MUNICIPAL AND MEDICAL WASTE INCINERATORS

In 1997, the U.S. Environmental Protection Agency acknowledged that *"[s]everal studies have identified strong correlations between chlorine content and CDD/CDF [dioxin] emissions during combustion tests."* At the same time, the Agency confirmed that PVC is a dioxin precursor.

Source: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Office of Air and Radiation, 1997. LOCATING AND ESTIMATING AIR EMISSIONS FROM SOURCES OF DIOXINS AND FURANS, EPA-454/R-97-003, Research Triangle Park, North Carolina, May 1997.

At the Bielefeld municipal waste incinerator in Germany, effective measures for reducing dioxin emissions included *"exclusion of PVC and computer scrap in the input."*

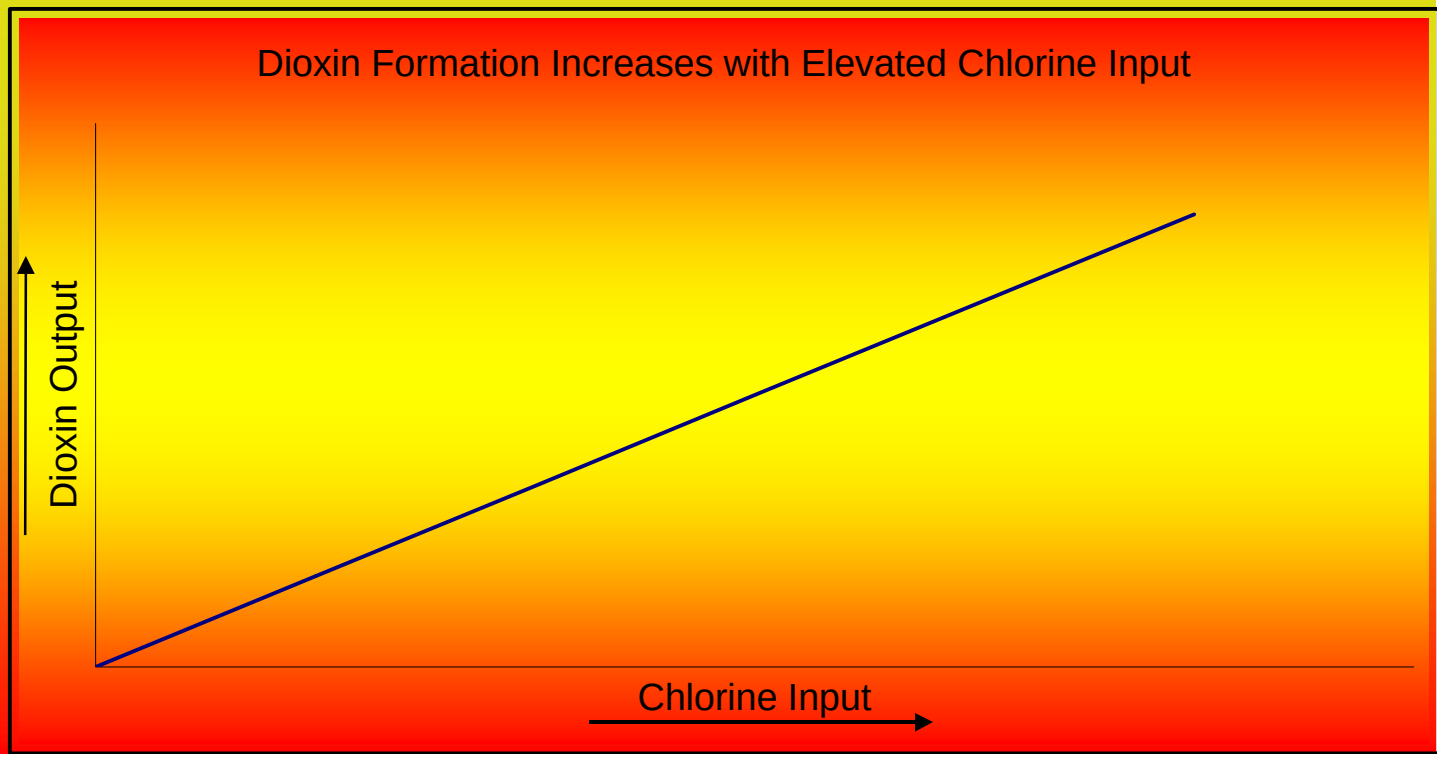
Source: Wilken, M.; Boske, J.; Jager, J.; Zeschmar-Lahl, B. 1994. PCDD/F, PCB, chlorobenzene and chlorophenol emissions of a municipal solid waste incineration plant (MSWI) - variation within a five day routine performance and influence of

