The American People's Dioxin Report

By The Center for Health, Environment & Justice

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Science

This report provides a summary of new scientific research on the toxic effects caused by or associated with exposure to dioxin. The information in this report is drawn from a comprehensive assessment of the sources, fate, and health effects of dioxin contained in the Technical Support Document (TSD) to this report. The key points and conclusions of the TSD provide the basis for this report. Most of the research and studies discussed in this report have been published since a well publicized draft report on dioxin was released by the U.S. Environmental Protection Agency (EPA) in 1994. The American People's Dioxin Report is intended to inform the public and their representatives in government so appropriate action can be taken to safeguard the health of the American people. The scientific findings of this report make it clear that there is an extensive body of high quality scientific information describing the toxic effects of dioxin in people. This data indicates that dioxin is a potent chemical that produces a wide variety of toxic effects in animals and that some of these effects are occurring in people.

The report's most striking finding is the impact of dioxin on the growth and development of children. Most of the new studies on dioxin address its effects on children, notably the effects on the development of the immune, reproductive, and nervous systems, in particular cognitive and learning abilities. While exposure of the general population occurs through ingestion of many common foods, children exposed *in utero* (in the womb) during critical periods of development appear to be the most sensitive and vulnerable to the toxic effects of dioxin.

In particular, dioxin has been associated with IQ deficits and increased susceptibility to infections in Dutch children exposed to "background" levels of dioxins. (These "background" levels are essentially the average daily intake of dioxin from food.) Studies in Finland have shownthat dioxin interferes with normal tooth development in infants exposed to "background" levels. The Dutch studies have also shown an association between dioxin and a higher prevalence of withdrawn/depressed behavior in children. An association between PCBs and adverse effects on attentional processes and an increase in hyperactive behavior in children has also been reported in these studies.

This new evidence from human studies provides strong confirmation of the toxicity of dioxin and its impact on the general American public. With this in mind, Americans have a choice: take action to protect public health by eliminating dioxin creation or continue to allow dioxin to be created and not burden industry with the short term transition costs of elimination. Prudent public health policy would make every effort to eliminate environmental releases of dioxin and related compounds.

Description of Dioxin

Dioxin belongs to a family of chemicals with related properties and toxicity. There are 75 different dioxins, or polychlorinated dibenzodioxins (PCDDs), 135 different furans, or polychlorinated dibenzofurans (PCDFs), and 209 different polychlorinated biphenyls (PCBs). Each different form is called a "congener."

Not all of the "dioxin-like" chemicals have dioxin-like toxicity, and the toxic ones are not equally toxic. Only 7 of the 75 dioxins, 10 of the 135 furans, and 12 of the 209 PCBs have dioxin-like toxicity. These 29 different dioxins, furans, and PCBs all exhibit similar toxic effects caused by a common mechanism: binding to a particular molecule known as the aryl hydrocarbon or "Ah" receptor (see Chapter 5 of the TSD).

It is believed that the tighter the binding to the Ah receptor, the more toxic the chemical. The most potent member of this family is 2,3,7,8-tetrachlorodibenzo-p-dioxin or TCDD, which also has the greatest affinity for the Ah receptor.

The word "dioxin" is often used imprecisely. Some people restrict its use only to 2,3,7,8-TCDD, the most toxic and most studied dioxin. Others extend its use to the whole class of chemicals with similar toxicity and whose effects are controlled or triggered by the Ah receptor. In this report, the terms "dioxin" and "dioxins" are used to refer to any of the dioxin family members that bind to the Ah receptor and elicit dioxin like effects.

Toxic Equivalents

Although all dioxin-like compounds are thought to act in the same way, they are not all equally toxic. Their different toxicities may be due to their unique properties of absorption, distribution, metabolism, and elimination in a body and/or strengths of binding to the Ah receptor. Therefore, the health risk of each congener is assessed by rating their toxicities relative to TCDD, the most potent of the dioxins. TCDD is assigned a value of "1" and each of the 17 toxic dioxins/furans and 12 PCBs is assigned a "toxicity factor" that estimates its toxicity relative to TCDD. The resulting estimates are called toxic equivalency factors (TEFs), which have been recently updated by the World Health Organization.[1] The toxic equivalency (TEQ) is determined by multiplying the concentration of a dioxin congener by its toxicity factor. The total TEQ in a sample is then derived by adding all of the TEQ values for each congener. While TCDD is the most toxic form of dioxin, 90% of the total TEQ value results from dioxin-like compounds other than TCDD.

The TEQ system is not perfect, but it is a reasonable way of estimating the toxicity of a mixture of dioxin-like compounds. There is good experimental support for the assumptions that underlie the TEQ system.[1,2] TEQs make it possible to take toxicity data on TCDD, a compound about which our knowledge is vast, and estimate toxicity for other compounds about which much less is known.

Sources of Dioxins

Dioxin is found everywhere in the world - in water, air, soil, and sediment - even in places where dioxin or dioxin-containing products have never been used. This broad distribution is evidence that the sources are multiple and that dioxins can travel long distances. Unlike most chemicals, dioxins have no intended use or value. Dioxins are unintended by-products of many chemical and combustion processes which involve chlorine. They get into the environment from industrial air emissions, wastewater discharges, disposal activities, and from burning material that contains chlorine. The EPA estimates that 2,745 grams (gm) TEQ released into the air each year.[3] Municipal solid waste incinerators, secondary copper smelting, and medical waste incinerators are identified as the top three sources of dioxin released into the air. Combustion sources account for nearly 80% of air sources. Dioxins are also released to water, soil and into consumer products, but these sources are poorly defined and only a few estimates have been made. A list of EPA's dioxin sources is shown in Table 1.

In developing a "national inventory" of dioxin sources, EPA only made estimates for 20 of 54 identified air source categories, due to their lack of confidence in the available data.[3] Preliminary estimates are made for 12 of the 34 poorly defined source categories, but these estimates are not included in the national inventory. EPA assigned "negligible" emissions to another 11 of these source categories and made no estimates for another 8 source categories even though there is some evidence of emissions. Overall, EPA's confidence in the data used to define dioxin releases to air, water, land, and products is weak and underestimates dioxin releases.

Source categories that are left out of EPA's dioxin inventory include iron ore sintering, polyvinyl chloride (PVC) production, accidental/structural fires, landfill fires, backyard burning, releases from petroleum refineries, asphalt mixing plants, and contaminated sites and other "reservoirs" of dioxin. Regrettably, there are apparently no efforts to collect such data from these and other sources. Some of these source categories, if included, would contribute substantially to the national inventory and significantly increase the amount of dioxins estimated to be released into the environment.

Environmental Fate

Dioxins enter the atmosphere either directly from air emissions or indirectly from volatilization from land or water, or from resuspension of particles. Depending on temperature and each congener's vapor pressure, dioxins are present in air as particulates or vapor. The more chlorinated compounds tend to bind to particulates and are protected from chemical and sunlight degradation. This protection may account for their relative abundance in the environment.

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Table 1

Inventory of Sources of Dioxin in the United States

Reference Year 1995	Central estimate (gm TEQ/year)
Air:	
Municipal waste incineration	1,100
Secondary copper smelting	541
Medical waste incineration	477
Forest, brush and straw fires	208
Cement kilns (hazardous waste burning)	153
Coal combustion	72.8
Wood combustion - residential	62.8
Wood combustion - industrial	29.1
Vehicle fuel combustion - diesel	33.5

Cement kilns (non-hazardous waste burning)	17.8
Secondary aluminum smelting	17
Oil combustion - industrial/utility	9.3
Sewage sludge incineration	6
Hazardous waste incineration	5.7
Vehicle fuel combustion - unleaded	6.3
Kraft recovery boilers	2.3
Secondary lead smelters	1.63
Cigarette combustion	0.81
Boilers/industrial furnaces	0.38
Crematoria	0.24
Total	**2,745**
Products:	
Pentachlorophenol-treated wood	25,000
Bleached chemical wood pulp and paper mills	24.1
Dioxazine dyes and pigments	0.36
2,4-Dichlorophenoxy acetic acid	18.4
Non-incinerated municipal sludge	7
Total	**25,050**

Land:	
Non-incinerated municipal sludge	207
Bleached chemical wood pulp and paper mills	1.4
Total	**208**
Water:	
Bleached chemical wood pulp and paper mills	**19.5**
Source: USEPA [3]	

Airborne dioxins can be carried large distances downwind from their sources as well as contribute significantly to local deposition.[4,5] Eventually, airborne dioxins settle onto soil, plants, and water where they enter the food chain. Dioxin will fall out onto crops that are fed to dairy cows and beef cattle where it accumulates in the milk and meat of these animals. Dioxin is attracted to and accumulates in fat. People who consume the contaminated meat and dairy products ingest substantial amounts of dioxin. When dioxin falls out onto waterways, it settles in sediments or remains suspended in the water for long periods of time because dioxins generally do not dissolve in water. Here too, the dioxins move up the aquatic food chain to fish and then into people.

Dioxin in Food

Americans accumulate harmful levels of dioxins in their bodies mostly through the ingestion of food. Some segments of the population, such as nursing babies and people who eat a diet high in animal fat or foods contaminated because of their proximity to dioxin release sites, are exposed to higher than average levels of dioxin.[6] Others, such as Vietnam veterans and some chemical plant workers, have accumulated additional dioxins because of their exposure to Agent Orange or other dioxin-contaminated chemicals in the workplace.[7]

Approximately 90%,[6,7] and perhaps as much as 98%, [8] of the dioxin that average Americans are exposed to comes from the foods they regularly eat. Because dioxins accumulate in fatty tissue, they are found mostly in meat, fish, and dairy products. Consequently, when people consume these foods, they also consume dioxins. As Table 2 shows, ground beef has the highest dioxin content, with 1.5 picograms per gram (pg/gram) which is equivalent to 1.5 parts per trillion (ppt), of all meats consumed by Americans. Depending on what and how much people eat, the average daily intake of dioxins for Americans is approximately 2.2 pg TEQ/kg body weight (bw),[9] ranging from 1 to 3 pg TEQ/kg bw.[10] Daily intake increases to 3 to 6 pg TEQ/kg bw if dioxin-like PCBs are included. The ingestion of dioxin in common foods has resulted in widespread low-level exposure of the general population.

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Table 2 - Dioxin Levels in U.S. Foods

Food Type	**Total TEQ (pg/gram food) (ppt)**
Ground beef	1.5
Soft blue cheese	0.7
Beef rib steak	0.65
Lamb sirloin	0.4
Heavy cream	0.4
Soft cream cheese	0.3
American cheese sticks	0.3
Pork chops	0.3
Bologna	0.12
Cottage cheese	0.04
Beef rib/sirloin tip	0.04
Chicken drumstick	0.03
Haddock	0.03
Cooked ham	0.03
Perch	0.023

Cod	0.023

Source: Schecter [26]

Dioxin Body Burden Levels

The average daily intake of dioxin results in an average dioxin tissue concentration in Americans that ranges from 28 to 41 nanograms (ng) TEQ/kg lipids (fat) and from 36 to 58 ng TEQ/kg lipids if dioxin-like PCBs are included.[11,12] A single national average of 28 ng TEQ/kg or 28 ppt was estimated as part of the most extensive survey of dioxin in humans, the National Human Adipose Tissue Survey (NHATS). This survey was first conducted by the EPA in 1982.[13] In 1987, the survey was repeated, and the results suggest some decreases in average dioxin body burdens, but the decreases may be due to improved analytical methods or to other issues involving methods of study. For most congeners, including TCDD, the differences between 1982 and 1987 tissue levels are not statistically significant.[14]

In addition to measuring exposure to dioxin by its daily intake, exposure can also be estimated by measuring how much of it builds up in the body. This is referred to as the "body burden" and is defined as the total accumulation of dioxin at any one time per kilogram of body weight.[11] For a person this would be how much they have accumulated up to the time of the testing. Using the average tissue concentrations from the studies above, estimated average dioxin body burdens range from 6 to 9 ng TEQ/kg body weight. If dioxin-like PCBs are included, the average dioxin body burden ranges from 8 to 13 ng TEQ/kg body weight.[11] In these estimates, TCDD contributes approximately 15% of the total TEQ.

These estimates represent average body burdens for a middle-aged person. Approximately 10% of the population can be expected to have at least three times this level and others as much as seven times these levels. These high exposure groups include nursing infants, children, some workers and farmers, people who rely on fish as a main staple of their diet such as some indigenous peoples and some fishermen, and people who live near dioxin-contaminated sites or dioxin-producing facilities. These groups have suffered a disproportionate share of dioxin exposure and many have already suffered the adverse health effects caused by these exposures.

