**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

**Metal**
Aluminum

**Description**

Aluminum is the most abundant metal in the earth's crust and it is widely distributed.

Aluminum is a very reactive element and is never found as the free metal in nature. It is found combined with other elements, most commonly with oxygen, silicon, and fluorine. These chemical compounds are commonly found in soil, minerals (e.g., sapphires, rubies, turquoise), rocks (especially igneous rocks), and clays.

Aluminum as the metal is obtained from aluminum-containing minerals, primarily bauxite.

Aluminum metal is light in weight and silvery-white in appearance.

**Sources**

Aluminum occurs naturally in soil, water, and air. High levels in the environment can be caused by the mining and processing of aluminum ores or the production of aluminum metal, alloys, and compounds.

Small amounts of aluminum are released into the environment from coal-fired power plants and incinerators.

**Breakdown**
Aluminum cannot be destroyed in the environment. It can only change its form or become attached or separated from particles.

Air
Aluminum particles in air settle to the ground or are washed out of the air by rain. However, very small aluminum particles can stay in the air for many days.
Water and soil
Most aluminum-containing compounds do not dissolve to a large extent in water unless the water is acidic or very alkaline.

**HOW CAN ALUMINUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
A small amount of the aluminum you breathe will enter your body through your lungs.

Ingestion
A very small amount of the aluminum in food or water will enter your body through the digestive tract. An extremely small amount of the aluminum found in antacids will be absorbed.

Dermal
A very small amount may enter through your skin when you come into contact with aluminum

Leave your body
Most aluminum in food, water, and medicines leaves your body quickly in the feces. Much of the small amount of aluminum that does enter the bloodstream will quickly leave your body in the urine.

**Reference**
http://www.atsdr.cdc.gov/toxprofiles/tp22.pdf

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

**Metal**
Antimony

**Description**
Antimony is a silvery white metal of medium hardness that breaks easily. Small amounts of antimony are found in the earth's crust. Antimony ores are mined and then either changed into antimony metal or combined with oxygen to form antimony oxide.

Antimony oxide is a white powder that does not evaporate. Only a small amount of it will dissolve in water. Most antimony oxide produced is added to textiles and plastics to prevent their catching on fire.

Antimony metal is too easily broken to be used much by itself. To make it stronger, a little antimony is usually mixed with other metals such as lead and zinc to form mixtures of metals called alloys. These alloys are used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, type metal, ammunition, and pewter.

**Sources**
Antimony is found at very low levels in the environment, so low that we often cannot measure it. You may be exposed to antimony by breathing air, drinking water, and eating foods that contain it. You also may be exposed by skin contact with soil, water, and other substances that contain antimony.

Antimony enters the environment during the mining and processing of its ores and in the production of antimony metal, alloys, antimony oxide, and combinations of antimony with other substances. Little or no antimony is mined in the United States, Antimony ore and impure metals are brought into this country from other countries for processing. Most antimony will end up in the soil or sediment, where it attaches strongly to particles that contain iron, manganese, or aluminum.

**Breakdown**
The antimony that comes out of the smoke stacks of these plants is attached to very small particles that settle to the ground or are washed out of the air by rain. It usually takes many days for antimony to be removed from the air. Antimony attached to very small particles may stay in the air for more than a month.

**HOW CAN ANTIMONY ENTER AND LEAVE MY BODY?**
Enter your body
Antimony can enter your body when you drink water or eat food, soil, or other substances that contain antimony. Antimony can also enter your body if you breathe air or dust containing antimony. We do not know if antimony can enter your body when it is placed on your skin.

Leave your body
A small amount of the antimony you eat or drink enters the blood after a few hours. The amount and the form of antimony in the food or water will affect how much antimony enters your blood. After you eat or drink very large doses of antimony, you may vomit. This will prevent most of the antimony from entering through the stomach and intestines into your blood. Antimony in your lungs will enter your blood after several days or weeks. The amount of antimony that will enter your blood from your lungs is not known.

After antimony enters your blood, it goes to many parts of your body. Most of the antimony goes to the liver, lungs, intestines, and spleen. Antimony will leave your body in feces and urine over several weeks.

**Reference**
http://www.atsdr.cdc.gov/toxprofiles/tp23.pdf

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

**Metal**
Arsenic

**Description**
Arsenic is classified chemically as a metalloid, having both properties of a metal and a nonmetal; however, it is frequently referred to as a metal. Elemental arsenic (sometimes referred to as metallic arsenic) is a steel grey solid material.

However, arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is called inorganic arsenic. Arsenic combined with carbon and hydrogen is referred to as organic arsenic.

Most inorganic and organic arsenic compounds are white or colorless powders that do not evaporate. They have no smell, and most have no special taste. Thus, you usually cannot tell if arsenic is present in your food, water, or air.

