Children At Risk

How toxic chemicals threaten Oregon's children and what we can do about it

Oregon Environmental Council
CLEAN AIR CLEAN WATER CLEAR THINKING

By Sarah Doll

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EXECUTIVE SUMMARY

courtesy of Environmental California

Every day we are exposed to hundreds of chemicals in the food we eat, the air we breathe, and the water we drink. They are in our homes, schools and workplaces. Some of these chemicals are more pervasive than others, some more toxic, and some longer-lasting. Many of these chemicals are known to cause cancer and other health problems.

Emerging science continues to uncover new health problems linked to various chemicals and chemical combinations, but some things are already quite clear. First, children are incredibly sensitive to chemical pollution. Their developing organs and systems, as well as their natural behavior, put them at tremendous risk. Second, rates of environmentally related diseases, such as birth defects, childhood cancer, asthma and other serious health problems among children, are increasing. Third, some chemicals are simply too toxic, too dangerous to children, to allow exposures to continue. We simply must protect children from these toxic pollutants at least as aggressively as we are moving to protect them from tobacco smoke and other similar threats.

With this report, the Oregon Environmental Council (OEC) is launching a concerted effort to eliminate the most dangerous of these chemicals that pose serious health risks to Oregon's children. Some are quite familiar, like mercury and lead. Others, like phthalates, may be difficult even to pronounce, but all pose threats to our children, and to future generations of Oregon children.

OEC collected information on environmental toxins and used those data to identify key chemicals of particular concern in Oregon. The data in this report are comprised of publicly available databases and compiled information from scientific peer-reviewed journals, government agencies, and other credible sources.

Phasing out these toxic chemicals will not be easy. Some of them are produced in massive quantities and used in thousands of everyday products. There is no "magic

wand" we can wave to eliminate them overnight. However, there are already clear alternatives to many of these chemicals, in many common uses. We must begin taking common sense steps to reduce these most dangerous chemicals now. OEC has set a goal of reducing these chemicals by 30% by 2010, and we are already well on the way to reducing mercury pollution by that amount. We believe we need to take special care in settings where children spend lots of time, and OEC is working with schools, childcare facilities and parents to help them protect their children from these toxic chemicals.

Working together, we can protect our children from these toxic threats, and lay the foundation to eliminate these dangerous chemicals entirely. Given Oregon's challenging financial picture, it is important to identify policy solutions as well as steps individual Oregonians can take to reduce exposure in their lives.

Long-term, Oregon should create an early warning system that would identify chemicals of concern before they started having real impacts on our children's health. One approach is to create a state-level children's environmental health advisory group charged with identifying environmental health hazards of concern to children in Oregon.

This report describes the common sources of these chemicals, how people are exposed, and what we know about the magnitude of the problem in Oregon. This report also recommends a set of preliminary strategies for reducing the release of these chemicals into the environment, and steps that individuals can take to reduce exposures. Appendix A lays out some dos and don'ts. This report is intended to increase public attention to these issues in Oregon, and to suggest strategies to create a healthier environment for all Oregonians.

"Working together, we can protect our children from these toxic threats."

12 CHEMICALS OF KEY CONCERN TO OREGON CHILDREN'S HEALTH

- acrolein
- benzene
- benzo(a)pyrene
- bisphenol-A
- brominated flame retardants (BFRs)
- diesel
- dioxin
- formaldehyde
- home & garden pesticides
- lead
- mercury
- phthalates

Background

Every day we are exposed to hundreds of chemicals in the food we eat, the air we breathe, and the water we drink. They are in our homes, schools and workplaces. Some of these chemicals are more pervasive than others, some more toxic, some longer-lasting.

Most of these chemicals are produced by everyday activities such as driving, backyard burning and industrial processes. Others can be found in our homes and office furnishings, kitchenware, children's toys, personal care products and even human breast milk. Numerous studies have linked environmental pollution from these sources to increasing rates of childhood illnesses, including premature and low birth-weight babies, asthma, birth defects, learning disabilities and even cancer.

The Oregon Environmental Council's (OEC) strategic plan leading up to the year 2010 aims to protect children from harmful pollution. To focus attention on the toxic chemicals of most concern to the health of Oregon's children, OEC collected information on toxic emissions and used those data to identify key chemicals of particular concern in Oregon. We selected these toxic chemicals based on the following criteria:

- toxic environmental pollutants;
- statewide problems;
- significant threats to human health either because people are widely exposed and/or exposure to the chemical poses a serious health threat;
- particularly dangerous to children;
- currently being released;
- measurable; and
- not being addressed effectively.

OEC's goal is to reduce exposures to these key chemicals and highlight the unintended toll that they have on our quality of life and health. Our primary focus is on substances where alternatives are available. OEC plans to build a coalition and work in partnership with users and producers of these toxins over the next several years to achieve reductions in exposures. As demonstrated by OEC's successful efforts to reduce mercury in the waste stream (see sidebar), we know that if we work together we can reduce these exposures and make Oregon an even healthier place to live, work and play. We all have to do our part to ensure a clean and healthy future for the next generation.

This report describes the common sources of these chemicals, how people are exposed and what we know about the magnitude of the problem in Oregon. This report also recommends a set of preliminary strategies for reducing the release of these chemicals into the environment. It is intended to increase public

OEC FORMS OREGON MERCURY SOLUTION TEAM

In the spirit of cooperation and constructive problem solving, OEC convened a broad group of stakeholders to form the Oregon Mercury Solution Team in 2000. The team's goal was to develop strategies to eliminate the release of mercury from human activities in Oregon by the year 2020, and reduce overall mercury exposure to the extent feasible. The Mercury Solutions Act of 2001, which passed both houses of the legislature by substantial margins, was a result of this collaborative process. The law provides the nation's first ban on mercury in thermostats, as well as in thermometers, auto switches and several other consumer products where viable alternatives already exist. It is estimated that these measures will ultimately reduce mercury pollution in Oregon by about 800 pounds per year.

For more information about the team or to get a copy of their report "Mercury: On the Road to Zero," go to our website www.council.org/pollution/mercury.htm.

attention to these issues in Oregon, and to suggest strategies to create a healthier environment for all Oregonians.

Why Children are More Vulnerable

Children are more vulnerable to toxic pollution than adults for a number of reasons. Specifically, infants and children:

- breathe more rapidly than adults;
- tend to breathe through their mouths, bypassing the filtering effect of the nose;
- eat more food and drink more water per pound of body weight;
- have organs that are immature and developing;
- have developing immune systems;
- generally spend more time out of doors and closer to the ground; and
- exhibit behaviors such as hand-to-mouth which can more directly bring pollution into their bodies.

Rates of many childhood diseases, such as asthma, allergies, autism, learning disabilities, attention deficit disorder, and certain types of birth defects, are increasing. For example, some national, environmentally linked disease trends include:

- The frequency of certain birth defects such as undescended testes and malformed urinary (hypospadis) tracts has doubled in US boys from 1970 to 1993.[1]
- Girls in the US appear to be reaching puberty six months to one year earlier than in the past. Boys are also reaching puberty earlier.[2]
- Sperm density in the US has declined over the last 30 years.[3]
- Childhood cancer has jumped from the realm of a medical rarity to the most common disease killer of American schoolchildren.[4]
- Rates of pre-term birth rose from 6.9% to 8.4% of births between 1975 and 1995.[5]
- Learning disabilities increased 191% between 1977 and 1994.[6]
- The National Academy of Sciences estimates that chemical exposures play a role in at least one in four cases of developmental disorders.[7]
- Asthma-related illness is a leading cause for school absenteeism in the US.[8]

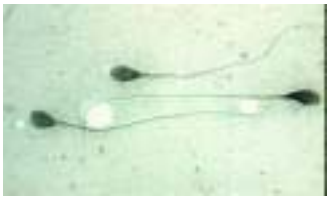
More and more studies demonstrate that exposure to toxic chemicals during infancy or childhood can affect the development of the respiratory, nervous, hormone and immune systems, as well as increasing the risk of cancer later in life. One study has shown that children who are exposed to pesticides before age one are four times more likely to develop early persistent asthma, for example.[9]

In addition to the emotional and human costs these diseases incur, the financial costs to society are huge. According to a recent study, the annual costs of environmentally attributable diseases in American children total $54.9 billion.[10] The Centers for Disease Control reports that children with asthma incur 88% higher health care costs per year on average than asthma-free children.

Phases of Development

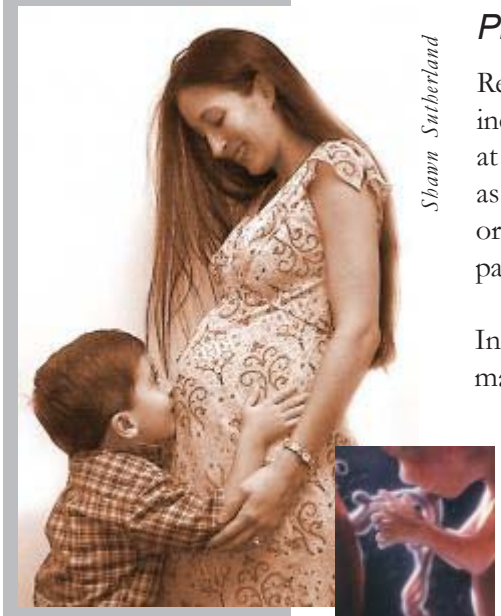
A key part of protecting our children from toxic pollution is a better understanding of when children are most vulnerable to toxic exposures. Here is an overview of how the key toxins targeted by OEC can affect the conception, birth and development of Oregon's children.

