

Addressing Hazardous Air Pollutants (HAPs or Air Toxics) in Wisconsin

Overview of WI Program & Recent Dioxin Testing Results
from a Sewage Incinerator for Dioxin Equivalents (WHO-
2005 ITEFs: Dioxins, Furans & PCBs)

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Wisconsin Facts



- Population 5.5 Million
- Most Residents in SE Part of State
 - 36% of residents live in 7 SE counties
- Milwaukee County Population 940,000
 - 18% of Total State Population
- Major WI Industries: Agriculture, Tourism, Pulp and Paper, Wood Products, Printing, Foundries, Metal Fabrication, Utilities (~70% of power from coal)
- 1.4 Million Dairy Cows (14% of US Total)

Wisconsin Facts: Air Sources

- 1500 Permitted Sources
- 650 Title V Major CAAA Sources
- 2100 Sources Report to the Inventory
 - We have sources that don't need permits that need to report to the inventory
- 240 New/Modified Construction Permits/Year

Why Does Wisconsin Have it's Own HAP Program?

- Federal HAP Program was not proceeding fast enough
- Citizens petitioned Department in early 1980's about the concern with slow progress over federal NESHAP program
- This led to task force and recommendation for rule – multi-year process 1982-1987
- Rule became effective in 1988 (2 years before 1990 Clean Air Act Amendments)

WI Air Toxics Rule Background

(Cont'd)

- Rule was controversial and lawsuits were filed by some industry groups claiming it went beyond statutory authority
- 1990 Court decision upheld majority of rule
- 1995 Rule revised to incorporate use of US EPA reference concentrations for chronic non-cancer effects
- July 2004 Latest rule revision effective

Basics of WI Air Toxics Rule

(Ch. NR 445 Admin. Code)

- Applies to new/modified and existing facilities, even those that do not need a permit
- About 438 chemicals listed originally
- Rule revised effective July 1, 2004 to cover a total of about 535 chemicals, including diesel exhaust and coal dust
- Sets ambient air concentrations (not to be exceeded beyond the property line, regardless of land use) for:
 - Acute non-carcinogens (based on ACGIH TLVs)
 - Chronic non-carcinogens (based on US EPA reference concentrations (RfCs))
- Establishes control technology requirements for carcinogens (must be listed by BOTH IARC and NTP to be considered)

Thresholds in WI Air Toxics Rule

- There are threshold tables in the rule that give a listing of emission rates that one can compare against
- Thresholds are based on modeling of a generic facility at 4 different stack heights, so as not to exceed a given standard or 10^{-5} risk for carcinogens - it is meant to filter out small emitters
- If non-exempt potential emissions are below these thresholds, then one documents their calculations and they are done
- If above thresholds, modeling or other compliance options available, or source must meet the Standard

Risk Based Off-Ramps

- In July 2004 Revisions, we offered a risk-based off-ramp where sources can:
 - For Single Pollutant: demonstrate $<10^{-6}$ risk
 - Facility Wide: demonstrate $< 10^{-5}$ risk
- Reason: Historically many sources could demonstrate it was too costly to control risks and an expensive technology review would achieve no environmental benefit. This allows us to concentrate resources on higher risk sources


Why Does the WI Rule Look the Way it Does Today?

- It looks this way because of the unique problems, social, economic and political landscapes in Wisconsin
- It is a hybrid of ambient standards for non-carcinogens and technology standards for carcinogens
- It tried to go beyond federal rules, to fix any health gaps in the federal HAP program, but is now required to be "no more stringent than" the federal program, thus WI program "complements" the 112(d) standards
- It is trying to focus resources on significant risks, rather than on all sources