Inorganic arsenic occurs naturally in soil and in many kinds of rock, especially in minerals and ores that contain copper or lead. When these ores are heated in smelters, most of the arsenic goes up the stack and enters the air as a fine dust. Smelters may collect this dust and take out the arsenic as a compound called arsenic trioxide (As2O3).

**Sources**
Arsenic occurs naturally in soil and minerals and it therefore may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. Volcanic eruptions are another source of arsenic.

Arsenic is associated with ores containing metals, such as copper and lead. Arsenic may enter the environment during the mining and smelting of these ores. Small amounts of arsenic also may be released into the atmosphere from coal-fired power plants and incinerators because coal and waste products often contain some arsenic.

Food is usually the largest source of arsenic. The predominant dietary source of arsenic is seafood, followed by rice/rice cereal, mushrooms, and poultry.

**Breakdown**
Arsenic cannot be destroyed in the environment. It can only change its form, or become attached to or separated from particles. It may change its form by reacting with oxygen or other molecules present in air, water, or soil, or by the action of bacteria that live in soil or sediment. Ultimately, most arsenic ends up in the soil or sediment.

**HOW CAN ARSENIC ENTER AND LEAVE MY BODY?**
Enter your body
If you swallow arsenic in water, soil, or food, most of the arsenic may quickly enter into your body. If you breathe air that contains arsenic dusts, many of the dust particles settle onto the lining of the lungs. Most of the arsenic in these particles is then taken up from the lungs into the body. You might be exposed in this way near waste sites where arsenic-contaminated soils are allowed to blow into the air, or if you work with arsenic-containing soil or products. If you get arsenic-contaminated soil or water on your skin, only a small amount will go through your skin into your body, so this is usually not of concern.

Leave your body
Both inorganic and organic forms leave your body in your urine. Most of the inorganic arsenic will be gone within several days, although some will remain in your body for several months or even longer. If you are exposed to organic arsenic, most of it will leave your body within several days.

**Reference**
http://www.atsdr.cdc.gov/toxprofiles/tp2.pdf

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

**Metal**
Barium

**Description**
Barium is a silvery-white metal that takes on a silver-yellow color when exposed to air.

Barium occurs in nature in many different forms called compounds. These compounds are solids, existing as powders or crystals, and they do not burn well. Two forms of barium, barium sulfate and barium carbonate, are often found in nature as underground ore deposits.

Other barium compounds, such as barium chloride, barium nitrate, and barium hydroxide, are manufactured from barium sulfate.

Barium compounds such as barium acetate, barium chloride, barium hydroxide, barium nitrate, and barium sulfide dissolve more easily in water than barium sulfate and barium carbonate, but because they are not commonly found in nature, they do not typically end up in drinking water unless the water is contaminated by barium compounds that are released from waste sites.

**Sources**
Barium is sometimes found naturally in drinking water and food.

Background levels of barium in the environment are very low. The air that most people breathe contains about 0.0015 parts of barium per billion parts of air (ppb).

Barium sulfate ore is mined and used in several industries. It is used mostly by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. Barium sulfate is also used to make paints, bricks, tiles, glass, rubber, and other barium compounds. Some barium compounds, such as barium carbonate, barium chloride, and barium hydroxide, are used to make ceramics, insect and rat poisons, and additives for oils and fuels; in the treatment of boiler water; in the production of barium greases; as a component in sealants, paper manufacturing, and sugar refining; in animal and vegetable oil refining; and in the protection of objects made of limestone from deterioration. Barium sulfate is sometimes used by doctors to perform medical tests and take x-ray photographs of the stomach and intestines.

**Breakdown**
Barium compounds that do not dissolve well in water, such as barium sulfate and barium carbonate, can persist for a long time in the environment. Barium compounds, such as barium chloride, barium nitrate, or barium hydroxide, that dissolve easily in water usually do not last in these forms for a long time in the environment. The barium in these compounds that is dissolved in water quickly combines with sulfate or carbonate that are naturally found in water and become the longer lasting forms (barium sulfate and barium carbonate). Barium sulfate and barium carbonate are the barium compounds most commonly found in the soil and water. If barium sulfate and barium carbonate are released onto land, they will combine with particles of soil.

**HOW CAN BARIUM ENTER AND LEAVE MY BODY?**
Enter your body
Barium enters your body when you breathe air, eat food, or drink water containing barium. It may also enter your body to a small extent when you have direct skin contact with barium compounds. The amount of barium that enters the bloodstream after you breathe, eat, or drink it depends on the barium compound. Some barium compounds that are soluble, such as barium chloride, can enter bloodstream more easily than insoluble barium compounds such as barium sulfate. Some barium compounds (for example, barium chloride) can enter your body through your skin.

