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EPA NATIONAL PRIMARY DRINKING WATER REGULATIONS

Contaminant Specific Fact Sheets
Inorganic Chemicals - Consumer Version

Asbestos	Lead
Barium	Copper
Cadmium	Antimony
Chromium	Beryllium
Mercury	Cyanide
Nitrates/Nitrites	Nickel
Selenium	Thallium

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National Primary Drinking Water Regulations

Asbestos

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 7 MFL

MCL: 7 MFL

WHAT IS ASBESTOS AND HOW IS IT USED?

Asbestos is a fibrous mineral occurring in natural deposits. Because asbestos fibers are resistant to heat and most chemicals, they have been mined for use in over 3,000 different products, including roofing materials, brake pads, and cement pipe often used in distributing water to communities.

WHY IS ASBESTOS BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for asbestos has been set at 7 million fibers per liter of water (MFL) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 7 MFL because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: Asbestos is not known to cause any health problems when people are exposed to it at levels above the MCL for relatively short periods of time.

Long-term: Asbestos has the potential to cause the following effects from a lifetime exposure at levels above the MCL: lung disease; cancer.

HOW MUCH ASBESTOS IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Asbestos fibers may be released from natural sources such as erosion of asbestos-containing ores, but the primary source is through the wear or breakdown of asbestos-containing materials, particularly from the wastewaters of

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	32,650	8,620,439
*Top Five States**		
PA	0	2,945,049
LA	61	2,256,400
TX	0	1,737,200
AR	1,000	568,227
VA	0	480,000
*Top Industrial Sources**		
Asbestos products	3,005	2,510,227
Alkalis, chlorine	1,973	2,256,404
Industrial organic chems	0	1,230,000
Asphalt felts, coatings	5	871,067
Auto parts	0	563,694
Petroleum refining	0	314,560
Plastic pipes	0	235,200
Shipbuilding, repairing	0	211,400

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

mining and other industries, and by the use of asbestos cement pipes in water supply systems.

From 1987 to 1993, according to the Toxics Release Inventory, asbestos releases to water and land totalled nearly 9 million lbs. These releases were primarily from asbestos products industries which use asbestos in roofing materials, friction materials, and cement. The largest releases occurred in Pennsylvania and Louisiana.

WHAT HAPPENS TO ASBESTOS WHEN IT IS RELEASED TO THE ENVIRONMENT?

As a naturally occurring substance, asbestos can be present in surface and ground water. Small fibers may be carried long distances by water currents before settling. Asbestos fibers do not bind to soils, but nevertheless do not migrate to ground water through soils. Asbestos is not expected to accumulate in aquatic life.

HOW WILL ASBESTOS BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for asbestos became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if asbestos is present above 7 MFL. If it is present above this level, the system must continue to monitor this contaminant once every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of asbestos so that it is consistently below that level. The following treatment methods have been approved by EPA for removing asbestos: Transmission Electron Microscopy.

HOW WILL I KNOW IF ASBESTOS IS IN MY DRINKING WATER?

If the levels of asbestos exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

EPA strongly encourages people to learn more about their drinking water, and to support local efforts to protect and upgrade the supply of safe drinking water. Your water bill or telephone book's government listings are a good starting point.

Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

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For additional information on the uses and releases of chemicals in your state, contact the:

Community Right-to-Know Hotline: (800) 535-0202.

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National Primary Drinking Water Regulations

Barium

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DRINKING WATER STANDARDS:

MCLG: 2 PPM

MCL: 2 PPM

WHAT IS BARIUM AND HOW IS IT USED?

Barium is a lustrous, machinable metal which exists in nature only in ores containing mixtures of elements. It is used in making a wide variety of electronic components, in metal alloys, bleaches, dyes, fireworks, ceramics and glass. In particular, it is used in well drilling operations where it is directly released into the ground.

WHY IS BARIUM BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for barium has been set at 2 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 2 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found barium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: gastrointestinal disturbances and muscular weakness.

Long-term: Barium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: high blood pressure.

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	928,448	57,063,031
Top Ten States *		
AZ	0	14,595,520
UT	1,500	13,423,164
VA	0	9,218,901
NM	0	5,233,790
IL	34,000	3,977,817
TN	0	2,586,[illegible]
AL	31,041	1,63[illegible]
PA	15,582	1,216,[illegible]2
TX	167,864	599,555
NJ	20,905	705,666
*Major Industries**		
Copper smelting	1,500	31,958,310
Car parts, accessories	1,743	9,456,667
Industrial organics	132,511	4,106,827
Inorganic pigments	5,261	3,672,451
Gray, ductile iron	0	1,556,681
Steelworks, furnaces	256,582	679,999
Electrometallurgy	1,599	633,876
Paper mills	64,770	527,330

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

How much Barium is produced and released to the Environment?

The most common ores are found in AK, AR, CA, GA, KY, MO, NV, and TN. Barite was produced at 38 mines in these states in 1973, with Nevada supplying 50% of the tonnage. Barium is released to water and soil in the discharge and disposal of drilling wastes, from the smelting of copper, and the manufacture of motor vehicle parts and accessories.

