

New York State
Heavy Metals Registry
1996 and 1997

New York State Department of Health
Bureau of Occupational Health

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Executive Summary

The New York State Department of Health (NYSDOH) Heavy Metals Registry was established in 1980 as a tool for the surveillance of adult exposures to lead, mercury, cadmium and arsenic. Information is received from clinical laboratories that test New York residents and employees for any of these four metals in their blood or urine. In 1992, legislation was enacted which required the reporting of all blood lead results, regardless of level. Only the reporting of test results by laboratories to the NYSDOH above specified limits are required for mercury, arsenic and cadmium.

This report presents statistics for the test results reported to the registry and conducted during 1996 and 1997. It is intended as a resource for programs providing preventive health care and for public officials concerned with reducing overall morbidity from heavy metals poisonings.

Because of the different reporting requirements and the relative frequency of significant exposure, more than 97 percent of the registry reports are for lead. In 1996, 4,832 adults were reported to the Heavy Metals Registry with blood lead levels at or above 10 µg/dL; in 1997, this decreased to 4,651 adults. The number of adults reported for arsenic and mercury is relatively similar each year, while the number of cadmium reports declined from 1996 to 1997.

Over 80 percent of the of the people reported in 1997 with blood lead levels greater than or equal to 25 µg/dL had an exposure that was occupational in origin. Fifty percent of these occupational lead exposures were to those in manufacturing jobs, while a third were to those in construction jobs. The highest blood lead levels appeared among those employed in three industries: construction, lead abatement and metal recycling. Occupations that put workers at higher risk for lead poisoning included mechanics and repairers, machine operators, and laborers.

Heavy Metals Registry Report 1996 and 1997

Overview

The NYSDOH Heavy Metals Registry (HMR) is a tool for the surveillance of adult exposures to lead, mercury, cadmium and arsenic. These metals are widely used in industry, and all have the potential to cause severe illness due to either acute or chronic exposure. Examination of the registry data can provide effective identification of potentially serious exposures in both communities and workplaces, thus allowing for the early initiation of environmental control measures to prevent illness.

The New York State Department of Health promulgated regulations in 1980 that established the HMR (sections 22.6 and 22.7 of the State Sanitary Code; Appendix A). Reporting to the registry began in 1982. Clinical laboratories that test New York residents and employees for lead, mercury, cadmium and arsenic in their blood or urine are required to report test results above specified limits to the NYSDOH.

For lead poisoning, the regulations require both in-state and out-of-state laboratories to report blood lead test results for specimens collected on New York State residents. In 1992, as part of a major childhood lead poisoning prevention initiative, legislation was enacted to require the reporting of all blood lead results for all age groups, regardless of level. This legislative change has helped to identify elevated blood lead levels early and verify decreases in blood lead levels.

Program Operation

More than 94 percent of all blood lead results received are reported electronically by the laboratories. The remaining tests are reported on paper forms. The percent of the other metals reported electronically varies, from approximately 20 percent for mercury to almost 60 percent for arsenic and cadmium.

All information reported to the registry is confidential. Records and computer files are maintained in accordance with NYSDOH regulations concerning medical data containing individual identifiers. Access to the data by anyone other than registry personnel is restricted and carefully monitored to ensure that confidentiality is maintained.

Registry staff contact individuals reported to the registry with an elevated level of any of the heavy metals. The staff member collects demographic information and information on the subject's work and home environment. This interview is used to determine the possible sources of exposure and to advise the person on appropriate control measures to limit future exposures. When the exposure is work-related, information is gathered on the employer, work location, lead protection measures in place and whether coworkers are also potentially exposed.

The NYSDOH industrial hygiene staff provides consulting services to worksites with employees who have high or persistently elevated heavy metal levels. For situations where the employer has not previously been reported to the registry, an industrial hygienist contacts the company to determine the exposure circumstances, learn whether coworkers are at risk and to assess whether the company is taking appropriate measures to control exposures. With all contacts, the industrial hygienist protects the confidentiality of the individual reported. An important focus for these efforts is smaller businesses that do not have either full-time medical or industrial hygiene staff to evaluate their worksites.