Leave your body
Barium that enters your body by breathing, eating, or drinking is removed mainly in feces and urine. Most of the barium that enters your body is removed within 1–2 weeks. Most of the small amount of barium that stays in your body goes into the bones and teeth.

**Reference**
http://www.atsdr.cdc.gov/toxprofiles/tp24.pdf

**Metal**
Beryllium

**Description**
Beryllium is an element that occurs naturally. It is present in a variety of materials, such as rocks, coal and oil, soil, and volcanic dust.

Two kinds of mineral rocks, bertrandite and beryl, are mined commercially for the recovery of beryllium.

Very pure gem-quality beryl is better known as either aquamarine (blue or blue-green) or emerald (green).

Beryllium is the lightest metal. A key distinction among beryllium compounds is that some are soluble in water, but many are not.

**Sources**
Beryllium enters the air, water, and soil as a result of natural and human activities. Emissions from burning coal and oil increase beryllium levels in the air.

Beryllium in water comes from different sources. Most of it comes from dissolving beryllium out of rocks and soil that water runs over and through. Only a very small part is from the settling of beryllium dust out of the air.

**Breakdown**
Air
Very small dust particles of beryllium in the air fall out of the air onto surface water, plant surfaces, and soil either by themselves or when rain or snow falls.

Water and Soil
These beryllium particles eventually end up back in the soil or in the bottoms of lakes, rivers, and ponds, where they stay and mix with beryllium that is already there.

**HOW CAN BERYLLIUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Beryllium can enter your body if you breathe air containing it. When you breathe air containing beryllium, beryllium particles can be deposited in the lungs.

Ingestion
Beryllium can enter your body if you eat food or drink water containing it.

Dermal Contact
Beryllium will not enter your body from skin contact with the metal unless the skin is scraped or cut and beryllium particles become imbedded in the wound. Only a small amount of beryllium may enter your body if your skin comes into contact with a beryllium salt dissolved in water.

Leave your body
The beryllium that you breathe in slowly dissolves in the lungs and moves slowly into the bloodstream. Some of the beryllium deposited in the lungs can be moved to the mouth and then swallowed; the rest can remain in your lungs for a long time. Therefore, most of the beryllium that you swallow leaves your body through the feces without entering the bloodstream.

The small amount of beryllium that moves from the lungs, stomach, and intestines into the bloodstream is carried by the blood to the kidneys. Beryllium leaves the kidneys by the urine. Some beryllium can also be carried by the blood to the liver and bones where it may remain for long periods.

**Reference**

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

http://www.atsdr.cdc.gov/toxprofiles/tp4.pdf

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

**Metal**
Cadmium

**Description**
Metal found in the earth's crust, associated with zinc, lead, and copper ores.

Pure cadmium is a soft, silver-white metal. Cadmium chloride and cadmium sulfate are soluble in water.

Most cadmium used in the United States is extracted as a byproduct during the production of other metals such as zinc, lead, or copper. Cadmium is also recovered from used batteries.

**Sources**
Cadmium is emitted to soil, water, and air by non-ferrous metal mining and refining, manufacture and application of phosphate fertilizers, fossil fuel combustion, and waste incineration and disposal.

Cadmium can accumulate in aquatic organisms and agricultural crops.

**Breakdown**
Air
Cadmium (as oxide, chloride, and sulfate) will exist in air as particles or vapors (from high temperature processes). It can be transported long distances in the atmosphere, where it will deposit (wet or dry) onto soils and water surfaces.

Soil
Cadmium and its compounds may travel through soil, but its mobility depends on several factors such as pH and amount of organic matter, which will vary depending on the local environment. Generally, cadmium binds strongly to organic matter where it will be immobile in soil and be taken up by plant life, eventually, entering the food supply.

Water
Cadmium exists as the hydrated ion or as ionic complexes with other inorganic or organic substances. Soluble forms migrate in water. Insoluble forms of cadmium are immobile and will deposit and absorb to sediments.

**HOW CAN CADMIUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
About 5-50% of the cadmium you breathe will enter your body through your lungs.

Ingestion
A small amount of the cadmium in food and water (about 1-10%) will enter your body through the digestive tract. If you do not have enough iron or other nutrients in your diet, you are likely to take up more cadmium from your food than usual.

Dermal contact
Virtually no cadmium enters your body through your skin.

Leave your body
Most of the cadmium that enters your body goes to your kidney and liver and can remain there for many years. A small portion of the cadmium that enters your body leaves slowly in urine and feces.

Your body can change most cadmium to a form that is not harmful, but too much cadmium can overload the ability of your liver and kidney to change the cadmium to a harmless form.

