

Sierra Club Great Lakes Program  
An Agenda for Public Health and Environmental Protection

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**Wisconsin Should Significantly Strengthen  
its Toxic Air Pollution Regulations**

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Sierra Club Great Lakes Program  
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## **Forward**

This document is one in a series produced for the Sierra Club Great Lakes Program in order to facilitate and increase public understanding of toxic substance issues and the connection between toxic air pollution, Great Lakes water pollution and effects on human health and the environment.

In this document, we offer a critique of current state-initiated airborne toxicant rules in Wisconsin and we make a series of specific recommendations for improvements in Wisconsin's NR 445 toxic air pollution rules. Our proposed changes address the need to control persistent bioaccumulative toxics in the Great Lakes, to reduce emissions of all toxic air pollutants by imposing technology-based controls, and to provide more specific standards to evaluate and limit residual risks to health and environment from toxic air pollutants. The Sierra Club Great Lakes Program seeks adoption of new rules in Wisconsin to accomplish these objectives.

This document is one of a series of advocacy and educational materials written to help citizens understand state and federal toxic air pollution regulations and to stimulate discussion about potential changes in state regulatory policy to more fully protect public health and the environment. Other documents in this series describe state toxic air pollutant regulations in detail and provide activist's checklists.

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## Table of Contents

1.	Introduction .....	1
2.	Summary of Major Criticisms of the Wisconsin’s NR 445 Rules on Toxic Air Pollution .....	1
3.	The Sierra Club Great Lakes Program Recommendations for Public Health and Environmental Protection — Changes Needed to Significantly Increase the Stringency of Wisconsin’s Rules to Control Toxic Air Pollution .....	3
3.1	State Policy on Emissions of Airborne Toxicants Should Emphasize the Precautionary Principle, Virtual Elimination of Persistent Bioaccumulative Toxicants, Toxics Use Reduction, Pollution Prevention Practices and Chemical Testing Programs .....	3
3.2	Wisconsin Should Adopt Comprehensive Technology-Based Emission Control Requirements for New, Modified and Existing Sources Instead of Exclusively Relying on Toxic Dilution Methods for Most Regulated Toxic Emissions .....	4
3.3	Wisconsin Should Amend its Regulations to Establish a Regulatory Process for Risk Assessment and Limitations on Residual Risks Rather than Relying Exclusively on Threshold Limit Values and “Table-Based” Toxic Air Pollution Regulations .....	7
3.4	A New Process-Based Wisconsin Risk Assessment Regulation Should Always Rely on Using the Best, Most Up-to-date Toxicology Information Available .....	7
3.5	Wisconsin Should Impose Comprehensive Multi-Pathway Exposure Assessment and Risk Characterization Procedures and Residual Risk-Base Emission Standards for Emissions of Persistent Bioaccumulative Toxic Air Pollutants from New, Modified and Existing Sources .....	9
3.6	For Classes of Particular Compounds Posing Unique Risks, Wisconsin Should Require Ecological Risk Assessment .....	10
3.7	Wisconsin’s Toxic Air Pollution Regulations Should be Coordinated with Emerging Regulation for Non-Point Source Atmospheric Inputs to Impaired	

	Water Bodies Under the Federal Clean Water Act's Total Maximum Daily Load Program .....	10
3.8	Wisconsin's Exemptions from Toxic Air Pollution Regulations Must be Revised .....	11
3.9	Enforcement of Incinerator Regulations .....	11
3.10	Wisconsin's Rules Allowing High Emissions from Chlor-alkali Plants, Mercury Ore Processing Facilities and Sludge Incineration/Drying Units Must be Made More Stringent .....	11
3.11	Wisconsin Should Regulate All Poly-Chlorinated Dibenzo-Dioxins/Furans Congeners and PCDD/PCDF-like Compounds by Using Toxic Equivalency Factors (TEF) .....	12
3.12	Wisconsin's Current Best Available Control Technology Requirement for Suspected Carcinogens is Inadequate .....	12
3.13	Wisconsin Should Promulgate Rules to Restrict and/or Ban Certain Commercial, Societal and Manufacturing Uses of Mercury .....	13
3.14	Wisconsin Should More Stringently Restrict Open Burning .....	14

## 1. Introduction

The Sierra Club Great Lakes Program (SCGLP) has reviewed Wisconsin's current rules to control toxic air pollution, found in Section NR 445. Certain aspects of Wisconsin's rules are extremely weak and allow significant emissions of toxic substances because they fail to impose comprehensive technology-based emission control requirements and because of their basic list-based approach.