Indigenous peoples, for instance, who eat fish and sea mammals from the Arctic regions are exposed to dioxin at higher than average levels because dioxin and PCB levels are particularly high in these foods.[15] Dairy cows, meat cattle, or other animals fed crops grown on soil contaminated with dioxin in the low part per trillion (ppt) levels accumulate significant amounts of dioxins.[16] An incinerator in the Netherlands that emitted large amounts of dioxins contaminated milk from cows grazing nearby. This milk was so contaminated that it was declared to be hazardous waste by the Dutch government.[17] On the other hand, vegetarians, who consume less meat and dairy products, have below-average body burden levels of dioxin.[18]

Dioxin in Breast Milk

Dioxin accumulates in breast milk because it readily dissolves in the milk's rich fat content. During nursing, dioxin is transferred from mother to baby [19, 20, 21, 22, 23, 24] who may absorb as much as 95% of the dioxin in the milk.[19, 20] Several studies reporting dioxin in human breast milk indicate that levels range from 20 to 30 ng TEQ /kg lipids in industrial countries and from 3 to 13 ng TEQ/kg lipids in less industrialized countries (Table 3).[6, 7] The World Health Organization (WHO) reports a worldwide mean of 20 ng TEQ/kg lipids, with values ranging from a low of 3.1 ng TEQ/kg lipids to a high of 110 ng TEQ/kg lipids.[25]

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Table 3 - Dioxin Levels in Pooled Breast Milk Samples from Various Countries

Country	Total TEQ (ng/kg, lipid)
Vietnam - Da Nang	34
Japan	27
Germany	27
Canada	26
USA	20
Vietnam - Ho Chi Minh City	19
South Africa - White	13
Pakistan	13
Russia	12
South Africa - Black	9

Vietnam - Hanoi	9
Thailand	3
Cambodia	3

Source: Schecter, 1994 [7]

Nursing infants ingest considerably more dioxins each day than adults. Studies in the U.S. and in the Netherlands have estimated daily intake of dioxins according to infant age. The U.S. study found that nursing infants typically consume between 35 and 53 pg TEQ/kg body weight (bw) per day in breast milk.[26] The more current Dutch study found that nursing infants typically consume about 112-118 pg TEQ/kg bw/day.[27] If the Dutch study is correct and infants consume dioxin at the rate of about 112-118 pg TEQ/kg bw/day, and adults typically ingest between 3 and 6 pg TEQ/kg bw/day,[10] then nursing infants consume about 50 times more dioxin per day than adults, confirming results from other studies.[15, 26] It is estimated that approximately 10-14% of total lifetime exposure can occur via nursing.[27, 28]Breast-fed babies accumulate far more dioxins than do formula-fed babies. In one study, dioxin intake was 50 times greater in breast-fed infants than it was in formula-fed infants.[23] In this same study, TEQ concentrations in blood from 11 month old formula-fed infants were less than one fourth the concentrations of the mother's blood and about 10 times less than the concentrations in infants that are breast-fed for six to seven months.

Although nursing infants are at increased risk because of their higher intake of dioxins, extensive studies in the Netherlands indicate that the benefits of nursing outweigh the risks. Breast milk contains all the nutrients in ideal proportion for optimum growth and development; the psychological benefits of nursing are invaluable; [29] and breast-fed babies have fewer respiratory illnesses, fewer skin problems, cry less, have fewer allergies, and are less constipated than other babies. For these and other reasons, despite the dioxin levels found in breast milk today, the World Health Organization (WHO) and the federal Agency for Toxic Substances and Disease Registry (ATSDR) both promote and support breast feeding.[6, 10]

A "Safe" Level of Dioxin

Three separate government agencies have established a "safe" or tolerable daily dose of dioxins. These guideline values are shown in Table 4. The table also shows how much dioxin exposure is "allowed" according to the guideline. This value is determined by multiplying the guideline value, in picograms per kilogram (pg/kg) of body weight, by the body weight of an average person, which is typically 70 kilograms or about 150 pounds. For example, to convert ATSDR's Minimum Risk Level, multiply 1 pg/kg by 70 kg which results in 70 pg. This means that any daily intake greater than 70 pg would exceed the lowest measure of safety set by ATSDR. As the table shows, the average daily dioxin intake of the American people exceeds the two federal government guidelines and is within the range of the international guideline. This average daily intake is more than 200 times higher than EPA's guideline, over twice ATSDR's guideline, and in the middle of the range of the WHO guideline.

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Table 4 - Daily Intake of Dioxin (TEQ) Compared to Established Guidelines

Guideline	(pg/kg bw/day)	Equivalent Intake for 70 kg adult (pg/day)
USEPA Risk Specific Dose [30]	0.01	0.70
ATSDR Minimal Risk Level [6]	1.0	70.0
WHO Tolerable Daily Intake [10]	1-4	70-280
Average Daily Intake of Dioxin in Food in the U.S.	2.2	154
Range of Daily Intake of	1-3	70-210

Dioxin in Food in the U.S.		
Range of Daily Intake of Dioxin and Dioxin-Like PCBs in Food in the U.S.	3-6	210-420

According to the EPA, the American people's lifetime risk of getting cancer from exposure to dioxin is 1 in 10,000.[30] The risk attributable to dioxin for highly exposed members of the population is 1 in 1,000. These risk estimates are based on ingesting a "risk specific dose" of 0.01 pg TEQ/kg bw/day over a 70-year lifetime. At this dose, there will be one additional cancer for every one million exposed people. One cancer per million is often considered an "acceptable risk" value.[31] Since the average daily intake of dioxin ranges from 1 to 3 pg/kg bw/day (3-6 pg/kg bw/day if dioxin-like PCBs are included), everyday the general American public is exposed to a cancer risk that is 100 to 300 times higher than the one-in-a-million "acceptable" cancer risk. Table 4 shows that the American people are already well above several federal and international guidelines for dioxin exposure as well as the typical "acceptable" cancer risk value.

"Safe" Body Burdens

The biological effects of a toxin depend on the concentrations of that substance in a target organ over a critical period of time. These concentrations in turn depend on three important factors: the absorption, distribution and persistence of the toxin throughout the body. These factors help determine a person's lifetime accumulation, or body burden, of dioxin. As discussed earlier, body burden is the concentration of a substance in tissue or blood per kilogram of body weight. Because body burden measurements account for differences in absorption, distribution and persistence across species and between individuals, [32] they can be used to compare the doses needed to produce similar adverse effects in different species.

Such a comparison was made by the World Health Organization which made a list of the most sensitive adverse health effects associated with exposure to dioxin in animals. These health effects, which are shown in Table 5, are primarily effects on the reproductive and immune systems. The WHO found that the lowest observed adverse effect levels (LOAELs), which ranged from 10 to 73 ng/kg, are all within a factor of 10 of the average body burden of 10 ng/kg in the human population. The USEPA made a similar comparison in their draft reassessment report in 1994.[30] The EPA included sensitive adverse effects in people, which are included at the bottom of Table 5. This table shows that adverse effects are occurring in some people with body burden levels similar to those that produce adverse effects in animals. The table also shows that the average body burden levels in the general American population is just below the levels that are causing adverse effects in animals.

Comparisons have also been made between the body burden levels of dioxin in animals and people that result in cancer. The body burden levels of dioxin at which exposed workers and experimental animals have higher numbers of cancers are similar. For both the workers and experimental animals, these body burden levels are also substantially higher than the body burden levels of dioxin in the general human population.[12, 25]

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Table 5 - Animal Body Burden Levels Associated with Sensitive Adverse Effects

Body Burden (ng/kg)	**Species**	**Health effect (reference)**
10	Mice	Adult immune suppression [33]
28	Rats	Decrease in sperm count [34]
42	Monkeys	Endometriosis [35]
42	Monkeys	Object learning [36]
50	Rats	Immune suppression [37,38]
73	Rats	Genital malformations (females) [39]
14	Humans	Altered glucose tolerance [40]
14	Humans	Decreased testis size [41]

83	Humans	Decreased testosterone [42]
10	Current average body burden in the general U.S. population	

Source: WHO, 1998; [10] USEPA, 1994 [30]

Sensitive Non-Cancer Effects Observed in the General Population

The Dutch Studies - Neurodevelopmental and Immune Effects

Main findings: Four point deficit in IQ and increased susceptibility to infections in 42 month old children exposed to typical daily intake levels of dioxins/PCBs.

Effects of dioxins and PCBs on neurodevelopment, the immune system and thyroid hormones were observed in children from the general population of the Netherlands.[43, 44] These studies found that prenatal (before birth) exposure to typical daily intake levels of dioxins/PCBs are associated with:

- Reduced birth weight and reduced growth from birth through 3 months of age; [45]
- Delays in psychomotor development at 3 months; [46]
- Neurodevelopmental delays at two weeks [47] and 18 months; [48]
- Alterations in thyroid hormones at birth and at 3 months; [49] and
- Alterations in immune status from birth to 42 months.[50, 51]

The adverse neurological effects found at birth and at 18 months could not be detected at 42 months.[52] However, a decrease in cognitive function as measured by a 4 point deficit in IQ was measured for the first time at 42 months.[53] This difference may be explained by the different testing procedures used. Prenatal exposure to dioxins/PCBs were also found to be associated with other neurodevelopmental and behavioral effects at 42 months including a decrease in high level play, [54] an increase in non play activity, [54] and an increased prevalence of being withdrawn and depressed.[55] These Dutch studies also found that postnatal (after birth) exposure to typical daily levels of dioxins/PCBs was associated with:

- Delays in psychomotor development at 7 months; [46]
- Alterations in thyroid hormones at 3 months; [49]

- Alterations in immune status as indicated by an increased prevalence of recurrent middle ear infections and decreased prevalence of allergic reactions to food, pollen, dust and pets at 42 months; [51] and
- An increase in mean reaction times, a decrease in sustained attention, and an increase in hyperactive behavior at 42 months.[54]

The Finnish Study - Developmental Effects

Main findings: An association between dioxin exposure and hypo-mineralization defects of permanent teeth.

A study of breast-fed Finnish children found an association between dioxin exposure and hypo-mineralization defects of permanent teeth.[56, 57, 58] These findings suggest that the observed effects are primarily due to lactational exposures. In contrast, the effects observed in the Dutch children were associated primarily with *in utero* exposure and not in children who were breast-fed. Teeth defects are also observed in the rice oil poisonings in both Japan [59] and Taiwan.[60] There are some toxicological data in animals to support effects of dioxin on tooth development. Dioxin causes defects of dental hard tissues in rats, [61] perhaps by altering the action of epidermal growth factor receptor.[62] Dental defects and changes in ameloblasts (enamel-forming cells) in rhesus monkeys exposed to PCBs have been reported.[63]

Miscellaneous Studies - Neurodevelopmental and Reproductive Effects

Two studies of children in the U.S. found similar neurodevelopmental effects associated with exposure to typical daily exposure levels of PCBs.[64, 65] An ongoing German study also found neurodevelopmental effects associated with low-level PCB exposure.[66] Some of the results differ among these studies. In a study of children from the general Japanese population, exposure to dioxin-like compounds are associated with adverse effects on thyroid hormones and the immune system.[67, 68]

Children of women exposed *in utero* to a complex mixture of PCDFs, PCBs and other compounds in the Taiwan rice oil poisoning incident of "Yu-cheng"(which translates to oil poisoning), suffered a number of effects including damage to the nervous and respiratory system;[69] higher than normal incidence of middle ear infections; [70] and reduced penis size at adolescence.[71]

In Seveso, Italy, the site of a major plant explosion that sent a cloud of dioxin into the community, children who developed chloracne experienced transient changes in immune parameters, but no adverse immunological effects.[72] Also, the sex ratio of children born (48 females to 26 males) in Seveso was not normal for several years following dioxin exposure, [73] but the same effect is not seen after dioxin exposure in the Yu-cheng children.[74] Though a major study of women exposed to dioxin at Seveso is underway, the existing epidemiological evidence showing the effect of dioxin exposure on endometriosis is limited and mixed.

One study in Israel found higher levels of dioxin in the blood of women with endometriosis than in controls.[75] Workers with chloracne who worked at the Nitro, West Virginia trichlorophenol plant reported higher than expected sexual dysfunction and lower than normal libido.[76]

In summary, some evidence indicates that dioxin exposure interferes with normal growth and development in children from the general population. Developmental neurotoxicity associated with dioxin exposure includes cognitive deficits, behavioral alterations such as increased withdrawal/depression, hyperactive behavior, and attentional difficulties. Other effects that are transient are decreased neuro-optimality (nerve function) and decreased psychomotor ability. Developmental effects on the immune system include increased susceptibility to infections, altered lymphocyte subsets, and increased respiratory disease and otitis (inflammation of the ear) in highly exposed infants. Developmental and reproductive effects include altered sex ratio (more females born than males), small penis and endometriosis. Many of the effects on the development of the nervous system are more associated with *in utero* exposure than with breast-feeding. The dental effects observed in the Finnish children are more strongly associated with dioxin exposure from breast milk, a finding consistent with the timing of tooth mineralization in humans.

Hormonal Effects

Major findings: Decrease in testosterone in workers and an increased risk of diabetes associated with exposure to dioxin.

Exposure to dioxin has a variety of effects on hormone function in animals and in people. In a group of U.S chemical plant workers (the NIOSH cohort), dioxin-exposed workers have lower than normal testosterone levels and higher than normal follicle-stimulating and luteinizing hormone levels, both of which can reduce sperm counts.[42]

Dioxin interferes with the hormone insulin and alters glucose tolerance which leads to diabetes. In one study of 55 exposed workers evaluated 10 years after exposure, 50% of the workers were diabetic or have abnormal glucose tolerance, an early indicator of diabetes.[77] Since this striking finding, there have been mixed findings of diabetes or glucose tolerance in several studies. In the NIOSH workers, the risk of diabetes increased 12% for every 100 ppt dioxin in blood lipid.[78]

In a study of the Ranch Hand veterans, the soldiers who had the highest exposures to Agent Orange, those with blood dioxin greater than 33.3 pg/gm (ppt) have a relative risk of 2.5 for diabetes.[41] A relative risk of 1.0 means that an exposed person is no more likely to develop the disease than an unexposed person. In a follow-up study, the veterans exposed to dioxin had a relative risk of 1.4 for glucose abnormalities, 1.5 for diabetes, and 2.3 for the use of oral medications to control diabetes.[79]

This study also found that Ranch Hand veterans exposed to dioxin develop diabetes at an earlier age than other veterans and that non-diabetic Ranch Hands exposed to dioxin have a relative risk of 3.4 for serum insulin abnormalities.