Fertility and Conception



D. Tsai - U. of Cincinnati

A recent Harvard study found that men with lower sperm counts often have high levels of **phthalates** (plastic softeners) in their bodies. Men exposed to **lead** pollution have also been found to have reduced fertility. By some estimates, human sperm counts are dropping by as much as 1% per year, and **bisphenol-A** (used in hard "polycarbonate" plastics such as "Nalgene" water bottles) and **PBDEs** (flame retardants) may be yet other causes.



Shawn Sutherland

Pregnancy

Recent research by the US EPA suggests that **phthalates** are a possible factor in increasing rates of certain male birth defects, such as hypospadias (the penis opens at its base instead of its tip) and undescended testicles. Similar birth defects, as well as oral clefts, have also been associated with **dioxins**, which are created by burning or heating chlorine; e.g., in garbage incinerators, backyard burn barrels or pulp and paper mills.

Inhaled **benzene** can result in low birth weights, delayed bone formation and bone marrow damage.

Other chemical exposures in the womb can lead to problems that become evident only some time after birth. For example, one in every six women of childbearing age in the US is estimated to have unsafe levels of **mercury** in her blood. Decades of evidence tells us that fetal exposure to mercury can result in cerebral palsy, mental retardation, psychiatric disturbances and more subtle, but still significant problems related to cognitive impairment and developmental delays.[11]

PBDEs (flame retardants) can alter hormone levels and thyroid function in fetuses, also leading to developmental and learning disabilities in young children. **Dioxins** also cross the placenta, and according to animal studies, in utero exposure to dioxins can lead to learning disabilities.

Chemical exposures may also threaten some pregnancies directly by triggering miscarriages. Even at low doses, for example, **bisphenol-a** has been shown to lead to miscarriages in

mice. A California study found that mothers who live within a nine-square mile area in which commercial **pesticide** spraying takes place during pregnancy are 40% to 120% more likely to suffer miscarriages.[12] **Benzo(a)pyrene**, a prominent component of wood smoke and vehicle emissions, has also been fingered as a potential trigger of miscarriages.

Infancy

Once out of the womb, a baby is still quite vulnerable to chemical exposures. For example, a USC study found that children exposed to household **pesticides** were twice as likely to develop asthma than those not exposed.[13]

Researchers agree that breast feeding babies is by far healthier (for both mom and baby) than formula. However, new research is showing that certain chemicals, such as **PBDEs**, are building up in breast milk at alarming rates, with the US having higher concentrations than other countries. That's troublesome because it means that our kids are starting life with a higher "body burden" of toxins that could lead to unforeseeable problems later in life, including passing along a higher risk of birth defects, miscarriage or other illnesses to their children. **Dioxins** also build up in breast milk.

Childhood

Like **mercury** and **PBDEs**, **lead** can impact brain development. Early childhood is a time to be especially wary of **lead** exposure, which usually occurs via toddlers eating peeling lead-based paints (found in houses built before 1978).

Benzene is a more ubiquitous threat (it is found in vehicle exhaust as well as wood smoke and other sources) and a known carcinogen (particularly linked to childhood leukemia).

A study in Denver found that children with lymphomas and other cancers were more likely to live in houses with **pesticide**-treated yards.[14] **Dioxins** are also a known cause of cancer, according to the National Toxicology Program.

Diesel exhaust contains benzene and other carcinogens, and is also an asthma trigger, especially for sensitive children who ride diesel school buses, or live near freeways or truck routes. Like **diesel**, **formaldehyde** (which is also found in car exhaust, as well as cabinetry, furniture and other building products made of particle board) is a carcinogen, as well as an asthma trigger.

Acrolein, another widely found by-product of field and slash burning, as well as fireplaces, woodstoves and vehicles, is a strong asthma trigger. In fact, it accounts for nearly two-thirds of the risk of non-cancer illnesses that Oregonians experience from all hazardous air pollutants.

Table 1: Developmental Phases and Associated Chemicals

Phase of Development	Associated Chemicals
Conception	Bisphenol-A, Lead, PBDE, Phthalates
In Utero	Benzene, Benzo(a)pyrene, Bisphenol-A, Dioxin, Mercury, PBDE, Pesticides, Phthalates
Infancy	Diesel, Dioxin, Lead, Mercury, PBDE, Pesticides
Childhood	Acrolein, Benzene, Benzo(a)pyrene, Diesel, Dioxin, Formaldehyde, Lead, Mercury
Later in Life (Cancer)	Benzene, Diesel, Dioxin, Formaldehyde, Pesticides

Each of these chemicals has specific sources, exposure routes and impacts on human health. The good news is that there are strategies that can help reduce these threats. This report highlights each of these elements for each chemical of concern.

OEC believes the scientific evidence connecting chemical exposures to a range of human diseases is robust enough to justify more aggressive efforts to reduce exposures to these environmental toxins.

Table 2: Chemicals, their Health Impacts and Key Sources[15]

Chemical	Health Impacts	Key Sources
Acrolein	asthma-allergic (accounts for 65% of all non-cancer health risk from hazardous air pollutants)	slash/prescribed burning, off-road engines, cars & trucks
Benzene	aplastic anemia, adult-onset leukemias, childhood leukemias, mutliple myeloma, myelodysplastic syndrome	trucks, buses and cars, off-road engines, woodstoves, slash burning, and backyard burning
Benzoapyrene (PAHs/POMs)	porphyria-toxic, laryngeal cancer; lung cancer; scrotal cancer	woodstoves, backyard burning
Bisphenol-A	evidence of prostate cancer; benign prostatic hypertrophy, hormonal changes, menstrual disorders, congenital malformations, accelerated or delayed puberty	household uses (e.g., #7 plastic bottles; tableware; helmets)
Brominated Flame Retardants (PBDE)	evidence of thyroid cancer, cognitive impairment, developmental delays, hearing loss	household uses (electrical products and building materials, textiles)
DEHP/ phthalates	data on health effects is somewhat newer and less well documented but includes evidence of pre-term delivery, genito-urinary malformations (e.g., hypospadias), testicular atrophy, hormonal changes, abnormal sperm/counts	household uses (some toys, cookware, cosmetics)
Diesel	lung cancer, asthma, upper respiratory illness	construction equipment, trucks, buses, logging, farm equipment, logging equipment, generators, home heating
Dioxins	chloracne, immune suppression, non-Hodgkin's lymphoma; soft-tissue sarcoma	backyard burning of trash, wood fuel boilers, industrial sources
Formaldehyde	contact dermatis-allergic; nasal cancer (also "good" evidence of asthma and lung cancer effects)	backyard burning, woodstove and slash burning; cars & trucks, off-road engines, indoor air pollution from furniture, cosmetics and other products
Home and Garden Pesticides	arrhythmias, peripheral neuropathy, links to asthma, lymphomas, abnormal sperm counts, cognitive impairment and other disorders	household uses (lawn & garden sprays, exterminators, flea collars)
Lead	chronic renal disease, atherosclerosis, hypertension; anemia, gout, abnormal sperm/counts, reduced fertility (males), hyperactivity, mental retardation, cognitive impairment, disequilibrium, developmental delay, peripheral neuropathy, psychiatric disturbances	household (urban) (old paint, drinking water pipes), and some industrial sources
Mercury	cerebral palsy, mental retardation, cognitive impairment, disequilibrium, developmental delay, hearing loss; Minamata disease, peripheral neuropathy, seizures, myoclonus, psychiatric disturbances	industrial emissions, abandoned mines and certain products

ACROLEIN

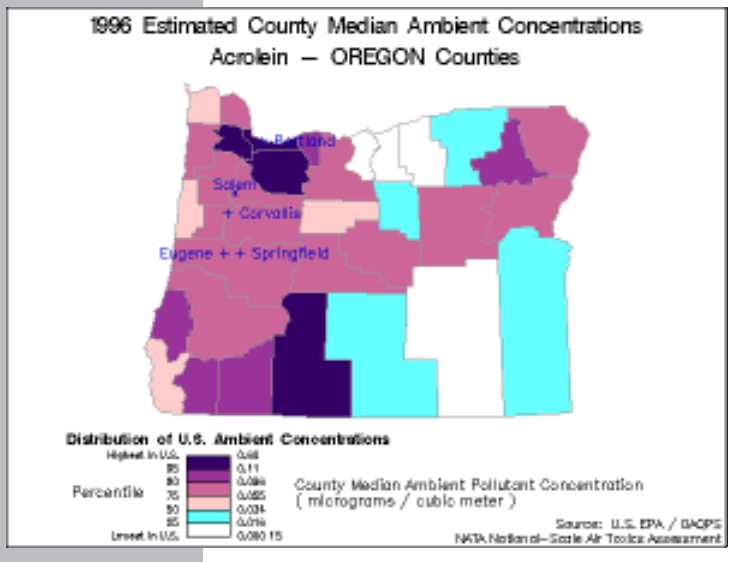
What is acrolein? Acrolein can be formed and released into the air when wood (forest, wildfires, wood stoves), tobacco, other plants and fossil fuels (e.g., gasoline) are burned. Acrolein is also used as a pesticide to control algae, weeds, bacteria and mollusks.[16]

How people are exposed: People are exposed to acrolein primarily from breathing it when they are near automobile exhaust, wood smoke and to-bacco smoke.

Health problems associated with exposure: Acrolein exacerbates asthma.[17] It is suspected to cause cancer and developmental, nervous system, skin and liver problems.[18] Breathing high levels of acrolein can cause burning of the nose, throat and eyes, and can severely damage the lungs.