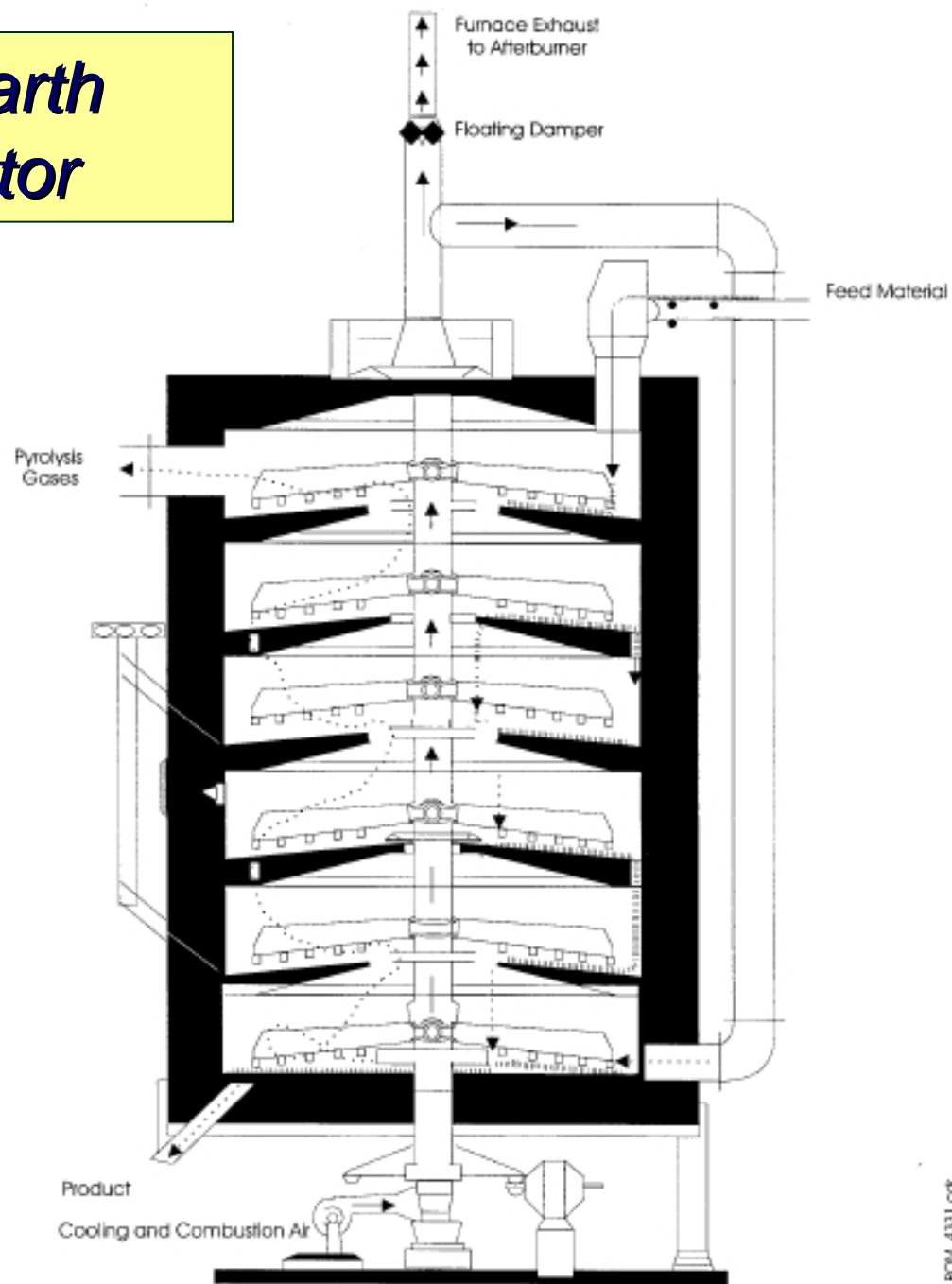
Green Bay Metro Sewerage Sludge Incinerator

- Initial use of EPA AP-42 emission factors showed potential emissions above threshold in WI Air Toxic Rule of 0.0001 lbs/year
- Compliance engineer asked facility to test for dioxin equivalents – it wasn't required by rule
- WI-DNR worked with GBMSD and testing companies to find best test method(s)
- WHO 2005 ITEFs including chlorinated dioxins and furans as well as PCB congeners
- Learning curve for all, including testing firms

Green Bay Metropolitan Sewerage District

- Serves Green Bay Metro Area (Home of Packers & Brett Favre) 
- Will include De Pere in the future (previously had their own incinerator).
- Incinerator is a multi-hearth furnace
- Facility wanted to save money on natural gas - asked to turn off afterburner in secondary chamber