In the ongoing study of the residents of Seveso, Italy, there is an increase in deaths from diabetes in females in the second highest exposure area and a slightly elevated increase (not statistically significant) in males.[72] Deaths from diabetes in the highest exposed area showed a suggestive but not statistically significant increase, though the number of deaths are too few to draw any conclusions.

Cancer Effects

Epidemiological data from high exposure situations suggest that a number of the effects of dioxin exposure seen in animals also occur in humans . However, because studies in humans cannot be done under the same controlled conditions as studies in experimental animals, dioxin's effects on humans are not as clear cut as they are in animal models. Nevertheless, similarities between humans and experimental animals allow reasonable comparisons and projections from dioxin's effects in animals to its effects on humans: they both have the Ah receptor and associated factors; a number of biochemical responses are similar; and, on a body burden basis, many human responses to dioxin are reasonably comparable to the responses in animals.[11, 12]

Updates of ongoing studies indicate that dioxin exposure causes cancer in humans in a dose-dependent fashion. The most important of these studies are the series of studies by Flesch-Janys and colleagues in Germany and by Bertazzi and colleagues in Italy. The studies of the German chemical plant workers attempt to quantify the dose-response relationship between estimated TCDD exposure and total mortality.[80,81] The Italian studies of mortality among those exposed to the Seveso plant accident also focus on cancer mortality in populations grouped by exposure level.[82] Both research groups recognize limitations and uncertainties in their studies including estimating exposure and defining specific causes of death, among other limitations of epidemiologic studies. However, both series of studies strengthen the conclusion that dioxin exposure is related to cancer mortality in humans in a dose-related fashion.

Two additional important studies are the update of the NIOSH chemical workers in the U.S.[83] and analysis of a group of Dutch workers [84] that is part of a larger international group of workers.[85] The NIOSH update also shows a dose-response relation between dioxin exposure and cancer mortality.

These studies together provide strong support for the decision by the World Health Organization's International Agency for Research on Cancer (IARC) to define TCDD as "carcinogenic to humans."[25] In making an overall judgement of dioxin's carcinogenicity in humans, IARC now includes mechanistic information as well as human and animal data. For example, the importance of the Ah receptor in mediating dioxin's toxic effects and its presence in both humans and experimental animals is acknowledged. This decision is further supported by strong evidence in animal studies that show dioxin causes cancer in all studies that have been conducted. The U.S. National Toxicology Program (NTP) had upgraded dioxin from its status as "reasonably anticipated to be a human carcinogen" to "known to cause cancer in humans" in 1997,[86] but reconsidered their decision based on procedural errors pointed out by industry. NTP has not decided whether they will upgrade dioxin or leave it as "reasonably anticipated to be a human carcinogen."

As discussed earlier, the lifetime risk of getting cancer from exposure to dioxin is 1 in 10,000 for the general American population and 1 in 1,000 for highly exposed members of the population.[30] These risk estimates are based on ingesting a "risk specific dose" of 0.01 pg TEQ/kg bw/day over a 70-year lifetime. If these estimates are taken seriously, then the average exposure of the American people to dioxin poses an uncertain but potentially substantial risk, a point made at least a decade ago.[87]

Sensitive Non-Cancer Effects Observed in Animal Studies

Studies of dioxin's effects in experimental animals indicate that it causes a host of toxic effects including cancer; reproductive and developmental toxicity; damage to the immune system;

neurotoxicity; endocrine disruption; liver and skin toxicity. Among the sensitive effects observed in animals are a number of biochemical and cellular effects that occur at body burden levels of about 10 ng/kg or less, levels comparable to those found in the average person.[88] These effects include production of the liver enzymes CYP1A1 and CYP1A2; alterations in hormones, such as epidermal growth factor (EGF), that affect growth and development; oxidative damage; and alterations in lymphocyte subsets,[12] a measure of immune function. These observations suggest that dioxins cause biological effects at levels comparable to those found in the average American. At present, it is unclear if these effects are adverse or not.

Developmental neurotoxicity: Subtle deficits in object learning are observed in the offspring of rhesus monkeys chronically exposed to dioxin *in utero* and from breast milk.[36] Similar exposure to dioxin also adversely affects long-lasting learning and memory in rats.[89] In this study, deficits in exposed animals of both sexes for different learning tasks were observed. Some of these tasks may represent a response strategy rather than improvement in learning or memory.

Endometriosis: The incidence and severity of endometriosis in rhesus monkeys chronically exposed to dioxin rises as the dose increases.[35] Surgically-induced endometriosis has been enhanced in dioxin-exposed monkeys [90] and in rats and mice.[91] In human endometrial tissue, the Ah receptor is expressed, suggesting that it is involved during the reproductive phase of this tissue.[92]

Effects on the Developing Reproductive System: Pregnant rats exposed to a single dose of dioxin during the development of fetus' organs give birth to both male and female offspring with permanent damage to their reproductive systems.[34, 39]

Immunotoxicity: Pregnant female rats exposed to dioxin give birth to offspring with an immune system problem called "delayed type hypersensitivity" [37, 38] which renders the animals more susceptible to viral infections. Captive harbor seals fed Baltic fish with 210 ng TEQ/kg lipid in their blubber develop delayed type hypersensitivity relative to controls which were fed cleaner Atlantic fish with only 62 ng TEQ/kg lipid in their blubber.[93] The seals fed the contaminated fish were less able to mount a normal immune response. Eight week old mice treated with 10 ng/kg of dioxin die more frequently than controls when exposed to influenza virus.[33] This viral susceptibility occurs at the lowest level of any effect observed in animals. This represents the most sensitive adverse effect of dioxin exposure on record.

Conclusion: The American People are at Serious Risk from their Daily Intake of Dioxin in Food

This report integrates all the information including the newest studies on dioxins' effects on human health and comes to the following conclusions:

- All American children are born with dioxin in their bodies. The greatest impact appears to be on the growth and development of children. Disrupted sexual development, birth defects and damage to the immune system may result.

- Dioxin exposure has been associated with IQ deficits, increased prevalence of withdrawn/depressed behavior, adverse effects on attentional processes, and an increase in hyperactive behavior in children. These effects have been reported in 42-month old Dutch children whose exposure to dioxins/PCBs came primarily before birth.

- Dioxin exposure has been associated with alterations in immune function including increased susceptibility to infections and changes in T-cell lymphocyte populations. These effects have been reported in 42-month old Dutch children whose exposure to dioxins/PCBs came primarily before birth. Altered immune function, reported at birth, 3, and 18 months of age, persists to 42 months of age in these children. Reported immune effects include an increase in middle ear infections and chicken pox, and a decrease in allergic reactions.

- There is evidence of both developmental and reproductive effects in children exposed to dioxin. These effects include defects in permanent teeth, adverse effects on thyroid hormones, altered sex ratio (more females than males), and increased respiratory disease.

- The average daily intake of dioxin in food poses a substantial cancer risk to the general American population. The lifetime risk of getting cancer from exposure to dioxin is 1 in 10,000 for the general American population and 1 in 1,000 for highly exposed members of the population. These risks are 100 and 1,000 times higher, respectively, than the one-in-a-million "acceptable" cancer risk.

- Nearly all Americans are exposed to dioxin through ingestion of common food, mostly meat and dairy products. Dairy cows and beef cattle absorb dioxin by eating dioxin contaminated feed crops. The crops become contaminated by airborne dioxins that settle onto soil and plants. Dioxins enter the air from thousands of sources including incinerators that burn medical, municipal, and hazardous waste.

- The average daily intake of the American people is already well above several federal guidelines and at mid-range of international guidelines for dioxin exposure. The average daily intake of the American people is more than 200 times higher than EPA's cancer risk guideline, over twice ATSDR's lowest adverse effect level, and in the middle of the range of the World Health Organizations's tolerable food intake.

- At higher risk of exposure to dioxin are children, nursing infants, some workers and farmers, people who eat fish as a main staple of their diet such as some indigenous peoples and fishermen, and people who live near dioxin release sites. These groups of people are likely exposed to at least 10 times as much dioxin as the general population.

Dioxin is an ubiquitous poison that is in our food and that causes many toxic effects in people and animals. The neurodevelopmental and reproductive effects observed in children may be the most disturbing new evidence. The small shifts in cognitive ability or thyroid levels may be the tip of the iceberg of the impact of dioxin on the general American public.

We know that the daily dioxin intake of Americans is already too high, and exceeds several federal risk guidelines. We also know that some members of the general population are particularly sensitive to exposure to dioxin and others are exposed to higher than average daily levels. These are infants and children, people who live near contaminated sites, fishermen and indigenous people who rely on fish as a main staple of their diet, workers, and others with high exposures. These groups have suffered a disproportionate share of dioxin exposure and many have already suffered the adverse health effects caused by these exposures. Every effort should be made to eliminate environmental releases of dioxin and related compounds. Americans have a choice: take action to protect public health by eliminating dioxin creation or continue to allow dioxin to be created and not burden industry with the short term transition costs of elimination and related compounds.

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Policy Recommendations

Introduction

Since 1995, the EPA has made and then broken numerous promises about the release of a final version of the dioxin reassessment. Now, four years later it has yet to be released and federal, state, and even local governments have written rules for dioxin sources without the benefit of the final reassessment's information about dioxin's toxicity.

In 1997, EPA said it would hold public hearings around the country to discuss the policy implications of the reassessment. These hearings, like the release of the final reassessment, have yet to happen.

Communities burdened by dioxin exposure are tired of waiting for EPA to act. People at the grassroots know that truly protective public policy will eliminate dioxin exposure. They know that the EPA has failed to protect them with the measures it has taken so far. So the following policy recommendations reflect communities' experience and knowledge about how to stop dioxin exposure, and outline what protective public policy for dioxin should include.

This section of the report recommends protective policies and is the result of the collaboration of more than 50 activists from grassroots, regional and national environmental groups who came together, in person and through email and fax. This work built on previous activism on dioxin which has been taking place for years in communities and through a national network of grassroots dioxin activists. These activists have experienced firsthand the results of EPA's lack of action on dioxin. While EPA has delayed, made excuses, and broken promises, their communities continue to be exposed to dioxin. They can recommend with considerable authority what policies are needed to stop dioxin exposure.

This document is a starting point for stopping dioxin exposure. It includes policy recommendations for twelve dioxin sources which are among the largest. These twelve are addressed in this document because they are logical places to begin talking about what truly protective policies must include. Addressing these twelve sources won't take care of the whole problem, but it will be a good beginning.

In most of the recommendations we have cited EPA's estimates of how much dioxin was released into the air from different sources in 1995. These estimates were published in 1998 as part of EPA's Inventory of Sources of Dioxin. As discussed in Chapter Three of the Technical

Support Document, these estimates have many limitations and are often based on very little data, the quality of which is often unknown. These estimates are presented only to provide a way to compare, on a relative basis, the different sources of dioxin.

The recommendations in this report are specific to each source and include steps such as eliminating chlorine from a process or closing a regulatory loophole. But all of these policy recommendations have some core principles in common. These principles act as the foundation of any recommendations the grassroots dioxin movement can make about any dioxin source. These principles, which must be at the heart of any dioxin policy, are described below.

Prevention Not Control

For any dioxin policy to have a chance of meaningful impact, it must have at its core a commitment to the elimination of dioxin. This means that policies must require that no dioxin be created in the first place, instead of current practice which generally requires better control of the dioxin at the end of the pipe. Prevention of dioxin involves several key components.

First is the recognition that dioxin comes from processes which involve chlorine or the combustion of substances containing chlorine. Addressing chlorine is the only way to eliminate dioxin. EPA must reorient its dioxin research and policy towards a materials focus, including a commitment to identify processes and products whose production, use, or disposal create dioxin and begin phasing out these processes and materials over time.

Fundamentally, EPA dioxin policy should require zero creation and discharge of dioxin from all sources. This should include a position that there is no safe or "acceptable" level of dioxin in food, processed or raw, since food is the largest source of human exposure to dioxin.

Precautionary Principle

The Precautionary Principle states, "When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not established scientifically." Growing evidence on the hazards of dioxin demands precautionary action to prevent further exposure, even though absolute proof of harm has not been established.

This should be the guiding philosophy behind all public policies, including those on dioxin. Scientific uncertainty can no longer be an excuse to avoid or continue the delay in establishing and implementing effective policies to stop dioxin exposure. We know enough to act now.

The precautionary principle should replace the flawed technique of risk assessment in the regulation of dioxin. Instead of using value-laden estimates of risk to determine how much dioxin exposure is "acceptable," the precautionary principle guides us in drawing that line at zero. No more dioxin exposure is "acceptable" because any additional exposure is too much.

Additionally, any policy based on the precautionary principle will shift the burden of proof from communities, which currently have to convince regulators that a facility is unsafe, to the industry or regulators themselves. Instead of the community being forced to show that something is unsafe in order to stop it, supporters of the proposal would have to prove that a project is safe in order to proceed.