The NYSDOH staff makes recommendations to reduce exposure to all heavy metals whenever feasible. The NYSDOH recommendations for lead exposure are guided by Occupational Safety and Health Administration (OSHA) standards and our experience in addressing similar problem exposures. The goal of the consultation is to identify site specific exposure reduction techniques and to encourage monitoring to help assure that exposures have been reduced.

1996 and 1997 Report

This report presents statistics for the test results reported to the registry and conducted during 1996 and 1997. It is intended as a resource for programs providing preventive health care and for public officials concerned with reducing overall morbidity from heavy metals poisonings.

Because of the change in the reporting requirement for lead in 1992 and because lead exposure is much more common, lead tests account for more than 97 percent of the reports received by the HMR. Section II of this report focuses on the lead reports.

Section I - Demographics

The tables and figures in this section display the number of reports received and individuals tested for each of the metals for both 1996 and 1997. Basic demographic information such as sex, age and occupational status is displayed in Table I-1. Figures I-1 to I-4 display the number of adults reported to the registry every year for each metal since the registry began in 1982. The number of employers with employees reported each year is included in Table I-2. This table includes only those employees for whom the source of exposure is occupational. Individuals may have repeat tests conducted either to verify the first test result or to determine if their level is changing. Individuals for whom information is unknown generally were not interviewed either due to their refusal of an interview, inability to locate them or their levels were low enough not to be of concern.

Mercury

In 1996, 51 adults, and in 1997, 49 adults were tested for mercury and found to have levels at or above 20 ng/ml in urine or at or over 5 ng/ml in blood (the levels which are reportable to the HMR). An average of 3.3 tests was reportable for each individual in 1996. This decreased to an average of 1.6 tests per individual in 1997. More than 75 percent of those tested were male.

The majority of tests were conducted on people who may have received occupational exposures. Most of the employees with occupational exposures were male (data not shown). Most of the employees reported worked for a drug manufacturer or a manufacturer of scientific measuring devices (e.g., thermometers).

Cadmium

Only 12 adults residing or working in New York State were tested for cadmium and had levels at or above 5 µg/l in urine or at or above 10 ng/ml in blood in 1996, and only one adult in 1997 met this criteria. These tests were evenly divided between the sexes and were conducted primarily on people 30 years and older. The number of reportable tests for cadmium has varied considerably over the 15 years of the registry, although lately the number of reportable tests is decreasing. For most of the people tested, the source of exposure to cadmium was unknown. However, for those individuals with known occupational exposures to cadmium, the majority were employed in the manufacturing of unassembled jewelry.

Arsenic

The number of reportable tests for arsenic was also small. Twenty-five individuals had urine levels of arsenic at or above 50 µg/L in 1996. This number increased slightly to 31 individuals in 1997. In general, 1.3 tests per person were reportable for each person tested. The source of exposure was unknown for the majority of reports, even after interviews were conducted. Like cadmium, the number of reportable tests for arsenic has varied considerably over the years.

Lead

In 1996, 4,832 adults residing or working in New York State were tested for lead and had levels at or above 10 µg/dL. This number decreased slightly to 4,651 adults tested in 1997 with levels at or above 10 µg/dL. Examination of Figure I-4 shows a rapid increase in the number of adults reported to the HMR in 1994. This increase is due in part to the enactment of the New York State law in 1992 which required the reporting of all blood lead results for all ages, regardless of level, and to the enactment of the OSHA Lead in Construction standard in 1993 requiring more biomonitoring for construction workers. Other potential factors in this jump in reporting are increases in bridge repair work and in activity among residential painters in New York State over the past few years. Approximately 1.8 tests per adult were conducted in both 1996 and 1997.

