

DRAFT

DATE: April 15, 2008

TO: File

FROM: Tom Karman – AM/7

SUBJECT: Background Information Relating to the Mercury Emission Limitations in the February 2008 Proposed Revisions to Chapter NR 446

The information provided in this memo includes additional background relating to the mercury emission limitations in the February 2008 proposed revisions to Chapter NR 446. It includes current mercury emissions and mercury fuel data for large and small electric generating units (EGU) affected by the proposal as well as a more detailed analysis of the expected mercury emissions including the BACT requirement for small EGUs and the large EGU emission control efficiency and emission concentration limitations. Note that under the proposed revisions large EGUs, 150 megawatts and larger, may choose to meet a 90% mercury control efficiency or a stack mercury emission concentration based on electrical output of 0.0080 pounds per gigawatt-hour (lbs/GWh).

This information was compiled to provide a better understanding of the mercury emission levels expected under the proposed revisions. Four attachments are included:

Attachment A - Table 1 Mercury Emissions from Existing and New Coal-Fired Electric Generating Units in Wisconsin Greater than 25 Megawatts

Attachment B - Table 2 Evaluation of Mercury Emissions from Electric Generating Units Greater than 150 Megawatts

Attachment C - 1999 ICR Fuel Mercury Content Data

Attachment D - Output-based Mercury Emission Concentration Limitation Determination

In addition, using information contained in the attachments, the memo addresses the following questions that have been raised concerning expected mercury emissions and control levels in the February 2008 proposal.

- 1. How does the 90% mercury control efficiency compare to the 0.0080 lbs/GWh output mercury emission concentration?*

With the exception of the large EGUs at Dairyland Power Cooperative, large EGUs owned and operated by Wisconsin Power & Light (WP&L), WE Energies and Wisconsin Public Service Corporation (WPSC) must perform at 90% or greater mercury control efficiency to achieve 0.0080 pounds per gigawatt-hour (lbs/GWh) output mercury emission concentration (see Attachment B).

A 92% control efficiency, on average, must be achieved by all large EGUs to meet a 0.0080 lbs/GWh output mercury emission concentration. This includes the large EGUs operated by Dairyland Power Cooperative and the new large EGUs at WE Energies Elm Road Generating Station (Units 1 & 2) and Wisconsin Public Service Corporation Weston Generating Station (Unit 4). At a 90% control efficiency the average mercury emission concentration for all large EGUs is 0.0090 lbs/GWh.

For Dairyland Power Cooperative, 90% control efficiency is equivalent to 0.0050 lbs/GWh or conversely 0.0080 lbs/GWh requires 85% control as determined from the fuel mercury content. The 0.0080 lbs/GWh output rate requirement is less stringent for Dairyland Power Cooperative because they currently combust a low mercury content coal.

The table below includes a summary of the average mercury output rate at 90% control efficiency and average mercury control efficiency required to achieve 0.0080 lbs/GWh by utility system for all large EGUs. For comparative purposes note that according to the Electric Power Research Institute (EPRI) the average concentration of mercury in coals tested under EPA's 1999 ICR data was 5.77 E-06 lbs/mmBtu for subbituminous coals and 8.65 E-06 pounds per million BTU (lbs/mmBtu) for bituminous coals.

Utility System	Heat Rate - BTU per kilowatt hour	Fuel Mercury Concentration - pounds per million BTU	Average Mercury Output Rate (lbs/GWh) at 90% Control Efficiency	Mercury Control Efficiency (%) Required to Achieve 0.0080 lbs/GWh
WP&L	10,397	7.83E-06	0.0080	90%
Dairyland Power	10,493	4.94E-06	0.0050	85%
We Energies	9,776	11.20E-06	0.0110	93%
WPSC	9,666	10.05E-06	0.0100	92%
	9,980	9.52E-06	0.0090	92%

2. *What is the relationship between coal mercury content and mercury emissions?*

Based on an EPRI analysis of EPA's 1999 ICR data, 85% of bituminous coals and 95% of subbituminous coals used by EGUs have a mercury concentration below 10.00E-06 lbs/mmBTU (see Attachment C). This threshold is assumed to account for the vast majority of coal that may be used by Wisconsin's large EGUs. Note that the current average fuel mercury concentration in coals combusted in large EGUs in Wisconsin is 9.52E-06 lbs/mmBTU. The table below is a determination of mercury emissions assuming that the coal combusted in large EGUs is elevated to a minimum mercury concentration of 10.00E-06 lbs/mmBTU based on the EPRI analysis (see Attachment B). In this determination, the large EGUs are assumed to continue combusting coal currently being used with fuel mercury concentration higher than the 10.00E-06 threshold.

Utility System	Current Fuel Mercury Concentration (lbs/mmBTU)	Current Annual Mercury Emissions at 90% Control Efficiency (lbs)	Annual Mercury Emissions at 90% Control Efficiency and 10E-06 lbs/mmBTU (lbs)	Potential Increase in Mercury Emissions
WP&L	7.83E-06	99	127	28
Dairyland Power	4.94E-06	24	48	24

We Energies	11.20E-06	250	266	16
WPSC	10.05E-06	66	71	5
	9.52E-06	439	491	73

An increase in annual mercury emissions of 73 pounds is possible if all large EGUs combusted coal at or above the threshold mercury concentration determined in the EPRI analysis.

When considering the impact of changes in fuel mercury concentration on emission levels it is also useful to consider the level of control equipment performance likely to occur to ensure compliance is achieved. Historically, to meet air pollution emission limitations, the electric utility sector will design and operate control equipment to achieve greater emission reductions than regulations demand. Table 2 in Attachment B includes a determination of mercury emissions from large EGUs considering a likely minimum operating control efficiency of 92%. At current fuel mercury concentration levels, annual mercury emissions from large EGUs at a 92% control efficiency would be 351 pounds, 88 pounds less than a 90% control efficiency achieves, 439 pounds.

3. *Why is the department proposing a regulation for coal-fired EGUs that is based on the reduction of mercury in the fuel combusted?*

Similar to requirements established for coal-fired EGUs in many other states, the department’s mercury revision proposal establishes a mercury control requirement that reflects the mercury control technology research, development and design approach. It makes sense to adopt regulations in the form that technical feasibility has been demonstrated. Control efficiency is an equitable regulatory approach for mercury control of EGUs as it does not penalize units that are already achieving mercury reductions as a co-benefit of controlling other air pollutants.

As an alternative to the 90% control efficiency, an electrical energy output based emission concentration has also been proposed. Attachment D includes the data used in determining an emission concentration equivalent to the control efficiency requirements in the proposed revisions for a 70%, 80% and 90% mercury control efficiency.