Consideration of All Pathways of Dioxin Exposure

Current policy relies on risk assessment which looks at each source of exposure and each chemical independently, and only worries about how much harm that one source will do for a defined exposure. This is an unrealistic view because communities are often burdened with multiple polluting facilities releasing many chemicals. Communities have also had past exposures which must be considered. The use of risk assessment is also inadequate because it only looks at cancer and completely ignores past exposures, cumulative or synergistic (when chemicals combine to have a new or greater effect) impacts, or multiple sources of exposure. Dioxin policy must require consideration of cumulative and synergistic impacts from all sources in an area.

Environmental Justice

For many years, incinerators, paper mills, cement kilns and other dioxin-producing facilities have been disproportionately located in low-income, tribal, people of color, or other disenfranchised communities. This disparate treatment of people of color and low-income people has led to disproportionate and adverse health impacts in these communities.

Any policy on dioxin must include a commitment to environmental justice. As the principles of environmental justice state, "public policy should be based on mutual respect and justice for all peoples, free from any form of discrimination or bias... Environmental justice demands the cessation of the production of all toxins and hazardous wastes, and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production... Environmental justice also protects the right of victims of environmental injustice to receive full compensation and reparations for damages as well as quality health care." The full list of Principles can be found in Appendix A.

Fish and land-based subsistence cultures are at higher health risk from persistent bioaccumulative toxics in the food web and ecosystem. Base-line sampling should be done in communities of color and low-income communities to establish the levels of dioxin found in impacted communities and to determine disparate toxic burdens. Currently, standards for chemical exposure are written for white, middle-aged adults. Risk assessments do not take into account the sensitive populations, such as elders, children, and those already suffering from environmentally induced disease.

Just Transition

Phasing out dioxin will require substantial technological and economic transformation, as numerous products and processes are removed from production or converted to chlorine-free alternatives. This transformation may be difficult to implement and it is essential that workers and communities should not bear the economic burden of these changes. The phase-out of dioxins should therefore be guided by a transition program to protect, compensate and provide future opportunities for workers and communities affected by the conversion.

A "just transition" (see the Principles for a Just Transition in Appendix B) includes a commitment to income and benefit protection for affected workers and their families, a commitment to involving unions and protecting workers' right to organize through transition, and a commitment to economic development in communities affected by transition.

Policy to eliminate dioxin must include a commitment to just transition. It should also include a commitment to preserving jobs by supporting industries which make the switch to technology needed to eliminate dioxin.

No Transfer of Dioxin from One Media to Another

Prevention, rather than control, of dioxin requires a commitment to making sure that everything leaving a facility remains free of dioxin. This includes byproducts such as ash and sludge, and products such as paper, chemicals, and plastics. It is unacceptable to use pollution control technology to simply transfer dioxin from air and water discharges into sludge or ash which are widely dispersed in the environment. Dioxin must be eliminated at the source, not just moved around by control technology.

Also unacceptable is the practice of "beneficial use" of dioxin-contaminated sludge or ash. "Beneficial use" is a euphemistic term describing the use of dioxin-contaminated wastes as products. These wastes should be managed in a manner that prevents their contamination from being dispersed into the environment. Instead, "beneficial use" of wastes includes using incinerator ash and other manufacturing wastes as ingredients in fertilizer, construction material, or as landfill cover and spreading sewage sludge on land as fertilizer and material for mine reclamation. "Beneficial use" of dioxin contaminated materials such as sludge and ash is only beneficial to the waste producers who avoid the expense of properly managing their waste. The irresponsible policy of allowing these dioxin-contaminated substances to be widely dispersed into the environment must stop immediately.

The Right to Know the Extent of Dioxin Contamination

In many of the recommendations in this report there are calls for testing of agricultural products, fish, and soil near dioxin-producing facilities. We have the right to know how much dioxin is in our food and the environment. And while testing might at first provide more questions than answers, it is a starting point for understanding the extent of the dioxin problem. For too long the absence of data has been an excuse for not taking action. While we take measures to prevent new dioxin exposure, we must continue to try to document the extent of existing dioxin contamination.

The progress made so far in stopping dioxin exposure has not been the result of government policy. It has come from activism in communities across the country, where incinerators have been shut down, paper mills have agreed to clean up their processes, and local governments have passed dioxin resolutions and agreed to buy chlorine free products. This report is not meant to discourage this kind of grassroots activism. It is meant to gather the lessons learned from these efforts and combine them into a blueprint for government and industry action to stop dioxin exposure. Continued local activism is what will convince all levels of government to follow this blueprint and dioxin-producing industries to change their ways. This report on dioxin policy recommendations can serve as a map for government as it catches up with the people it is supposed to lead.

Municipal Solid Waste Incinerators

Problem

Municipal solid waste (MSW) incinerators have many undesirable environmental and economic impacts. Essentially, incinerators transform household garbage, consisting primarily of recyclable, reusable, and compostable materials, into dioxin, metals, and other toxic gases and large amounts of toxic ash. The EPA has estimated that in 1995, MSW incineration released from 492 to 2460 grams TEQ of dioxin, with a central estimate of 1100 grams TEQ. MSW incineration is the largest source on EPA's list of dioxin emissions to air in 1995. Incinerator ash, which is highly contaminated with dioxin and metals, is being increasingly dispersed through the environment as many states allow it to be "recycled" and used as landfill cover or in road and construction projects. Incinerators are expensive and need constant feeding to generate enough revenue to pay off the debt communities take on to build them. This leaves little incentive for communities to recycle and reduce the amount of waste they create.

No regulations can make incineration a rational or safe means for managing MSW. Moreover, EPA has demonstrated neither the will nor the means for adequately protecting public health and the environment from the impacts of MSW incineration. This is illustrated by current federal policies, which focus on trying to capture emissions from incinerator stacks and are full of loopholes. One such loophole in the Clean Air Act allows for a three-hour exemption from air emission permit standards during start-up, shut-down, and malfunction, leading to regular prolonged exposures to dioxin and other pollutants with no regulatory consequences for the facilities. Other loopholes allow facilities other than incinerators to burn municipal waste without the regulations and pollution controls found at incinerators. These other burners include cement and aggregate kilns, backyard burning, "small" (under 40 tons per day) incinerators, and co-generation power plants.

Current federal policies, where they do apply, are not protective of the environment and public health. They focus on better pollution control technologies rather than preventing pollution by reducing toxics in the waste stream. Better control technologies may reduce the amount of toxic chemicals emitted from the smoke stack, but control technology simply transfers contaminants from the air to the ash. EPA does not have a policy that will adequately quantify the amount of pollutants in incinerator ash, nor do they require its safe handling and disposal. EPA's choice of the Toxic Characteristic Leaching Procedure (TCLP) to determine whether incinerator ash is toxic has served to protect the incinerator industry from the financial burdens associated with the handling and disposal of ash as hazardous waste. The test does not require a determination of absolute levels of toxic metals or dioxins, it just measures what leaches out when acid is passed through the ash. The lime used in incinerator scrubbing systems often neutralizes the acid, reducing the amount of leaching. Because there is never a determination of what is really in the ash, the use of the TCLP is grossly unprotective of wildlife, drinking water supplies, and people exposed to the ash. This includes workers at incinerator facilities and landfill sites, citizens in incinerator communities and near landfills which use ash as daily cover, and citizens exposed to ash reutilization schemes. Viable alternatives to incineration exist. For example, recycling facilities create more jobs than an incinerator and are less capital intensive to implement.

Recommendations

- Eliminate Municipal Solid Waste Incineration
- Close Loopholes on Non-Incineration Combustion
- Categorize Incinerator Ash as Hazardous Waste
- Implement Responsible, Long-Term, Non-Incineration Solutions for Municipal Waste Disposal

Eliminate Municipal Solid Waste Incineration

A. There should be an immediate shut down of all MSW incinerators not defined as "waste-to-energy" facilities.

B. No permits for new "waste-to-energy" projects, with a five year phase out of existing facilities.

Close Loopholes on Non-Incinerator Combustion

Municipal solid waste should not be disposed of by any thermal destruction processes. The following options for burning household waste, either as raw garbage or as refuse derived fuel (RDF), should be banned:

- backyard trash burning
- cement and/or aggregate kilns
- co-generators (including, but not limited to, coal power plants)
- commercial hazardous waste or industrial on-site incinerators
- open burning at landfill sites

- industrial, municipal, and school furnaces and/or other boilers
- pyrolysis

Categorize Incinerator Ash as Hazardous Waste

A. An immediate ban on the utilization of MSW ash for any purpose (such as use in cement or construction aggregate or as landfill cover) due to its gross contamination by heavy metals, dioxins, furans, and other toxic chemicals.

B. All MSW incinerator ash must be classified and disposed of as hazardous waste.

Implement Responsible, Long-Term, Non-Incineration Solutions for Municipal Waste Disposal

A. Waste management policies should lead to source reduction measures and intensive reuse, recycling and composting programs. In addition, incinerator workers should be given the opportunity to work in the alternative facilities or given appropriate compensation for job loss.

B. Non-incineration solutions should include, but are not limited to:

- Clean production of consumer goods, which would exclude toxic ingredients such as heavy metals.
- Intensive waste reduction measures for all waste generators.
- Intensive recycling programs for, but not limited to, compostables, paper, metal, and glass for all waste generators. Recycling projects should ensure a safe workplace.
- Federal mandates on packaging materials that prioritize reusable materials, such as glass, paper, and metal.
- Taxes on all "use once, then throw away" packaging materials.

Medical Waste Incinerators

Problem

Many hospitals, particularly those with on-site incinerators, routinely burn some or all of their waste. But the majority of this waste is similar to that found in the average household: cardboard, paper, cans, plastic bottles, etc. Incineration is not mandated for any waste at the national level. The Centers for Disease Control and Prevention states that "hospital wastes for which special precautions appear prudent are microbiology laboratory waste, pathology waste, bulk blood or blood products, and sharp items such as used needles or scalpel blades. In general, these items should either be incinerated or DECONTAMINATED (emphasis added) prior to disposal in a sanitary landfill." Hospitals do not need to burn all of their waste because viable alternatives exist. A variety of non-incineration technologies are available for medical waste, including autoclaves (steam sterilization), microwaves, and other treatment. While more research needs to be done on emissions from these types of facilities, current data indicate that dioxin is not likely to be formed during these treatment processes.

The EPA has estimated that in 1995 medical waste incineration released from 151 to 1510 grams TEQ of dioxin, with a central estimate of 477 grams TEQ. Medical waste incineration is the third largest source on EPA's list of dioxin emissions to air in 1995. Current EPA regulations focus on controlling air pollution rather than actually reducing the toxicity of all emissions. Such "end-of the pipeline" approaches are more expensive and less protective than an approach which focuses on reducing the toxicity of the waste stream through product changes and purchasing decisions.

The agency has said that the Maximum Achievable Control Technology (MACT) Rule for incinerators greatly reduces dioxin air emissions. But any amount of dioxin released is dangerous. The rule does not address the formation of dioxin in the incinerator, it requires technology which merely moves it from the stack to the ash, which is often released into the environment.

Medical waste contains a higher percentage of plastic than municipal solid waste. Polyvinyl chloride (PVC) plastic, in particular, is a large part of the medical waste stream. In fact, 25 percent of plastic medical products are made of PVC. But PVC is the least recycled type of plastic, so PVC is a large part of the waste stream in medical waste incinerators. In incinerators, PVC is a large contributor to the chlorine available for dioxin formation. But many PVC medical devices can be replaced with non PVC alternatives, including intravenous (IV) bags and fluid collection devices. Some European countries have acted more aggressively to limit the use of PVC, and in response there are US-based companies providing non-PVC IV bags to Europe, which are not yet available in the US.

Recommendations

- Eliminate Medical Waste Incineration
- In the Interim, Strengthen Performance Standards for Incinerators
- Phase-Out the Use of PVC In Medical Products
- Develop Alternative Technologies for Medical Waste Treatment
- Require Waste Reduction/Segregation Policies for Health Care Facilities

Eliminate Medical Waste Incineration

A. No new medical waste incinerators should be built.

B. Existing medical waste incinerators, both on-site and commercial, should be phased out over the next five years.

In the Interim, Strengthen Performance Standards for Incinerators

A. The EPA must stop using the Maximum Achievable Control Technology (MACT) rule as justification that they have done enough to control dioxin, and instead move to a strategy to prevent dioxin generation and exposure.

B. Medical waste incinerator ash and scrubber effluent must be designated as "hazardous" waste, rather than "special" or solid waste. Policies should ensure that this ash is isolated from the environment and that scrubber effluent is treated to remove contaminants prior to release into sewage treatment systems.

Phase-Out the Use of PVC in Medical Products

PVC is a primary source of dioxin emitted from medical waste incinerators. PVC products are rarely recycled, and they should not be burned. The manufacturers of medical devices need to move away from making products with PVC and begin using viable alternatives.

Develop Alternative Technologies for Treating Medical Waste

The EPA also needs to look at emissions from non-incineration treatment technologies. There is currently a lack of information about what comes out of autoclaves, microwaves, and other alternative disposal technologies. While early indications are that these technologies do not produce dioxin, we can't be sure without further investigation.