Multi-Hearth Incinerator



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Concern About Dioxin Formation

- Dioxin congener formation from precursors or de novo synthesis is expected to be maximized in temperature range between 400 and 850 °F (200 and 450 °C)
- We told facility about our concerns and allowed them to prove to us that they met our rule (less than 0.0001 lbs/year – dioxin equivalents)

Test Results

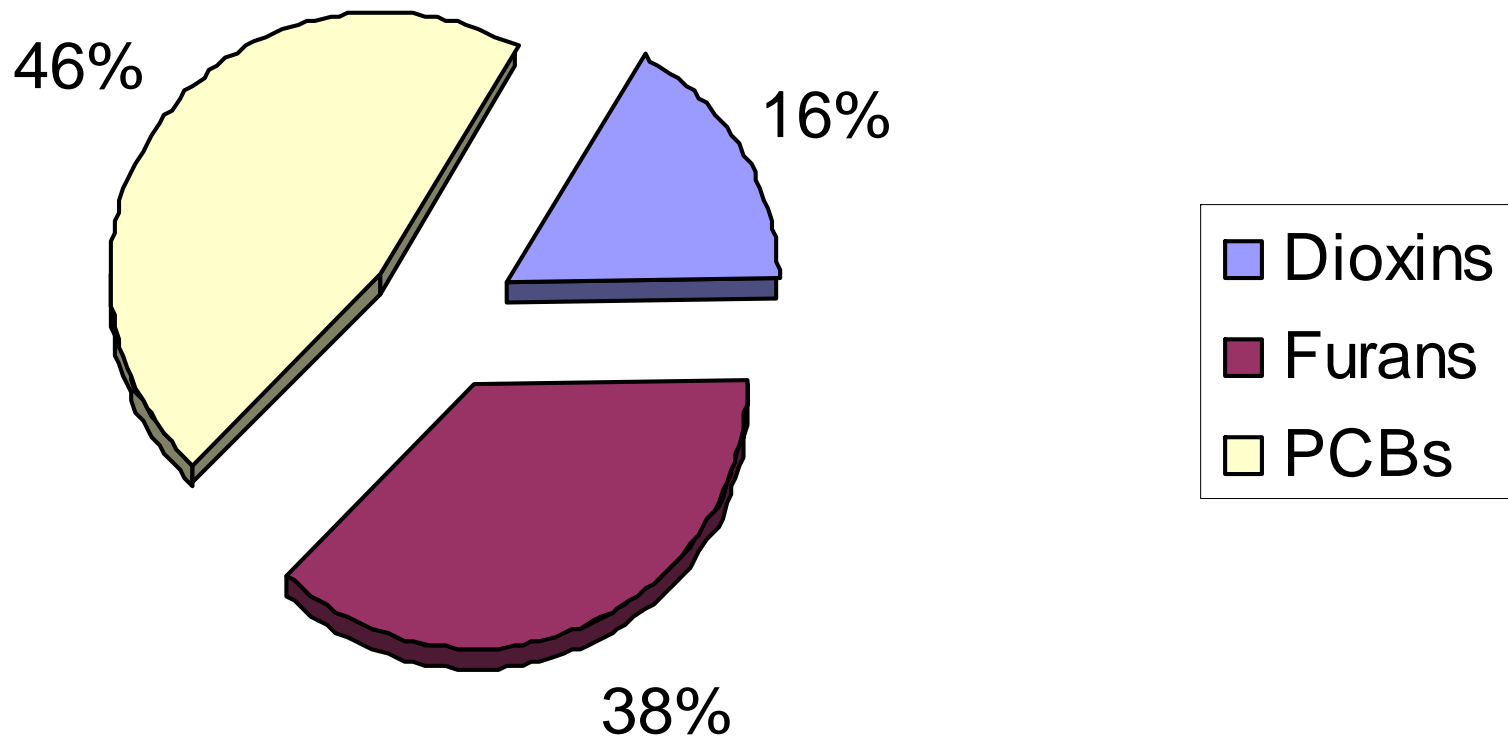
- Testing was done on April 24th and May 30, 2007. Two different scenarios average and maximum feed rates and with various temperature profiles
- Good news! With tests at 950 °F secondary chamber, emissions are less than threshold of 0.0001 lbs/year in WI Air Toxics rule. Testing done with higher feed rate and higher temperatures 1037 °F showed compliance as well
- Wrinkle: Facility wants to save money and asked to run incinerator at 850 °F. Also merger with De Pere treatment plant – different waste stream (?)
 - May have to retest at a later date to get approval at 850 °F while firing both existing & new waste stream