**Reference**
http://www.atsdr.cdc.gov/toxprofiles/tp5.pdf

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

**Metal**
Chromium

**Description**
Chromium is a naturally-occurring element found in rocks, animals, plants, and soil, where it exists in combination with other elements to form various compounds.

The three main forms of chromium are: chromium (0), chromium (III), and chromium (VI).

Small amounts of chromium (III) are needed for human health.

**Sources**
Chromium can be found in air, soil, and water after release from industries that use chromium, such as industries involved in electroplating, leather tanning, textile production, and the manufacture of chromium-based products.

Chromium can also be released into the environment from the burning of natural gas, oil, or coal.

**Breakdown**
Air
Chromium does not usually remain in the atmosphere, but is deposited into the soil and water.

Water and Soil
Chromium can change from one form to another in water and soil, depending on the conditions present.

**HOW CAN CHROMIUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
When you breathe air containing chromium, some of the chromium will enter your body through your lungs. Some forms of chromium can remain in the lungs for several years or longer.

Ingestion
A small percentage of ingested chromium will enter the body through the digestive tract.

Dermal contact
When your skin comes in contact with chromium, small amounts of chromium will enter your body.

Leave your body
Chromium(VI) is changed to chromium(III) in the body. Most of the chromium leaves the body in the urine within a week, although some may remain in cells for several years or longer.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp7.pdf

**Metal**
Cobalt

**Description**
Small amounts of cobalt are naturally found in most rocks, soil, water, plants, and animals, typically in small amounts. Cobalt is also found in meteorites.

Elemental cobalt is a hard, silvery grey metal.

However, cobalt is usually found in the environment combined with other elements such as oxygen, sulfur, and arsenic. Small amounts of these chemical compounds can be found in rocks, soil, plants, and animals.

Cobalt can also exist in radioactive forms. $^{60}Co$ is the most important radioisotope of cobalt.

**Sources**
It may enter air and water, and settle on land from windblown dust, seawater spray, volcanic eruptions, and forest fires and may additionally get into surface water from runoff and leaching when rainwater washes through soil and rock containing cobalt.

Soils near ore deposits, phosphate rocks, or ore smelting facilities, and soils contaminated by airport traffic, highway traffic, or other industrial pollution may contain high concentrations of cobalt.

**Breakdown**
Cobalt cannot be destroyed in the environment. It can only change its form or become attached or separated from particles.

Air
Cobalt contained in windborne soil is generally found in larger particles than those released from power plants. These large particles settle to the ground or are washed out of the air by rain. Cobalt that is attached to very small particles may stay in the air for many days.

Water and Sediment
Cobalt released into water may stick to particles in the water column or to the sediment at the bottom of the body of water into which it was released, or remain in the water column in ionic form.

Cobalt deposited on soil is often strongly attached to soil particles and therefore would not travel very far into the ground.

**HOW CAN COBALT ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Cobalt can enter your body when you breathe in air containing cobalt dust.

Ingestion
Cobalt can be ingested when you drink water that contains cobalt, when you eat food that contains cobalt.

Dermal contact
Cobalt enters the body when your skin touches materials that contain cobalt.

Leave your body
Once cobalt enters your body, it is distributed into all tissues, but mainly into the liver, kidney, and bones. After cobalt is breathed in or eaten, some of it leaves the body quickly in the feces. The rest is absorbed into the blood and then into the tissues throughout the body. The absorbed cobalt leaves the body slowly, mainly in the urine. Studies have shown that cobalt does not readily enter the body through normal skin, but it can if the skin has been cut.

**Reference**

**Attachment 2**
**Metals Information**
**Fruitland Magnesium Fire**
**Maywood, Los Angeles County, California**

http://www.atsdr.cdc.gov/ToxProfiles/tp33.pdf

**Metal**
Copper

**Description**
Copper is a reddish metal that occurs naturally in rock, soil, water, sediment, and, at low levels, air.

Copper also occurs naturally in all plants and animals. It is an essential element for all known living organisms including humans and other animals at low levels of intake.

Metallic copper can be easily molded or shaped. The elemental color of copper is red and copper compounds can be recognized by their blue-green color.

**Sources**
Copper can enter the environment through releases from the mining of copper and other metals, and from factories that make or use copper metal or copper compounds.

Copper can also enter the environment through waste dumps, domestic waste water, combustion of fossil fuels and wastes, wood production, phosphate fertilizer production, and natural sources (for example, windblown dust, from native soils, volcanoes, decaying vegetation, forest fires, and sea spray).

**Breakdown**
Elemental copper does not break down in the environment.

Air
Copper is carried on particles emitted from smelters and ore processing plants, and is then carried back to earth through gravity or in rain or snow. Copper is also carried into the air on windblown metallurgical dust.