Require Waste Reduction/Segregation Policies for Health Care Facilities

A. All levels of government need to address the waste stream that goes into medical waste incinerators, not just regulate what gets emitted from them. Specifically they should mandate that health care facilities recycle or minimize as much of their waste as possible and where possible, eliminate chlorine-containing products they purchase. These would include, but not be limited to, all PVC products (IV bags, patient ID bracelets, vinyl covers for patient records, shower curtains, etc.), and chlorine-bleached paper and packaging. This would remove the majority of the dioxin-creating products from the medical waste stream.

B. The health care industry needs to have a policy of ownership and responsibility for their wastes, rather than the current practice of trying to shift liability and responsibility to outside vendors, the government, etc. Taking responsibility for their waste stream would mean implementing strict waste minimization, recycling and toxicity reduction. This would include asking vendors to minimize packaging, using chlorine-free products and educating employees about the health and environmental impacts of their product choices.

C. The health care industry needs to move toward sustainable materials use, and end its use of PVC and other plastics that are not recyclable.

Hazardous Waste Incineration

Problem

The EPA has estimated that in 1995, hazardous waste incineration released from 2.6 to 12.8 grams TEQ, with a central estimate of 5.7 grams TEQ. Hazardous waste incineration is the fifteenth largest source on EPA's list of dioxin emissions to air in 1995. Hazardous waste incineration is one of the dioxin sources most contradictory to the precautionary principle. By allowing incineration as a disposal method for waste that is already toxic, EPA is encouraging the distribution and production of more of these toxic materials. In addition, existing policies don't address the cumulative impacts of the facilities and their emissions. The EPA prefers to operate as if the absence of evidence is evidence of absence of harm. Currently the burden of proving that hazardous waste incineration is unsafe rests on the community while the polluters and the government can't prove that these facilities are safe.

In addition, the siting of hazardous waste incinerators has become an environmental justice issue. Time and time again, the government and industry have tried to site these facilities on Indian Tribal reservations or in low income, people of color communities. Again, it is up to the tribe or community to prove that these facilities will have long-term health and environmental effects. The permitting process does not provide for a transparent, community-based decision-making process. Often, low-income, people of color, and Indian tribal communities are the last to know about the siting of toxic waste facilities in their community.

If all hazardous waste incinerators were shut down today, there would still be hazardous waste to deal with. Therefore, effective, economically viable, low-impact, non-combustion alternatives for hazardous waste disposal are needed. But hazardous waste generators must also reduce the amount of hazardous waste they create. Preventing the creation of new waste will reduce the need to continue dangerous practices such as burning hazardous waste. Toxics use reduction, the practice of changing the amount and toxicity of waste by reducing or eliminating the use of toxic chemical inputs, is a much more precautionary approach than trying to control the emissions which come out of incinerator stacks.

Recommendations

- Eliminate Hazardous Waste Incineration
- In the Interim, Strengthen Policies To Protect Impacted Communities
- Reduce the Creation of Hazardous Waste
- Identify Alternatives to Hazardous Waste Incineration.

Eliminate Hazardous Waste Incineration

A. No permits for new hazardous waste incinerators.

B. A five year phase-out of all existing hazardous waste incinerators.

C. An immediate ban on the disposal of hazardous waste in other industrial combustion facilities, including, but not limited to, co-generation plants, cement and aggregate kilns, boilers, and incinerators burning chemical weapons or other munitions. Hazardous waste should not be burned as fuel.

In the Interim, Strengthen Policies to Protect Impacted Communities.

A. Provide full and easy public access (e.g. internet access to real time data) to all monitoring data for all emissions and operational data (unusual occurrences, shutdowns, etc.) for existing incinerators.

B. Appropriate agencies should investigate the health effects of exposure to emissions on communities surrounding hazardous waste incinerators.

C. Appropriate agencies should investigate the effects of hazardous waste incineration on agriculture and livestock, including analysis of hay and grasses near the facilities to monitor how dioxin and other pollutants travel up the food chain.

Reduce the Creation of Hazardous Waste

A. Require hazardous waste generators to focus on the materials they use, through a toxics use reduction program. Such programs should require audits of toxic chemicals used in all production processes, planning to reduce the amount of toxics used, and public reporting of toxics use, and provide technical assistance for companies to meet these requirements.

B. Create capital investment initiatives for hazardous waste producers to invest in pollution prevention and minimize the amount of hazardous waste they create.

Identify Alternatives to Hazardous Waste Incineration

New disposal methods for hazardous waste must be non-combustion, environmentally sound and preferably closed-loop. Before alternative disposal methods are approved for widespread use, they must be carefully evaluated.

A. A coordinated and integrated effort between private industry, EPA, the Department of Defense, the Department of Energy, and all government innovative technology projects to accelerate the identification and deployment of non-incineration technologies for hazardous waste disposal.

B. Develop a set of criteria by which to measure the economic and technical viability, appropriateness, and acceptability of alternative disposal methods, which emphasize community health and ecological concerns. The community should be an equal partner in this process.

Cement and Aggregate Kilns

Problem

Some cement and aggregate kilns burn hazardous and municipal solid waste for fuel. Because of a loophole in federal law, wastes which are burned as fuel are considered exempt from being regulated as hazardous waste. This means that kilns which burn hazardous waste as fuel (they call it "recycling") are not held to the same standards as commercial hazardous waste incinerators, weak as those may be. This loophole provides economic gains both for the hazardous waste generators, who avoid the higher costs of hazardous waste treatment, and the cement and aggregate producers, who get paid to take the waste they use as fuel and don't have to buy as much traditional fuel. There should be a ban on using solid or hazardous waste as fuel. Industry should instead convert to unadulterated fuels such as natural gas which would have less impact on the environment.

According to EPA's dioxin sources inventory, making cement or aggregate with hazardous waste fuel creates more dioxin than using conventional fuels. The EPA has estimated that in 1995, cement and aggregate kilns burning hazardous waste for fuel released from 48.4 to 484 grams TEQ of dioxin, with a central estimate of 153 grams TEQ. Waste burning kilns are the fifth largest source on EPA's list of dioxin emissions to air in 1995. Kilns which do not burn waste for fuel were estimated to release from 5.6 to 56.3 grams of TEQ of dioxin in 1995, with a central estimate of 17.8 grams TEQ, the tenth largest source on EPA's list of dioxin emissions to air.

The process of making cement also produces fine particles, or cement kiln dust. This dust is captured by pollution control equipment, and in other settings is typically described as "fly ash." EPA testing has found cement kiln dust to contain dioxin, with dioxin content being higher in dust from kilns which burn hazardous waste as fuel. The dust is exempt from being regulated as hazardous waste, and can be disposed of in landfills. But due to regulatory loopholes, dust from cement and aggregate kilns is also mixed with clinker to make cement, distributed to unknowing customers as soil amendment or stabilizing material for other waste, or dispersed directly into the environment as it is spread on land. At the kilns, the dust is often stored outside in piles. But cement kiln dust was not included by EPA in their source inventory, because the agency considers its disposal in landfills an assurance that the dust will not make it's way back into the environment.

The cement industry began without the use of toxic fuel and for decades it prospered without the economic crutch of providing hazardous waste incineration. And many will argue that the market for cement will remain if the kilns can no longer use waste for fuel. But if jobs are lost due to the end of waste fuel, a just transition must be part of any policy for the cement and aggregate industry.

Recommendations

- Eliminate the Use of Hazardous Waste or Other Wastes as Fuel
- Prohibit Land Application or Secondary Use of Cement Kiln Dust
- During the Phase-Out of Hazardous Waste Fuels, Strengthen Policies to Protect Workers and Communities

Eliminate the Use of Hazardous Waste or Other Wastes as Fuel

A. Government should encourage a voluntary immediate end to the use of burning waste for fuel. If this doesn't happen, federal law should institute a mandatory time line for the end of this practice.

B. No permits should be granted for facilities to switch to burning waste for fuel, or for new facilities which would burn waste for fuel.

Prohibit Land Application or Secondary Use of Cement Kiln Dust

A. Legislation or policy must eliminate the loophole which allows toxic wastes, such as cement kiln dust, to be "recycled" or used as ingredients to avoid classification as hazardous waste.

B. Legislation or policy must prohibit the mixing of dust back into the cement product.

C. In the interim, cement or aggregate which is made this way must be labeled as such.

During the Phase-Out of Hazardous Waste Fuels, Strengthen Policies for Workers and Communities.

A. EPA must identify and track the inter-media transfers (that is, from fuel to product, from fuel to dust, from fuel to the air, etc.) of chlorinated compounds in kilns burning hazardous waste.

B. EPA should collect and evaluate data on emissions and releases from kilns burning hazardous wastes to determine what has been released into surrounding communities.

C. Appropriate agencies should investigate the health effects of exposure to these emissions on communities surrounding cement and aggregate kilns burning hazardous waste.

D. Appropriate agencies should investigate the effects of kilns on agriculture and livestock, including analysis of hay and grasses near the facility to monitor how dioxin and other pollutants travel up the food chain.

E. Policy should require public access to information on what fuels kilns are burning and how wastes are being handled.

Pulp and Paper

Problem

Dioxins are found in the water, air and solid wastes created at pulp and paper mills. The largest cause of dioxins in the industry is the use of elemental chlorine and other chlorinated compounds in the bleaching process. In addition, salt-laden wood, chlorinated plastics, and sludges are burned in on-site incinerators which produce energy for the operation of the mill. These incinerators (called "hog fuel boilers") generate dioxin, but are totally unregulated for dioxin. Dioxins have also been found in bleached paper food containers and other products. The EPA has estimated that in 1995, pulp and paper mill effluent contained from 13.8 to 27.6 grams TEQ of dioxin, with a central estimate of 19.5 grams TEQ; that pulp and paper mill sludge contained from 20 to 40 grams TEQ, with a central estimate of 28.4 grams TEQ; and that pulp contained from 17 to 34 grams TEQ, with a central estimate of 24.1 grams TEQ.

Current policies for the pulp and paper industry are not protective of the environment and public health. The latest federal policy for the industry, the "Cluster Rule," is a technology based standard which mandates the "best available technology" for pulp and paper mills. The cluster rule designates chlorine dioxide as the best available technology for bleaching, a choice based more on economics than health considerations. Chlorine dioxide was the industry's preference for bleaching technology because it requires the least change from current practice. But while chlorine dioxide bleaching produces less dioxin than elemental chlorine bleaching, it does not eliminate dioxin releases. The designation of chlorine dioxide as the best technology doesn't adequately protect worker safety because chlorine dioxide poses significant accident risks. Also, mills using chlorine dioxide cannot convert to "closed loop" or zero discharge systems, which should be a goal for the industry. And the rule has no requirements for testing air discharges of dioxins. The cluster rule takes a back-ended approach, rather than looking at the industry's impact on health and the environment. A protective policy would acknowledge that the best technology for bleaching paper is one that minimizes threats to worker and community health. The best technology is chlorine-free, not chlorine dioxide.

Many U.S.-based companies are making short-sighted investments in chlorine dioxide bleaching technology and virtually ignoring non-wood fibers, which need little or no bleaching. The technical and economical feasibility of processes that are free of dioxins, furans, organochlorines and their precursors has been proven in the industry's more advanced mills around the world. Worldwide, the industry is already moving gradually towards the use of oxygen, ozone, peroxide and other non-chlorine bleaching methods.

Recommendations

- Adopt Totally Chlorine-Free (TCF) Processes and Technologies
- In the Interim, Develop Strong Protective Policies and Eliminate Loopholes
- Ensure Worker Health & Safety
- Require Product Testing

Adopt Totally Chlorine Free (TCF) Processes and Technologies

A. EPA policy should move toward the complete elimination of chlorinated chemical feedstocks over the next five years. This timed phase-out will allow the industry a gradual transition to Totally Chlorine-Free (TCF) processing without undue economic burdens.

B. In its policy, EPA must set a ten-year time line for mills to achieve the zero discharge goal of the Clean Water Act. Requiring mills to adopt TCF technologies is the first step to achieving the goal of zero discharge called for in the Clean Water Act.

In the Interim, Develop Strong Protective Policies and Eliminate Loopholes

A. Rectify the Cluster Rule

EPA's decision to base the "best available technology" standard for bleaching on the use of chlorine dioxide was irresponsible. To rectify this part of the rules, the EPA policy should include the following:

- Time lines that require advanced technologies such as oxygen delignification, extended cooking, and ultimately, TCF bleaching as the best available technology for the industry. These Time lines could coincide with requirements for zero discharge of dioxins, furans, and other chlorinated compounds.
- Testing of effluents and affected water bodies with high volume dioxin monitoring devices to record levels of dioxins currently considered "undetectable."
- Regular testing of fish, aquatic plants and animals, and sediments in these areas. Zero tolerance for dioxin buildup in these organisms should be established.

- Encouragement for the development and implementation of processes to eliminate chlorine donors, such as chlorinated process water.

B. Strengthen the Maximum Achievable Control Technology (MACT) Rule

The EPA needs to take the potential for the pulp and paper industry to emit dioxin and precursors to air more seriously. The new MACT I rule is a step in the right direction, but assumes without adequate proof that levels of chlorine compounds released to air will be reduced with a reduction in methane emissions. The proposed MACT II rules need serious revision if they are to protect public health. The EPA must:

- Study, control, and eventually require elimination of air discharges of chlorine, chlorine dioxide, chloroform, hydrochloric acid and other chlorinated compounds.
- Study whether dioxins and furans or their precursors are created by ambient air discharges and if there are other health effects from these discharges.

