and transfers in this SIC code are most likely manufacturing plastics, pigments, paints and explosives.

The only Northeast state that reports lead emissions or transfers in this SIC code is New Jersey, and the releases come entirely from one plant, Cardinal Color, Inc. that manufactures organic dyes and pigments. Companies in Connecticut and New Jersey report emissions and transfers of lead compounds from this SIC code. In Connecticut companies manufacture explosives, organic chemicals (possibly lead oxides and lead stabilizers), and paints and allied

products. In New Jersey the majority of releases and transfers of lead compounds in this SIC code come from facilities that manufacture paints and allied products, and inorganic chemicals.

### *30 Rubber & Plastics*

This group includes establishments manufacturing products, not elsewhere classified, from plastics resins and from natural, synthetic, or reclaimed rubber.

The only Northeast state that reports lead emissions or transfers in this SIC code is New Jersey. Only one facility in New Jersey reports in this category, Breen Color Concentrates, Inc. They report relatively small amounts and they manufacture unsupported plastics profiles (perhaps rods, tubes and other shapes).

Massachusetts, New Jersey, and Rhode Island have facilities that report emissions or transfers of lead compounds in this category. These facilities are engaged in plastics resins blending, and the manufacture of miscellaneous rubber and plastic products.

### *32 Stone/Glass/Clay*

This group includes establishments engaged in manufacturing flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, asbestos products, and other products from materials taken principally from the earth in the form of stone, clay and sand.

New York and Massachusetts are the only Northeast states where companies report emitting or transferring lead and lead compounds in this SIC code. The bulk of the emissions and transfers in this SIC code come from a few companies that produce pressed and blown glass and glassware products.

### *33 Primary Metals*

This group includes establishments engaged in smelting and refining ferrous and nonferrous metals from ore, pig or scrap; in rolling, drawing and alloying metals; in manufacturing castings and other basic metal products; and in manufacturing nails, spikes, and insulated wire and cable.

All Northeast states except Connecticut and Vermont have companies that report lead emissions and transfers from this SIC code. The most prominent industries in the Northeast in this SIC code that report on lead are companies in the following categories: nonferrous wire drawing and insulation, copper rolling and drawing, blast furnaces and steel mills, copper foundries, nonferrous foundries, metal heat treating, primary nonferrous metals, aluminum, and cold finishing of steel shapes. All Northeast states have companies that report lead compound emissions and transfers from this SIC code. The most prominent industries in the Northeast in this SIC code that report on lead compounds are companies in the following categories: nonferrous wire drawing and insulation, copper rolling and drawing, gray iron foundries, blast furnace and steel mills, and secondary nonferrous metals.

### *34 Fabricated Metals*

This group includes establishments engaged in fabricating ferrous and nonferrous metal products, such as metal cans, tinware, handtools, cutlery, general hardware, nonelectric heating apparatus, fabricated structural metal products, metal forgings, metal stampings, ordnance, and a variety of metal and wire products, not elsewhere classified.

Only Connecticut, New Hampshire and New York have facilities in this SIC code that report releases or transfers of lead. All the Northeast states except Vermont have facilities in this SIC code that report releases or transfers of lead compounds. Lead emissions and transfers are reported by facilities manufacturing metal foil, plumbing fittings, nonferrous forgings, plating and polishing, metal coating, hardware, sheet metal, fabricated wire products, glass, small arms ammunition, screw machine products, and fabricated metal products. Lead compounds are reported from facilities that manufacture valves and pipe fittings, screw machine products, hardware, plating and polishing, metal coating, and fabricated metal products.

### *36 Electrical Equipment*

This group includes establishments engaged in manufacturing machinery, apparatus and supplies for generation, storage, transmission, transformation, and utilization of electrical energy. Included are the manufacturing of electricity distribution equipment, electrical industrial apparatus, household appliances, electrical lighting and wiring equipment, radio and television receiving equipment, communications equipment, electronic components and accessories, and other electrical equipment and supplies.

Connecticut, Massachusetts, New Hampshire, New York and Vermont have facilities that report emissions or transfers of lead in this SIC code. Massachusetts, New Hampshire, New Jersey, New York and Vermont have facilities that report emissions or transfers of lead compounds in this SIC code. Lead is reported by companies that manufacture cathode ray TV picture tubes, electric lamps, and semiconductors and related devices. Lead compounds are reported by companies that manufacture telephone and telegraph apparatus, batteries, electron tubes, electronic capacitors, electronic connectors, cathode ray TV picture tubes, and current-carrying wire devices.

### *37 Transportation*

This group includes establishments engaged in manufacturing equipment for transportation of passengers and cargo by land, air, and water. Products such as motor vehicles, aircraft, guided missiles and space vehicles, ships, boats, railroad equipment, motorcycles, bicycles and snowmobiles are included in this category.