From 1987 to 1993, according to the Toxics Release Inventory barium compound releases to land and water totalled over 57 million lbs. These releases were primarily from copper smelting industries. The largest releases occurred in Arizona and Utah. The largest direct releases to water occurred in Texas

What happens to Barium when it is released to the environment?

In water, the more toxic soluble barium salts are likely to be converted to insoluble salts which precipitate. Barium does not bind to most soils and may migrate to ground water. It has a low tendency to accumulate in aquatic life.

How will Barium be Detected in and Removed from My Drinking Water?

The regulation for barium became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if barium is present above 2 ppm. If it is present above this level, the system must continue to monitor this contaminant.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of barium so that it is consistently below that level. The following treatment methods have been approved by EPA for removing barium: Ion Exchange, Reverse Osmosis, Lime Softening, Electrodialysis.

How will I know if Barium is in my Drinking Water?

If the levels of barium exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

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National Primary Drinking Water Regulations

Cadmium

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DRINKING WATER STANDARDS:

MCLG: 5 PPB

MCL: 5 PPB

WHAT IS CADMIUM AND HOW IS IT USED?

Cadmium is a metal found in natural deposits as ores containing other elements. The greatest use of cadmium is primarily for metal plating and coating operations, including transportation equipment, machinery and baking enamels, photography, television phosphors. It is also used in nickel-cadmium and solar batteries and in pigments.

WHY IS CADMIUM BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for cadmium has been set at 5 parts per billion (ppb) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 5 ppb because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant if it occurs in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found cadmium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: nausea, vomiting, diarrhea, muscle cramps, salivation, sensory disturbances, liver injury, convulsions, shock and renal failure.

Long-term: Cadmium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: kidney, liver, bone and blood damage.

HOW MUCH CADMIUM IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

2.9 million lbs. of cadmium were produced in the US in 1986, and nearly twice that amount was imported in the same year. Cadmium occurs naturally in zinc, lead, copper and other ores which can serve as sources to ground and surface waters, especially when in contact with soft, acidic waters. Major industrial

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	31,487	2,059,574
Top Seven States *		
AZ	503	433,135
UT	1,750	372,110
MT	0	315,965
TN	2,700	288,781
ID	250	225,761
MO	2,361	189,914
WI	0	106,000
*Major Industries**		
Zinc, lead smelting	5,061	831,148
Copper smelting, refining	2,253	805,045
Indust. inorganic chems	250	225,761
Electroplating, anodizing	0	106,000
Steelworks, blast furnaces	5	13,000
Inorganic pigments	5,140	7,000

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

releases of cadmium are due to wastestreams and leaching of landfills, and from a variety of operations that involve cadmium or zinc. In particular, cadmium can be released to drinking water from the corrosion of some galvanized plumbing and water main pipe materials.

From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, cadmium releases were primarily from zinc, lead and copper smelting and refining industries, with the largest releases occurring in Arizona and Utah.

WHAT HAPPENS TO CADMIUM WHEN IT IS RELEASED TO THE ENVIRONMENT?

Some cadmium compounds are able to leach through soils to ground water. When cadmium compounds do bind to the sediments of rivers, they can be more easily bioaccumulated or re-dissolved when sediments are disturbed, such as during flooding. Its tendency to accumulate in aquatic life is great in some species, low in others.

HOW WILL CADMIUM BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for cadmium became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if cadmium is present above 5 ppb. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of cadmium so that it is consistently below that level. The following treatment methods have been approved by EPA for removing cadmium: Coagulation/Filtration, Ion Exchange, Lime Softening, Reverse Osmosis.

HOW WILL I KNOW IF CADMIUM IS IN MY DRINKING WATER?

If the levels of cadmium exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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National Primary Drinking Water Regulations

Chromium

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DRINKING WATER STANDARDS:

MCLG: 0.1 PPM

MCL: 0.1 PPM

WHAT IS CHROMIUM AND HOW IS IT USED?

Chromium is a metal found in natural deposits as ores containing other elements. The greatest use of chromium is in metal alloys such as stainless steel; protective coatings on metal; magnetic tapes; and pigments for paints, cement, paper, rubber, composition floor covering and other materials. Its soluble forms are used in wood preservatives.

WHY IS CHROMIUM BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for chromium has been set at 0.1 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 0.1 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found chromium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: skin irritation or ulceration.

Long-term: Chromium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: damage to liver, kidney circulatory and nerve tissues; skin irritation.

HOW MUCH CHROMIUM IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Production of the most water soluble forms of chromium, the chromate and dichromates, was in the range of 250,000 tons in 1992. Though chromium occurs in nature mostly as chrome iron ore and is widely found in soils and plants, it is rare

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	2,876,055	196,880,624
Top Ten States *		
TX	102,079	64,301,920
NC	43,522	55,217,044
IN	85,570	15,955,895
OH	51,830	8,319,600
UT	1,750	5,817,015
AR	2,300	3,532,000
KY	255	2,491,519
PA	110,149	2,337,905
GA	679,721	1,404,698
ID	91,750	1,404,870
*Major Industries**		
Indust. organics	3,272	120,707,814
Steelworks, Blast furn.	609,174	16,638,880
Electrometallurgy	33,269	10,796,928
Copper smelting, refining	1,750	5,817,015
Nonferrous smelting	2,300	3,532,000
Inorganic pigments	88,721	1,375,700
Pulp mills	985,800	224,198

* Water/Lnad totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

in natural waters. The two largest sources of chromium emission in the atmosphere are from the chemical manufacturing industry and combustion of natural gas, oil, and coal.