C. Combustion Processes and Waste Treatment

- Chlorinated feedstocks, excluding untreated wood, but including sludges, salt-laden wood, and plastic waste from recycling operations, must be eliminated from incinerators (hog fuel boilers) and other combustion "process equipment."
- Industry must further research how much dioxin is transferred from air and water discharges into solid waste and paper products, to better understand where the chlorine

from bleaching processes ends up. Simply transferring dioxin through pollution control equipment is not acceptable.

D. Sludge

- Chlorinated sludge should be considered and managed as hazardous waste. The sludge from processes using chlorinated compounds for bleaching must be tested on a regular basis. Strict standards must be set for the dioxin levels allowed in these sludges.

- The EPA should prohibit the incineration or land spreading of chlorinated pulp sludge.

Ensure Worker Health & Safety

A. Appropriate government agencies, including the Occupational Safety and Health Administration and the National Institute for Occupational Safety and Health, must better evaluate the health of pulp mill workers and communities who have been exposed to decades of chlorine use at mills. The studies must look beyond cancer and include effects on the immune, hormone, and reproductive systems, as well as developmental damage and chronic respiratory diseases.

B. These government agencies must also better evaluate the worker and community safety aspects of chlorine dioxide use at pulp mills. Chlorine dioxide threats are greater than that of elemental chlorine, and its chronic effects are largely unstudied.

C. The government and industry must find a consistent source of revenue for Just Transition for mill workers and communities affected by these changes.

Require Product Testing

A. Products bleached with chlorinated compounds must be tested for dioxin on a regular basis.

B. Products must be labeled with the amount of dioxin they contain.

C. Strict standards calling for zero dioxin should be set for products.

D. Government and industry should explore the issue of potential health impacts of dioxin in products which come in contact with food or sensitive skin on a regular basis, such as napkins, bathroom tissues, sanitary napkins, tampons, and the like.

In a broader context, the paper industry and government should be taking positive steps to promote healthier processes and products. They should encourage all levels of government to purchase totally chlorine-free or processed chlorine-free paper products and sponsor public education campaigns about the problems with dioxin and the role of chlorine-free processes in reducing health risks.

Polyvinyl Chloride Plastic

Problem

Polyvinyl chloride (PVC) plastic's entire life cycle, from production through use and disposal, has negative environmental impacts. PVC is made from two carcinogens, ethylene dichloride (EDC) and vinyl chloride monomer (VCM). The production of PVC creates large amounts of toxic chemicals, including dioxins, furans, PCBs, and hexachlorobenzene. A 1993 Greenpeace estimate of dioxin emissions would place PVC production among the largest sources of dioxin in the U.S.

EPA used a combination of Greenpeace and industry data to come up with a much lower estimate, but didn't include it in its 1998 sources inventory because they felt that there was insufficient information to make a "definitive release" estimate.

The PVC industry has been plagued by worker health and safety issues for decades. The industry was aware of health problems among PVC plant workers, including high rates of cancer, for decades before that information was shared with regulators or workers. The industry spent years using public relations and manipulating science in order to avoid disclosure and liability for worker illnesses and deaths. A Federal Court has noted that "the record shows what can only be described as a course of continued procrastination on the part of the industry to protect the lives of its employees."

PVC is widely used to make building materials, pipes, furniture, and components of automobiles. Although not especially flammable, when PVC is involved in a fire it gives off toxic hydrogen chloride gas which turns into hydrochloric acid on contact with moisture in the lungs. PVC is involved in a large portion of the approximately one million building and automobile fires in the U.S. each year. Combustion of PVC in accidental fires may be another significant source of dioxin in the environment.

When PVC is burned in medical waste and garbage incinerators, it is among the largest single sources of dioxin in those burners. Extremely toxic heavy metals in PVC, such as lead, cadmium and chromium, are also released from the stacks and end up in the ash of these incinerators.

Pollution associated with the life cycle of PVC has a disproportionate effect on low-income, people of color, and Indian Tribal communities. PVC ingredients and their toxic by-products have contaminated the air, water and soil of communities on the Gulf Coast of Louisiana and Texas where the industry is concentrated. These communities have significantly higher percentages of non-white residents than state and national averages. In addition, incinerators which burn municipal, medical, and hazardous wastes rich in PVC and its by-products tend to be located more predominantly in African-American, Latino, and Indian Tribal communities.

Virtually all of the products made of PVC have safer substitutes available, making the risks posed by PVC completely unnecessary and unacceptable.

Recommendations

- Phase-Out PVC
- Ensure a Just Transition For Workers
- During Phase-Out, Address Environmental Justice Concerns

Phase-Out PVC

EPA should announce a PVC "sunset" program, the intent of which is to progressively reduce the production and use of PVC in the U.S. to zero. Priority should be given to those uses that cause the most dioxin formation during their life cycle (e.g., those most likely to be incinerated or involved in fires) and are most easily replaced with safer, chlorine-free substitutes.

A. Phase-out existing PVC production plants over five years, and permit no new facilities. During these five years, begin the process of providing for a just transition for workers, as described below.

B. Over five years, phase-out burning PVC waste in commercial burners and incinerators.

C. More rapid phase-outs of:

- All short-life PVC uses (packaging, toys, IV-bags, etc.).
- PVC products in areas susceptible to fire (construction materials, PVC coated cables, appliances, and vehicles)
- Combustion-based processes to recycle metals containing PVC residues (electrical cables, automobile components).

D. Promote alternative products. EPA should encourage the government to purchase alternatives to PVC to help develop markets for these products.

Ensure a Just Transition For Workers

Any plan to protect health and the environment from dioxin sources -- including a PVC sunset program -- must prevent or compensate for job loss and economic disruption for communities and workers.

- A tax during phase-out on the production of EDC and VCM would help to drive the transition away from PVC and finance the costs associated with it. The revenues from such a tax could be used for transitional measures to ensure that a PVC phase-out is just, equitable, and orderly for workers and affected communities. In particular, a transition fund could be used to assist affected workers and communities by providing funding for educational opportunities, income protection, health insurance, and research and development of safer PVC alternatives.

During Phase-Out, Address Environmental Justice Concerns

- EPA should apply its environmental justice policy and investigate and initiate action to prevent dioxin formation during the life cycle of PVC plastic. President Clinton's Executive Order 12898 on Environmental Justice requires that the agency improve "research relating to the health and environment of minority populations" and reduce pollution in these communities.

Pesticides

Problem

In these recommendations, the term "pesticides" refers to pesticides, insecticides, herbicides, fungicides, rodenticides, and wood preservatives. Some pesticides are contaminated with dioxin as a result of manufacturing processes which use chlorine. Some of the better known dioxin-contaminated pesticides include Agent Orange, 2,4,5-T, Silvex, 2,4-D, and pentachlorophenol. This dioxin contamination is not disclosed on pesticide product labels. Other chlorinated pesticides are suspected to be contaminated with dioxin because they contain chlorine. And as discussed in the policy recommendations for other sources, burning chlorinated wastes such as pesticides can create dioxins. Chlorinated pesticides should not be burned for disposal or as fuel. There is no EPA estimate of the amount of dioxin released during the production of pesticides because the manufacture of some dioxin-contaminated pesticides is banned or strictly regulated, and because the contents of pesticide formulations are considered confidential business information. However some dioxin-contaminated pesticides, such as 2,4-D and pentachlorophenol are still used widely today and past releases of banned substances can continue to be a source of exposure.

All pesticides, including those contaminated with dioxin, invade all organisms (humans, pets, and wildlife) through the food we eat, the water we drink, and air we breathe in our homes, schools, workplaces, and habitat. Exposure is primarily involuntary, with people and wildlife being exposed to hazards unknowingly. Workers and communities are exposed during manufacture, transportation, application, and disposal. Farmers and farm workers are exposed in all phases of pesticide mixing, loading, use, and disposal, as well as in the harvesting of crops. In addition, people are exposed as a result of off-target drift and contamination of groundwater and surface water. Pets and wildlife are exposed to pesticides throughout the environment: lawns, forests, crop lands, rangelands, soil, air, and lakes, streams, and oceans.

Many pesticides which are now banned or highly restricted in the U.S. are still produced domestically and exported to developing countries. Communities in these countries are subject to the same public health and environmental risks from these products which were deemed unacceptable here. In an ironic "circle of poison" these banned and highly restricted pesticides are used to produce food with hazardous residues and sent back to the U.S. to find their way to our dinner tables.

Recommendations

- Eliminate Dioxin-Contaminated Pesticides
- In the Interim, Develop More Protective Pesticide Policies

Eliminate Dioxin-Contaminated Pesticides

A. The EPA should ban dioxin-contaminated pesticides. This could be done under existing federal laws, including the "reasonable certainty of no harm" standard of Food Quality Protection Act.

B. In the interim, establish an Elimination Task Force. The Task Force will consist of practitioners and advocates of alternatives to the use of such pesticides, and will investigate options for local, state, and national plans for the elimination of production, use, and incineration of dioxin-contaminated pesticides.

C. Support environmentally sound alternatives to dioxin-contaminated pesticides. (For instance, phosphate pesticides cause chemical sensitivity, so they are not a viable alternative.)

D. The plan to eliminate dioxin-contaminated pesticides must include a commitment to a just transition and plans to prevent or compensate for the economic and social dislocation that results from elimination.

E. In the interim, the export of banned dioxin-contaminated pesticides must be prohibited.

F. Appropriate government agencies should establish a testing program for pesticides suspected to be contaminated with dioxin. If they are found to be contaminated, the pesticides should be included in the process for elimination detailed above.

In the Interim, Develop More Protective Pesticide Policies.

A. Prohibit lending policies that require farmers to have a pesticide use plan in order to get a loan.

B. Identify, through mandatory testing, pesticide manufacturing processes and pesticide manufacturer locations that result in dioxin formation.

C. Establish protective health-based standards for cleanup methods for closed pesticide manufacturing and disposal facilities and provide resources for strong enforcement.

D. Develop protective exposure standards and an education campaign for workers involved in the manufacture, application, and disposal of pesticides.

E. Forbid the preemption by state or federal law of local requirements for posting of the use and/or presence of dioxin-contaminated pesticides.

F. Identify and label pesticides contaminated with dioxin.

G. Identify and publish lists of dioxin-contaminated pesticide ingredients by trade name, common chemical name, and chemical name/CAS number.

Petroleum Manufacturing

Problem

Petroleum manufacturing (oil and gas refining) uses and mobilizes chlorine in multifaceted process systems that combine it with petrochemicals, catalysts and heat. Of the industries known to generate dioxin, oil and gas refining is the largest, by mass of material produced. All refinery processes tested to date (reforming, cracking and oil-fired boilers/furnaces) test positive for dioxin. Evidence also suggests the production of dioxin-like PCBs by the industry.

Dioxin has been found in stack, wastewater, and runoff releases and refined products. (Diesel and motor oil tested straight from the refinery contain dioxin, chlorine, and dioxin precursors, and vast amounts of petroleum coke are sold to be burned in other industries that are confirmed dioxin sources.) The amount of dioxin released has not been estimated due to lack of testing by government agencies and failure to test and report the industry's dioxin releases via refined products distributed (and often burned) just about everywhere. However, data from the San Francisco Bay Area show a clear gradient of increasing environmental dioxin levels as one moves from 100 miles away, to miles away, to the location of the refinery and suggests that the industry is one cause of cumulative dioxin pollution.

The petroleum manufacturing industry is involved in creating conditions of environmental injustice. Low income communities of color are on the refinery fence lines and eat fish from the harbors where refineries dump. Workers face severe health and safety threats and threatened and actual job loss, while the industry consolidates and downsizes. Oil firms have an unfair share of the power in decisions about what happens in communities.

Recommendations

- Eliminate Chlorine from the Process
- Ensure a Just Transition and Worker Health & Safety
- Ensure a Transparent, Equitable and Verifiable Process

Eliminate Chlorine from the Process

The use of chlorinated solvents to recondition certain catalysts means that chlorine is present in amounts which could form dioxin at many steps in the refining process.

A. Identify all the preventable uses of chlorine in dioxin-producing refinery processes, since dioxin cannot be produced without chlorine.

B. Eliminate the chlorine source in every dioxin-producing reaction in the plants since oil can be refined without chlorine. Find alternatives which prevent the addition of chlorine and chlorinated compounds throughout the processing systems and related activities. For example, remove the carbon buildup from metal catalysts without burning chlorinated solvents and redesign or replace existing chlorine and chloride removal systems, since the original 'desalters' were designed before it was recognized that there is an urgent need to prevent the formation of dioxin from traces of chlorine.

Ensure A Just Transition and Worker Health & Safety

Take all necessary steps to include community members and plant workers and give them an equal voice in decision-making about how quickly the oil company will zero out dioxin and how it will retain jobs and improve worker health and safety while it does so.

- Immediate up-front investment by the oil company operating the plant into funds which will pay not only capital costs for the switch to zero chlorine/zero dioxin solutions, but also pay for community members' and workers' work on the projects, for independent technical consultants hired and directed by the community and workers, for any costs of finding and verifying zero dioxin solutions, and for job retraining or transition.

Ensure a Transparent, Equitable and Verifiable Process

Precautionary policy for oil and gas refining would base priorities for action on what can be done and verified now to eliminate dioxin.