Table I-1. Number of Adults Reported by Sex, Age and Occupational Status and Total Number of Tests Reported, 1996-1997

	Mercury (≥ 20 ng/ml)		Cadmium (≥ 5 μ g/l)		Arsenic (≥ 50 μ g/l)		Lead (≥ 10 μ g/dL)	
	N	%	N	%	N	%	N	%
1996 Reports								
Number of Adults	51	100	12	100	25	100	4832	100
Sex								
Male	44	86.3	6	50.0	17	68.0	4231	87.5
Female	7	13.7	6	50.0	6	24.0	504	10.3
Unknown	0	---	0	---	2	8.0	97	2.2
Age								
≤ 29 years	10	19.6	0	---	0	---	916	19.0
30-49 years	30	58.8	6	50.0	14	56.0	2823	58.4
≥ 50 years	9	17.6	5	41.7	8	32.0	1019	21.1
Unknown	2	3.9	1	8.3	3	12.0	74	1.5
Exposure								
Occupational	31	60.8	3	25.0	1	4.0	2327	48.2
Non-Occupational	4	7.8	2	16.7	5	20.0	117	2.4
Both	0	---	0	---	0	---	28	0.6
Unknown	16	31.4	7	58.3	19	76.0	2360	48.8
Total Number of Tests	167	---	12	---	34	---	9018	---
1997 Reports								
Number of Adults	49	100	1	100	31	100	4651	100
Sex								
Male	37	75.5	1	100	21	67.7	4152	89.3
Female	6	12.2	0	---	8	25.8	483	10.4
Unknown	6	12.2	0	---	2	6.5	16	0.3
Age								
≤ 29 years	9	18.4	0	---	6	19.4	813	17.5
30-49 years	26	53.1	0	---	15	48.4	2752	59.2
≥ 50 years	6	12.2	1	100	10	32.3	1042	22.4
Unknown	8	16.3	0	---	0	---	44	0.9
Exposure								
Occupational	40	81.6	1	100	4	12.9	2430	52.3
Non-Occupational	2	4.1	0	---	9	29.0	120	2.6
Both	0	---	0	---	0	---	36	0.8
Unknown	7	14.3	0	---	18	58.1	2065	44.4
Total Number of Tests	77	---	2	---	33	---	8352	---

Table I-2. Number of Known Employers with Employees Reported to the Heavy Metals Registry, 1996-1997

	1996	1997
Mercury	4	6
Cadmium	2	1
Arsenic	1	3
Lead	319	326

Section II - Lead Tests by Blood Lead Level

Demographics

Because the reporting requirements for lead are different from those for the other metals, the results of the lead tests are displayed by level of the test in Figures II-1 through II-4. The figures display the highest test reported for each individual within that year.

Approximately 56,000 reports were received in 1996 with blood lead levels less than 10 µg/dL, while 4,832 adults had blood lead levels greater than or equal to 10 µg/dL. The number of adults with blood lead levels greater than or equal to 10 µg/dL decreased in 1997 to 4,651, and the number of adults with blood lead levels less than 10 µg/dL increased to more than 61,000 reports.. (Figure II-1). Over 75 percent of all adults tested in 1996 and 1997 had blood lead levels less than 10 µg/dL, and approximately 60 percent of these adults were female, including many women tested during pregnancy (data not shown). Although New York State law does not require testing all pregnant women for blood lead, the state has established guidelines for health care practitioners to assist them in determining a woman's risk of lead poisoning on their initial prenatal visit. The HMR receives limited information on adults reported with blood lead levels less than 10 µg/dL, but only actively processes those with 10 µg/dL or above. Therefore, it is possible that some of the adults with blood lead levels less than 10 µg/dL in 1997 were tested more than once.

The majority of lead reports included in the registry with incomplete demographic information are for those individuals with lower blood lead levels. The NYSDOH considers adult blood lead test results at or above 25 µg/dL to be an indication of potential poisoning, therefore, interventions and interviews are conducted above this level. OSHA standards require a worker be removed from a workplace exposure when an employee has a blood lead level at or above 50 µg/dL. Approximately 90 percent of those reported at or above 25 µg/dL were men (Figure II-2). In 1997, a larger percent of those individual with severely elevated blood lead levels (at or above 60 µg/dL) were over 50 years of age (Figure II-3) and had non-occupational exposures (Figure II-4). Some of the most common examples of non-occupational lead exposure include target shooting at indoor ranges, stained glass work, casting lead figurines or fishing sinkers and home renovation, especially the renovation of those structures built before 1978.