Comparison of Measured Dioxin Emissions and Temperatures

Dioxin Equivalent Emissions WHO TEFs 2005 DFP	1.94 E-06 lb/yr	4.19 E-06 lb/yr
	1.36 E-10 lb/ton	3.69 E-10 lb/ton
2° Chamber	1037 °F	959 °F
1° Chamber Hearth 1	1103 °F	1007 °F
1° Chamber Hearth 2	1193 °F	1139 °F
1° Chamber Hearth 3	1494 °F	1646 °F
1° Chamber Hearth 4	1672 °F	1845 °F
1° Chamber Hearth 5	1128 °F	891 °F
1° Chamber Hearth 6	887 °F	340 °F
1° Chamber Hearth 7	205 °F	103 °F
Stack test dates	Incinerator #2 Max. Capacity April, 24 2007	Incinerator #1 Avg. Capacity May 30, 2007

Green Bay Metro Sewerage District Sewage Incinerator Test 4-30-07:

Percent of WHO 2005 DFP Equivalents by Congener Group -
Detects Level Used in Place of Less than values



Example

WHO

TEFs

2005

Toxicol. Significant Dioxin-Like Pollutants (Dioxins, Furans & PCBs)	Synonym (for PCBs)	CAS #	Toxic Equivalent Factor (TEF) WHO 2005
TetraCDD, 2,3,7,8-		1746-01-6	1
1,2,3,7,8-PentaCDD		40321-76-4	1
1,2,3,4,7,8-HexaCDD		39227-28-6	0.1
1,2,3,6,7,8-HexaCDD		35322-46-9	0.1
1,2,3,7,8,9-HexaCDD		19408-74-3	0.1
1,2,3,4,6,7,8-HeptaCDD		57653-85-7	0.01
OctaCDD		3268-87-9	0.0003
2,3,7,8-TetraCDF		51207-31-9	0.1
1,2,3,7,8-PentaCDF		57117-41-6	0.03
2,3,4,7,8-PentaCDF		57117-31-4	0.3
1,2,3,4,7,8-HexaCDF		70648-26-9	0.1
1,2,3,6,7,8-HexaCDF		57117-44-9	0.1
2,3,4,6,7,8-HexaCDF		60351-34-5	0.1
1,2,3,7,8,9-HexaCDF		72918-21-9	0.1
1,2,3,4,6,7,8-HeptaCDF		67562-39-4	0.01
1,2,3,4,7,8,9-HeptaCDF		55673-89-7	0.01
OctaCDF		39001-02-0	0.0003
3,3',4,4'-Tetrachlorobiphenyl	PCB 77	32598-13-3	0.0001
3,4,4',5-Tetrachlorobiphenyl	PCB 81	70362-50-4	0.0003
3,3',4,4',5-Pentachlorobiphenyl	PCB 126	57465-28-8	0.1
3,3',4,4',5,5'-Hexachlorobiphenyl	PCB 169	32774-16-6	0.03
2,3,3',4,4'-Pentachlorobiphenyl	PCB 105	32598-14-4	0.00003
2,3,4,4',5-Pentachlorobiphenyl	PCB 114	74472-37-0	0.00003
2,3',4,4',5-Pentachlorobiphenyl	PCB 118	31508-00-6	0.00003
2,3',4,4',5'-Pentachlorobiphenyl	PCB 123	65510-44-3	0.00003
2,3,3',4,4',5-Hexachlorobiphenyl	PCB 156	38380-08-4	0.00003
2,3,3',4,4',5'-Hexachlorobiphenyl	PCB 157	69782-90-7	0.00003
2,3',4,4',5,5'-Hexachlorobiphenyl	PCB 167	52663-72-6	0.00003