Because the rules are dated and obsolete, they do not ensure protection of public health – they do not rely on toxicological assessments with the most up-to-date available information. Finally, Wisconsin, as a Great Lakes State, does not have sufficient regulatory authority to deal with persistent, bioaccumulative toxic air pollutants, which are a threat to both the Great Lakes and inland waters.

Wisconsin citizens should demand that policymakers in the Thompson Administration and in the Wisconsin Department of Environmental Protection promulgate significantly more stringent rules to control airborne toxicants.

## 2. Summary of Major Criticisms of the Wisconsin's NR 445 Rules on Toxic Air Pollution

The following points summarize our major criticisms of Wisconsin's toxic air pollution rules. Each criticism is covered in more detail later in this report.

- Wisconsin's NR 445 toxic air pollution rules require technology-based emission controls for facilities emitting a small number of proven human carcinogens, as well as municipal and infectious waste incinerators. However, the rule does not require an assessment of, or a maximum limitation on, residual human health risks after this technology-based emission control requirement has been applied.
- S Although emissions of suspected human carcinogens must be controlled with Best Available Control Technology (BACT), the failure to require assessment of residual risks means that emission control technology decisions will not properly incorporate concerns about adverse public health and environmental impacts.
- S The presumption of NR 445 is that substances must be listed by the National Toxicology Program and the International Association for Research on Cancer before they can be considered as environmental carcinogens. Such a presumption means that substances for which there is credible evidence of carcinogenicity will continue to be regulated as non-carcinogens for many years until both of these agencies act on the scientific evidence.
- S Regulation of most other toxic air pollutants under NR 455 is extremely weak. For toxic pollutants that are not listed on Tables 1 through 5, both emissions and

community ambient impacts are unregulated, even for new and modified emission sources. There are no comprehensive technology-based emission control requirements for toxic air pollution in Wisconsin.

- S** For 341 toxic air pollutant listed in Tables 1, 2, 4 and 5, there are no technology-based emission control requirements; only maximum ambient concentrations of a pollutant outside of company fence lines are regulated. This allows uncontrolled emissions sources with tall stacks and long distances to fence lines to comply with the rule. In addition, emission sources are free to pollute community air resources all the way up to the level of the ambient restriction and thus make exclusive use of publicly held air resources. The rule does not prevent multiple emission sources of the same pollutant from causing ambient restrictions to be exceeded. Wisconsin tests compliance with its rules through an air quality modeling demonstration that can be subject to error.
  
- S** Ambient concentration limitations for emitted substances on Tables 1, 2 and 4 are based on out-of-date threshold limit values (TLVs) published by the American Conference of Governmental Industrial Hygienists (ACGIH) between 1987 and 1991. Ambient concentrations are limited to 2.4% of most TLVs except for those TLVs with one hour ceiling values, for which the ambient concentrations are limited to 10% of the TLV for one hour exposures. We criticize Wisconsin's use of TLVs to set community ambient limits because:
  - S** ACGIH explicitly disavows such uses in their TLV documents, notwithstanding the wide use by air quality officials nationwide of TLVs for purposes of risk assessment.
  - S** Some ACGIH TLVs are based on unpublished, non-disclosed industry data
  - S** TLVs were only meant to protect healthy workers and not human populations sensitive toxic air pollution, such as children and people with pre-existing respiratory disease
  - S** TLVs are sometimes based on non-inhalation criteria
  - S** Wisconsin has no methodology for setting ambient limits for substances for which there is no TLV
  
- S** In any case, Wisconsin's failure to use the most recently issued TLVs means that public health does not benefit from ongoing TLV reviews that reflect the most recent toxicology information available.