Mg(OH)2-addition. Chemosphere 29 (9-11): 2039-2050.

The U.S. Environmental Protection Agency acknowledges that, for laboratory- and pilot-scale studies, their *"review of experimental data clearly indicates an association between chlorine content of feed/fuels and the potential synthesis of CDDs and CDFs."*

Source: U.S. Environmental Protection Agency, 2000. Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. Washington, DC, September 2000.

MANY STUDIES WITH LABORATORY- AND PILOT-SCALE COMBUSTORS HAVE FOUND THAT INCREASED CHLORINE INPUT LEADS TO GREATER DIOXIN FORMATION



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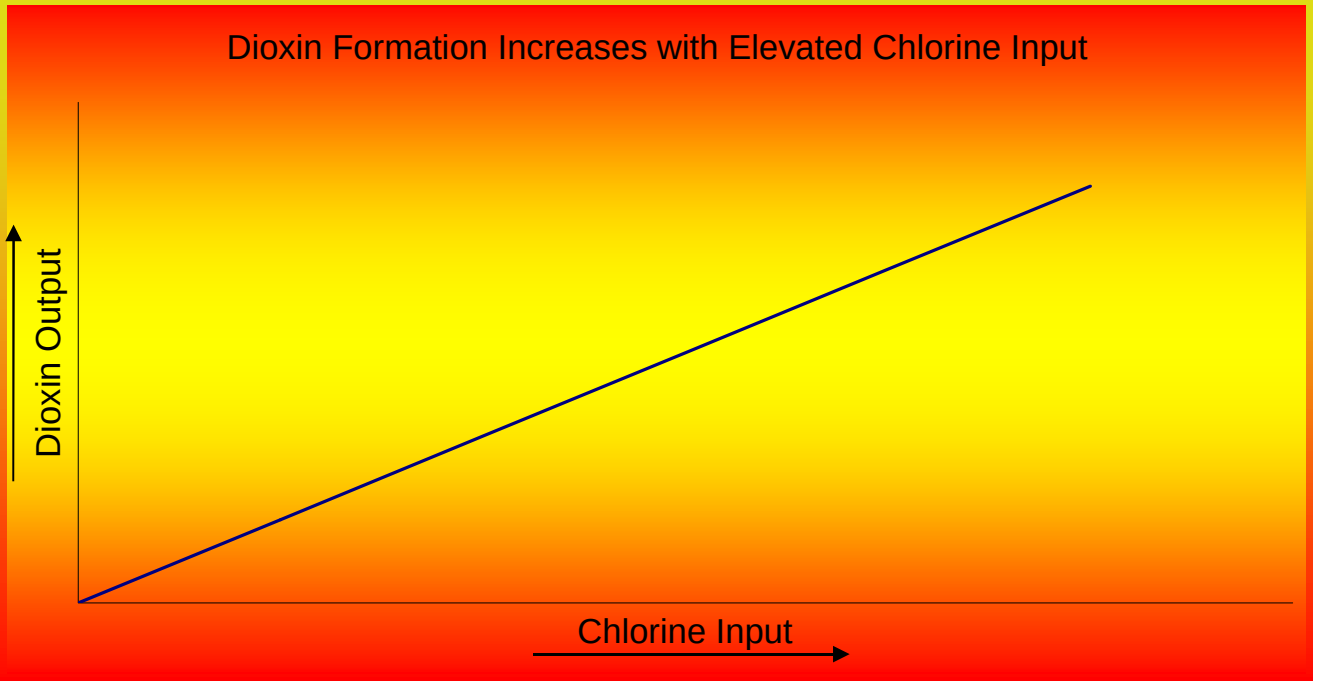
STUDIES OF SMALL-SCALE AND OTHER COMBUSTION SYSTEMS HAVE FOUND THAT INCREASED CHLORINE INPUT LEADS TO GREATER DIOXIN FORMATION