Dangerous to children: Because children are more active outdoors, their lungs are still developing, and they breathe more air than adults per pound of body weight, they are more vulnerable to the toxic effects of pollutants such as acrolein. Acrolein is a strong asthma trigger, which is a particular concern for children. Asthma episodes can be more severe due to the smaller airways of children, and result in more hospitalizations in children, particularly from the ages of 0 to 4 years.[19]

California identified acrolein as one of five toxic chemicals in the air that may cause infants and children to be especially susceptible to illness.[20]



Oregon problem: According to the US Environmental Protection Agency (EPA) data on air toxins, exposure to acrolein in the air poses the highest non-cancer risk in Oregon. Multnomah, Clackamas, Washington, Jackson, and Klamath counties have some of the highest air concentrations in the nation according to EPA data.[21] Union, Baker, Yamhill, Linn and Douglas counties also have more than double the level considered "safe".[22]

In its 1999 emissions inventory, the Oregon Department of Environmental Quality (DEQ) estimated that three-quarters of the measured acrolein in the air comes from "area" pollution sources (e.g., structure fires, slash and prescribed

burning); 17% from mobile sources such as cars and off-road engines; and 8% from stationary sources (mostly wood bark boilers).[23]

At this point in time, there are no data on how much acrolein is used as a pesticide in Oregon. However, over 92,000 juvenile steelhead were killed in 1996 as a result of an accidental acrolein spill into the Talent Canal in SW Oregon.[24]

STRATEGIES FOR REDUCING EMISSIONS OF ACROLEIN IN OREGON:

Policy Solutions:

- Promote alternatives to prescribed and slash burning.
- Promote the use of cleaner or alternative fuels in motor vehicle engines.
- Encourage the retirement of old wood stoves and switching to cleaner burning fuels such as natural gas or wind-derived electricity.
- Create incentives to clean up off-road engines with pollution control equipment.
- Encourage Oregonians to drive less.
- Fully implement Oregon's pesticide use reporting law so that we can identify current uses of acrolein and find alternatives where appropriate.

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What YOU Can Do:

- Chose a car that has reduced emissions such as a hybrid or alternative fuel vehicle such as biodiesel. You can minimize your emissions by buying a car that is rated by the EPA as a super low-emission vehicle (SULEV). All vehicles now have a mandatory under-the-hood label that identifies emissions.
- If you have a wood stove, switch to a cleaner burning source of heat such as natural gas or wind-derived electricity.
- Avoid exposure to cigarette smoke.

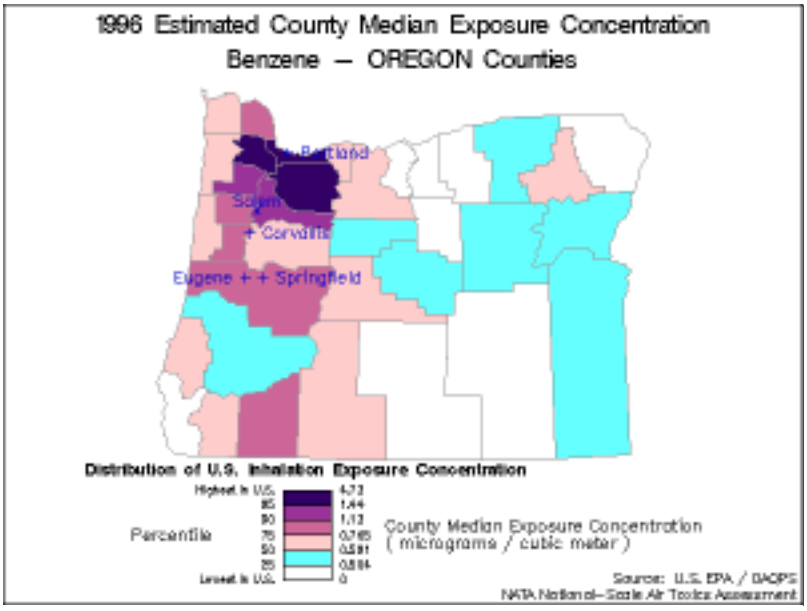
BENZENE

What is benzene? Benzene is a clear, colorless, flammable liquid chemical formed from both natural processes and human activities. Benzene is a component in gasoline, diesel fuel and aviation fuel. Benzene is also used to produce chemicals to make plastics, resins and nylon. It is also used to make certain types of rubber, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires.

How people are exposed: People most commonly are exposed to benzene by breathing automobile exhaust. Air around hazardous waste sites, fuel storage facilities, gas stations, and industrial emissions also often has higher concentrations of benzene. Inhalation of cigarette smoke is also a source of benzene exposure. Indoor exposure to benzene can come from contact with glues, paints, furniture wax, and detergents. Occasionally, exposure to benzene may result from consumption of gasoline and/or oil contaminated well water.

Health problems associated with exposure: Benzene is a known human carcinogen linked to leukemia. Breathing benzene can cause drowsiness, dizziness and unconsciousness. Long-term benzene exposure causes effects on bone marrow, can cause anemia, chromosomal damage and excessive bleeding, and affect the immune system, increasing the chance for infection.[25]

Dangerous to children: Benzene is strongly linked to childhood leukemia.[26] It is also known to cause developmental problems in children. Studies on animals suggest that benzene inhaled by pregnant women may result in low birth weights, delayed bone formation, and bone marrow damage in the child.[27] In humans, benzene crosses the placenta and is present in the cord blood in amounts equal to those in maternal blood; however, the health implications of that exposure are unclear.[28]



Oregon problem: Benzene is one of the primary air pollutants contributing to added individual cancer risk in Oregon. Ambient levels and exposures are significantly higher (up to 50 times) than levels considered to be safe in most areas of the state.[29]

According to DEQ's 1999 emissions inventory, 60% of out-of-doors benzene emissions were from mobile sources such as gas-powered cars or logging equipment, and 39% from small "area" pollution sources (primarily conventional wood stoves, prescribed slash burning and burning of residential garbage). Oregon-based gasoline terminals accounted for releases of 14,488 pounds of benzene in 2000.[30]

STRATEGIES FOR REDUCING BENZENE EMISSIONS IN OREGON:

Policy Solutions:

- Promote the use of cleaner or alternative fuels in motor vehicle engines.
- Limit engine idling.
- Require emissions controls on fuel dispensing and transfer equipment.
- Create incentives to modify engines to run more cleanly or retrofit engines with pollution control equipment to reduce exhaust.
- Encourage the retirement of old wood stoves and the switching to cleaner burning fuels such as natural gas or wind-derived electricity.
- Encourage Oregonians to drive less.
- Ban backyard burning of residential garbage.

What YOU Can Do:

- Select products (paints, glues) that do not contain benzene.
- Chose a car that has reduced emissions such as a hybrid or alternative fuel vehicle.
- Avoid exposure to cigarette smoke.
- Don't idle your vehicle unnecessarily.

BENZO(A)PYRENE

What is benzo(a)pyrene? Benzo(a)pyrene, or B(a)P, results from incomplete burning of organic materials in industrial processes, transportation, energy production and use, food preparation, tobacco, trash burning, and wildfires. B(a)P belongs to a group of compounds called polycyclic aromatic hydrocarbons (PAH) that are commonly found in airborne mixtures of pollution, like soot.

How people are exposed: People are exposed to B(a)P primarily by breathing air containing the pollutant and secondarily by drinking water, touching materials, and eating food containing the compound. Small amounts of B(a)P can also be found in charcoal-broiled food, roasted coffee, fruits and vegetables.[31]

Transportation-related sources of B(a)P include exhaust soot and tar from gasoline and diesel engines. Industrial sources of B(a)P include coal tar processing, petroleum refining, shale refining, coal and coke processing, kerosene processing, and heat and power generation sources.[32]

Health problems associated with exposure: Benzo(a)pyrene is a known carcinogen as well as a suspected developmental, hormone, liver, respiratory, skin, and immune system toxicant.[33] In addition, benzo(a)pyrene is a persistent bioaccumulative toxin.[34]

Dangerous to children: Recent studies indicate that exposure to B(a)P in utero can have negative consequences for fetal development and specifically "precarcinogenic damage," meaning that there is a higher chance of cancer later in life.[35] Recent evidence also indicates lower birth weights and head size as a result of exposures.[36] Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing, as did their offspring. These offspring also had higher rates of birth defects and lower body weights.[37]

Joe Walicki

Oregon problem: The majority of B(a)P emissions in Oregon are from sources such as vehicle exhaust, forest fires, wood stoves, and backyard burning.[38] Backyard burning is still common in many parts of the state.

Point sources are small but significant contributors to B(a)P emissions. Point sources of benzo(a)pyrene in Oregon are aluminum smelters, steel mills, wood preservers using creosote, and tar/asphalt production. Two aluminum

smelters operating in Oregon have permits to release B(a)P, but two Oregon steel mills that are probable sources of B(a)P do not.[39] In addition, there are 15 companies in Oregon that manufacture asphalt paving mixture and thus contribute to B(a)P levels in the state.[40]

STRATEGIES TO REDUCE BENZO(A)PYRENE EMISSIONS IN OREGON:

Policy Solutions:

- Promote alternatives to prescribed and slash burning.
- Promote the use of cleaner or alternative fuels in motor vehicle engines.
- Encourage the retirement of old wood stoves and the switching to cleaner burning fuels such as natural gas or wind-derived electricity.
- Create incentives to retrofit off-road engines with pollution control equipment.
- Encourage Oregonians to drive less.
- Ban backyard burning.
- Fully implement Oregon's Executive Order phasing out the discharge of persistent bioaccumulative toxins in Oregon by 2020.