- S** NR 445 fails to protect public health and environment from all persistent, bioaccumulative toxic pollutants of concern in the Great Lakes region because of its failure to incorporate multi-pathway exposure and risk assessment, its failure to provide maximum risk-based limits on emissions and because NR 445's toxicant tables are not coordinated with lists associated with Great Lakes toxic air deposition concerns.
- S** Although NR 445 is not very stringent, it is nevertheless quite complex. The complexity of NR 445 results from the many provisions to extend exemptions, extend compliance deadlines and provide variances that only benefit industry.
- S** NR 445's exemption of fossil fuel burning equipment seriously undermines public health and environmental protection, particularly as it relates to mercury emissions from electric utility plants and industrial boilers and the subsequent environmental effects of these discharges.
- S** NR 445's use of a static, list-based TLV approach to evaluating ambient risks rather than a dynamic risk assessment procedure means the rule will always be out-of-date, will always fail to use the best toxicology information presently available and will fail to effectively protect public health and the environment.
- S** Finally, virtually nothing in NR 445 addresses the need to assess the ecological risks posed by potential emissions.

**1. The Sierra Club Great Lakes Program Recommendations for Public Health and Environmental Protection — Changes Needed to Significantly Increase the Stringency of Wisconsin's Rules to Control Toxic Air Pollution**

**1.1 State Policy on Emissions of Airborne Toxicants Should Emphasize the Precautionary Principle, Virtual Elimination of Persistent Bioaccumulative Toxicants, Toxics Use Reduction, Pollution Prevention Practices and Chemical Testing Programs**

The Sierra Club embraces the precautionary principle in setting policy to control toxic air pollution. . We should not wait for definitive scientific proof of environmental and public health damages before implementing prudent preventive measures to limit emissions and to evaluate and limit subsequent public health and environmental impacts from toxic air pollution.

The Sierra Club strongly opposes the use of quantitative risk assessment as a justification to allow uncontrolled, poorly controlled or poorly characterized emissions of

toxic air pollutants to the environment. Quantitative risk assessment used in this manner will inevitably lead to excessive human and environmental exposures, failure to account for exposure to multiple and synergistic environmental contaminants and unreliable characterization of potential real-world health and environmental threats. Moreover, existing risk assessment procedures often fail to consider all pathways of exposure and potential future hazards from bioaccumulation of persistent toxicants.

In the case of persistent bioaccumulative toxicants, the Sierra Club supports virtual elimination of emissions and zero discharge as the goal for point and area sources. For chemicals that exhibit persistence, bioaccumulation, or both, virtual elimination and zero discharge should be the required policy in the Great Lakes states and provinces to achieve Great Lakes restoration.

For all other toxic air pollutants, the Sierra Club strongly embraces toxics use reduction and pollution prevention to dramatically reduce public health threats and environmental impacts. Zero discharge through changes in industrial processes and the elimination of toxic materials should still be the goal in dealing with toxic air pollution.

In all cases, industries seeking to emit air toxics should be under a “reverse onus” to prove that such emissions do not pose a threat to our Great Lakes environment and public health *prior to* their widespread use and/or release. This burden of proof should never rest on the public.

The Sierra Club recommends that environmental agencies require industries wishing to use and/or emit toxic chemicals to submit detailed toxicological data on such chemicals. State and federal environmental regulators should insist on detailed toxicological testing of high production-volume chemicals to determine the potential of these materials to cause cancer, neurological damage, endocrine disruption and/or other harmful effects. Such testing must take place before emissions are permitted.

## **1.2 Wisconsin Should Adopt Comprehensive Technology-Based Emission Control Requirements for New, Modified and Existing Sources Instead of Exclusively Relying on Toxic Dilution Methods for Most Regulated Toxic Emissions**

Currently, NR 445 only requires technology-based emission controls for 111 chemicals and elements which have been listed under the rule as known or suspected human carcinogens (cancer causing chemicals) and for municipal solid waste incinerators. For the 341 other regulated substances in Tables 1, 2, 4 and 5 of NR 445, there are no technology-based emission control requirements other than those that might apply from regulation as common criteria pollutants (pollutants that cause smog formation or airborne particles).