Water
When copper and copper compounds are released into water, the copper that dissolves can be carried in surface waters either in the form of copper compounds or as free copper or, more likely, copper bound to particles suspended in the water.

Soil
When copper is released into soil, it can become strongly attached to the organic material and other components (e.g., clay, sand, etc.) in the top layers of soil and may not move very far when it is released.

**HOW CAN COPPER ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Copper can also enter your body if you breathe air or dust containing copper.

Ingestion
Copper can enter your body when you drink water or eat food, soil, or other substances that contain copper.

Dermal contact
We do not know how much copper enters the body through the skin.

Leave your body
Copper rapidly enters the bloodstream and is distributed throughout the body after you eat or drink it. Your body is very good at blocking high levels of copper from entering the bloodstream. We do not know how much copper enters the body through the lungs or skin. Copper then leaves your body in feces and urine, mostly in feces. It takes several days for copper to leave your body.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf

**Metal**
Lead

**Description**
Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust.

However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds.

Metallic lead is resistant to corrosion (i.e., not easily attacked by air or water). When exposed to air or water, thin films of lead compounds are formed that protect the metal from further attack.

Lead is easily molded and shaped. Lead can be combined with other metals to form alloys.

**Sources**
Lead occurs naturally in the environment. However, most of the high levels found throughout the environment come from human activities.

Lead can enter the environment through releases from mining lead and other metals, and from factories that make or use lead, lead alloys, or lead compounds. Lead is released into the air during burning coal, oil, or waste. Before the use of leaded gasoline was banned, most of the lead released into the U.S. environment came from vehicle exhaust.

**Breakdown**
Some lead compounds are changed into other forms of lead by sunlight, air, and water. However, elemental lead cannot be broken down.

Air
Lead is removed from the air by rain and by particles falling on land or into surface water.

Water and Soil
Lead may remain stuck to soil particles or sediment in water for many years. Movement of lead from soil particles into groundwater is unlikely unless the rain falling on the soil is acidic or "soft".

Once lead falls onto soil, it sticks strongly to soil particles and remains in the upper layer of soil.

**HOW CAN LEAD ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Some of the lead that enters your body comes from breathing in dust or chemicals that contain lead. Once this lead gets into your lungs, it goes quickly to other parts of the body in your blood.

Ingestion
You may also swallow lead by eating food and drinking liquids that contain it.

Dermal contact
Dust and soil that contain lead may get on your skin, but only a small portion of the lead will pass through your skin and enter your blood if it is not washed off.

Leave your body
Shortly after lead gets into your body, it travels in the blood to the "soft tissues" and organs (such as the liver, kidneys, lungs, brain, spleen, muscles, and heart). After several weeks, most of the lead moves into your bones and teeth. Some of the lead can stay in your bones for decades. The lead that is not stored in your bones leaves your body in your urine or your feces.
**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp13.pdf

**Metal**
Manganese

**Description**
Manganese is a naturally occurring substance found in many types of rocks and soil.

Pure manganese is a silver-colored metal; however, it does not occur in the environment as a pure metal. Rather, it occurs combined with other substances such as oxygen, sulfur, and chlorine.

Manganese is a trace element and is necessary for good health.

**Sources**
Manganese is a normal constituent of air, soil, water, and food.

Additional manganese can be found in air, soil, and water after release from the manufacture, use, and disposal of manganese-based products.

**Breakdown**
As with other elements, manganese cannot break down in the environment. It can only change its form or become attached or separated from particles.

Soil
The chemical state of manganese and the type of soil determine how fast it moves through the soil and how much is retained in the soil.

Water and sediment
In water, most of the manganese tends to attach to particles in the water or settle into the sediment.

The manganese-containing gasoline additive may degrade in the environment quickly when exposed to sunlight, releasing manganese.

**HOW CAN MANGANESE ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
When you breathe air containing manganese, a small amount of the manganese will enter your body through your lungs and the remainder can become trapped in your lungs. Some of the manganese in your lungs can also be trapped in mucus which you may cough up and swallow into your stomach.

Ingestion
Manganese in food or water may enter your body through the digestive tract to meet your body's needs for normal functioning.

Dermal contact
Only very small amounts of manganese can enter your skin when you come into contact with liquids containing manganese.

Leave your body
Once in your body, manganese-containing chemicals can break down into other chemicals. However, manganese is an element that cannot be broken down. Most manganese will leave your body in feces within a few days.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp151.pdf



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**Metal**
Mercury

**Description**
Mercury occurs naturally in the environment and exists in several forms. These forms can be organized under three headings: metallic mercury, inorganic mercury, and organic mercury.