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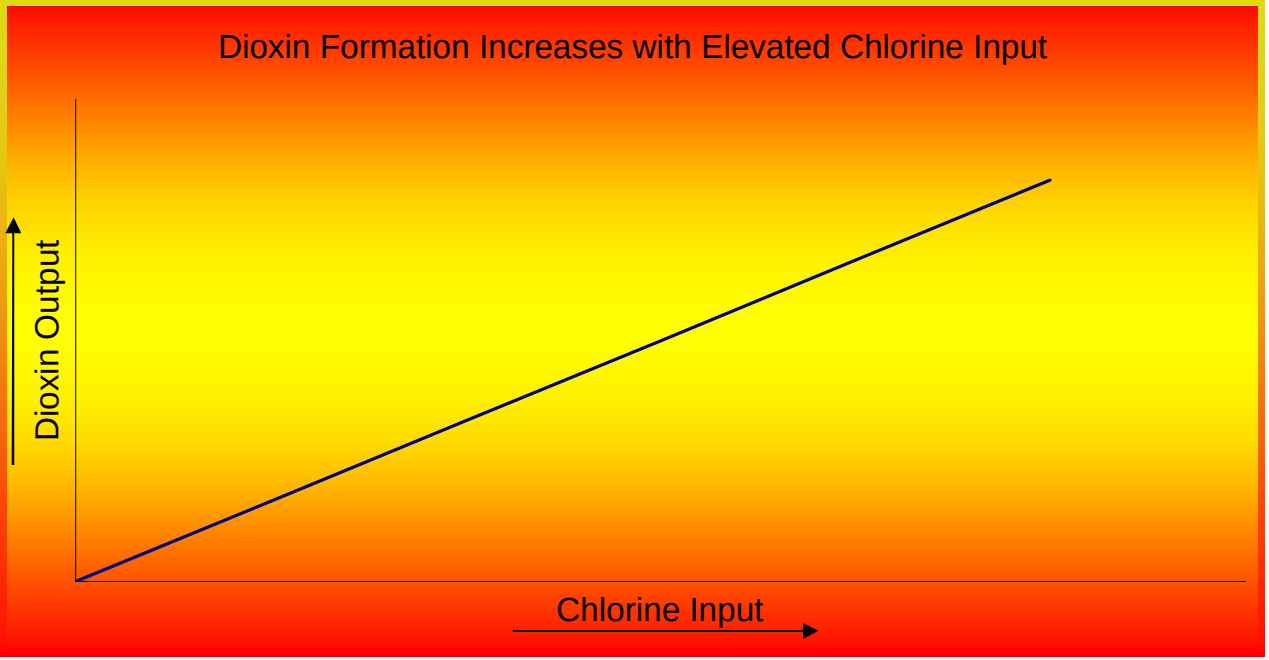

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Lower chlorine input has been found to correlate with reduced dioxin formation in studies carried out in

* **laboratory- and pilot-scale combustion systems**
* **small-scale combustion systems , and**
* **full-scale combustion systems.**

In the specific case of full-scale waste incinerators, some studies have found decreased dioxin formation with reduced chlorine input, while others have not.

This has led many policymakers and others to surmise that, for this particular category of combustion systems, chlorine input has little or no influence on dioxin formation.

No scientific theory has been advanced to explain how or why the chlorine/dioxin relationship in full-scale waste incinerators should differ from that in other combustion systems.