The only restrictions on these toxic air pollutants, then, are the maximum ambient, ground-level air concentrations at the fence-line of an industry source. This means that tall stacks, long distances to property fence lines and other “dilution” methods, rather than emissions controls, can be relied upon to meet these restrictions for most air contaminants regulated under the rule.

Under Wisconsin’s “ambient” approach to regulating toxic air pollution, individual emission sources can make exclusive use of available air resources by polluting community air all the way up to the level of ambient pollutant concentration limit. Nothing in the rule effectively prevents adjacent sources from doing the same thing, even where both sources may have a combined effect on community air resources.

In addition, under Wisconsin’s “ambient” approach, public health protection relies exclusively on the risk assessments used to establish the maximum ambient concentration limits. There is no back-up protection for public health if these risk assessments or the air quality modeling exercises intended to show compliance with the limits are in error.

Wisconsin’s approach isn’t precautionary, doesn’t protect the public trust in air resources and doesn’t necessarily protect public health because of errors and imperfection in making modeling predictions of the impact of sources on community air quality.

With comprehensive technology-based emission control requirements, sources must install emission control equipment or make changes to processes and process equipment to reduce emissions. Any residual threats to public health and environmental protection can then be evaluated.

The SCGLP recommends the following technology-based emissions control technology requirements:

<b>Pollutant or Source Category</b>	<b>Emission Control Requirement</b>
Persistent bioaccumulative toxics from either new, modified or existing sources	Lowest Achievable Emission Rate (LAER) technically achievable, consistent with “virtual elimination” goals of the Binational Toxics Strategy
Known or suspected human carcinogens as indicated by credible evidence; chemical compounds having serious chronic endocrine disruption, teratogenic and/or neurological effects in human systems	Lowest Achievable Emission Rate (LAER) technically achievable
New, modified or existing municipal solid waste or medical waste incinerators	Lowest Achievable Emission Rate (LAER) technically achievable, consistent with “virtual elimination” goals of the Binational Toxics Strategy
New or modified sources of all airborne toxicants other than those indicated above	Best Available Control Technology (BACT) determined by a top-down methodology similar to BACT for Prevention of Significant Deterioration Sources
New, modified and/or existing sources of airborne toxicants which are serious pulmonary irritants and/or sensitizers with serious acute and chronic effects on respiratory function (i.e. hydrogen sulfide, sulfuric or nitric acid aerosol, isocyanates, chlorine and chlorine dioxide, hydrogen fluoride, etc.)	Best Available Control Technology (BACT) determined by a top-down methodology similar to BACT for Prevention of Significant Deterioration Sources
Existing sources of airborne toxicants other than those noted above which are listed by rule and which are not otherwise subject to requirements for new/modified sources	Reasonably Available Control Technology similar to a level of stringency associated with CAA Maximum Achievable Control Technology requirements for existing sources

### **1.3 Wisconsin Should Amend its Regulations to Establish a Regulatory Process for Risk Assessment and Limitations on Residual Risks Rather than Relying Exclusively on Threshold Limit Values and “Table-Based” Toxic Air Pollution Regulations**

For new and modified sources of toxic air pollution, Wisconsin should abandon its table-based approach and regulate the full spectrum of air toxic materials emitted after the application of technology-based controls as indicated in the prior section.

According to the National Institute for Environmental Health Sciences:

“There are 50,000 chemicals in commercial production. It is estimated that about 10,000 are in significant commercial production and perhaps 2,000 present significant exposure levels. We do not know what fraction of those have been adequately tested, but certainly it is not much more than 10 to 30 percent.”<sup>1</sup>

By contrast, current Wisconsin regulations require only limited controls for 452 different chemical compounds and elements. Many of the listed chemicals are pesticides and pharmaceuticals not likely to be emitted, so the coverage is even less than the absolute number of 452 regulated substances would suggest. Clearly, most toxic air pollutants will be unregulated in Wisconsin in the absence of new standards designed to rein in such unregulated emissions.

New and modified sources will pose the greatest long term potential for public and environmental exposure because they will be in existence and emitting for the longest period of time. New and modified sources also offer the most significant opportunities to impose new, modern air contaminant controls designed to curb emissions.