From 1987 to 1993, according to the Toxics Release Inventory, chromium compound releases to land and water totalled nearly 200 million pounds. These releases were primarily from industrial organic chemical industries. The largest releases occurred in Texas and North Carolina. The largest direct releases to water occurred in Georgia and Pennsylvania.

WHAT HAPPENS TO CHROMIUM WHEN IT IS RELEASED TO THE ENVIRONMENT?

When released to land, chromium compounds bind to soil are not likely to migrate to ground water, They are very persistent in water as sediments. There is a high potential for accumulation of chromium in aquatic life.

HOW WILL CHROMIUM BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for chromium became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if chromium is present above 0.1 ppm. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of chromium so that it is consistently below that level. The following treatment methods have been approved by EPA for removing chromium: Coagulation/Filtration, Ion Exchange, Reverse Osmosis, Lime Softening.

HOW WILL I KNOW IF CHROMIUM IS IN MY DRINKING WATER?

If the levels of chromium exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

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Mercury

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DRINKING WATER STANDARDS:

MCLG: 2 PPB

MCL: 2 PPB

WHAT IS MERCURY AND HOW IS IT USED?

Mercury is a liquid metal found in natural deposits as ores containing other elements. Electrical products such as dry-cell batteries, fluorescent light bulbs, switches, and other control equipment account for 50% of mercury used.

WHY IS MERCURY BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for mercury has been set at 2 parts per billion (ppb) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 2 ppb because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

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WHAT ARE THE HEALTH EFFECTS?

Short- or Long-term: EPA has found mercury to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: kidney damage.

HOW MUCH MERCURY IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Large amounts of mercury are released naturally from the earth's crust. Combustion of fossil fuels, metal smelters, cement manufacture, municipal landfills, sewage, metal refining operations, or most notably, from chloralkali plants are important sources of mercury release. Nearly 8 million lbs. of mercury were produced in the U.S. in 1986.

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	6,971	60,877
Top Six States		
TN	164	29,161
LA	431	21,829
DE	117	3,860
OH	29	2,760
AL	1,462	1,001
WV	1,657	454
		48
Major Industries		00
Chemical, allied products	12,269	74,720
Electric lamps	0	2,750
Paper mills	2,500	0

From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, mercury releases to land and water totalled nearly 68,000 lbs. These releases were primarily from chemical and allied industries. The largest releases occurred in Tennessee and Louisiana. The largest direct releases to water occurred in West Virginia and Alabama.

WHAT HAPPENS TO MERCURY WHEN IT IS RELEASED TO THE ENVIRONMENT?

Mercury is unique among metals in that it can evaporate when released to water or soil. Also, microbes can convert inorganic forms of mercury to organic forms which can be accumulated by aquatic life.

HOW WILL MERCURY BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for mercury became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if mercury is present above 2 ppb. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of mercury so that it is consistently below that level. The following treatment methods have been approved by EPA for removing mercury: Coagulation/Filtration; Granular Activated Carbon; Lime softening; Reverse osmosis.

HOW WILL I KNOW IF MERCURY IS IN MY DRINKING WATER?

If the levels of mercury exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

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National Primary Drinking Water Regulations

Nitrates and Nitrites

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

Drinking Water Standards (ppm):	MCLG	MCL
Nitrate:	10	10
Nitrite:	1	1

What are Nitrates/Nitrites and how are they used?

Nitrates and nitrites are nitrogen-oxygen chemical units which combines with various organic and inorganic compounds. Once taken into the body, nitrates are converted into nitrites. The greatest use of nitrates is as a fertilizer.

Why are Nitrates/Nitrites being Regulated?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for nitrates has been set at 10 parts per million (ppm), and for nitrites at 1 ppm, because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL for nitrates has been set at 10 ppm, and for nitrites at 1 ppm, because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

What are the Health Effects?

Short-term: Excessive levels of nitrate in drinking water have caused serious illness and sometimes death. The serious illness in infants is due to the conversion of nitrate to nitrite by the body, which can interfere with the oxygen-carrying capacity of the child's blood. This can be an acute condition in which health deteriorates rapidly over a period of days. Symptoms include shortness of breath and blueness of the skin.

Long-term: Nitrates and nitrites have the potential to cause the following effects from a lifetime exposure at levels above the MCL: diuresis, increased starchy deposits and hemorrhaging of the spleen.

How much Nitrates/Nitrites are produced and released to the Environment?