A very practical explanation for the inconsistent findings among studies of waste incinerators can be found among the various factors that are known to weaken and confound the results of such studies:

- **study design flaws;**
- **sampling and analytical methods that yield highly uncertain data;**
- **delayed release of dioxins (memory effect); and**
- **high variability of waste contents and incinerator operating conditions).**

These and other extraneous factors create a background of experimental `noise'. This background noise is simply too great to allow consistent characterization of the relationship of chlorine input and dioxin formation in full-scale waste incinerators.

Taking this background noise into account, the many studies that have been conducted in a variety of different combustion systems, including full-scale waste incinerators, constitute a compelling body of evidence that dioxin formation in waste incinerators decreases when chlorine input is reduced.

In the Convention on Long-Range Transboundary Air Pollution, the Parties have agreed that reducing inputs of plastics, e.g., PVC and other chlorine-containing materials, is an effective and often low-cost method for reducing dioxin formation in full-scale combustion systems including iron/steel production, sinter plants, primary and secondary copper production, aluminum production, utility and industrial boilers, motor vehicles and domestic appliances.

Long Range Transport of Air Pollutants, Annex V, Best Available Techniques to Control Emissions of Persistent Organic Pollutants from Major Stationary Sources and Annex VII, Recommended Control Measures for Reducing Emissions of Persistent Organic Pollutants from Mobile Sources. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants.

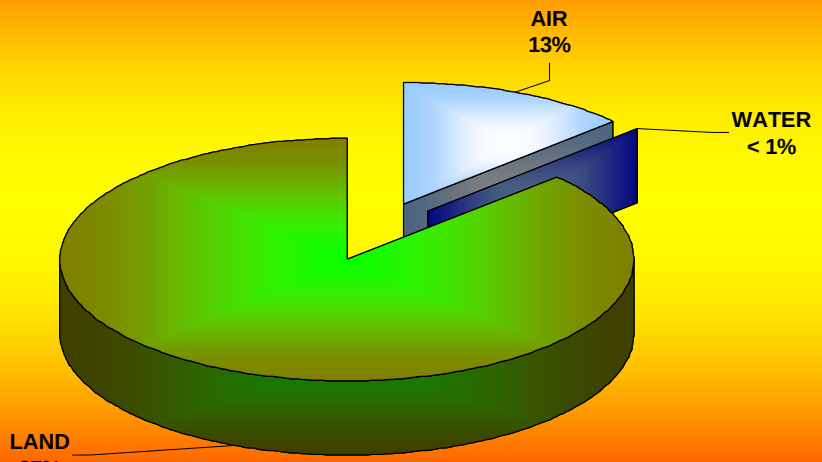
National Research Council, 2000. Waste Incineration & Public Health. ISBN 0-309-06371-X, Washington, D.C.: National Academy Press.

"THE COMMITTEE'S CONSENSUS JUDGMENTS ABOUT WASTE INCINERATION AND PUBLIC HEALTH … Dioxins, furans, and mercury are examples of persistent pollutants for which incinerators have contributed a substantial portion of the total national emissions. … Whereas one incinerator might contribute only a small fraction of the total environmental concentrations of these chemicals, the sum of the emissions of all the incineration facilities in a region can be considerable. The primary pathway of exposure to dioxins is consumption of contaminated food, which can expose a very broad population. In such a case, the incremental burden from all incinerators deserves serious consideration beyond a local level.

Thus, the committee has a substantial* degree of concern for the incremental contribution to dioxins emissions from all incinerators on a regional level and beyond. " [Emphasis added]