### **1.4 A New Process-Based Wisconsin Risk Assessment Regulation Should Always Rely on Using the Best, Most Up-to-date Toxicology Information Available**

Table-based rather than process-based regulatory procedures will always lead to the regulations being out-of-date and unable to protect public health with the latest, most up-to-date toxicology information.

Under a process based rule for pathway analysis, exposure determination and risk assessment, explicit procedures are set forth in the rule on precisely how such assessments should be conducted and what data is to be used. Such a process-based rule would require the use of the best possible toxicology data available for risk assessment

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<sup>1</sup> See <http://www.niehs.nih.gov/oc/factsheets/ead/text.htm>

purposes. If no toxicology data is available, then a stringent ambient limitation of 0.1 micrograms/cubic meter for an annual average should be imposed. The entire structure of the process should always encourage the development of the best, most reflective toxicology data available, rather than merely relying on threshold limit values as the present rule requires.

For environmental carcinogens, the process set forth in the rule would show the appropriate risk assessment procedure for the determination of what exposure is associated with a one in a million risk for environmental carcinogens. The linearized multi-stage model of carcinogenicity should be used for a conservative prediction of one in a million risk levels for airborne concentrations assuming a 70 year lifetime exposure. The assumption of this model is that there is no threshold for increases in risk from exposure to proven or suspected human cancer causing materials; and that elevations in cancer risk can be caused by chemical agents that either initiate or promote carcinogenic processes.

For non-carcinogens, the procedure would specify the appropriate species difference, route difference and dose conversions and other uncertainty factors to be used.

Risk assessment for environmental carcinogens should rely on all available credible and up-to-date scientific evidence of carcinogenicity and dose response relationships, rather than a static list-based process relying on data that can be ten or more years old.

Individual permitted emissions for new and modified sources of environmental carcinogens should not cause lifetime cancer risks from inhalation exposure at the company property line to exceed one in a million. For non-carcinogens, modeled air concentrations of toxic air pollutants should not exceed screening levels predicted by the applicable rule-described process based on the use of the best toxicology information available.

Here is the hierarchy of available toxicology data on non-carcinogens in order of increasing quality for community air pollution risk evaluation procedures as one goes down the table:

<b>Toxicology Data for Risk Assessment for Non-Carcinogens</b>
No data available; use 0.1 ug/M3 for annual average screening level
Only LD-50 available
An LC-50 is available
An oral route, 7 day No Observable Effects Level is available
An inhalation route, 7 day No Observable Effects Level is available
An ACGIH TLV is available; use 1% of the TLV as screening level
A NIOSH recommended occupational health exposure guideline is available; use 1% of the guideline as the screening level
An EPA Reference Dose is available
An EPA Reference Concentration is available

For each of the above types of toxicology data, appropriate and conservative dose route conversion factors, species difference factors and other uncertainty factors should be used to ensure public health protection.

For toxic air pollutants with acute toxicity, dose conversion factors and other uncertainty factors should use respiration rates, body sizes and whole body dose calculations appropriate to protect children who spend a great deal of their time outdoors.

For pulmonary irritants and sensitizers, such as toluene di-isocyanate and chlorine dioxide, short term averaging times as brief as ten minutes should be considered for maximum health protection.

### **1.5 Wisconsin Should Impose Comprehensive Multi-Pathway Exposure Assessment and Risk Characterization Procedures and Residual Risk-Base Emission Standards for Emissions of Persistent Bioaccumulative Toxic Air Pollutants from New, Modified and Existing Sources**

All new, modified and existing sources should be required to perform residual risk assessments after applying technology-based emission control requirements for persistent bioaccumulative toxicants, known or suspected carcinogens and other toxic pollutants.

In the event that Wisconsin retains a table-based approach to their regulation, Wisconsin should ensure that any table-based regulations that remain in effect are properly coordinated with designated tier 1 and 2 pollutants under the Binational Toxics

Strategy. Additional chemical compounds that display persistent bioaccumulative behaviors should also be added to any remaining Table-based regulations in NR 455.

Risk assessment for persistent bioaccumulative toxicants should incorporate multi-pathway exposure assessment and should identify sensitive demographic population subgroups (i.e. subsistence fishers, local consumers and farmers who may be more at risk from exposure on farmland adjacent to airborne toxicant sources, etc.).