Industry and Occupation

Table II-1 displays the county of the employer for those individuals reported to the HMR with blood lead levels greater than or equal to 25 µg/dL. Only industries with at least one blood lead report at or above 25 µg/dL are included since interventions and interviews are conducted at this level. Individuals with unknown employer information generally were not interviewed either due to their refusal of an interview or inability to locate them. In order to maintain confidentiality, the exact number of adults is not listed for those counties with three or fewer individuals with blood lead levels greater than or equal to 25 µg/dL. In general, the numbers reflect the distribution of industrial sites in major urban areas; thus, more reports are seen from

areas such as Erie County (Buffalo) and the boroughs of New York City. The data also provide an indication of the location of industries that are involved in lead-using activities, such as the manufacturing of electronic and other electrical equipment, and document the location of larger industries that conduct regular biomonitoring. Those companies that regularly conduct blood lead testing are more likely to have employees reported to the HMR with elevated blood lead levels.

Tables II-2 for 1996 and II-3 for 1997 display the number of people represented in the HMR by industry type. All of the industries listed are for individuals reported as having occupational exposures. Only industries with at least one blood lead report at or above 25 µg/dL are included in these tables, since lead poisoning is generally considered to be evident at this level.

Approximately half of the occupational exposures are to employees in manufacturing jobs while a third are to those in construction. Those employed in construction have among the highest blood lead levels, along with those working with electronic equipment and with metal recycling (wholesale trade – nondurable goods). In 1997, more people in electric, gas and sanitary services, the majority of whom were in asbestos removal/lead abatement, and in fabricated metal products (e.g., manufacturing of plumbing fixtures, fitting and trim) were reported. Table II-4 compares the number of peak lead reports that are greater than or equal to 40 µg/dL among people employed in construction to those employed in other industries. The number of adults with highly elevated blood lead levels is remaining steady in construction but decreasing in general industry compared to 1996.

Tables II-5 for 1996 and II-6 for 1997 display the number of people reported to the HMR by occupation. Occupations at high risk for lead poisoning include mechanics and repairers, machine operators, and laborers.

Figure II-1. Percent of Tested Adults Reported to the Heavy Metals Registry, by Blood Lead Level, 1996-1997

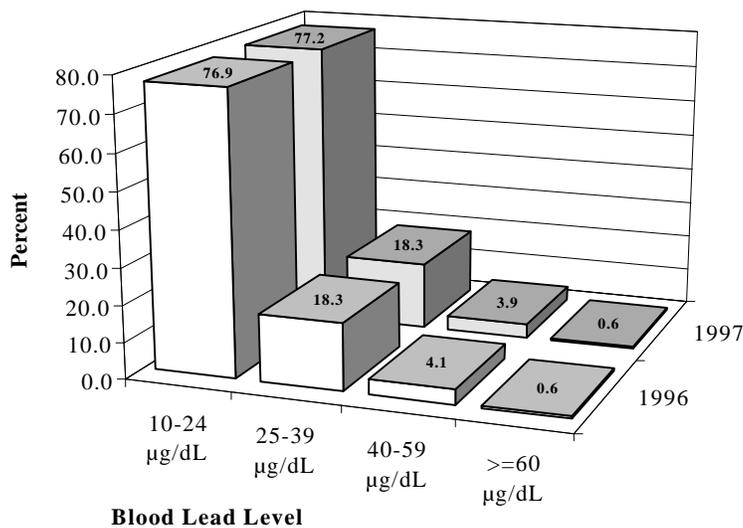


Figure II-2. Percent of Tested Adults Reported to the Heavy Metals Registry, by Sex and Blood Lead Level, 1996-1997