Most nitrogenous materials in natural waters tend to be converted to nitrate, so all sources of combined nitrogen, particularly organic nitrogen and ammonia,

RELEASES TO WATER AND LAND: 1991 TO 1993

	Water	Land
TOTALS (in pounds)	59,014,376	53,134,805
*Top Fifteen States**		
GA	12,114,253	12,028,585
CA	0	21,840,999
AL	3,463,097	6,014,674
LA	8,778,237	2,250
MO	6,985,890	206,181
MS	6,952,387	0
KS	5,140,000	877,095
VA	5,091,764	0
NV	0	4,977,482
FL	1,056,560	1,835,736
AR	1,206,610	1,058,294
MD	1,802,219	138,819
IA	1,500,340	132,042
OK	1,436,348	14,199
UT	0	1,045,400
*Major Industries**		
Nitrogenous fertilizer	41,584,611	8,607,376
Misc. Ind. inorganics	4,113,312	29,676,919
Misc. Metal ores	0	5,764,976
Misc. Ind. organics	5,091,764	0
Fertilizer mixing	480,000	4,554,916
Explosives	850,921	1,297,590
Paper mills	1,727,061	0
Pulp mills	1,321,500	3,350
Canned foods	0	1,056,794
Phosphate fertilizers	1,000,000	0

* State/industry totals only include facilities with releases greater than 10,000 lbs.

should be considered as potential nitrate sources. Primary sources of organic nitrates include human sewage and livestock manure, especially from feedlots.

The primary inorganic nitrates which may contaminate drinking water are potassium nitrate and ammonium nitrate both of which are widely used as fertilizers.

According to the Toxics Release Inventory, releases to water and land totalled over 112 million pounds from 1991 through 1993. The largest releases of inorganic nitrates occurred in Georgia and California.

WHAT HAPPENS TO NITRATES/NITRITES WHEN THEY ARE RELEASED TO THE ENVIRONMENT?

Since they are very soluble and do not bind to soils, nitrates have a high potential to migrate to ground water. Because they do not evaporate, nitrates/nitrites are likely to remain in water until consumed by plants or other organisms.

HOW WILL NITRATES/NITRITES BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for nitrates/nitrites became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples at least once a year and analyze them to find out if nitrates/nitrites are present above 50 percent of their MCLs. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above their MCLs, your water supplier must take steps to reduce the amount of nitrates/nitrites so that they are consistently below that level. The following treatment methods have been approved by EPA for removing nitrates/nitrites: Ion exchange, Reverse Osmosis, Electrodialysis.

HOW WILL I KNOW IF NITRATES/NITRITES ARE IN MY DRINKING WATER?

If the levels of nitrates/nitrites exceed their MCLs, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

EPA strongly encourages people to learn more about their drinking water, and to support local efforts to protect and upgrade the supply of safe drinking water. Your water bill or telephone book's government listings are a good starting point.

Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

EPA's Safe Drinking Water Hotline: (800) 426-4791.

For additional information on the uses and releases of chemicals in your state, contact the:

Community Right-to-Know Hotline: (800) 535-0202.

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Office of Water 4601
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National Primary Drinking Water Regulations

Selenium

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

Drinking Water Standards:

MCLG: 0.05 ppm

MCL: 0.05 ppm

What is Selenium and how is it used?

Selenium is a metal found in natural deposits as ores containing other elements. The greatest use of selenium compounds is in electronic and photocopier components, but they are also widely used in glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions.

Why is Selenium being Regulated?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for selenium has been set at 0.05 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has been set at 0.05 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

What are the Health Effects?

Short-term: Selenium is an essential nutrient at low levels. However, EPA has found selenium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: hair and fingernail changes; damage to the peripheral nervous system; fatigue and irritability.

Long-term: Selenium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: hair and fingernail loss; damage to kidney and liver tissue, and the nervous and circulatory systems.

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	13,556	1,010,686
Top Five States *		
UT	1,578	696,515
AZ	0	260,632
WI	0	45,000
IN	5,300	0
TX	359	4,920
*Major Industries**		
Copper smelting, refining	1,500	962,067
Metal coatings	0	45,000
Petroleum refining	8,949	977

* Land totals only include facilities with releases greater than 1000 lbs.

HOW MUCH SELENIUM IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Production in 1985 was reported to be 429,515 pounds. Selenium compounds are released to the air during the combustion of coal and petroleum fuels, and during the smelting and refining of other metals.

From 1987 to 1993, according to the Toxics Release Inventory selenium releases to land and water totalled over 1 million lbs. These releases were primarily from copper smelting industries. The largest releases occurred in Utah. The largest direct releases to water occurred in Indiana.

WHAT HAPPENS TO SELENIUM WHEN IT IS RELEASED TO THE ENVIRONMENT?

The toxicity of selenium depends on whether it is in the biologically active oxidized form, which occurs in alkaline soils. These conditions can cause plant uptake of the metal to be increased. It is known that selenium accumulates in living tissues.

HOW WILL SELENIUM BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for selenium became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if selenium is present above 0.05 ppm. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of selenium so that it is consistently below that level. The following treatment methods have been approved by EPA for removing selenium: Activated Alumina, Coagulation/Filtration, Lime Softening, Reverse Osmosis.

HOW WILL I KNOW IF SELENIUM IS IN MY DRINKING WATER?

If the levels of selenium exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

EPA's Safe Drinking Water Hotline: (800) 426-4791.

For additional information on the uses and releases of chemicals in your state, contact the:

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National Primary Drinking Water Regulations

Lead

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: ZERO

ACTION LEVEL: 15 PPB

WHAT IS LEAD AND HOW IS IT USED?

Lead is a metal found in natural deposits as ores containing other elements. It is sometimes used in household plumbing materials or in water service lines used to bring water from the main to the home.

WHY IS LEAD BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for lead has been set at zero because EPA believes this level of protection would not cause any of the potential health problems described below.