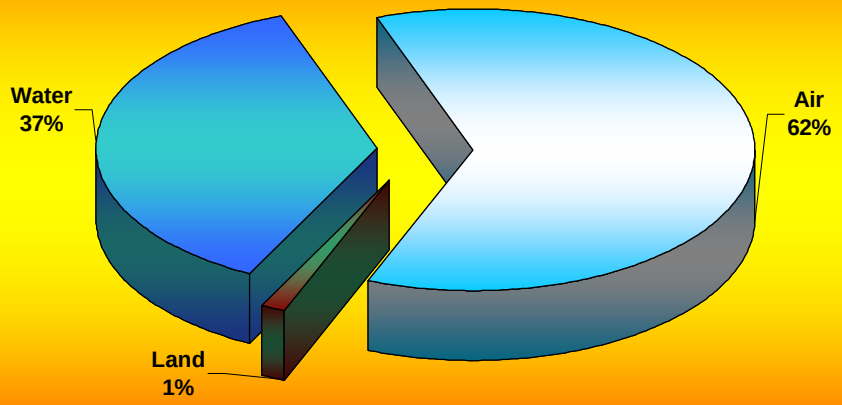
**** "The term "substantial" is used to express the committee's highest degree of concern …"*** **The committee expressed this, its highest degree of concern about dioxin releases from incinerators, irrespective of the implementation of Maximum Achievable Control Technology.**

European Union Dioxin Releases to Air, Water & Land



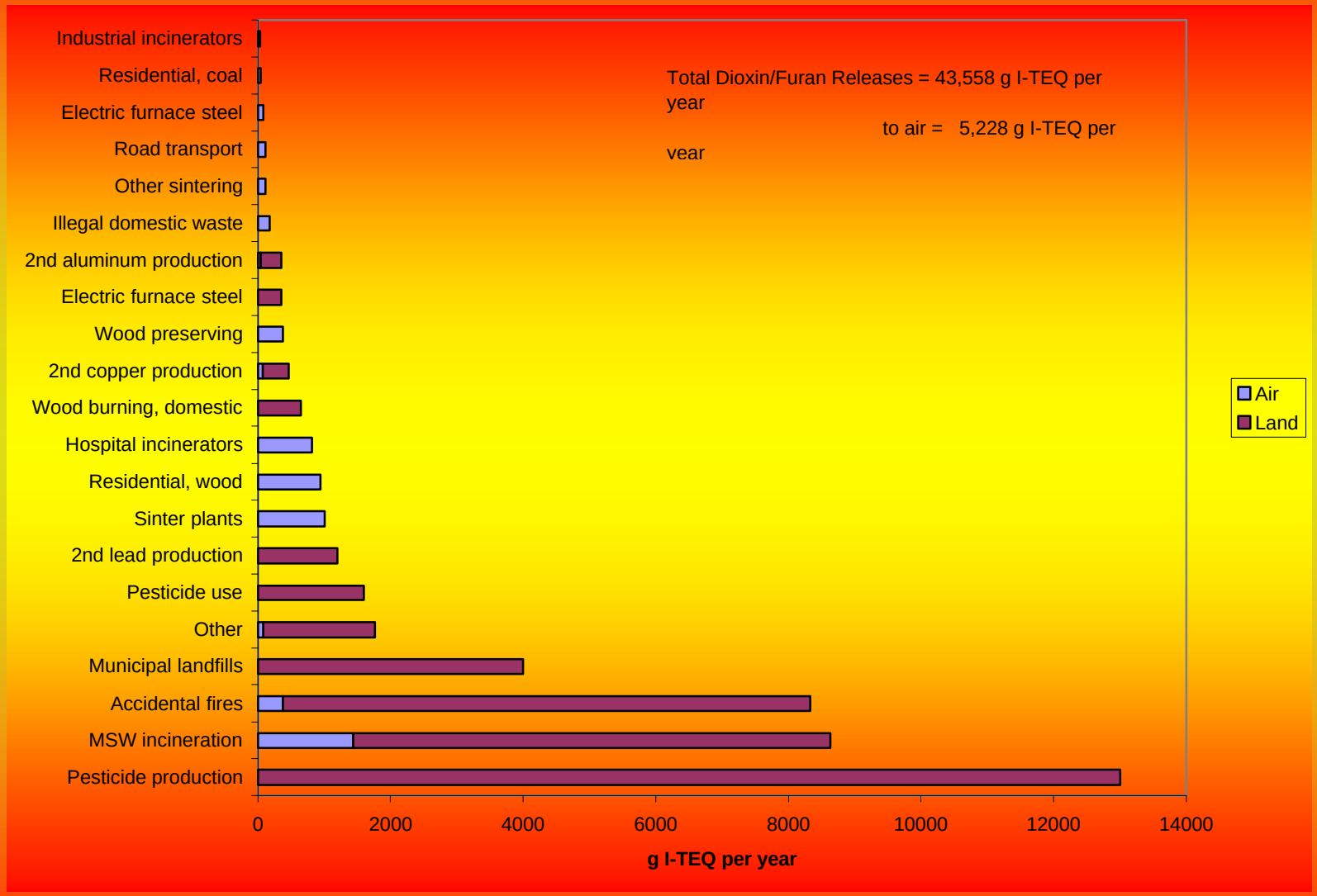
Total Dioxin Releases to All Media = 44,058 g I-TEQ per year