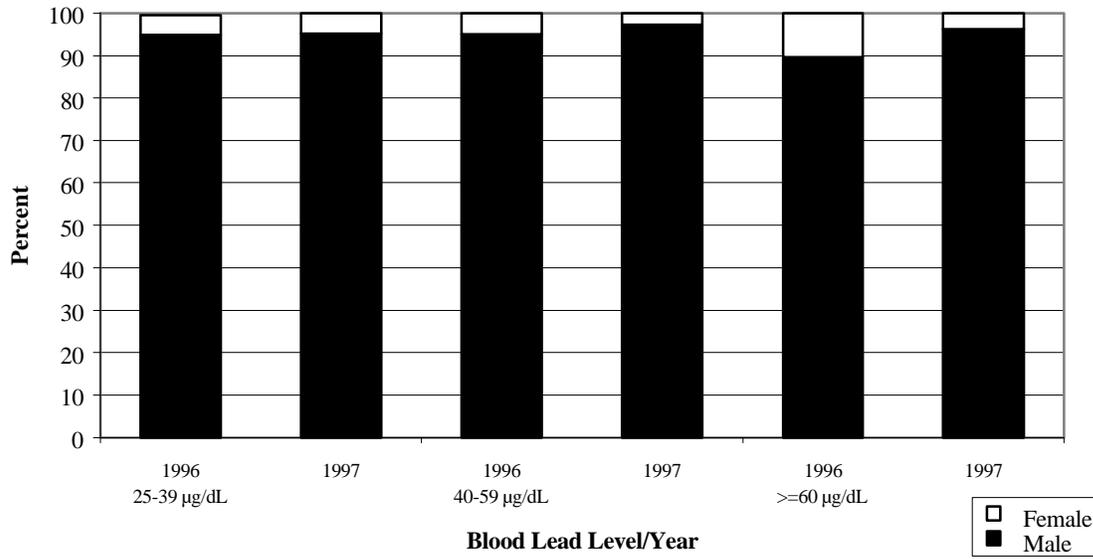


Figure II-3. Percent of Tested Adults Reported to the Heavy Metal Registry, by Age and Blood Lead Level, 1996-1997

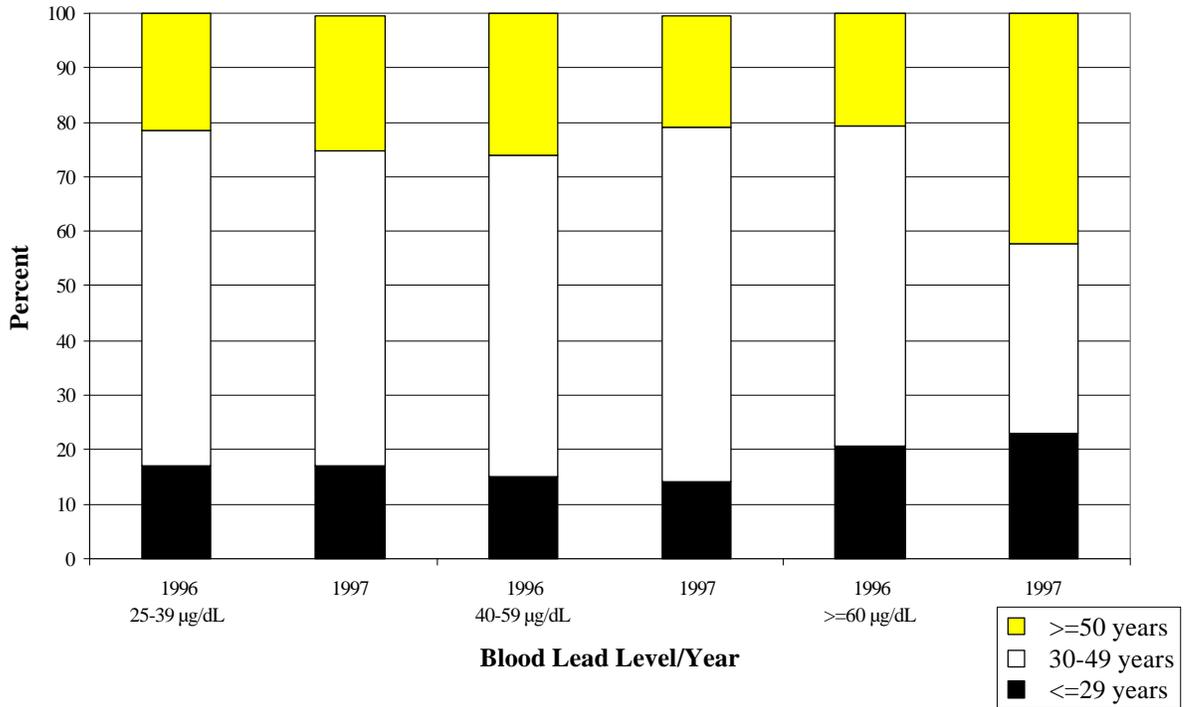


Figure II-4. Percent of Tested Adults Reported to the Heavy Metals Registry, by Source of Exposure and Blood Lead Level, 1996-1997