An individual source, together with other multiple sources and background, should not be permitted to cause excess cancer risks calculated for all pathways to exceed one in 100,000.

### **1.6 For Classes of Particular Compounds Posing Unique Risks, Wisconsin Should Require Ecological Risk Assessment**

Certain materials, such as tri-butyl tin, pose unique ecological risks that will not be reflected in multi-pathway human health risk assessments. Wisconsin should develop either a rule-based process to identify these materials and to require ecological risk assessment during permitting or a Table should be developed to list these materials by rule if Wisconsin retains its table-based regulation. In cases where ecological risk assessment is warranted because of an individual toxic air pollutant, permitting of emission sources should not allow exclusive use of natural resources or decisions to allow irretrievable commitment of natural resources that would allow local or regional biodiversity to be damaged.

### **1.7 Wisconsin's Toxic Air Pollution Regulations Should be Coordinated with Emerging Regulation for Non-Point Source Atmospheric Inputs to Impaired Water Bodies Under the Federal Clean Water Act's Total Maximum Daily Load Program**

Non-point source atmospheric pollution of the Great Lakes and inland lakes of this region has emerged as a serious public health and environmental problem. Under the Clean Water Act's program to develop Total Maximum Daily Load budgets for water bodies impaired by airborne deposition of chemical contaminants, measures must be taken to roll back emissions from existing sources and to prevent new sources from making problems worse.

Wisconsin's toxic air pollution regulations should be amended to authorize TMDL-based toxicant budget limitations during permitting of new, modified and existing sources.

### **1.8 Wisconsin's Exemptions from Toxic Air Pollution Regulations Must be Revised**

Wisconsin's present system of exemptions from NR 455 should be revised because major classes of toxic air pollutant sources are exempted and unregulated through these exemptions. In particular, the present exemption for fossil fuel burning devices will lead to unregulated emissions of mercury, arsenic and poly-cyclic aromatic hydrocarbons (PAH) from fossil fuel burning combustors, such as electric utilities, cement plants and industrial boilers. Recent information shows that such industries can be major sources of mercury.

Wisconsin should discontinue its current exemptions for gasoline distribution activities when feasible and prudent emission control techniques exist to control excess cancer risks from gasoline marketing and distribution. Implementation of more stringent measures in this commercial sector will also reduce regional smog problems.

### **1.9 Enforcement of Incinerator Regulations**

Although the current NR 455 imposes a technology-based emission limitation of "lowest achievable emission rate" on municipal solid waste and infectious waste incinerators, it is not clear that this requirement is being imposed across the board on all waste incinerator sizes. Enforcement of stringent technology-based emission standards is important for smaller incinerators since existing federal requirements only apply to municipal waste incinerators larger than 250 tons per unit.

Wisconsin should interpret its current standards to prohibit common household, commercial and apartment waste incinerators which generally lack emission controls. For other waste incinerators, Wisconsin DNR should ensure that all facilities in the state comply with the stringent technology requirements.

### **1.10 Wisconsin's Rules Allowing High Emissions from Chlor-alkali Plants, Mercury Ore Processing Facilities and Sludge Incineration/Drying Units Must be Made More Stringent**

Wisconsin presently allows chlor-alkali plants and mercury ore processing facilities to discharge over 5 lbs of mercury per day (1825 lbs/year); the same rules allow sludge incinerators and dryers to discharge over 7 lbs of mercury per day (2555 lbs/year).

Such mercury limits are extremely lenient for major sources, which can achieve much lower limits with state of the art emission control technologies, pollution prevention or effective limitations on mercury feedrates. As such, these rules (found at NR 446) are not consistent with a "virtual elimination" strategy for control of mercury emissions.

Wisconsin should impose technology-based mercury emission control and feedrate limits that will reduce mercury emissions by at least 95% compared to the uncontrolled emission rates for these facilities.