U.S. Dioxin Releases to Air, Water and Land (USEPA, 2000)

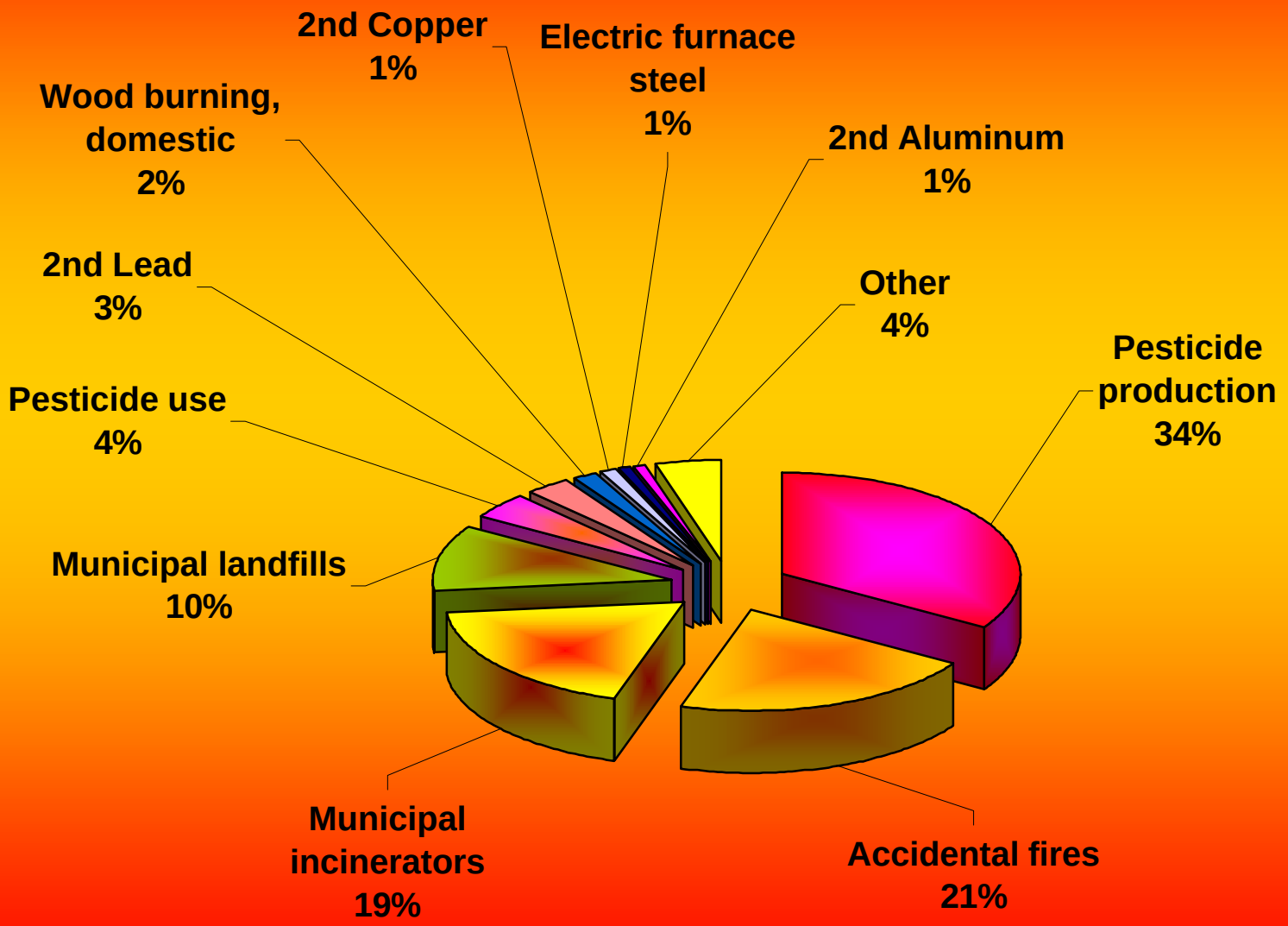


Total Dioxin Releases