Connecticut, New York and Vermont have facilities that report releases or transfers of lead in this SIC code. Only New York has facilities that report releases or transfers of lead compounds in this SIC code. Lead is reported by companies that manufacture electric boats, motor vehicle parts, and aircraft engines. Lead compounds are reported by companies that manufacture motor vehicle parts.

## **Additional Work**

Having identified the industry sectors (and/or product categories) that emit or transfer lead or lead compounds in the Northeast, additional work might include any of the following:

- choose a few industry sectors or product categories on which to focus
- research and report on pollution prevention opportunities (P2) for those sectors or categories
- prepare outreach materials about lead P2 opportunities
- facilitate information sharing between the states and other groups working on lead reduction projects (i.e., MA Toxics Use Reduction Institute's work on lead-free electronics, including the wire and cable industry)
- identify uses of lead for which there are no good P2 opportunities and determine research needs

Another possibility for additional work is to determine the most common products that contribute lead to the municipal solid waste stream, and to identify opportunities for product stewardship projects.

## Bibliography

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## Notes

Total Air Emissions = the sum of fugitive air and stack air release amounts (in pounds).

Surface Water Discharges = Releases to water include discharges to streams, rivers, lakes, oceans, and other bodies of water. This includes releases from contained sources, such as industrial process outflow pipes or open trenches. Releases due to runoff, including stormwater runoff are also reportable to TRI.

Releases to Land = Disposal to land on site is the release of a toxic chemical to land within the boundaries of the reporting facility. Releases to land include disposal of toxic chemicals in landfills (in which wastes are buried), land treatment/application farming (in which a waste containing a listed chemical is applied to or incorporated into soil), surface impoundments (which are uncovered holding areas used to volatilize and/or settle materials), and other land disposal methods (such as waste piles) or releases to land (such as spills or leaks).

Total Off-site Releases = Off-site releases are from Section 6 (transfers off-site to disposal) of the Form R. Off-site releases include metals and metal compounds transferred off-site for solidification/stabilization and for waste water treatment, including to POTWs.

Transfers to POTWs = The total amount (in pounds) of the toxic chemical transferred from the facility to all Publicly Owned Treatment Works (POTWs) during the calendar year (January 1 - December 31). POTW refers to a municipal sewage treatment plant. The most common transfers will be conveyances of the toxic chemical in facility wastewater through underground sewage pipes, however, trucked or other direct shipments to a POTW are also included in this estimate.

Recycled On-site = The total amount (in pounds) of the toxic chemical recycled on-site during the calendar year (January 1 - December 31) prior to the year for which the report was submitted. This includes only the amount of the toxic chemical actually recovered for reuse, not the total amount of the toxic chemical in the

wastestream entering recycling units on-site. This amount does not include quantities of the toxic chemical that were recycled on-site as the result of a catastrophic event, remedial action or other, one-time event not associated with production.

Recycled Off-site = The total amount (in pounds) of the toxic chemical sent off-site for recycling during the calendar year (January 1 - December 31) prior to the year for which the report was submitted. This includes all amounts of the toxic chemical intended to be recycled and sent off-site for that purpose, not just the amount of the toxic chemical actually recovered. This figure includes all transfers off-site reported in section 6.2 which are classified with a recycling code. This amount does not include quantities of the toxic chemical that were transferred off-site for recycling as the result of a catastrophic event, remedial action or other, one-time event not associated with production.

Treated On-site = The total amount (in pounds) of the toxic chemical treated on-site during the calendar year (January 1 - December 31) prior to the year for which the report was submitted. This includes only the amount of the toxic chemical actually treated (destroyed) by processes at the facility, not the total amount of the toxic chemical present in wastestreams sent to those processes. This amount does not include quantities of the toxic chemical that were treated for destruction on-site as the result of a catastrophic event, remedial action or other, one-time event not associated with production.

Treated Off-site = The total amount (in pounds) of the toxic chemical sent for treatment off-site during the calendar year (January 1 - December 31) prior to the year for which the report was submitted. This includes the total amount of the toxic chemical intended to be treated (destroyed) and sent off-site for that purpose, not the amount of the toxic chemical actually treated (destroyed) by off-site processes. This figure includes all transfers off-site reported in section 6.2 which are classified with treatment waste management codes and most transfers to POTWs reported in section 6.1, except for metals. This does not include transfers of metals to publicly owned treatment works (POTWs) because metals cannot be treated (destroyed) and will ultimately be disposed. Transfers of metals to POTWs are included in section 8.1. This amount also does not include quantities of the toxic chemical that were transferred off-site for treatment as the result of a catastrophic event, remedial action or other, one-time event not associated with production.