Since lead contamination generally occurs from corrosion of household lead pipes, it cannot be directly detected or removed by the water system. Instead, EPA is requiring water systems to control the corrosiveness of their water if the level of lead at home taps exceeds an Action Level.

The Action Level for lead has been set at 15 parts per billion (ppb) because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to control this contaminant should it occur in drinking water at their customer's home taps.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short- and Long-term effects: Lead can cause a variety of adverse health effects when people are exposed to it at levels above the MCL for relatively short periods of time. These effects may include interference with red blood cell chemistry, delays in normal physical and mental development in babies and young children, slight deficits in the attention span, hearing, and learning abilities of children, and slight increases in the blood pressure of some adults.

Long-term effects: Lead has the potential to cause the following effects from a lifetime exposure at levels above the MCL: stroke and kidney disease; cancer.

HOW MUCH LEAD IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Lead may occur in drinking water either by contamination of the source water used by the water system, or by corrosion of lead plumbing or fixtures. Corrosion of plumbing is by far the greatest cause for concern. All water is corrosive to metal plumbing materials to some degree. Grounding of household electrical systems

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	970,827	143,058,771
Top Twelve States *		
MO	4,408	40,656,278
AZ	771	23,240,625
MT	0	20,822,517
UT	4,600	11,881,000
TX	1,988	11,515,211
OH	127,990	5,196,522
IN	62,894	4,851,940
TN	7,140	2,095,489
IL	26,601	1,930,080
WI	1,310	1,350,980
MN	0	1,313,895
NM	0	1,060,880
*Major Industries**		
Lead smelting, refining	31,423	68,996,819
Copper smelting	5,371	34,942,505
Steelworks, blast furn.	379,849	18,149,696
Storage batteries	0	1,867,292
China plumbing fixtures	1,310	1,350,980
Iron foundries	10,021	1,274,777
Copper mining	0	1,240,000

* Water/Land totals only include facilities with releases greater than 100,000 lbs.

to plumbing may also exacerbate corrosion. Over time, lead-containing plumbing materials will usually develop a scale that minimizes further corrosion of the pipe.

Lead is rarely found in source water, but lead mining and smelting operations may be sources of contamination. Eighty eight percent of the lead mined in the US comes from seven mines in the New Lead Belt in southeastern Missouri. From 1987 to 1993, according to the Toxics Release Inventory lead compound releases to land and water totalled nearly 144 million lbs. These releases were primarily from lead and copper smelting industries. The largest releases occurred in Missouri, Arizona and Montana. The largest direct releases to water occurred in Ohio.

WHAT HAPPENS TO LEAD WHEN IT IS RELEASED TO THE ENVIRONMENT?

When released to land, lead binds to soils and does not migrate to ground water. In water, it binds to sediments. It does not accumulate in fish, but does in some shellfish, such as mussels.

HOW WILL LEAD BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for lead became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples from household taps twice a year and analyze them to find out if lead is present above 15 ppb in more than 10 percent of all homes tested. If it is present above this level, the system must continue to monitor this contaminant twice a year.

If contaminant levels are found to be consistently above the Action level, your water supplier must take steps to reduce the amount of lead so that it is consistently below that level. The following treatment methods have been approved by EPA for controlling lead: Corrosion control.

HOW WILL I KNOW IF LEAD IS IN MY DRINKING WATER?

If the levels of lead exceed the Action Level, the system must notify the public via newspapers, radio, TV and other means. Customers will be informed of what they can do at home to lower their exposure to lead. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

EPA's Safe Drinking Water Hotline: (800) 426-4791.

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National Primary Drinking Water Regulations

Copper

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 1.3 PPM

ACTION LEVEL: 1.3 PPM

WHAT IS COPPER AND HOW IS IT USED?

Copper is a metal found in natural deposits as ores containing other elements. It is widely used in household plumbing materials.

WHY IS COPPER BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for copper has been set at 1.3 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described below.

Since copper contamination generally occurs from corrosion of household copper pipes, it cannot be directly detected or removed by the water system. Instead, EPA is requiring water systems to control the corrosiveness of their water if the level of copper at home taps exceeds an Action Level.

The Action Level for copper has also been set at 1.3 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to control this contaminant should it occur in drinking water at their customer's home taps.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short- and Long-term effects: Copper is an essential nutrient, required by the body in very small amounts. However, EPA has found copper to potentially cause the following health effects when people are exposed to it at levels above the Action Level for relatively short periods of time: stomach and intestinal distress, liver and kidney damage, and anemia. Persons with Wilson's disease may be more sensitive than others to the effects of copper contamination.

HOW MUCH COPPER IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Copper may occur in drinking water either by contamination of the source water used by the water system, or by corrosion of copper plumbing. Corrosion of plumbing is by far the greatest cause for concern. Copper is rarely found in source water, but copper mining and smelting operations and municipal incineration may

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	1,538,148	442,082,245
Top Ten States *		
UT	55,350	153,501,500
NM	0	130,682,387
AZ	2,636	104,619,532
MI	19,763	11,172,897
NY	66,057	10,017,766
MT	0	8,696,153
TN	301,417	1,208,804
MO	250	1,480,000
AL	41,213	513,536
MD	78,601	270,945
*Major Industries**		
Primary copper smelting	7,591	201,214,264
Other nonferrous smelt.	4,414	11,317,048
Plastic materials	44,422	9,637,850
Blast furnaces, steel	156,982	3,225,752
Poultry slaughtering	0	1,249,750
Copper rolling, drawing	17,253	941,075
Ind. organic chems	28,936	827,356
Prepared feeds, misc.	1,038	760,094
Ind. inorganic chems	220,503	527,458

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

be sources of contamination.