Things YOU can do:

- Chose a car that has reduced emissions such as a hybrid or alternative fuel vehicle.
- If you have a wood stove, switch to a cleaner burning source of heat such as natural gas or wind-derived electricity.
- When grilling, avoid blackening your food.

"Benzo(a)pyrene is a known carcinogen...and a persistent bioaccumulative toxin."

BISPHENOL-A

What is bisphenol-A? Bisphenol-A (BPA) is the main ingredient in hard polycarbonate plastics for drinking water bottles, food containers and baby bottles. These plastics are used in many food and drink packaging materials, while the resins are commonly used as lacquers to coat metal products such as food cans, bottle tops and water supply pipes. It is one of the top 50 production-volume chemicals in the United States.

How people are exposed: Since BPA can leach from plastic material, human exposure to BPA comes primarily from the consumption of food or liquid that has had direct contact with BPA-containing plastics. It is released from bottles which have been subjected to bottle brushing, dishwashing or sterilization. Other possible exposure routes being evaluated are dental fillings and sealants that include BPA.

"Low-level exposures have led to spontaneous miscarriages and birth defects in mice, and particularly malformations of male offspring. It has also been linked to speeding the pace of sexual development and obesity."

Health problems associated with exposure: Bisphenol-A is linked to reproductive damage, hormone disruption and reduced sperm count.[41] One recent study suggests exposure to BPA may make certain cancers more vigorous.[42]

Dangerous to children: Bisphenol-A, a hormone disruptor, is showing up in fetal blood, with the highest levels in amniotic fluid.[43] Fetuses are extremely susceptible to the impacts of hormone disruption. Low-level exposures have led to cell changes in lab animals that can cause spontaneous miscarriages and birth defects.[44] It has also been linked to speeding the pace of sexual development and obesity.[45],[46]

Oregon problem: Products containing these chemicals are ubiquitous in Oregon. Clearly this is not an Oregon-specific problem, but it is a problem that affects Oregonians.

STRATEGIES TO REDUCE BISPHENOL-A POLLUTION IN OREGON:

Policy Solutions:

- Label consumer products that contain BPA.
- Phase out use of bisphenol-A in food packaging materials, and in the manufacture of substances liable to come into contact with food and drink.
- Encourage the use of alternatives to BPA. The Danish Environmental Protection Agency has identified specific alternatives.[47]

What YOU Can Do:

- Avoid plastics with recycling code #7.
- Use glass, ceramic or metal containers, or alternative plastics with recycling code #1,#2, #4 or #5.
- Avoid heating plastics which can cause the plastic to leach more.
- If you do use these plastics, recycle old or worn plastics because old plastics leach more than newer ones.

BROMINATED FLAME RETARDANTS

What are brominated flame retardants? Brominated flame retardants are chemicals added to consumer goods, such as computers, TV sets, car seats and furniture, to make them difficult to burn. There are no known natural sources of brominated flame retardants, but they have been found worldwide in house dust, indoor air, rivers and oceans, and in human tissue.

One common class of flame retardants – polybrominated diphenyl ethers (PBDEs) – are of most concern. These chemicals closely resemble the molecular structure of PCBs, a known carcinogen, whose use has been phased out due to human health concerns.

How people are exposed: Since PBDEs are merely mixed into plastics and do not bind to them, these chemicals escape from the products and can enter workplaces, homes and the environment.

Exposure to PBDEs likely comes from eating contaminated foods and/or breathing contaminated air, particularly indoor air. PBDEs show up in dust, rivers, lakes and even arctic mammals. In addition, when PBDEs are burned or incinerated, they break down to form dioxins (see Dioxins section).

Health problems associated with exposure: Exposure to low doses of PBDEs are suspected of causing neurological and developmental damage including deficits in learning, memory and hearing, changes in behavior, and delays in sensory-motor development, and potentially cancer. It appears to disrupt the thyroid hormone. This is especially dangerous for fetuses, as women who in the first trimester of pregnancy have depressed levels of certain thyroid hormones are much more likely to give birth to a child with low IQ or even mild retardation.[48] Male rats exposed to low doses of PBDEs while in the womb have significantly decreased sperm counts.

Dangerous to children: Because of their smaller weight, children's intake of PBDEs per kilogram of body weight is greater than that of adults. PBDEs remain in the body for many years where they are stored in body fat. PBDEs have an affinity for and will concentrate in breast milk fat and, thus, can expose children through breastfeeding. It has also been shown that PBDEs stored elsewhere in a mother's body can be released during pregnancy, cross the placenta and enter fetal tissue.[49]

Oregon problem: A 2004 analysis of PBDEs in the breast milk of 10 Oregon women found levels twice as high as the average levels found in women from the Pacific NW as a whole.[50] The levels found in Northwest women were comparable to levels found elsewhere in North America, but are substantially higher than those found in other countries such as Sweden and Japan.[51] Another recent study found PBDEs in both wild and farmed salmon. Levels were generally higher in the farmed salmon (with the exception of wild Chinook salmon).[52]

Diane M. Casamassina

STRATEGIES TO REDUCE PBDE POLLUTION IN OREGON:

Policy Solutions:

- Ban the use of PDBEs consumer products sold in Oregon (several states have banned PBDEs including Hawaii, California, New York and Maine).
- Encourage the purchase of alternatives or products that do not contain these chemicals. PBDEs are not needed to achieve adequate flame retardancy and meet stringent flammability standards. For example, substitute flame retardants are already used on printed circuit boards and the plastic housing used in computers and other electronics. Phosphorus-containing flame retardants are all effectively used as flame retardants in certain applications.
- Create incentives for Oregon companies to produce alternatives.
- Fully implement Oregon's Executive Order phasing out the discharge of persistent bioaccumulative toxins in Oregon by 2020.

What YOU Can Do:

- Purchase products from companies that have phased out use of these chemicals. For example, Intel, Apple and Epson are making all of their products free of PBDE flame retardants. In addition, Hewlett Packard has eliminated PBDEs from their PCs and printers, and Panasonic has removed them from their phones, cell phones and FAX machines. Ikea no longer sells furniture with PBDEs.
- Choose natural stuffings (e.g., cotton or wool) instead of foam-filled furniture unless you are sure they are PBDE-free.

DIESEL PARTICULATE MATTER

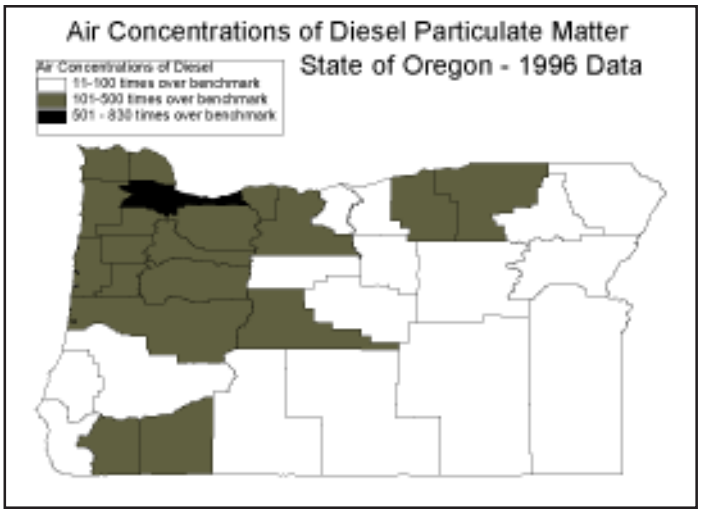
What is diesel particulate matter? Diesel particulate matter is composed of tiny, unburned carbon particles emitted from diesel engines. Hazardous air pollutants, such as benzene and formaldehyde, attach themselves to these particles.

How people are exposed: Diesel particulate matter comes primarily from heavy-duty diesel engines. These engines are used "on-road" in trucks and buses and "off-road" in construction, industrial and agricultural equipment. The main Oregon sources of diesel particulate matter are heavy-duty diesel trucks and construction equipment. Logging equipment, farm equipment and railroad locomotives are also contributors. Off-road equipment uses particularly dirty fuel.

On-road emissions can be especially dangerous because exposures are often greatest for passengers inside diesel vehicles, such as school buses, and in the vehicles traveling directly behind. For example, California scientists discovered that when cars follow diesel trucks and buses, the levels of diesel particulate matter inside the cars are six to eight times higher than the ambient air outside the car.[53]

Health problems associated with exposure: The ultra-fine particles in diesel emissions are easy to breathe and can lodge deep within the lungs. Diesel is a known asthma trigger and, according to the EPA, is a human carcinogen. Diesel is also known to cause upper respiratory illness and heart and lung disease. New evidence finds that diesel can aggravate other allergic responses.[54]

Dangerous to children: Scientists are finding there is no "safe" level of diesel exhaust exposure for children, especially those with lung disease. Children are especially at risk because their lungs are still developing. Children's exposure to diesel exhaust on school buses is as much as 5-15 times higher than background levels.[55] There is epidemiological evidence that supports an association between particulate air pollution and infant mortality.[56]



Oregon problem: In Oregon, trucks, buses and cars contribute 35% of the problem, and off-road equipment (e.g., logging equipment, farm equipment, and railroad locomotives) contributes 65% of the problem, with roughly half of the off-road contribution coming from construction equipment.[57]

Diesel is the number one air toxic cancer risk in Oregon. The Department of Environmental Quality estimates that diesel particulate is 787 times over the human health benchmark in Portland.[58] However, diesel is not just an urban problem – people in every county in Oregon are exposed to significant ambient concentrations of diesel particulates. Estimated increased cancer risk over a lifetime of exposure is 380 per million people in Oregon (this varies from 830 per million additional cancer cases in Multnomah County, to 230 per million in Benton County to 17 per million in Harney County).[59] According to the Oregon Asthma Program, over 282,000 Oregonians have asthma, including 63,000 children.[60] Reducing exposures can help reduce incidences of asthma and other respiratory ailments.