- Ensure that the absolute need for a publicly verifiable dioxin elimination process is honored. The presence or absence of dioxin and chlorine at a root source is verifiable, and public information and verification is fundamental to community power, democracy, and the scientific process.

- In addition, we need to stop oil and gas manufacturers from contributing to other polluting practices when they can no longer sell ethylene to PVC manufacturers; petroleum coke to power plants, foundries and cement kilns; low grade diesel and motor oil that spreads dioxin pollution; etc. Policy should take a preventive, zero-dioxin approach in the petroleum life cycle, which would include its use as a fuel in polluting practices such as those listed above.

Metallurgical Processes

Problem

Metallurgical processes are accompanied by the generation of numerous pollutants, including dust, soot, solid waste and a variety of toxic compounds. Historically, the industry has been under constant pressure to reduce the resultant impact on the environment and the hazards to which its workers are exposed.

In recent years, the thermal processes used in several metallurgical operations in iron and steel-producing sectors as well as the copper, aluminum, magnesium, nickel and other metal industries were identified as potential dioxin sources. Research in some European countries, particularly in Germany, Netherlands, Sweden, and Norway have shown that these metallurgical processes, particularly iron sintering, are significant contributors to national dioxin inventories. The United States and Canada are aware of these sources, but so far only very few measurements have been performed. Preliminary results from the small number of dioxin stack tests on iron sintering plants indicate, however, that the measured dioxin emissions are comparable to what has been found at European facilities of the same type. Thus, the design and implementation of a comprehensive dioxin testing program for metallurgical facilities in North America is essential to assess the true magnitude of these emissions.

Based on the evidence from European studies of different metallurgical processes, it is possible to identify ways to virtually eliminate the dioxin emissions from these types of facilities. The studies indicate that the emissions are chiefly due to the presence of input materials that are contaminated with chlorinated organic compounds. Hence, one way to virtually eliminate dioxin emissions is simply to avoid the introduction of these compounds into metallurgical processes. One specific source of chlorine is polyvinyl chloride (PVC) plastic, a ubiquitous material in metal recycling facilities such as secondary copper smelting (PVC coated wiring) and possibly steel recycling (PVC components in cars and refrigerators.) PVC which goes through the combustion or heating processes at these plants leads to dioxin creation. Despite the uncertainty of estimating dioxin releases from metal production, EPA estimated that in 1995, secondary copper smelting released from 171 to 1710 grams TEQ of dioxin, with a central estimate of 541 grams TEQ. Secondary copper smelting is the second largest source on EPA's list of dioxin emissions to air in 1995.

However, reducing other chlorine inputs may be more difficult and bear economic consequences for both the owner/operators of these facilities and the employed labor force. In addition, while evidence from European studies of metallurgical processes suggests that there are ways to reduce dioxin emissions, so little is yet known about U.S. and Canadian plants that remedial measures and the economic consequences of implementing them remain poorly defined. In these circumstances the most important recommendation is to establish a comprehensive survey of the impact of the present operating practices in the different metallurgical operations on their dioxin emissions. On that basis it would be possible to devise facility type-specific remedial measures for preventing dioxin emissions at the source - the entry points of chlorine - and to evaluate their economic feasibility.

Recommendations

- Determine the Causes and Amounts of Dioxin Production in U.S. Metals Facilities
- Eliminate Chlorine Inputs in Metallurgical Processes

Determine the Causes and Amounts of Dioxin Production in U.S. Metals Facilities

- Government agencies should establish a comprehensive and updated dioxin stack test program for all source classes, including metallurgical facilities.

- EPA should develop an audit program for different metallurgical facility types (integrated iron and steel plants, mini mills, grey iron foundries, secondary copper smelters, secondary aluminum smelters, and magnesium, nickel, and other metal production facilities) to identify points of entry for chlorinated compounds.

Eliminate Chlorine Inputs in Metallurgical Processes

- Establish requirements for facilities involved in the manufacture of ferrous and non-ferrous metal products to prevent wherever possible the contamination of their input materials with chlorinated compounds, including PVC plastic, a key pre-requisite to eliminating the possibility of dioxin formation during the thermal processes as part of their production sequence.

Clean Up of Contaminated Sites

Problem

Dioxin and PCBs, a similarly toxic and persistent group of chemicals, are often found together in contaminated sites and present similar challenges to communities seeking safe, thorough cleanup. Currently, the most common remedies are to incinerate or landfill contaminated soil. These are not acceptable options to concerned communities, nor are they protective of human health and the environment. Landfilling without treatment simply moves the contamination to another community, which will eventually be impacted when that landfill leaks. Containment on-site without treatment just leaves the contamination for future generations. And incineration creates emissions of dioxin and other toxic air pollutants, and does not completely destroy the dioxin and PCBs in the material being burned. Incineration is not an acceptable "treatment." Communities need safe destruction of these contaminants which can be done on-site, and with no adverse impacts on human health and the environment.

The use of incineration as a remedy is perpetuated by an industry and government bias against innovative non-incineration technologies. This bias can be seen in engineering curricula, regulatory training, and research which focus on building better burners and landfills. Communities are often frustrated by the lack of alternatives to incineration. As it now stands, companies have no incentive to develop non-incineration technologies and EPA has no mandate to certify alternatives for use in the field. Another disturbing trend is leaving the contamination in place and relying on "natural attenuation" to take care of the problem. Natural attenuation essentially means performing no further treatment and waiting for dilution, dispersion, evaporation, and eventually degradation to deal with the contamination.

Current requirements for community participation in the choice and oversight of cleanup methods are inadequate. Public participation practices are often treated by government agencies as mere formalities, even though it is the community which must live with the consequences of the cleanup. For example, public notification about hearings often consists only of an ad buried in the
back of the newspaper or in government bulletins citizens don't see. And while Superfund's Technical Assistance Grant (TAG) program is a valuable start towards improving public participation, it could be strengthened. One improvement would be to allow TAG groups to fund independent testing of the cleanup site. Citizens need data which is not generated by the parties responsible for paying for the cleanup. But most importantly, citizens need an equal voice in the decision-making process. If citizens express an opinion or oppose a cleanup decision, current laws do not give this viewpoint the same weight as those of government agencies or companies paying for the cleanup.

Recommendations

- Require Selection of Community-Accepted Cleanup Technologies
- Develop Non-Incineration Destruction Technologies which are Effective, Feasible, and Portable

Require Selection of Community-Accepted Cleanup Technologies

A. Communities affected by any cleanup decisions must have participation and input equal to that of agencies and responsible parties in all negotiations. The burden of proving a technology is harmful should not fall to the community. Rather, the responsible parties and government agencies should have to prove to the community's satisfaction that the proposed technology is safe. Communities must have final veto power over any decisions made which affect their well-being, including property values and health risks.

B. In order to remedy the problem of inadequate community involvement in the cleanup process, the following elements must be added to the public participation process:

- Meaningful notification and pre-hearing for any cleanup project, including written notices to community and environmental groups.
- Funding for technical assistance, including the generation of independent test data, to community and public interest participants.
- Capacity for effective and genuine community oversight must exist prior to the choice of a technology. This capacity should include timely sharing of relevant information about the project with a TAG group and the community.
- Communities must be meaningfully involved from the beginning of the process. This includes giving equal weight and consideration to the input of the community, data generated by the community, and the information and conclusions of the community's TAG advisors. Decisions about cleanup should be made by a team which includes citizens. The team should receive adequate information and technical assistance to make an informed choice of an appropriate cleanup technology.

C. Existing cleanup standards should be enforced uniformly. Responsible parties' influence should not result in a less thorough cleanup.

D. Site-specific cleanup standards should be reviewed yearly with respect to new information about health impacts and cleanup technology, and adjusted to reflect new information.

E. Uniform, protective, health-based cleanup standards for all sites should be established.

F. "Averaging" of contaminant levels to meet cleanup standards must stop. This practice leaves large amounts of contamination behind because highly contaminated areas are averaged with clean areas. Averaging is currently allowed on residential property.

G. EPA's policy of off-site landfilling of contaminated soil with no treatment must be discontinued.

H. Capping of contamination without treatment should be eliminated instead of being a preferred method of site remediation. Capping is just leaving the contamination for future generations.

I. On-site containment of contamination must be thorough, but should only be used as an interim measure, until a destruction technology which is acceptable to the community can be used at the site.

Develop Non-Incineration Destruction Technologies Which Are Effective, Feasible, and Portable

A. The current regulatory system is not adequate to encourage alternative (non-incineration) destruction technologies. We need a regulatory process that is more responsive to the development of new technologies and that facilitates such development, rather than impeding it. Government support for such research and development should require consideration of the technology's appropriateness to a broad range of environments and social settings, including applications in developing countries with relatively low technological capacity. Beyond government support for development, EPA must commit to utilizing and testing new technologies in the field and certifying them for use at cleanup sites.

B. To help communities deal with the inevitable trade-offs faced when deciding between technologies, information on the performance of full-scale conventional and alternative facilities should be made available. The following technical criteria need to be considered when exploring alternative methods of clean up:

- Destruction efficiency
- Potential for the production of dangerous compounds or by-products
- Safety
- Potential for uncontrolled/fugitive releases (from handling, storage, transportation, or processing)
- Potential for vessel containment failure (leaks or other releases)
- Potential for catastrophic release (such as an explosion)
- What chemicals remain after treatment
- Potential for the leftovers to be re-processed
- Capability for and commitment to community/external monitoring throughout the life of the project
- Complete access to information about the technology
- Public acceptance
- Need for any specialized resources, including trained personnel, water, electricity, etc.
- Track record and reliability of the company/contractor and the technology (down time and maintenance issues)
- Amount of time for project completion
- Business factors (cost, management, insurance, regulation and oversight)
- Portability (potential for on-site treatment)
- Ability to dismantle and remove when cleanup is complete
- Effectiveness of treatment process when it changes scale (capability to go from small experimental size to larger field unit or change scale for different project)
- Potential for local labor and materials to be used

Coal

Problem

Dioxin can be formed when coal is burned, because most coal contains some chlorine. There are numerous environmental threats posed by coal combustion, among them emissions of mercury, nitrogen oxides, sulfur oxides, carbon dioxide and dioxin. The EPA has estimated that in 1995, utility and industrial burning of coal released from 32.6 to 163 grams TEQ of dioxin, with a central estimate of 72.8 grams TEQ. Utility and industrial burning of coal is the sixth largest source on EPA's list of dioxin emissions to air in 1995. A long term strategy to phase out the use of coal will reduce all of the threats mentioned above.

Addressing the environmental impacts of coal burning requires measures which will have an enormous impact on workers and some regions' economies. Any policy on coal must acknowledge these impacts and include provisions to minimize worker dislocation and community disruption through a program for just transition.

As with most combustion processes, the ash from burning coal is highly contaminated with dioxin, mercury, and metals. Coal ash from power plants has been exempted from the Resource Recovery and Conservation Act (RCRA)'s standards for hazardous waste. Some states are allowing the reuse of coal ash as an aggregate material for construction, as a fill material to reclaim strip mines, as landfill cover, or as an ingredient in fertilizer. Such wide distribution of contaminated ash throughout the environment is a dangerous policy. Just like incinerator ash, coal ash must be classified and treated as hazardous waste, and not "recycled" or reused.

Recommendations

- Eventual Phase-Out of Coal-Burning
- Categorize Ash as Hazardous Waste
- Ensure Just Transition for Workers

Eventual Phase-Out of Coal Burning

It is recognized that solar, wind, biomass, geothermal, and fuel cell technologies are readily available, and can produce power with little or no pollution. The cost of using renewable sources of energy is falling dramatically, and should continue to do so as demand for renewable technologies increases. Incentives for investment in energy efficiency and renewable energy are critical to making them available to consumers in the market place.

Due to the complex social, environmental, and economic issues surrounding coal mining and the use of coal as a fuel, the implementation of policies for coal should be worked out in detail by key stakeholders. Advocates for the rights of coal miners and coal-fired utility workers, the prevention of global warming, and alternative energy have been meeting to define how a phase-out of coal burning could occur without lost wages for workers or energy shortages and economic burdens for consumers. This discussion process, called the "Blue-Green Dialogue," is not yet complete. Out of respect to the amount of time, effort, and expertise these stakeholders continue to dedicate to this process, we have not elaborated implementation steps for the goal of phasing out coal burning. These details should come from this stakeholder discussion. However, any phase-out of coal should include, at a minimum, the following:

A. Increased federal procurement of renewable energy technologies.

B. Increased federal funding for research and development on energy efficiency and renewable energy.

C. Requirements for utilities to produce at least a set percentage of their electricity using renewable energy, such as solar, wind, and geothermal. This percentage should increase on a regular basis.

Categorize Ash as Hazardous Waste.

A. An immediate ban on the utilization of ash from coal plants for any purpose, due to its gross contamination from dioxin, mercury and other pollutants of concern.

B. End the exemption for coal ash from classification as hazardous waste. All ash must be managed as hazardous waste.

Ensure Just Transition for Workers

The coal industry has a dedicated labor movement and the phase-out of coal is a serious transition for workers. There have already been a number of jobs lost. It is critical that a phase-out of coal minimize worker and community impacts, by including provisions for income and benefit protection, a commitment to assisting workers in finding comparable replacement work, and measures to ensure economic vitality for impacted communities.