Metallic mercury is a shiny, silver-white metal that is a liquid at room temperature. Metallic mercury is the elemental or pure form of mercury. At room temperature, some of the metallic mercury will evaporate and form mercury vapors. Mercury vapors are colorless and odorless.

Inorganic mercury compounds occur when mercury combines with elements such as chlorine, sulfur, or oxygen. These mercury compounds are also called mercury salts. Most inorganic mercury compounds are white powders or crystals.

When mercury combines with carbon, the compounds formed are called "organic" mercury compounds or organomercurials. The most common forms of methylmercury and phenylmercury are white crystalline solids. Dimethylmercury, however, is a colorless liquid.

**Sources**
Mercury enters the environment as the result of the normal breakdown of minerals in rocks and soil from exposure to wind and water, and from volcanic activity.

Metallic and inorganic mercury enters the air from mining deposits of ores that contain mercury, from the emissions of coal-fired power plants, from burning municipal and medical waste, from the production of cement, and from uncontrolled releases in factories that use mercury.

Microorganisms (bacteria, phytoplankton in the ocean, and fungi) convert inorganic mercury to methylmercury. This form of mercury can result in bioaccumulation up the food chain especially in fish.

**Breakdown**
Air
In air, the mercury vapor can be changed into other forms of mercury, and can be further transported to water or soil in rain or snow.

Soil and Water
Mercury usually stays on the surface of sediments or soil and does not move through the soil to underground water. If mercury enters the water in any form, it is likely to settle to the bottom where it can remain for a long time.

**HOW CAN MERCURY ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Mercury can enter your body by breathing in mercury vapors in the air.

Ingestion
Mercury can enter the body by shallowing or eating contaminated food or water.

Dermal contact
Mercury can enter the body by close contact with the skin.

Leave your body
Once inorganic mercury enters the body and gets into the bloodstream, it moves to many different tissues. Inorganic mercury leaves your body in the urine or feces over a period of several weeks or months.

Methylmercury can be changed by your body to inorganic mercury that can leave your body via feces.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp46.pdf

**Metal**
Nickel

**Description**
Pure nickel is a hard, silvery-white metal, which has properties that make it very desirable for combining with other metals to form mixtures called alloys.

Many of these nickel compounds are water soluble (dissolve fairly easily in water) and have a characteristic green color.

Nickel and its compounds have no characteristic odor or taste.

**Sources**
Nickel combined with other elements occurs naturally in the earth's crust. It is found in all soil, and is also emitted from volcanoes.

In the environment, it is primarily found combined with oxygen or sulfur as oxides or sulfides. Nickel is also found in meteorites and on the ocean floor in lumps of minerals called sea floor nodules.

Nickel is released into the atmosphere during nickel mining and by industries that make or use nickel, nickel alloys, or nickel compounds. Nickel is also released into the atmosphere by oil-burning power plants, coal-burning power plants, and trash incinerators.

**Breakdown**
Air
Small particles of dust that settle to the ground or are taken out of the air in rain or snow. It usually takes many days for nickel to be removed from the air. If the nickel is attached to very small particles, it can take more than a month to settle out of the air.

Soil and Water
A lot of nickel released into the environment ends up in soil or sediment where it strongly attaches to particles containing iron or manganese. Under acidic conditions, nickel is more mobile in soil and might seep into groundwater.

**HOW CAN NICKEL ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
If you breathe air that contains nickel, the amount of nickel you inhale that reaches your lungs and enters your blood depends on the size of the nickel particles.

Ingestion
More nickel will pass into your body through your stomach and intestines if you drink water containing nickel than if you eat food containing the same amount of nickel.

Dermal contact
A small amount of nickel can enter your bloodstream from skin contact.

Leave your body
After nickel gets into your body, it can go to all organs, but it mainly goes to the kidneys. The nickel that gets into your bloodstream leaves in the urine. After nickel is eaten, most of it leaves quickly in the feces, and the small amount that gets into your blood leaves in the urine.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp15.pdf

**Metal**
Selenium

**Description**
Selenium, in its pure form of metallic gray to black crystals, is often referred to as elemental selenium or selenium dust. Elemental selenium is commercially produced, primarily as a by-product of copper refining.

Selenium is not often found in the environment in its elemental form, but is usually combined with sulfide minerals or with silver, copper, lead, and nickel minerals.

Selenium also combines with oxygen to form several substances that are white or colorless crystals.

**Sources**
Weathering of rocks and soils may result in low levels of selenium in water, which may be taken up by plants. Weathering also releases selenium into the air on fine dust-like particles.

Volcanic eruptions may release selenium in air. Selenium commonly enters the air from burning coal or oil. Selenium that may be present in fossil fuels combines with oxygen when burned, which may then react with water to form soluble selenium compounds.