From 1987 to 1993, according to the Toxics Release Inventory copper compound releases to land and water totalled nearly 450 million lbs., of which nearly all was to land. These releases were primarily from copper smelting industries. The largest releases occurred in Utah. The largest direct releases to water occurred in Tennessee.

WHAT HAPPENS TO COPPER WHEN IT IS RELEASED TO THE ENVIRONMENT?

All water is corrosive toward copper to some degree, even water termed noncorrosive or water treated to make it less corrosive. Corrosivity toward copper is greatest in very acidic water. Many of the other factors that affect the corrosivity of water toward lead can also be expected to affect the corrosion of copper.

HOW WILL COPPER BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for copper became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples from household taps twice a year and analyze them to find out if copper is present above 1.3 ppm in more than 10 percent of all homes tested. If it is present above this level, the system must continue to monitor this contaminant twice a year.

If contaminant levels are found to be consistently above the Action level, your water supplier must take steps to reduce the amount of copper so that it is consistently below that level. The following treatment methods have been approved by EPA for controlling copper: Corrosion control.

HOW WILL I KNOW IF COPPER IS IN MY DRINKING WATER?

If the levels of copper exceed the Action Level, the system must notify the public via newspapers, radio, TV and other means. Customers will be informed of what they can do at home to lower their exposure to copper. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

EPA's Safe Drinking Water Hotline: (800) 426-4791.

For additional information on the uses and releases of chemicals in your state, contact the:

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National Primary Drinking Water Regulations

Antimony

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 6 PPB

MCL: 6 PPB

WHAT IS ANTIMONY AND HOW IS IT USED?

Antimony is a metal found in natural deposits as ores containing other elements. The most widely used antimony compound is antimony trioxide, used as a flame retardant. It is also found in batteries, pigments, and ceramics/glass.

WHY IS ANTIMONY BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for antimony has been set at 6 parts per billion (ppb) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 6 ppb because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found antimony to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: nausea, vomiting and diarrhea.

Long-term: Antimony has the potential to cause the following effects from a lifetime exposure at levels above the MCL:AND/OR- Antimony is a (known/potential drinking water) human carcinogen. OR- No reliable data are available concerning health effects from long-term exposure to antimony in drinking water.

HOW MUCH ANTIMONY IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

In 1984, 64.5 million lbs. antimony ore was mined and refined. Production of the most commonly used antimony compound, the trioxide, increased during the 1980s to about 31 million lbs, reported in 1985. Industrial dust, auto exhaust and home heating oil are the main sources in urban air.

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (In pounds)	330,064	12,003,373
Top Ten States *		
AZ	505	7,074,128
MT	0	2,338,697
TX	24,817	840,392
LA	55,414	344,762
WI	1,445	392,000
MO	784	188,266
WA	63,220	99,915
ID	2,600	140,250
TN	687	108,325
AL	27,536	69,503
*Major Industries**		
Copper smelting, refining	505	7,074,128
Other nonferrous smelt.	17,015	2,383,947
Sec. nonferrous smelt.	1,459	803,398
Misc Indust. Organics	18,424	581,465
Porcelain plumb. fixtures	1,445	392,000
Petroleum refining	111,527	202,251
Misc Inorganic chems.	4,962	140,250
Plastics, resins	20	60,372
Storage batteries	0	45,952
Synthetic fibers	26,803	12,535

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

From 1987 to 1993, according to the Toxics Release Inventory antimony and antimony compound releases to land and water totalled over 12 million lbs. These releases were primarily from copper and lead smelting and refining industries. The largest releases occurred in Arizona and Montana. The greatest releases to water occurred in Washington and Louisiana.

WHAT HAPPENS TO ANTIMONY WHEN IT IS RELEASED TO THE ENVIRONMENT?

Little is known about antimony's fate once released to soil. Some studies indicate that antimony is highly mobile in soils, while others conclude that it strongly adsorbs to soil. In water, it usually adheres to sediments. Most antimony compounds show little or no tendency to accumulate in aquatic life.

HOW WILL ANTIMONY BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for antimony became effective in 1994. Between 1993 and 1995, EPA required your water supplier to collect water samples every 3 months for one year and analyze them to find out if antimony is present above 6 ppb. If it is present above this level, the system must continue to monitor this contaminant.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of antimony so that it is consistently below that level. The following treatment methods have been approved by EPA for removing antimony: Ion Exchange, Lime Softening, Reverse Osmosis, Electrodialysis.

HOW WILL I KNOW IF ANTIMONY IS IN MY DRINKING WATER?

If the levels of antimony exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

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EPA

National Primary Drinking Water Regulations

Beryllium

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 4 PPB

MCL: 4 PPB

WHAT IS BERYLLIUM AND HOW IS IT USED?