According to a 2002 study, failure to regulate off-road diesel engines in Oregon annually leads to 111 premature deaths in adults over 30; 2,335 asthma attacks; 2,581 cases of lower respiratory problems; 74 cases of bronchitis; 63 hospital admissions for pneumonia and chronic pulmonary disease; 235 cases of acute bronchitis in children; 2,588 cases of upper respiratory illness; 20,569 work loss days; and 106,906 minor restricted activity days. The estimated monetary benefit for avoiding these cases is $879 million annually.[61]

STRATEGIES TO REDUCE DIESEL POLLUTION IN OREGON:

Policy Solutions:

- Bring ultra-low sulfur diesel to Oregon for use in all diesel engines.
- Encourage use of alternative fuel vehicles such as biodiesel.
- Retrofit old diesel engines with pollution control equipment.
- Create incentives to retire the oldest engines and purchase new engines that meet new, cleaner engine standards.
- Reduce unnecessary idling by passing a law limiting idling and encouraging alternatives such as truck stop electrification.
- Establish contract preferences for low-emission fleets and construction equipment.

What YOU Can Do:

- Find out if your school district has diesel school buses and, if it does, help them fundraise to secure money to put pollution control equipment on them.
- If a big construction project is going on in your area, call your elected officials and ask that the construction equipment have pollution control equipment.

DIOXINS

What are dioxins? Dioxins form when chlorine combines with organic matter at high temperature. Dioxins do not occur naturally. They are a by-product of many kinds of manufacturing, including paper bleaching and cement making. Dioxins are also produced by burning trash that contains Polyvinyl Chloride (PVC). PVC, also known as vinyl, is a plastic widely used in building materials, home furnishings, consumer products, some plastic bottles, medical products and packaging. In addition, when a product that contains certain brominated flame retardants burns, it creates dioxins.

How people are exposed: People are exposed to dioxins primarily by eating beef and other animals high on the food chain. Air emissions of dioxins settle out on grasses eaten by farm animals or in sediment that are taken up by fish. The dioxins build up in fatty tissues and are passed on to humans. Beef, pork, fish, shellfish, dairy products, and human milk are the major sources of human exposure. Burn barrels, usually located close to the ground, tend to localize the dispersion of dioxin emissions, putting people in certain communities at greater risk for dioxin exposure.

Health problems associated with exposure: Dioxins are extremely toxic. Dioxins cause a range of health effects at levels hundreds or thousands of times lower than most chemicals. According to the EPA, even average background levels in the environment can cause adverse health effects in the general population. Dioxins are a carcinogen and have been linked to birth defects, hormone disruption, diabetes, learning disorders, reproductive difficulties, diabetes, cardiovascular disease, and problems of the immune, nervous and gastrointestinal systems.[62]

Dangerous to children: Dioxins can cross the placenta; thus children can be exposed to dioxins prenatally. In addition, newborns can be exposed through breast milk. Monkeys exposed to dioxins as fetuses showed evidence of learning disabilities.[63] Dioxins are also linked to hormone disruption, which can lead to disturbed sexual, reproductive and growth development.

Oregon problem: The Willamette and Columbia rivers have levels of dioxins that are above the Total Maximum Daily Load (TMDL) pollutant limits established by DEQ. According to DEQ, a total of 463 miles of Oregon's rivers and streams do not meet minimum safety standards for fish consumption due to dioxins.

DEQ estimates that over 100 pounds of dioxins are released into Oregon's air and water annually. According to DEQ's 1999 air emissions inventory, the two main sources responsible for 96% of airborne dioxin emissions in Oregon are some 200 wood-fired boilers used primarily by the pulp and paper industry (49%) and burning of residential garbage (47%).[64] Backyard burning of residential garbage is still a common practice in many areas of the state. While burning of plastics is banned in Oregon, DEQ estimates that when backyard burning is permitted, a certain amount of plastic is still being burned.

Emissions of dioxins to water in Oregon come primarily from lumber and pulp and paper manufacturing, and specifically the use of the chemical pentachlorophenol for preserving wood. Regulatory agencies are failing to control most point sources of dioxins. Of the 20 facilities that reported releasing dioxins to the air and/or water in 2001, only one holds a permit from DEQ for its release of dioxins.[65]

STRATEGIES TO REDUCE DIOXINS IN OREGON:

Policy Solutions:

- Provide local alternatives to backyard trash burning and burn barrels. Where garbage collection services do not exist, municipalities should provide incentives for recycling and composting to eliminate the need for backyard trash burning.
- Ban all backyard burning or, at a minimum, enforce the law on burning plastic household waste and provide more alternatives to burning especially in rural areas.
- Require wood-fired boilers to reduce dioxin emissions. (OEC is working to help make boilers in Oregon more efficient, which has the added benefit of helping to reduce their dioxin emissions.)
- Require DEQ to include dioxin limits in all air and water permits for facilities that release dioxins.
- Fully implement Oregon's Executive Order phasing out the discharge of persistent bioaccumulative toxins in Oregon by 2020.

What YOU Can Do:

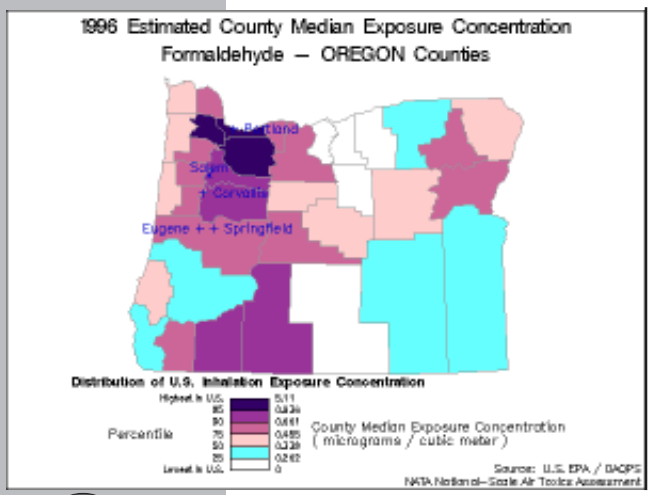
- Don't burn your trash, especially plastics.
- Eat low on the food chain.
- Avoid buying products made of PVC.
- Check to make sure that the fish you catch to eat is not on Oregon's fish consumption advisory list (see Appendix C).

FORMALDEHYDE

What is formaldehyde? Formaldehyde is a flammable, colorless gas with a pungent odor. It is a naturally occurring chemical that is also produced in the laboratory for consumer products. It is one of the top 25 chemicals produced in the United States with over 11.3 billion pounds manufactured in 1998.[66] It is used in the production of paper, plywood, particle board and adhesives. Formaldehyde has a wide range of additional uses from household products, such as antiseptics, medicines and cosmetics, to food preservatives, pesticides and as an agent in tobacco products. In addition, automobile exhaust, diesel and airplane engines, incinerators, and chemical smog all contribute formaldehyde to outdoor air.[67]

How people are exposed: Whether it is from pressed wood furniture, flooring and other manufactured wood products, cigarette smoke, automobile exhaust or wood burning stoves, people are exposed to formaldehyde primarily by breathing contaminated air. For up to five years after their manufacture, furniture constructed from pressed composite wood products like plywood gives off formaldehyde gas. People are exposed after application of certain paints, floor finishes, certain fabrics, household cleaners and the glue used to adhere carpets to the floor. People may also be exposed to formaldehyde by wearing cosmetics (some, like nail polish, can emit high levels of formaldehyde when wet) and wrinkle-free clothing or products made using urea formaldehyde (UF) resins.

Health problems associated with exposure: Formaldehyde is known to cause cancer in humans, especially in the nasal region and upper respiratory tract. Studies with animals indicate that formaldehyde exposure is linked to brain tumors, leukemia, lymphomas, and lung cancer. Formaldehyde also acts as an asthma trigger in humans and is a suspected liver, reproductive and neurological toxicant.[68]



Dangerous to children: Because children's lungs are still developing, children are more active outdoors, and they breathe more air than adults per pound of body weight, children are more vulnerable to the toxic effects of pollutants such as formaldehyde. Formaldehyde is a strong asthma trigger, which is a particular concern for children.

Oregon problem: Multnomah, Clackamas, and Washington counties are all in the top five percent for outdoor formaldehyde exposure concentrations nationwide.[69]

In 2001, Oregon had the fourth largest industry releases of formaldehyde in the nation, with 875,730 pounds of formaldehyde released into the air and water.[70] An additional 2,235 pounds of formaldehyde were released from non-industrial sources in Oregon such as cigarette smoke, wood burning, and pesticide application.[71] Lane, Linn, Jackson, and Klamath counties alone account for over 70% of Oregon's industrial releases of formaldehyde; the leader being Lane County which was responsible for 220,704 pounds of emissions in 2000.[72] Within Oregon, timber product companies and resin production companies contribute the most formaldehyde to outdoor air.[73]

Thousands of products containing formaldehyde are sold in Oregon. Clearly this is not an Oregon specific problem, but it is a problem that affects Oregonians. We can promote alternatives and reduce key avenues of exposure, such as indoor exposure to "off-gassing" furniture.

STRATEGIES TO REDUCE FORMALDEHYDE POLLUTION IN OREGON:

Policy Solutions:

- Require more stringent air quality controls on wood, paper and resin production facilities.
- Use cleaner or alternative fuels and tighten vehicle emission standards.
- Raise awareness of the health implications associated with wood burning.
- Create incentives for commercial buildings and home builders to use formaldehyde-free building materials.