### **1.11 Wisconsin Should Regulate All Poly-Chlorinated Dibenzo-Dioxins/Furans Congeners and PCDD/PCDF-like Compounds by Using Toxic Equivalency Factors (TEF)**

Currently, the only chlorinated dioxin compound regulated by Wisconsin is 2,3,7,8 tetra-chloro-dibenzo(p)dioxin (TCDD) as a suspected human carcinogen. However, other chlorinated dioxin congeners are also toxic, such as 2,3,7,8 tetra-chloro-dibenzofuran, which is thought to be about 1/10th the toxicity of 2,3,7,8 TCDD.

Wisconsin should regulate all poly-chlorinated dibenzo dioxins/furans through a system of toxic equivalency factors and lowest achievable emission rate technology-based emission controls.

### **1.12 Wisconsin's Current Best Available Control Technology Requirement for Suspected Carcinogens is Inadequate**

Although Wisconsin provides for Best Available Control Technology (BACT) emission control requirements for suspected carcinogens, no residual risk determination is done after imposing the technology-based requirement. However, BACT is defined as

“Best available control technology” means an emission limitation for a hazardous air contaminant based on the maximum degree of reduction practically achievable as specified by the department on an individual case-by-base basis taking into account energy, economic and environmental impacts and other costs related to the source.”

Unfortunately, the failure of Wisconsin to require a determination of residual risks means that Wisconsin DNR will be incapable of determining the “environmental impact” of the expected emission and that Wisconsin BACT determinations will be less stringent than would otherwise be expected from the text of the rule. Wisconsin should implement Sierra Club recommendations for comprehensive assessment of residual risks after the application of technology-based emission controls to solve this problem.



**1.13 Wisconsin Should Promulgate Rules to Restrict and/or Ban Certain Commercial, Societal and Manufacturing Uses of Mercury**

Wisconsin should promulgate rules to restrict and/or ban the sale, use, and disposal of certain mercury-containing items and work practices involving mercury. These restrictions are intended to reduce or eliminate mercury pollution in the environment or to achieve mercury use reductions where feasible and prudent alternatives exist. The restrictions would also reduce mercury use patterns when frivolous (such as use in clothing) or when such patterns are otherwise expected to cause unnecessary mercury emissions to the environment. Finally, some of these restrictions can be expected to reduce the potential for serious indoor mercury contamination problems.

<b>Proposed Restrictions, Bans and Work Practices Concerning Mercury Products</b>
Ban on sale of mercury-containing games, apparel, decorations and novelties
Requirement for recyclers to remove mercury switches for mercury recovery from vehicle processing and white goods
Requirement for health care facilities to collect mercury-containing medical batteries and recycle for mercury recovery
Requirement for building demolition companies to collect mercury containing thermostats and electrical switches for mercury recovery and/or proper disposal
Ban the sale and use of mercury fever thermometers
Restrict use of mercury meteorological instruments by government, industry and scientific users
Ban on the sale of household mercury thermostats and electrical switches
Requirement for mortuaries to recover dental amalgams before cremation
Prohibit bulk mercury sale to general public and restrict sale only to government, scientific, educational and industrial users; mercury sales for ritualistic uses to be banned
Restrict sale of batteries to minimal mercury content achievable with current battery manufacturing techniques
Require proper disposal techniques for mercury-containing fluorescent lights for large commercial, government, educational, industrial and institutional users

Require fugitive control measures for preparation of dental amalgams, collection measures for water recovered from dental drilling for amalgam removal and restrictions on disposal of removed amalgams
Prohibition on incineration of phenol mercuric acetate wastes in cement kilns
Restrictions and performance standards on mercury recovery operations to limit fugitive emissions and environmental impacts
Provide money and staff for the mercury “Clean Sweep” programs

**1.14 Wisconsin Should More Stringently Restrict Open Burning**

Wisconsin’s current open burning regulation is too permissive. Open burning of construction waste, trash and leaves can emit a wide variety of toxic air contaminants. These emissions not only cause local nuisances and property damage through soiling and odors, such emissions will likely cause severe difficulty for people with respiratory ailments.

Open burning can be a significant regional source of toxic metals, poly-chlorinated dibenzo-dioxins/furans and polycyclic aromatic hydrocarbons, all of concern for Great Lakes water quality. As a result, these sources should come under more stringent state rule control.