Beryllium is a metal found in natural deposits as ores containing other elements, and in some precious stones such as emeralds and aquamarine. The greatest use of beryllium is in making metal alloys for nuclear reactors and the aerospace industry.

WHY IS BERYLLIUM BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for beryllium has been set at 4 parts per billion (ppb) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has also been set at 4 ppb because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found barium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: inflammation of the lungs when inhaled; less toxic in drinking water.

Long-term: Beryllium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: damage to bones and lungs; cancer.

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	1,314	341,721
Top Five States		
PA	653	174,250
OH	490	166,292
MI	5	1,000
TX	0	174
MN	142	0
Major Industries		
Copper rolling, drawing	405	180,502
Nonferrous metal smelting	481	151,790
Nonferrous rolling, drawing	4	8,000
Aluminum foundries	5	1,000
Blast furnaces, steelworks	250	250
Petroleum refining	142	174

HOW MUCH BERYLLIUM IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Production of beryllium metal was 490,000 lbs. in 1986. It is released principally in the smoke stacks and ash wastes of power plants which burn coal. It is also found in discharges from other industrial and municipal operations. Rocket exhaust products also consist of various beryllium compounds.

From 1987 to 1993, according to the Toxics Release Inventory beryllium releases to land and water totalled over 340,000 lbs. These releases were primarily from copper rolling and drawing industries which use it as a hardener in alloys. The largest releases occurred in Pennsylvania and Ohio.

WHAT HAPPENS TO BERYLLIUM WHEN IT IS RELEASED TO THE ENVIRONMENT?

Very little is known about what happens to beryllium compounds when released to the environment. It appears unlikely to leach to ground water when released to land. Erosion or runoff of beryllium compounds into surface waters is not likely to be in a soluble form.

HOW WILL BERYLLIUM BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for beryllium became effective in 1994. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if beryllium is present above 4 ppb. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of beryllium so that it is consistently below that level. The following treatment methods have been approved by EPA for removing beryllium: Activated Alumina, Coagulation/filtration, Ion Exchange, Lime Softening, Reverse Osmosis.

HOW WILL I KNOW IF BERYLLIUM IS IN MY DRINKING WATER?

If the levels of beryllium exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

EPA strongly encourages people to learn more about their drinking water, and to support local efforts to protect and upgrade the supply of safe drinking water. Your water bill or telephone book's government listings are a good starting point.

Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call:

EPA's Safe Drinking Water Hotline: (800) 426-4791.

For additional information on the uses and releases of chemicals in your state, contact the:

Community Right-to-Know Hotline: (800) 535-0202.

United States Environmental Protection Agency | Office of Water 4601 | EPA 811-F-95-002 I-C October 1995

National Primary Drinking Water Regulations

Cyanide

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 0.2 PPM

MCL: 0.2 PPM

WHAT IS CYANIDE AND HOW IS IT USED?

Cyanide is a carbon-nitrogen chemical unit which combines with many organic and inorganic compounds. The most commonly used form, hydrogen cyanide, is mainly used to make the compounds needed to make nylon and other synthetic fibers and resins. Other cyanides are used as herbicides.

WHY IS CYANIDE BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for cyanide has been set at 0.2 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has been set at 0.2 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found cyanide to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: rapid breathing, tremors and other neurological effects.

Long-term: Cyanide has the potential to cause the following effects from a lifetime exposure at levels above the MCL: weight loss, thyroid effects, nerve damage.

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	939,611	641,082
Top Ten States		
CA	0	430,886
PA	208,239	4,909
IN	187,377	20,242
OH	160,203	850
TX	54,379	83,394
MD	89,438	23,503
Major Industries		
Blast furnaces + steel	747,970	53,404
Metal heat treating	0	430,886
Ind organic chems	49,098	82,912
Plating + polishing	29,486	29,636

HOW MUCH CYANIDE IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Production of the most common cyanides was roughly 5 billion pounds a year in the late 1980s and early 1990s. The major cyanide releases to water are discharges from metal finishing industries, iron and steel mills, and organic chemical industries. Releases to soil appear to be primarily from disposal of cyanide wastes in landfills and the use of cyanide-containing road salts. Chlorination treatment of some wastewaters can produce cyanides as a by-product.

From 1987 to 1993, according to the Toxics Release Inventory cyanide compound releases to land and water totalled about 1.5 million lbs. These releases were primarily from steel mills and metal heat treating industries. The largest releases occurred in California and Pennsylvania.

WHAT HAPPENS TO CYANIDE WHEN IT IS RELEASED TO THE ENVIRONMENT?

Cyanides are generally not persistent when released to water or soil, and are not likely to accumulate in aquatic life. They rapidly evaporate and are broken down by microbes. They do not bind to soils and may leach to ground water.

HOW WILL CYANIDE BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for cyanide became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if cyanide is present above 0.2 ppm. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of cyanide so that it is consistently below that level. The following treatment methods have been approved by EPA for removing cyanide: Ion Exchange, Reverse Osmosis, Chlorine.

HOW WILL I KNOW IF CYANIDE IS IN MY DRINKING WATER?

If the levels of cyanide exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

Learn more about your drinking water!

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National Primary Drinking Water Regulations

Nickel

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 0.1 PPM

MCL: 0.1 PPM

WHAT IS NICKEL AND HOW IS IT USED?