What YOU Can Do:

- Select wood products that do not contain formaldehyde. Solid wood or antique wood furniture would be better choices. Neil Kelly Cabinets in Portland offers formaldehyde-free cabinets, some of which are also made of recycled wheat straw. The Medite Corporation in Medford makes formaldehyde-free fiber board (using woodchips and dust left after milling) for use in home interiors.
- Avoid products that contain formaldehyde, urea formaldehyde (UF) or phenol formaldehyde (PF).
- Seal unfinished wood items with water-based polyurethane sealant (one that does not contain formaldehyde).
- Chose clothing and bedding that have not been treated with formaldehyde.
- Select formaldehyde free cosmetics. Go to www.ewg.org for a list of cosmetic ingredients.

Robert B. Hallock

LEAD

What is lead? Lead is a naturally occurring metal found in the earth's crust. Its main current uses are in certain batteries and in the production of chemicals and ammunition, but it was formerly used in paints and other products.

How are people exposed? People are exposed to lead primarily by ingesting it from peeling paint or paint dust. Homes painted before 1978 likely were painted with lead-based paint. Lead is also found on vinyl, non-glossy miniblinds and in under-fired terra cotta pottery and Mexican folk remedies such as Azarcon and Greta. Lead in the atmosphere comes primarily from hazardous waste sites or heavy automobile traffic. Gasoline was the largest source of lead (90%) in the atmosphere until the 1970s when the EPA reduced the amount of lead that can be used in gasoline.[74] As a result of lead in gasoline, homes near freeways or roadways may still have lead in the soil. It is also released from certain industrial processes and burning fossil fuels.

Health problems associated with exposure: Lead accumulates in blood, bones, muscles and fat. Adults exposed to lead may have decreased reaction time, affected memory, weakness in the fingers, wrists or ankles, anemia and increased blood pressure. Lead has also been linked to reduced sperm count in men.

Dangerous to children: Infants and young children are especially sensitive to even low levels of lead. Lead can damage the brain and nerves in fetuses and young children, resulting in learning deficits and lowered IQ[75] (losing even one IQ point can mean a 2.4 percent reduction in lifetime earnings[76]). Pregnant women exposed to lead have a higher risk of bearing children with birth defects.

Oregon problem: Home renovations and remodeling contribute nearly half of the childhood lead poisonings in Oregon.[77] Elevated lead levels in Oregon have also been found in tap water drawn from plumbing made before 1985 (when lead solder was banned). Approximately two percent of Oregon children under the age of six have elevated blood lead levels.[78] Children of color are at greater risk of poisoning. For example, in Multnomah County, African-American and Hispanic children have elevated lead levels at three times the rate of white children.[79]

Regulatory agencies are failing to control most point sources of lead. Of the 48 industrial facilities reporting a total of 6,509 pounds of lead released to Oregon's air in 2001, only 19 (almost 40%) have permits to release lead to the air. Of the 18 facilities reporting lead releases to water (3,108 pounds in 2001), only five (or less than one-third) have permits to release lead to water.[80]

STRATEGIES TO REDUCE LEAD POLLUTION IN OREGON:

Policy Solutions:

- Expand efforts to help homeowners and renters get lead paint remediated.
- Ensure that all children on Medicaid are tested for lead poisoning.
- Test schools and child care facilities for lead exposures, especially in paint and drinking water.
- Ban the use of lead in all engines, not just highway engines.
- Ensure that lead-containing products such as batteries and computer monitors are appropriately recycled.
- Require DEQ to include permit limits for lead for all facilities that release it.

What YOU Can Do:

- Clean up paint chips immediately and keep paint in good condition.
- Clean areas where children play. Regularly wet-wipe floors, window sills and frames, porches and other surfaces to remove lead dust.
- Wash toys, stuffed animals, bottles and pacifiers often to remove lead dust.
- Clean or remove shoes before entering the home to avoid tracking in lead from soil.
- Test homes built before 1978 that are being remodeled for lead.
- Test homes for lead in drinking water and replace lead solder where possible. If lead soldered pipes can't be replaced readily, use cold water for drinking, cooking, or making baby formula. Run the water for 15-30 seconds until it feels noticeably colder.

Bradley Mason

MERCURY

What is mercury? Mercury is a naturally occurring metal that is also released from certain human activities, and has many industrial and commercial uses. When released to the land or air, mercury ultimately ends up in the water, and once in the water it increases in concentration as it moves up the food chain and accumulates in fish and other living things.

How people are exposed: People are most directly exposed to mercury by eating contaminated fish. Just a gram of mercury can make the fish in a 20-acre lake unsafe to eat.

Health problems associated with exposure: Mercury is a potent neurotoxin that affects the brain and nervous system. Fetuses and young children are the most vulnerable to the toxic effects of mercury. Recent data from the Environmental Protection Agency suggest that one in six women of childbearing age has levels of mercury so high that small increases in her exposure to mercury while pregnant could jeopardize the health of her baby.

Dangerous to children: Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. Children exposed to even small amounts of mercury in utero can have impairments in attention, memory and language skills. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.[81]

Oregon problem: In Oregon, the Health Division has issued fish consumption advisories for 12 water bodies, including the entire mainstem of the Willamette River, due to mercury contamination. See Appendix C for a complete listing of Oregon-specific fish consumption advisories.

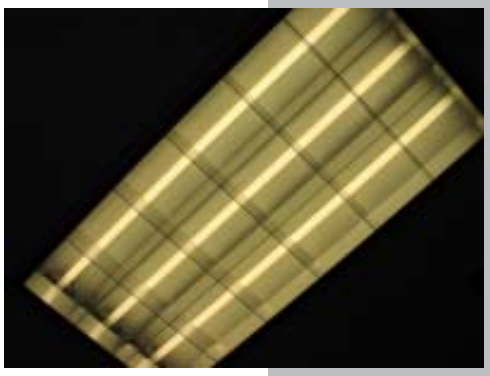
The major sources of mercury in Oregon are mercury-added products (e.g., thermostats, thermometers), point sources (power plants that burn coal, commercial and industrial boilers, steel mills, cement kilns), and abandoned mercury and gold mines. Additional sources of mercury releases in Oregon include laboratories, dental offices and health care facilities.[82] The total amount of mercury released from human sources in Oregon is estimated at about 4,500 pounds annually.[83]

Regulatory agencies are failing to control most point sources of mercury. Of the 10 facilities reporting mercury releases to the air and/or water, not one has a permit to release mercury. None of these facilities are required to limit or monitor for mercury emissions, (except municipal solid waste incinerators).[84]

STRATEGIES TO REDUCE MERCURY EMISSIONS IN OREGON:

Oregon has begun to address the problem through the Mercury Solutions Act of 2001 which phases out use and sale of certain mercury-containing products such as fever thermometers, thermostats, auto switches and novelty products.

Policy Solutions:



- Eliminate mercury from products such as non-fever thermometers and industrial equipment.
- Increase recycling of fluorescent light tubes, which also contain mercury.
- Clean up abandoned mines.
- Encourage more aggressive efforts to reduce mercury emissions from dental offices, laboratories and other health care facilities.
- Ensure that existing mercury thermostats, thermometers and auto switches are being collected and recycled appropriately.
- Require point sources to track and reduce mercury emissions. The DEQ should ensure that mercury is included in all applicable air and water permits, and permits should reduce mercury emissions over time.
- Fully implement Oregon's Executive Order phasing out the discharge of persistent bioaccumulative toxins in Oregon by 2020.

What YOU Can Do:

- Recycle your mercury thermometer and fluorescent light tubes. Call 1-800-Recycle to find out where.
- Take your car to a participating auto repair shop to see if it contains mercury tilt switches. If it does, the shop will replace it for free with a non-mercury-containing switch. Check the NATA web site for more information and a list of participating shops www.aboutnata.org.
- Use digital thermostats and ensure that old mercury containing thermostats are recycled appropriately.
- Check to make sure that the fish you catch to eat is not on Oregon's fish consumption advisory list (see Appendix C). Get a copy of *An Expectant Mother's Guide to Eating Fish in Oregon* from the Oregon Department of Human Services at http://www.dhs.state.or.us/publichealth/fishadv/docs/mothersguide.pdf or 503-872-5357.
- Children under six and women of child bearing age should limit their consumption of certain types of fish (see Appendix B).

Joe Walicki

HOME AND GARDEN PESTICIDES

What are pesticides? Pesticides, including insecticides, herbicides and fungicides, are chemicals designed to kill insects, plants, fungi and other unwanted organisms. Pesticides are widely used not only in agriculture and forestry, but also on roadsides and golf courses, as well as in schools, hospitals, parks, and in homes and gardens.

The EPA estimates that US consumers spent over $1.9 billion in 1999 for some 80 million pounds of insecticides, herbicides, fungicides and other types of pesticides. More than half of all US households – an estimated 58 million households – use insecticides at home.[85]

How people are exposed: People can be exposed to pesticides either by absorbing them through the skin, inhaling pesticides in the air, and/or consuming pesticide residues on food. For example, while we expect that the highest volume of pesticide use occurs in agriculture, studies indicate that most Oregon children are primarily exposed in non-agricultural settings. At least one study found that the largest number of chemicals and the highest concentrations are found in household dust, as compared to air, soil and food.[86]

Health problems associated with exposure: Acute exposure to high amounts of pesticides can cause difficulty breathing, chest tightness, vomiting, cramps, diarrhea, blurred vision, sweating, headaches, dizziness, loss of consciousness, and possibly death. Numerous studies of human exposure to pesticides demonstrate links to a wide variety of chronic health problems, ranging from cancer, birth defects, reproductive damage, asthma and neurobehavioral problems.