**Breakdown**
As an element, selenium cannot be created or destroyed, although selenium can change forms in the environment.

Air
Airborne particles of selenium, such as in ash, can settle on soil or surface water.

Soil and Water
The forms and fate of selenium in soil depend largely on the acidity of the surroundings and its interaction with oxygen. In the absence of oxygen when the soil is acidic, the amount of selenium that can enter plants and organisms should be low.

Elemental selenium that cannot dissolve in water and other insoluble forms of selenium are less mobile and will usually remain in the soil, posing smaller risk of exposure. Selenium compounds that can dissolve in water are sometimes very mobile.

**HOW CAN SELENIUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Selenium in the air may also enter your body when you breathe it.

Ingestion
Selenium from the environment mainly enters the body when people eat food containing selenium.

Dermal contact
You should also be aware that selenium compounds, including those used in some medicated dandruff shampoos, are not easily absorbed through the skin.

Leave your body
Most of the selenium that enters the body quickly leaves the body, usually within 24 hours. Beyond what the body needs, selenium leaves mainly in the urine, but also in feces and breath.

Selenium can build up in the human body, however, if exposure levels are very high or if exposure occurs over a long time. It builds up mostly in the liver and kidneys but also in the blood, lungs, heart, and testes. Selenium can build up in the nails and in hair, depending on time and amount of exposure.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp92.pdf

**Metal**
Silver

**Description**
Silver is rare but occurs naturally in the environment as a soft, "silver" colored metal. Because silver is an element, there are no manmade sources of silver.

It also occurs in powdery white (silver nitrate and silver chloride) or dark-gray to black compounds (silver sulfide and silver oxide).

Silver could be found at hazardous waste sites in the form of these compounds mixed with soil and/or water.

Silver is stable and remains in the environment in one form or another until it is taken out again by people. The form it is found in depends on environmental conditions.

**Sources**
The natural wearing down of silver-bearing rocks and soil by the wind and rain also releases large amounts of silver into the environment.

Photographic materials are the major source of the silver that is released into the environment.

Another source is mines that produce silver and other metals.

**Breakdown**
Because silver is an element, it does not break down, but it can change its form by combining with other substances. Over time it may change from the form first released, to metallic silver, and then back to the same or other compounds.

Silver that is released into the environment may be carried long distances in air and water. Rain washes silver compounds out of many soils so that it eventually moves into the groundwater.

**HOW CAN SILVER ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Silver may enter your body after breathing air containing silver.

Ingestion
Silver may enter the body of a person is by drinking water that contains silver or eating food grown near the site in soil that contains silver. Silver can also enter the body when soil that has silver in it is eaten.

Dermal contact
Silver can enter your body through your skin when you put your hands into solutions containing silver compounds or when you come in contact with silver-containing powders.

Leave your body
Most of the silver that is eaten or breathed in leaves the body in the feces within about a week. Very little passes through the urine. It is not known how much of the silver that enters the body through the skin leaves the body. Some of the silver that is eaten, inhaled, or passes through the skin may build up in many places in the body.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp146.pdf

**Metal**
Thallium

**Description**
Pure thallium is a soft, bluish-white metal

In its pure form, it is odorless and tasteless.

It can be found in pure form or mixed with other metals in the form of alloys. It can also be found combined with other substances such as bromine, chlorine, fluorine, and iodine to form salts. These combinations may appear colorless to white or yellow.

Thallium exists in two chemical states (thallous and thallic). The thallous state is the more common and stable form.

**Sources**
Thallium is widely distributed in trace amounts in the earth's crust.

Small amounts of thallium are released into the air from coal-burning power plants, cement factories, and smelting operations.

**Breakdown**
Thallium remains in the environment since it is a metal and cannot be broken down to simpler substances.

We do not know how much time it takes for thallium to move from one medium to another.

**HOW CAN THALLIUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Breathing in thallium from the air can enter the body through the lungs.

Ingestion
Thallium can enter your body when you eat food or drink water contaminated with thallium. When thallium is swallowed most of it is absorbed and rapidly goes to various parts of your body, especially the kidney and liver.

Dermal contact
Thallium can enter your body when your skin comes in contact with it.

Leave your body
Thallium leaves your body slowly. Most of the thallium leaves your body in urine and to a lesser extent in feces. It can be found in urine within 1 hour after exposure. After 24 hours, increasing amounts are found in feces. It can be found in urine as long as 2 months after exposure. About half the thallium that enters various parts of your body leaves them within 3 days.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp54.pdf



ED_001052_00000974-00018

**Metal**
Vanadium

**Description**
Vanadium is a naturally occurring element. It is widely distributed in the earth's crust at an average concentration of approximately 100 mg/kg. Vanadium is found in about 65 different minerals.