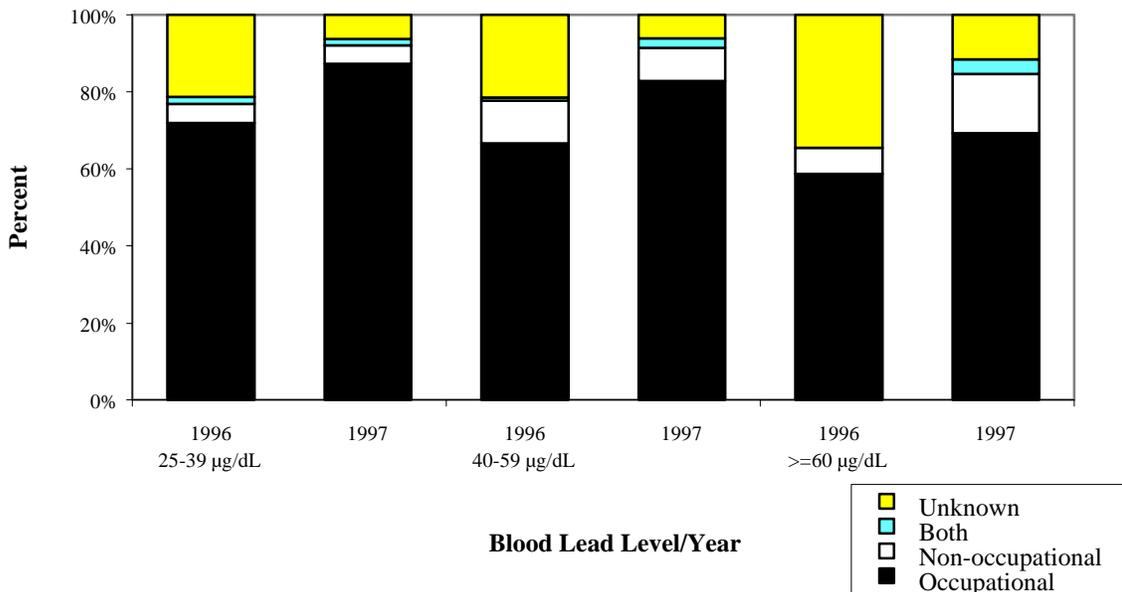


Table II-1. Number of Adults with Blood Lead Levels ≥ 25 $\mu\text{g/dL}$, by County of Employer, 1996-1997

County	1996	1997
Albany	10	7
Broome	38	29
Cattaraugus	≤ 3	0
Cayuga	0	≤ 3
Chatauga	22	16
Chemung	39	29
Chenango	≤ 3	0
Clinton	0	≤ 3
Columbia	9	4
Cortland	0	≤ 3
Dutchess	0	4
Erie	53	46
Genesee	≤ 3	≤ 3
Greene	≤ 3	0
Herkimer	≤ 3	≤ 3
Jefferson	≤ 3	0
Lewis	6	5
Livingston	5	≤ 3
Monroe	14	16
Montgomery	0	≤ 3
Nassau	49	49
Niagara	6	≤ 3
Oneida	35	24
Onondaga	36	38
Ontario	0	≤ 3
Orange	174	180
Oswego	0	≤ 3
Otsego	5	8
Rensselaer	8	4
Rockland	13	16
St. Lawrence	≤ 3	0
Saratoga	56	54
Schenectady	0	≤ 3
Schoharie	≤ 3	0
Seneca	≤ 3	≤ 3
Steuben	37	66
Suffolk	6	7
Sullivan	≤ 3	≤ 3