to All Media = 7,917.8 g I-TEQ/year

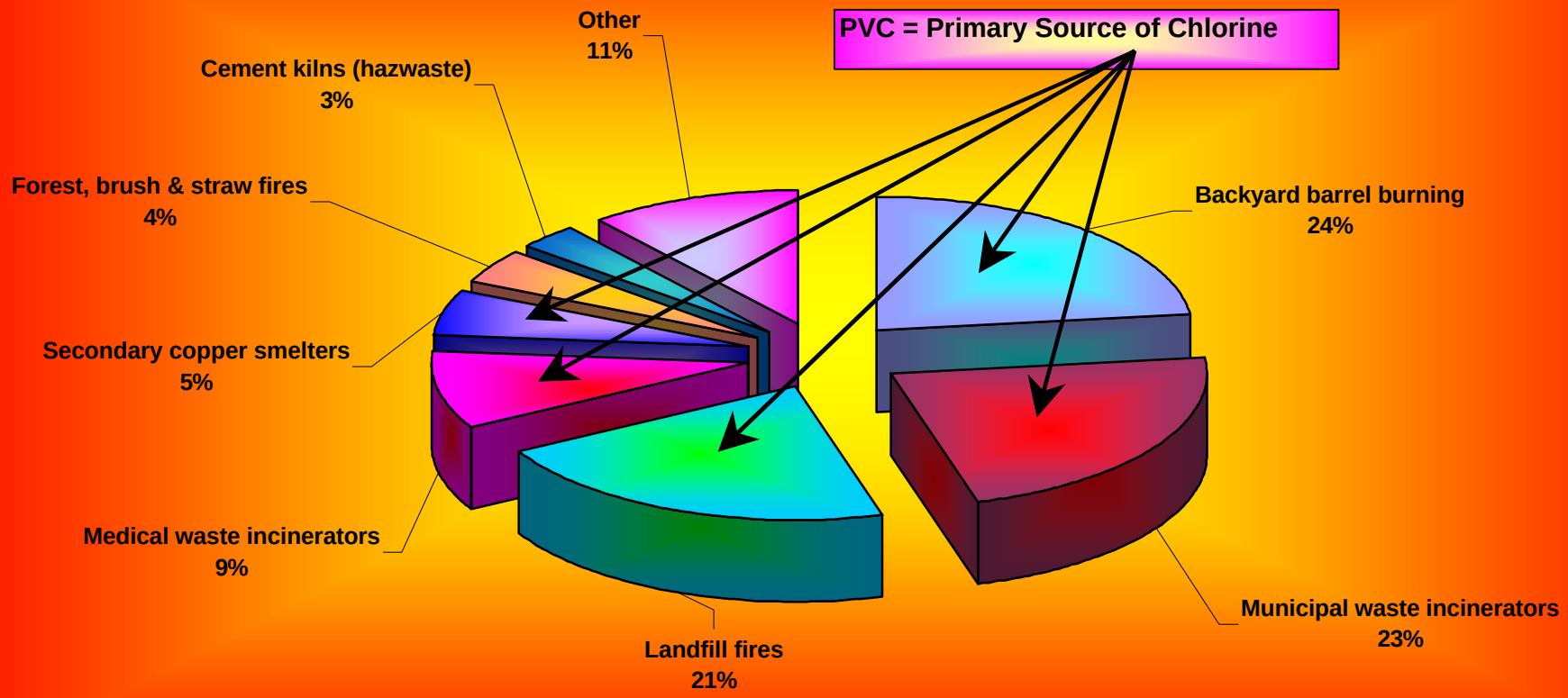
European Union Dioxin Release to Air & Land