Industrial Burning of Treated Wood

Problem

The EPA has estimated that in 1995, wood burning in industrial facilities released from 13 to 65 grams TEQ of dioxin, with a central estimate of 29.1 grams TEQ. Industrial wood burning is the ninth largest source on EPA's list of dioxin emissions to air in 1995. Wood is burned primarily as fuel, either to generate electricity or for heat. The industrial sector accounts for over 70% of wood burned as fuel for electricity in the U.S. About 25% is burned in residential homes and about 1% is burned by utilities to generate electricity. About half of the wood consumed by the industrial sector is burned as wood waste such as wood chips, bark, sawdust, or "hogged" fuel by the paper or lumber and wood products industries. The rest of the wood consumed as fuel by industry is burned in industrial furnaces.

In their 1998 dioxin sources inventory, EPA reported that dioxin was found in all the industrial facilities burning wood which were tested. However, much higher levels of dioxin were estimated to come from facilities that burned wood containing higher levels of chlorine than normal. For example, chipboard can contain high levels of chlorine because of the binding agents it contains. Also, wood treated with pentachlorophenol (penta) contains higher levels of chlorine than untreated wood because penta is a chlorinated wood preservative which is often directly contaminated with dioxin. When burned, pent-treated wood will generate even more dioxins. Although EPA made no such estimate, other studies have shown that about three times as much dioxin is generated at facilities that burn penta-treated wood compared to non-treated wood. Burning wood containing more chlorine would result in higher dioxin emissions than those estimated above by EPA for burning untreated wood.

A number of incinerators that generate electricity have turned to burning wood in recent years. Loopholes in federal regulations allow companies that burn wood waste as fuel to generate electricity to bypass stringent solid waste burning regulations and at the same time allow the companies to charge more for the electricity they generate. The wood burned in these incinerators includes virgin wood, wood waste, and construction waste. Construction waste might include painted wood, treated railroad ties and utility poles, and wood contaminated with chemicals spilled or released during demolition.

The most common chemicals used to treat wood are pentachlorophenol (penta), copper chromium arsenate (CCA), and creosote. Penta is banned in 26 countries. In the U.S., its use is restricted to treating utility poles. There are an estimated 135 million utility poles in the U.S. and almost half have been treated with penta. Approximately three million poles are taken out of service each year. These discarded poles are not classified as hazardous waste, so they can be disposed of in municipal waste landfills or burned as fuel to generate electricity. The burning of penta-treated wood generates a significant portion of the dioxin released from wood burning and is a source which can be easily eliminated.

There are a number of loopholes in existing utility regulations that encourage the burning of wood for generating electricity. One major loophole is in the Public Utilities Regulatory Policies Act of 1978 (PURPA). One function of PURPA is to define from which sources, besides their own, utility companies are required to buy electricity. Such "Qualifying Facilities" include "small power production facilities" and "co-generation" plants. (Co-generation plants capture more energy than traditional electricity generators by capturing the steam or heat which is generated in addition to the electricity produced. The captured heat or steam is then used for commercial, industrial, or heating purposes.) PURPA allows co-generation plants to be fueled by waste such as tires, plastics, and wood, and requires the electricity generated by Qualifying

Facilities to be purchased by utilities at rates that are often greater than what it costs the utility to generate electricity at its own facility. Essentially, this acts as a subsidy for waste burners because it guarantees a rate for the electricity they generate.

Recommendations

- Eliminate Industrial Burning of Treated Wood
- Eliminate Chlorinated Wood Treatments
- Close Loopholes that Encourage Burning Wood Waste

Eliminate Industrial Burning of Treated Wood

A. Prohibit the burning of penta-treated wood and other wood treated with chlorinated compounds, whether in co-generation facilities, hazardous waste incinerators, or other industrial boilers and burners.

B. Classify and manage penta-treated utility poles as hazardous waste.

C. Support development and implementation of methods to decontaminate or destroy penta-treated wood without dioxin formation.

Eliminate Chlorinated Wood Treatments

A. Ban the use of pentachlorophenol and any other chlorinated compounds for treating utility poles.

B. Establish a Task Force on alternatives to penta-treated utility poles, consisting of producers of alternative pole materials, knowledgeable community activists, and appropriate government

representatives. The Task Force will investigate national, state, and local options for alternatives to penta-treated poles, and develop plans for the eventual removal of penta-treated poles from the environment.

C. Until a ban goes into effect, develop protective exposure standards and an education campaign for utility and construction workers exposed to chlorinated wood preservatives.

D. Identify and promote environmentally sound non-pesticide alternatives for wood preservation treatments, including those used in other parts of the world.

E. Establish strong regulations requiring non-chlorinated treatment for wood.

Close Loopholes that Encourage the Burning of Wood Waste

Eliminate subsidies for burning wood to generate electricity. Eliminate the loopholes in the Public Utility Regulatory Policies Act (PURPA) which allow the burning of chlorine-treated wood, plastics and other dirty fuels such as tires in co-generation plants and burners from which utilities are required to purchase power. Amend PURPA to allow only the use of clean alternative energy sources in Qualifying Facilities.

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Appendix A

Principles of Environmental Justice

WE, THE PEOPLE OF COLOR, gathered together at this multinational People of Color Environmental Leadership Summit, to begin to build a national and international movement of all peoples of color to fight the destruction and taking of our lands and communities, do hereby re-establish our spiritual interdependence to the sacredness of our Mother Earth; to respect and celebrate each of our cultures, languages and beliefs about the natural world and our roles in healing ourselves; to insure environmental justice; to promote economic alternatives which would contribute to the development of environmentally safe livelihoods; and, to secure our political, economic and cultural liberation that has been denied for over 500 years of colonization and oppression, resulting in the poisoning of our communities and land and the genocide of our peoples, do affirm and adopt these Principles of Environmental Justice:

1. Environmental justice affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.

2. Environmental justice demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.

3. Environmental justice mandates the right to ethical, balanced, and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.

4. Environmental justice calls for universal protection from nuclear testing, extraction, production and disposal of toxic/hazardous wastes and poisons and nuclear testing that threaten the fundamental right to clean air, land, water, and food.

5. Environmental justice affirms the fundamental right to political, economic, cultural and environmental self-determination of all peoples.

6. Environmental justice demands the cessation of the production of all toxins, hazardous wastes, and radioactive materials, and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production.

7. Environmental justice demands the right to participate as equal partners at every level of decision-making including needs assessment, planning, implementation, enforcement and evaluation.

8. Environmental justice affirms the right of all workers to a safe and healthy work environment, without being forced to choose between an unsafe livelihood and unemployment. It also affirms the right of those who work at home to be free from environmental hazards.

9. Environmental justice protects the right of victims of environmental injustice to receive full compensation and reparations for damages as well as quality health care.

10. Environmental justice considers governmental acts of environmental injustice a violation of international law, the Universal Declaration On Human Rights, and the United Nations Convention on Genocide.

11. Environmental justice must recognize a special legal and natural relationship of Native Peoples to the U.S. government through treaties, agreements, compacts, and covenants affirming sovereignty and self-determination.

12. Environmental justice affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities, and providing fair access for all to the full range of resources.

13. Environmental justice calls for the strict enforcement of principles of informed consent, and a halt to the testing of experimental reproductive and medical procedures and vaccinations on people of color.

14. Environmental justice opposes destructive operations of multi-national corporations.

15. Environmental justice opposes military occupation, repression and exploitation of lands, people and cultures, and other life forms.

16. Environmental justice calls for the education of present and future generations which emphasizes social and environmental issues, based on our experience and an appreciation of our diverse cultural perspectives.

17. Environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible; and make the conscious decision to challenge and re-prioritize our lifestyles to insure the health of the natural world for present and future generations.

Adopted, October 27, 1991

The First National People of Color Environmental Leadership Summit
Washington, D.C.

Appendix B

Principles of Just Transition

Notwithstanding the current economic expansion, job insecurity abounds. Globalization, downsizing, automation and technology, and the use and abuse of temporary workers are destroying millions of decent paying jobs. Adding to the insecurity are environmental pressures that threaten to rapidly change what is produced, and how and where production occurs.

These forces inevitably are used to divide us -- workers here versus workers in other nations, health and safety versus job security, and jobs versus the environment. We reject these no-win choices.

Just Transition offers an alternative path. It recognizes the ongoing nature of change in our economy, and the need to solve the social, economic, and ecological problems confronting us. Just Transition requires that any path to address such problems must minimize worker and community impacts. The chosen path will in turn determine the kinds and extent of assistance needed to help workers and communities hurt by these actions.

Fundamentally, Just Transition demands that workers and communities economically harmed by policies for the public good be made whole. It also requires that the right of workers to form unions and collectively bargain throughout a transition process be maintained and strengthened.

The following outlines some of the key principles of Just Transition:

1. **National Commitment**

   Just Transition requires an overarching national commitment to a just society and full-employment economy that provides family-supporting jobs to American workers now and in the future. It fundamentally recognizes that workers and their families together make up the communities that are the foundation of our nation. For an economy to be sustainable, workers must be organized into unions and communities must provide citizens with quality jobs, housing, health care, education, transportation, public services, leisure activities and a healthful environment.

2. **Making Workers Whole**
   If public policies designed to protect the public good dislocate working people, then it is the obligation of public policy to make workers whole. We need to set a very high standard for what workers and communities receive due to dislocations caused in order to protect the public good. Making whole means maintaining full income and benefits for as long as it takes to get comparable work.

3. **Broad Eligibility**
   There must be a presumption that all dislocated workers in specific industries and regions affected by public policies are eligible for targeted transition assistance. Workers in many industrial sectors and regions are often threatened by multiple factors operating at the same time, often mutually reinforcing and not always easily distinguishable. Public policies frequently serve to exacerbate the impacts and hardships of dislocations due to technological and market forces. In these circumstances, Just Transition should apply to all affected workers regardless of the cause.

4. **Fairness**
   The real costs of public policies that protect the public good must not be shouldered

disproportionately by any one group of people. We recognize that the public as a whole may benefit from policies that protect the environment. For example, while all of us gained from the ban on tetra-ethyl lead in gasoline, the thousands of workers who subsequently lost their jobs shouldered the real cost of that transition. Such an outcome violates our sense of fairness in society. In addition, these workers represent a significant resource lost to the economy if we do not re-employ their skills and experience.

5. **Labor's Role and Worker Rights**
   Workers and their representatives must be fully involved in the design, planning and implementation of Just Transition policies and programs from the national to the plant levels.

   Just Transition must also maintain and strengthen the right of workers to form unions and collectively bargain throughout a transition process. Worker involvement and labor rights are intrinsically linked. Unions fear that the dislocations will thin their ranks making it more difficult to protect remaining members, and to protect and improve the living and working standards of unorganized workers in new and existing industries. Union membership should be integral to all Just Transition programs.

6. **Comparable Work**
   Just Transition must help working people subject to economic dislocations find comparable productive work. Most workers who become dislocated want to continue their work. If that work is eliminated due to public policy shifts, income and benefits must be maintained for as long as it takes to find productive alternative work. Workers must be provided sufficient forms and levels of assistance to help them find and qualify for new family wage jobs. Dislocated workers should be given preference to receive training and be hired for new jobs created by emerging industries within an affected region. For those who want to immediately take available jobs, even at lower wages, Just Transition must provide a wage subsidy to make them whole. However, we cannot let Corporate America provide the only definition of what productive work is. A broad range of work opportunities become possible if we as labor develop our own definition of what is productive.

7. **Full Social Accounting**
   Just Transition must be based on a full accounting of the social impacts of change. While companies measure costs in ways that fail to account for the full impact of their decisions on workers and the environment, our government must assure that accounting for potential impacts of policies carried out in the public interest wholly captures the effects on workers and their communities, as well as the costs of making them whole.

8. **Full Funding**
   Just Transition requires a separate, dedicated, reliable, and sufficient national source of funds.

   To prevent the financial starvation of Just Transition, a sufficiently large dedicated fund is needed to protect dislocated workers affected by public policies. Ultimately, all domestic economic dislocations, such as those caused by environmental regulations, utility deregulation, trade agreements, and military base closures, should be covered by these funds.

9. **Advance Planning**
   Just Transition requires advance planning to ensure that adequate worker assistance mechanisms are in place before the hardships of dislocation are felt. Advance warning and preparations cut down the hardship and costs of transition after dislocation occurs. As former International Association of Machinists president William Winpisinger said regarding defense conversion, "When a gun is at your head, it's already too late." It is necessary to establish an early warning notification process for workers, unions and service providers, to ensure sufficient time to plan and implement the transition mechanisms prior to dislocation.

10. **Older Worker Protections**
    Special attention must be paid to the needs of older, high seniority workers during Just Transition. High seniority workers, especially those over 50 years old, are likely to have the hardest time with transition. Many may not be able to find alternative work or participate in redefined work/school options. Those workers should be given first choice at whatever options are available including full income and benefits until retirement, and pension and health care benefits should be guaranteed after they reach retirement age.

11. **Making Communities Whole**
    Financial and technical assistance and other policies will be needed to make communities whole. In several parts of the country, especially rural areas, some public policies can devastate a community or even an entire region. Even if workers are made whole, many may be unable to stay in their communities and support the local economy. At a minimum, an impacted community should receive funds that compensate them dollar for dollar for any loss of tax revenues to maintain the sustainability of the community. Just Transition aims to sustain economic development in such areas leading to a full economic recovery.