County, continued	1996	1997
Tioga	≤ 3	≤ 3
Tompkins	≤ 3	≤ 3
Ulster	6	5
Wayne	0	≤ 3
Westchester	35	37
Yates	0	≤ 3
Out of State	42	59
Unknown	151	116

New York City Area	1996	1997
New York	38	23
Bronx	57	33
Kings	50	62
Queens	97	97
Richmond	≤ 3	≤ 3

**Table II-2. Number of Tested Adults with Peak Blood Lead Levels ≥ 25 $\mu\text{g/dL}$
By Industry Type, 1996**

SIC Code	SIC Descriptor	Blood Lead Level ($\mu\text{g/dL}$)			
		25-39	40-59	≥ 60	Total
Construction					
15	General Contractors	23	4	1	28
16	Heavy Construction	101	31	4	136
17	Special Trade Contractors	138	51	4	193
	Total	262	86	9	357
Manufacturing					
25	Furniture and Fixtures	1	0	0	1
28	Chemicals and Allied Products	13	1	0	14
30	Rubber and Miscellaneous Plastic Products	1	0	0	1
32	Stone, Clay, Glass and Concrete Products	67	3	0	70
33	Primary Metal Industries	89	5	1	95
34	Fabricated Metal Products	55	17	0	72
35	Industrial and Commercial Machinery	1	0	0	1
36	Electronic and Other Electrical Equipment	119	36	1	156
37	Transportation Equipment	10	2	0	12
38	Measuring, Analyzing and Controlling Instruments	4	0	0	4
39	Miscellaneous Manufacturing Industries	5	1	0	6
	Total	365	65	2	432
Nonmanufacturing					
9	Fishing, hunting and trapping	1	0	0	1
48	Communications	8	1	0	9
49	Electric, Gas and Sanitary Services	14	2	0	16
50	Wholesale Trade - Non-durable Goods	6	2	3	11
73	Business Services	5	4	0	9
75	Automotive Repair	6	1	0	7
76	Miscellaneous Repair Services	1	0	0	1
80	Health Services	1	0	0	1
82	Education Services	0	1	0	1
86	Membership Organizations	1	0	0	1
87	Engineering, Accounting and Research Services	1	0	0	1
91	Executive, Legislative and General Government	1	0	0	1
92	Justice, Public Order and Safety	11	1	0	12
96	Administration of Economic Programs	6	0	1	7
99	Nonclassifiable Establishment	20	4	6	30
	Total	82	16	10	108

Table II-3. Number of Tested Adults with Peak Blood Lead Levels ≥ 25 $\mu\text{g/dL}$ By Industry Type, 1997

SIC Code	SIC Descriptor	Blood Lead Level ($\mu\text{g/dL}$)			
		25-39	40-59	≥ 60	Total
Construction					
15	General Contractors	20	3	2	25
16	Heavy Construction	108	29	1	138
17	Special Trade Contractors	162	48	5	215
	Total	290	80	8	378
Manufacturing					
28	Chemicals and Allied Products	10	0	0	10
32	Stone, Clay, Glass and Concrete Products	91	18	0	109
33	Primary Metal Industries	71	1	1	73
34	Fabricated Metal Products	43	13	3	59
35	Industrial and Commercial Machinery	3	0	0	3
36	Electronic and Other Electrical Equipment	118	29	0	147
37	Transportation Equipment	8	0	0	8
38	Measuring, Analyzing and Controlling Instruments	2	0	0	2
39	Miscellaneous Manufacturing Industries	6	0	0	6
	Total	352	61	4	417
Nonmanufacturing					
44	Water Transportation	1	0	0	1
47	Transportation Services	1	0	0	1
48	Communications	2	0	0	2
49	Electric, Gas and Sanitary Services	28	6	4	38
50	Wholesale Trade - Non-durable Goods	8	1	1	10
52	Building Materials, Hardware and Garden Supply	3	0	0	3
59	Miscellaneous Retail	1	0	0	1
65	Real Estate	2	0	0	2
73	Business Services	12	2	1	15
75	Automotive Repair	3	0	0	3
76	Miscellaneous Repair Services	1	0	0	1
79	Amusement and Recreation Services	0	1	0	1
80	Health Services	1	0	0	1
84	Museums, Art Galleries, and Gardens	0	0	1	1
87	Engineering, Accounting and Research Services	3	0	0	3
92	Justice, Public Order and Safety	14	0	0	14
95	Administration of Housing Programs	1	0	0	1
96	Administration of Economic Programs	7	0	0	7
97	National Security and International Affairs	1	0	0	1
99	Nonclassifiable Establishment	22	5	1	27
	Total	110	15	8	133