European Union Dioxin Releases to Land, Total = 38,330 g I-TEQ/year



U.S. Dioxin Releases to Air from `Quantified' and `Unquantified' Sources in 1995 USEPA (2000)



Total Estimated Releasees to Air = 4,884.7 grams I-TEQ per year

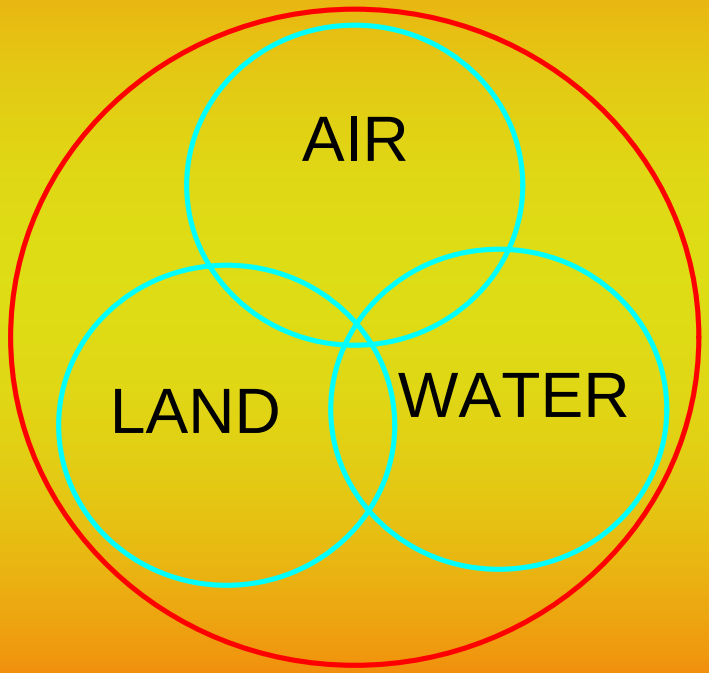
SOURCES OF DIOXINS AND FURANS

CHLORINE

- WASTE INCINERATION
- FERROUS AND NON-FERROUS METAL PRODUCTION
- POWER GENERATION AND HEATING
- MINERAL PRODUCTS
- TRANSPORT
- UNCONTROLLED COMBUSTION
- CHEMICAL PRODUCTION
- MISCELLANEOUS
- DISPOSAL / LANDFILL
- HOTSPOTS / RESERVOIRS

DIOXINS

WHAT IS THE ENVIRONMENT?



EU Dioxin Inventory

- All dioxin releases are reported as being to either air, water or land.
- Dioxins in products are not addressed.

US Dioxin Inventory

- Dioxins in residues sent to landfill are not considered to be releases to the environment and are not reported.
- Dioxins in products are reported separately from releases to air, water and land.

UNEP Dioxin Toolkit

- Dioxins in residues sent to landfill are reported but are not considered to be releases to the environment
- Dioxins in products are reported separately from releases to air, water and land.

GREENPEACE Reports

http://ww.greenpeace.org/~toxics/

* **Chlorine, Combustion and Dioxin: Does Reducing Chlorine in Wastes Decrease Dioxin Formation in Waste Incinerators?**

* **Incineration and Human Health**

* **Dioxin Elimination: A Global Imperative**

* **The Burning Question: Chlorine & Dioxin**

* **The Relationship Between Chlorine Input to Combustors and Dioxin Output: An Annotated Bibliography**

* **Technical Criteria for the Destruction of Stockpiled Persistent Organic Pollutants**

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