Nickel is a metal found in natural deposits as ores containing other elements. The greatest use of nickel is in making stainless steel and other alloys.

WHY IS NICKEL BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for nickel has been set at 0.1 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has been set at 0.1 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: Nickel is not known to cause any health problems when people are exposed to it at levels above the MCL for relatively short periods of time.

Long-term: Nickel has the potential to cause the following effects from a lifetime exposure at levels above the MCL: decreased body weight; heart and liver damage; skin irritation.

HOW MUCH NICKEL IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Production of nickel was 84.6 million lbs. in 1986. Nickel compounds can be made as a by-product during various industrial processes that use nickel catalysts, such as coal gasification, petroleum refining, and hydrogenation of fats and oils. They have also been identified in residual fuel oil and in atmospheric

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	709,236	26,079,419
Top Ten States *		
OR	459	6,256,532
AR	4,250	5,622,900
ID	1,000	2,200,250
IN	28,050	2,098,196
PA	19,680	2,052,736
AZ	767	984,817
TX	0	777,400
MD	77,200	666,637
CA	6,687	285,731
GA	61,100	193,111
*Major Industries**		
Primary nonferrous meta	16,874	12,053,688
Blast furnaces + steel	304,891	6,784,227
Ind inorganic chems	22,689	2,519,468
Ind organic chems	109,141	1,105,934
Petroleum refining	186,499	949,411
Primary copper	1,272	996,817
Iron+steel foundries	500	409,000
Gray iron foundries	3,326	334,524
Inorganic pigments	62,394	193,111

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

emissions from nickel refineries.

From 1987 to 1993, according to the Toxics Release Inventory nickel releases to land and water totalled nearly 27 million lbs. These releases were primarily from nickel smelting/refining and steelworks industries. The largest releases occurred in Oregon and Arkansas. The largest direct releases to water occurred in Maryland and Georgia.

WHAT HAPPENS TO NICKEL WHEN IT IS RELEASED TO THE ENVIRONMENT?

Nickel is one of the most mobile of the heavy metals when released to water, particularly in polluted waters, where organic material will keep nickel soluble. Though nickel does accumulate in aquatic life, it does not become magnified along food chains. Nickel released to soil may leach into ground water or be washed into surface water.

HOW WILL NICKEL BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for nickel became effective in 1994. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if nickel is present above 0.1 ppm. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of nickel so that it is consistently below that level. The following treatment methods have been approved by EPA for removing nickel: Ion Exchange, Lime Softening, Reverse Osmosis.

HOW WILL I KNOW IF NICKEL IS IN MY DRINKING WATER?

If the levels of nickel exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

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National Primary Drinking Water Regulations

Thallium

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

DRINKING WATER STANDARDS:

MCLG: 0.5 PPB

MCL: 2 PPB

WHAT IS THALLIUM AND HOW IS IT USED?

Thallium is a metal found in natural deposits as ores containing other elements. The greatest use of thallium is in specialized electronic research equipment.

WHY IS THALLIUM BEING REGULATED?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for thallium has been set at 0.5 parts per billion (ppb) because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL has been set at 2 ppb because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

WHAT ARE THE HEALTH EFFECTS?

Short-term: EPA has found thallium to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: gastrointestinal irritation; nerve damage.

Long-term: Thallium has the potential to cause the following effects from a lifetime exposure at levels above the MCL: changes in blood chemistry; damage to liver, kidney, intestinal and testicular tissues; hair loss.

HOW MUCH THALLIUM IS PRODUCED AND RELEASED TO THE ENVIRONMENT?

Thallium is not produced in the US. Approximately 4,500 lbs. of thallium and its compounds were reportedly imported in 1987. Man-made sources of thallium pollution are gaseous emission of cement factories, coal burning power plants,

RELEASES TO WATER AND LAND: 1987 TO 1993

	Water	Land
TOTALS (in pounds)	2,606	2,770
Top Five States		
TX	6	2,020
OH	1,500	0
MN	1,100	0
CO	0	500
IN	0	250
*Major Industries**		
Primary copper smelting	1,856	765
Petroleum refining	750	1,255
Primary nonferrous metals	0	500
Blast furnaces, steelworks	0	250

and metal sewers. The leaching of thallium from ore processing operations is the major source of elevated thallium concentrations in water. Thallium is a trace metal associated with copper, gold, zinc, and cadmium.

WHAT HAPPENS TO THALLIUM WHEN IT IS RELEASED TO THE ENVIRONMENT?

Thallium does not long persist if released to water, but does have a strong tendency to accumulate in aquatic life. If released to land, it may bind to alkaline soils, but may otherwise migrate to ground water.

HOW WILL THALLIUM BE DETECTED IN AND REMOVED FROM MY DRINKING WATER?

The regulation for thallium became effective in 1994. Between 1993 and 1995, EPA required your water supplier to collect water samples once and analyze them to find out if thallium is present above 2 ppb. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above the MCL, your water supplier must take steps to reduce the amount of thallium so that it is consistently below that level. The following treatment methods have been approved by EPA for removing thallium: Activated alumina; Ion Exchange.

HOW WILL I KNOW IF THALLIUM IS IN MY DRINKING WATER?

If the levels of thallium exceed the MCL, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

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