Dangerous to children: Children may be exposed to pesticides by playing on floors, treated lawns and play areas, or by handling treated pets. For example, several studies have found that use of the insecticide chlorpyrifos – for indoor flea control and other insects – leads to unsafe exposures to children playing in the house, even when used according to directions and for several days after use.[87]

Pesticides are often the cause of acute poisonings, particularly for children younger than six. Several studies implicate pesticides as a cause for chronic diseases such as childhood leukemia, lymphomas and other cancers, even if exposure occurs in the womb. A study of children with brain tumors in Los Angeles County found that these children were twice as likely as children without the disease to have mothers who had treated their dog(s) for fleas and/or ticks during pregnancy.[88]

Some household pesticides may also threaten pregnancy directly. A recent laboratory study found that a commonly sold herbicide mixture for lawns and gardens (containing the herbicides 2,4-D, mecoprop and dicamba) induced abortions in mice exposed to levels considered "safe" by the EPA.[89]

A recent study also found that children exposed to pesticides in their first year of life are at higher risk for asthma, particularly early persistent asthma.[90]

Oregon problem: As elsewhere in the US, Oregon homeowners use a range of pesticides at home, for infestations of insects such as wasps, cockroaches and ants, as well as for fleas and pets. In the garden, homeowners also rely heavily on weed-killers, weed and feed products, and slug baits. Further, many of these same chemicals are used in other settings such as schools, childcare facilities, hospitals and parks, where people – particularly children – may be commonly exposed. However, in Oregon, the details of where and when these pesticides are used are still unknown because the State Legislature has failed to implement Oregon's 1999 Pesticide Use Reporting law.

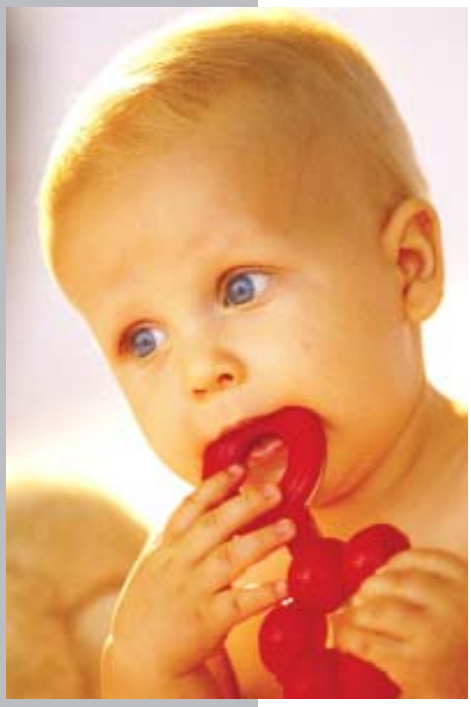
STRATEGIES TO REDUCE EXPOSURE TO HOME AND GARDEN PESTICIDES IN OREGON:

Policy Solutions:

- Fully implement Oregon's pesticide use reporting system.
- Encourage Oregonians to forego pesticides and rely on non-chemical management of pests.
- Encourage schools, childcare facilities and local governments to avoid use of pesticides unless absolutely necessary.
- Encourage pet owners to use flea combs and vacuuming to control fleas.
- Ask retailers to educate their customers about the merits of safer alternatives.

What YOU Can Do:

- Look for non- and low-toxic alternatives to traditional pest control products. Check out the National Coalition for Alternatives to Pesticides' web site for practical information on alternatives at http://www.pesticide.org/factsheets.html.
- Store food in secure containers.
- Select companies, like Organicare in Portland, which offer lawn care services without the use of pesticides, and home pest control companies, like EcoCare, which use non-toxic products to eliminate pest problems.



PHTHALATES

What are phthalates? Phthalates are used to soften plastic and can be found in many products, including food containers, plastic wrap, toys perfumes, beauty products, additives to hairsprays, lubricants, wood finishers and building materials such as pipes, vinyl flooring and wallpaper. Phthalates are perhaps best known as the chemical that helps create that "new car smell." Worldwide manufacturers produce an estimated billion pounds of phthalates every year.[91] The PVC industry uses large amounts of phthalates. DEHP (Di 2-ethylhexyl Phthalate) is the phthalate of greatest concern.

How people are exposed: People are exposed to phthalates by chewing on vinyl products (teethers, toys), eating contaminated food, inhalation, drinking water and certain hospital tubing. When exposed to heat and light, phthalates deteriorate into dust which can then be inhaled or ingested by people. People are also exposed through the use of personal care and cosmetic products.

Health problems associated with exposure: Phthalates are among the most frequently found contaminants in human bodies. Babies exposed to a certain phthalate in utero are born a week earlier on average than babies without exposure.[92] Men with high levels of phthalates in their urine tend to have low levels of sperm production.[93] DEHP is a probable human carcinogen,[94] but the carcinogenicity of other phthalates is unknown at this time. A very recent study suggest a link between phthalates and asthma.[95]

Dangerous to children: Children age six months to four years have the highest daily DEHP exposure from combined sources such as food, indoor air and water.[96] The ratio of chemicals to body weight often means they are receiving much larger doses than adults.

In the laboratory, phthalate exposure led to undescended testicles and malformed urinary tracts in male babies. Studies have also indicated a link between phthalate exposure and premature breast development and early puberty. In June 2003, the American Academy of Pediatrics recommended research on phthalates effects on the fetus and infants. Their review of the literature found that no studies had directly addressed this question. However, animal research clearly documents harm, and data from the US Centers for Disease Control show widespread exposure.

Oregon problem: Products containing these chemicals are ubiquitous in Oregon. Clearly this is not an Oregon-specific problem, but it is a problem that affects Oregonians. We know that people have measurable levels of phthalates in their blood and we can work to reduce those levels.

STRATEGIES TO REDUCE PHTHALATE POLLUTION IN OREGON:

Policy Solutions:

- Support Health Care Without Harm's efforts to reduce exposures to phthalate products in hospital settings (see www.noharm.org).
- Create state and local contract preferences for construction utilizing non-PVC products.
- Prohibit the use of phthalates in children's toys or other products with which children will come in contact.

What YOU Can Do:

- Avoid plastics with recycling code number #3.
- Use metal, glass, ceramic, wooden or other natural non-PVC products.
- Choose cosmetics that are free of toxins (the Environmental Working Group has a web site that will tell you how often phthalates are contained in personal care products – http://www.ewg.org/reports/skindeep/browse_products.php).
- Choose phthalate-free plastic toys from companies such as Early Start, Guidecraft, Lamaze, and The Natural Baby Catalogue. Look for toys made from polypropylene or polytheylene.
- Don't heat or microwave in plastic containers.

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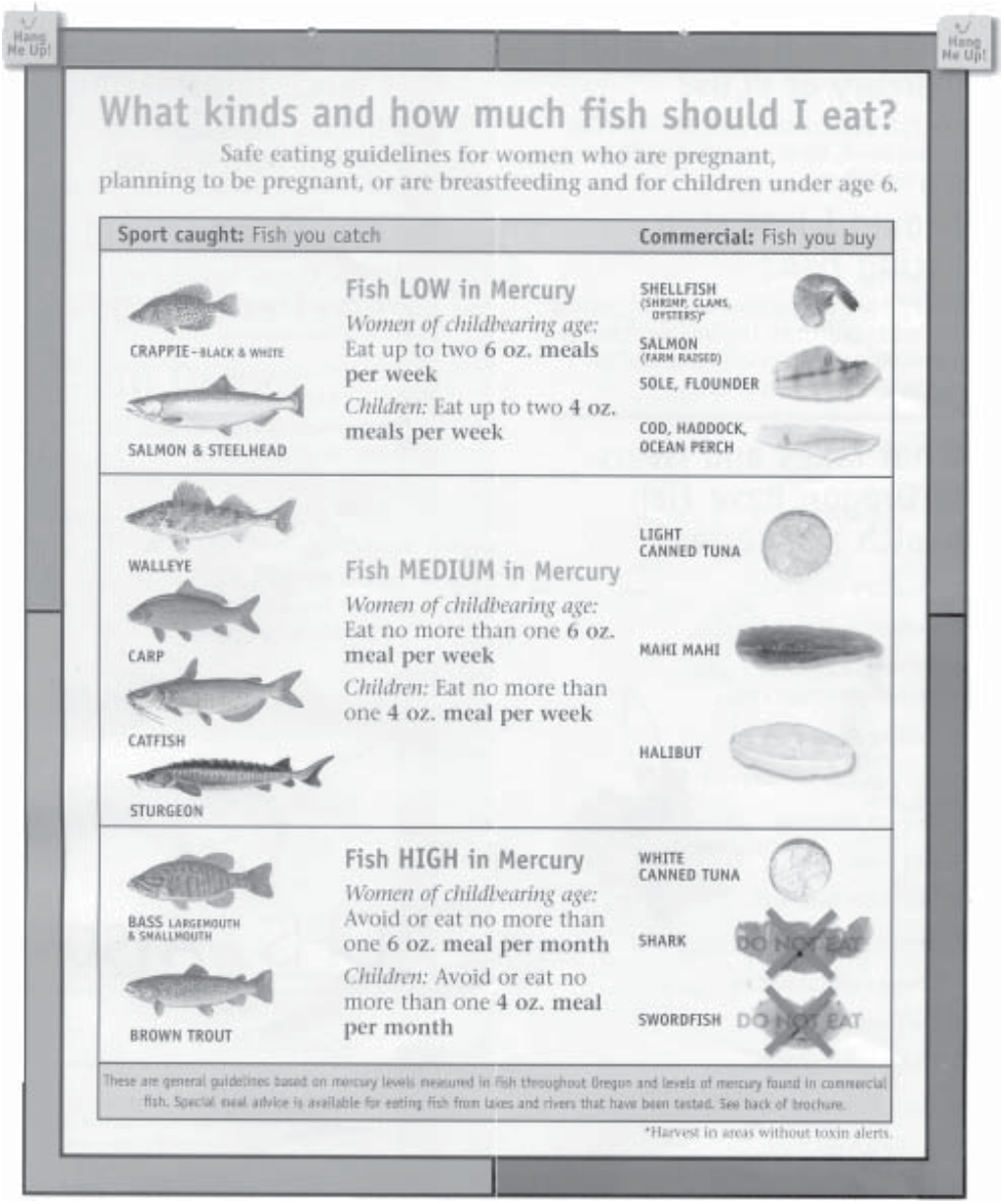
APPENDIX A: HOW TO AVOID THESE CHEMICALS AT HOME