Depending on its form, vanadium can be a gray-white metal or light gray or white lustrous powder. Pure vanadium is a bright white, soft, and ductile metal.

**Sources**
Vanadium occurs naturally in soil, water, and air. Natural sources of atmospheric vanadium include continental dust, marine aerosol, and volcanic emissions.

Releases of vanadium to the environment are mainly associated with industrial sources, especially oil refineries and power plants using vanadium rich fuel oil and coal. Global human-made atmospheric releases of vanadium have been estimated to be greater than vanadium releases due to natural sources. Natural releases to water and soil are far greater overall than human-made releases to the atmosphere.

**Breakdown**
Vanadium cannot be destroyed in the environment. It can only change its form or become attached or separated from airborne particulate, soil, particulate in water, and sediment.

Air
Vanadium particles in the air settle to the ground or are washed out of the air by rain. Smaller particles, such as those emitted from oil-fueled power plants, may stay in the air for longer times and are more likely to be transported farther away from the site of release.

Water and Soil
The transport and partitioning of vanadium in water and soil is influenced by many factors including acidity of the water or soil and the presence of particulates. Vanadium can either be dissolved in water as ions or may become adsorbed to particulate matter.

**HOW CAN VANADIUM ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Some of the vanadium you breathe will enter your body through your lungs; however, we do not know how much will enter.

Ingestion
A small amount of vanadium in food and water (3-20%) will enter your body through the digestive tract. The vanadium compounds you are exposed to will determine how much is absorbed.

Dermal contact
We do not know how much vanadium will enter your body through your skin. It is likely that very little will pass through the skin.

Leave your body
Vanadium that is not absorbed into the tissues with exit the body through urine and feces.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp58.pdf



ED_001052_00000974-00019

**Metal**
Zinc

**Description**
Zinc is one of the most common elements in the Earth's crust.

In its pure elemental (or metallic) form, zinc is a bluish-white, shiny metal.

Powdered zinc is explosive and may burst into flames if stored in damp places. Zinc can also combine with other elements, such as chlorine, oxygen, and sulfur, to form zinc compounds.

**Sources**
Zinc is found in the air, soil, and water and is present in all foods.

Most zinc enters the environment as the result of mining, purifying of zinc, lead, and cadmium ores, steel production, coal burning, and burning of wastes.

**Breakdown**
Zinc is an essential element needed by your body in small amounts and cannot be broken down by the environment.

Air
In air, zinc is present mostly as fine dust particles. This dust eventually settles over land and water. Rain and snow aid in removing zinc from air.

Water
Most of the zinc in lakes or rivers settles on the bottom. However, a small amount may remain either dissolved in water or as fine suspended particles.

Soil
Most of the zinc in soil is bound to the soil and does not dissolve in water.

**HOW CAN ZINC ENTER AND LEAVE MY BODY?**
Enter your body
Inhalation
Zinc can also enter through your lungs if you inhale zinc dust or fumes from zinc-smelting or zinc-welding operations on your job.

Ingestion
Zinc can enter the body through the digestive tract when you eat food or drink water containing it.

Dermal contact
The amount of zinc that passes directly through the skin is relatively small.

Leave your body
Zinc is stored throughout the body. Zinc increases in blood and bone most rapidly after exposure. Zinc may stay in the bone for many days after exposure. Normally, zinc leaves the body in urine and feces.

**Reference**
http://www.atsdr.cdc.gov/ToxProfiles/tp60.pdf

## Additional Metals*:

Calcium (Ca)
A silver-white divalent metallic element of the alkaline-earth group that is found in most plants and animals and that is especially important in people for strong healthy bones.
http://www.merriam-webster.com/dictionary/calcium

Iron (Fe)
A silver-white malleable ductile magnetic heavy metallic element that readily rusts in moist air, occurs native in meteorites and combined in most igneous rocks, is the most used of metals, and is vital to biological processes.
http://www.merriam-webster.com/dictionary/iron

Magnesium (Mg)
A silver-white malleable ductile light metallic element that occurs abundantly in nature and is used in metallurgical and chemical processes, in photography, signaling, and pyrotechnics because of the intense white light it produces on burning, and in construction especially in the form of light alloys.
http://www.merriam-webster.com/dictionary/magnesium

Potassium (K)
A silver-white soft light low-melting monovalent metallic element of the alkali metal group that occurs abundantly in nature especially combined in minerals.
http://www.merriam-webster.com/dictionary/potassium

Sodium (Na)
A silver-white sofy waxy ductile element of the alkali meal group that occurs abundantly in nature in combined form and is very active chemically. It is found in salt, baking soda, and other compounds.
http://www.merriam-webster.com/dictionary/sodium