**Table II-4. Number of Tested Adults with
Peak Blood Lead Levels ≥ 40 $\mu\text{g}/\text{dL}$,
by Construction and Other Industry Type**

Year	Construction	Other Industries
1982	10	576
1983	48	492
1984	25	607
1985	22	574
1986	34	523
1987	37	518
1988	38	431
1989	30	360
1990	41	294
1991	113	197
1992	60	145
1993	141	154
1994	79	123
1995	84	105
1996	95	94
1997	88	88

Table II-5. Number of Tested Adults with Peak Blood Lead Levels ≥ 25 $\mu\text{g/dL}$, by Occupation, 1996

Occupation	Blood Lead Levels ($\mu\text{g/dL}$)			Total
	25-39	40-59	≥ 60	
Executive, Administrative and Managerial	3	0	1	4
Professional Specialty	2	0	0	2
Technicians and Related Support	8	0	0	8
Sales	3	0	0	3
Administrative Support, Including Clerical Service	4	0	1	5
Farming, Forestry and Fishing	16	2	0	18
Mechanics and Repairers	0	0	0	0
Construction Trades	56	11	0	67
Precision Production	237	73	14	324
Machine Operators and Tenders	32	9	0	41
Fabricators, Assemblers and Inspectors	139	24	1	164
Transportation and Material Moving	50	10	2	62
Handlers, Equipment Cleaners, Helpers and Laborers	15	3	1	19
	94	15	0	109
Total	659	147	20	826

Table II-6. Number of Tested Adults with Peak Blood Lead Levels ≥ 25 $\mu\text{g/dL}$, by Occupation, 1997

Occupation	Blood Lead Levels ($\mu\text{g/dL}$)			Total
	25-39	40-59	≥ 60	
Executive, Administrative and Managerial	2	0	1	3
Professional Specialty	3	0	0	3
Technicians and Related Support	6	0	0	6
Sales	1	0	0	1
Administrative Support, Including Clerical Service	3	0	0	3
Farming, Forestry and Fishing	23	3	0	26
Mechanics and Repairers	0	0	0	0
Construction Trades	56	9	0	65
Precision Production	220	53	9	282
Machine Operators and Tenders	29	9	1	39
Fabricators, Assemblers and Inspectors	108	19	3	130
Transportation and Material Moving	60	10	0	70
Handlers, Equipment Cleaners, Helpers and Laborers	22	4	3	29
	105	23	2	130
Total	638	130	19	787

Appendix A

22.6 Reporting heavy metals in blood and urine. Every physician, clinical laboratory and health facility in attendance of a person with a blood or urine test resulting in a value at or above those listed in section 22.7 of this Part, shall report such occurrence to the State Commissioner of Health within 10 days of the receipt of the results of such test. The report shall be on such forms as prescribed by the State Commissioner of Health.

Historical Note

Sec filed May 14, 1981 eff. Dec. 1, 1981.

22.7 Reportable levels of heavy metals in blood and urine. For purposes of section 22.6 of this Part, the following levels of heavy metals in blood and urine samples are reportable to the State Commissioner of Health:

<i>Metal</i>	<i>Sample</i>	<i>Reportable at or above</i>
Lead	Blood	25 µg/dL
Cadmium	Blood	10 ng/ml
	Urine	5 µg/l
Mercury	Blood	5 ng/ml
	Urine	20 ng/ml
Arsenic	Urine	50 µg/l

Historical Note

Sec filed May 14, 1981, amd. filed Sept. 11, 1986
eff. Sept. 11, 1986