	Do	Don't
Seafood	Eat a variety of fish (it's healthy for you!), with the caveats noted in the next column	Children & women of child-bearing age should avoid swordfish and albacore because of **mercury** contamination; they should also limit wild salmon & canned chunk light tuna to 1-2 cans/month
Dairy & Meat Products	Drink low-fat or non-fat milk, soy milk or other products; breastfeed infants	Two-thirds of our average esposure to **dioxin** occurs via eating high-fat dairy & meat products from cows that have grazed on pastures contaminated by dioxin
Kitchenware	Use metal, wood, glass or other non-plastic products	Bottles & other plastic items with a "3" recycling symbol may contain **phthalates** & also emit **dioxin** when burned; those with a "7" may contain bisphenol-a (BPA)
Cabinets, Flooring & Furniture	Buy solid wood "FSC" certified products, or other alternatives (e.g., "PrimeBoard" made from wheat straw)	Wood products made of particle board can "off-gas" **formaldehyde** glues, as can (to a lesser extent) those made of plywood, waferboard or fiberboard (some formaldehyde-free fiberboards are available; see pg. 6).
Bedding	Consider mattresses with wool (a natural flame retardant) fill	Most mattresses with synthetic fill are likely to include **PBDEs**
Home Heating	Conserve energy & use natural gas or electric heat generated by wind	**Diesel** & home heating oil pollute heavily; replace such systems if possible or use bio-diesel blends; woodstoves and wood-burning fireplaces emit **benzene**, **formaldehyde**, **dioxins**, **benzo-a-pyrene** & other carcinogens; use them sparingly
Thermostats & Thermometers	Use digital, mercury-free models; programmable thermostats can also help save energy	Many older thermostats & thermometers contain **mercury**; recycle them properly with your other household hazardous waste
Home Electronics	Use Epson, IBM & Apple products; HP printers & PCs; Panasonic phones, cell phones & fax machines	Some other brands may contain **PBDE** flame retardants; be sure to ask if you're not sure
Toys	Phthalate-free toys are available from: Early Start; Guidecraft; Lamaze & The Natural Baby Catalogue	Try to avoid toys made out of soft plastic vinyl that often contains **phthalates** & can emit **dioxins** if burned as trash
Trash & Yard Debris	Recycle as much as possible	Don't burn trash, especially PVC plastics, which, when burned, emit **dioxins**
Pet Care	Use pet combs, frequent vacuuming & other non-toxic controls of fleas	Many flea collars, sprays & dips contain dangerous **pesticides**
Lawn & Garden Care	Limit lawn areas & grow native plants adapted to the Northwest	**Pesticides** such as weed killers & insecticides should be used as a last resort, if at all
Indoor Pest Control	Use diatomaceous earth & other less toxic controls	Most commercial ant & roach killers contain toxic **pesticides**

APPENDIX B: WHAT KINDS AND HOW MUCH FISH SHOULD I EAT?



Hang Me Up!

What kinds and how much fish should I eat?

Safe eating guidelines for women who are pregnant, planning to be pregnant, or are breastfeeding and for children under age 6.

Sport caught: Fish you catch | **Commercial:** Fish you buy

Fish LOW in Mercury

Women of childbearing age: Eat up to two **6 oz. meals per week**

Children: Eat up to two **4 oz. meals per week**

CRAPPIE – BLACK & WHITE

SALMON & STEELHEAD

SHELLFISH (SHRIMP, CLAMS, OYSTERS)*

SALMON (FARM RAISED)

SOLE, FLOUNDER

COD, HADDOCK, OCEAN PERCH

Fish MEDIUM in Mercury

Women of childbearing age: Eat no more than one **6 oz. meal per week**

Children: Eat no more than one **4 oz. meal per week**

WALLEYE

CARP

CATFISH

STURGEON

LIGHT CANNED TUNA

MAHI MAHI

HALIBUT

Fish HIGH in Mercury

Women of childbearing age: Avoid or eat no more than one **6 oz. meal per month**

Children: Avoid or eat no more than one **4 oz. meal per month**

BASS LARGEMOUTH & SMALLMOUTH

BROWN TROUT

WHITE CANNED TUNA

SHARK DO NOT EAT

SWORDFISH DO NOT EAT

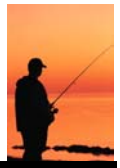
These are general guidelines based on mercury levels measured in fish throughout Oregon and levels of mercury found in commercial fish. Special meal advice is available for eating fish from lakes and rivers that have been tested. See back of brochure.

*Harvest in areas without toxin alerts.

This chart was reproduced from the Oregon Department of Human Services brochure "An Expectant Mothers Guide to Eating Fish in Oregon." For a copy of the brochure, contact the department at 1-800-422-6012 or download it from the web at http://www.dhs.state.or.us/publichealth/fishadv/index.cfm. The brochure is available in English or Spanish.

OREGON FISH ADVISORIES

Fish are a nutritious, low-fat source of protein. However, fish in some Oregon waters have contaminants that may be harmful to you and your family's health. Please consult the recommendations below for fish consumption guidelines. For more information call the Oregon Department of Human Services at 503-731-4012 or visit their website at www.healthoregon.org/fishadv. Please note, not all of Oregon's waters have been sampled for contaminants in fish.



WATERBODY	CONTAMINANT
Antelope Reservoir (SE Zone)	Very high mercury levels **All species**
Columbia Slough (Willamette Zone)	PCB levels **Carp, Crappie**
Cooper Creek Reservoir (Willamette Zone)	High mercury levels **All species**
Cottage Grove Reservoir (Willamette Zone)	Very high mercury levels **All species**
Dorena Reservoir (Willamette Zone)	Moderate mercury levels **All species**
East Lake (Central Zone) Do **not** eat brown trout 16" or larger	High mercury levels **All species**
Galesville Reservoir (SW Zone)	High mercury levels **All species**
Jordan Creek (SE Zone)	Very high mercury levels **All species**
Lower Columbia River (Columbia River Zone)	PCBs, dioxins, & pesticides **All resident species**
Owyhee Reservoir (SE Zone)	Very high mercury levels **All species**
Owhyee River upstream of the reservoir to Three Forks (SE Zone)	High mercury levels **All species**
Plat I Reservoir (SW Zone)	Moderate mercury levels **All species**
Snake River, including Brownlee Reservoir (Snake River Zone)	Moderate mercury levels **All species**
Willamette River and Coast Fork Willamette to Cottage Grove Reservoir	High mercury levels **and** PCBs, dioxins & pesticides **All resident species**

CRAYFISH AND CLAM ADVISORIES

- Crayfish and clams harvested above (east of) **Bonneville Dam** to the mouth of Ruckel Creek should not be eaten.
- Crayfish harvested within 1000 feet of the property lines of the former McCormick & Baxter site located south of the Burlington Northern Railroad bridge in **Portland Harbor** should not be eaten.

CONSUMPTION RECOMMENDATION

VERY HIGH MERCURY LEVELS

- Women of childbearing age, children under 6, and people with liver and kidney damage should avoid eating fish from these waters.
- Healthy adults should eat no more than one 8 ounce meal per month.

HIGH MERCURY LEVELS

- Children under 6 should eat no more than one 4 ounce meal every two months.
- Women of childbearing age should eat no more than one 8 ounce meal every month.
- Healthy adults should eat no more than one 8 ounce meal every two weeks.

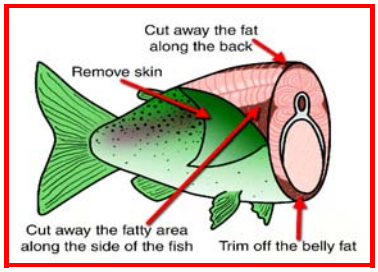
MODERATE MERCURY LEVELS

- Children under 6 should eat no more than one 4 ounce meal every month.
- Women of childbearing age should eat no more than one 8 ounce meal every two weeks.
- Healthy adults should eat no more than one 8 ounce meal every week.

PCBs, DIOXINS & PESTICIDES

- All persons should reduce or avoid eating fatty parts of fish. Exposure can be reduced by removing the skin and all fat, eggs and internal organs.

See diagram below.



This chart was reproduced from the Oregon Department of Human Services website "Statewide Fish Consumption Guidelines." For more information, contact the department at 1-800-422-6012 or you can download the guidelines from the DHS website at http://www.dhs.state.or.us/publichealth/fishadv/docs/fishadv.pdf.