

# ENVIRONMENTAL DEFENSE FUND

1616 P Street, NW  
Washington, DC 20036  
(202) 387-3500

June 21, 1989

Bob Holloway  
Waste Combustion Section  
OS-322  
USEPA  
401 M Street, SW  
Washington, DC 20460

Dear Bob:

As you probably know, a diverse group of people interested in hazardous waste management, particularly incineration, went on a tour of hazardous waste facilities in Switzerland, Germany, and Denmark earlier this month. I was lucky enough to be included, as was Joe Carra from EPA and K.C. Lee from Union Carbide. The tour was arranged under the auspices of the New Jersey Institute of Technology.

I am writing to let you know a few things we learned on the tour pertaining to issues that have arisen around EPA's developing hazardous waste incinerator rule.

We visited the following facilities:

- 1) the Ciba-Geigy 4000 ton-per-year (tpy) rotary kiln at their Basel, Switzerland plant;
- 2) the Hessische Industriemull (HIM) facility in Biebesheim, West Germany, a 60,000 tpy rotary kiln that is a joint industry-government venture in the German state of Hessen;
- 3) the Bayer Company's complex in Leverkusen, West Germany, which includes 4 incinerators, one a multiple hearth fluid bed incinerator for sludges, the others rotary kilns, with capacity about 100,000 tpy;
- 4) Kommunekemi, the Danish national chemical waste treatment facility in Nyborg, which includes a 90,000 tpy rotary kiln, with an expansion planned to 140,000 tpy.

We also met with operators of the Swedish SAKAB facility (40,000 tpy rotary kiln), although we didn't visit this site. What follows is an assortment of things we learned along the way which may be of interest to you in developing the incinerator rule.

National Headquarters  
257 Park Avenue South  
New York, NY 10010  
(212) 505-2100

1405 Arapahoe Avenue  
Boulder, CO 80302  
(303) 440-4901

5655 College Avenue  
Oakland, CA 94618  
(415) 658-8008

1108 East Main Street  
Richmond, VA 23219  
(804) 780-1297

128 East Hargett Street  
Raleigh, NC 27601  
(919) 779-1793



Technology employed for air pollution control:

All of these facilities had or were installing both particulate removal devices and gas scrubbing devices (usually multi-stage) for acid gases. Several of the facilities had continuous emission monitors (CEM) for hydrocarbons and HCl, as well as other traditional parameters, as detailed below.

At Ciba-Geigy, thermal de-NO<sub>x</sub> will be employed soon, using selective catalytic reduction (SCR). With SCR, they expect to meet the soon-to-be-promulgated Swiss federal NO<sub>x</sub> standard of 100 mg/m<sup>3</sup>.

At Bayer, a 3-stage scrubber is employed, which cools the gases entering the downstream ESP to 60°C, allowing for very efficient condensation of volatile organics or metals onto particles before their removal in the ESP. This system also allows them to routinely achieve a particulate matter (dust) level of 10-15 mg/m<sup>3</sup> (i.e., 0.004-0.006 grains per dscf)!!

At SAKAB, the new unit they are installing will probably have a scrubber, a baghouse, and an ESP, in order to meet the Swedish 0.1 ng/m<sup>3</sup> dioxin standard. They also intend to utilize extensive cooling prior to particulate removal to condense dioxins and mercury onto particles.

At Kommunekemi, one of the units has 2 ESPs, the newest one has a baghouse. Both are achieving about 8 mg/m<sup>3</sup> particulate matter emissions, but the baghouse system has a significant reduction in fine particles compared to the ESP system..

Continuous emissions monitoring (CEM):

\* Ciba-Geigy used CEM for dust, CO, SO<sub>2</sub>, NO<sub>x</sub>, O<sub>2</sub>, and THC. They used an FID C<sub>1</sub> detector for THC, and reported no major problems with routine (daily) maintenance. The CEM values reading out while we were in the control room were as follows (for what it's worth):

CO:	2-3 mg/m <sup>3</sup>
SO <sub>2</sub> :	175 "
NO <sub>x</sub> :	218 "
O <sub>2</sub> :	11.9 vol %
THC:	2.8-3.1 mg/m <sup>3</sup>

\* HIM used CEM for dust, CO, HCl, HF, and O<sub>2</sub>. They report no problems with their CEM devices, but have a rigorous routine maintenance program.

They use a 30-minute averaging system, in which 48 30-minute values are calculated and recorded into a computer each day. These 30-minute values are adjusted during the 30-minute period by taking measurements every 90 seconds. The values are compared to emissions standards as follows:

- no more than one of the 30-minute values in a given day (and no more than 3% in a given year) can exceed 120% of the standard;
- none of the 30-minute values can exceed 200% (i.e., twice the standard);
- all 24-hour values (calculating by averaging the 48 30-minute values each day) must be below the standard.

\* Bayer uses CEM for dust, CO, HCL, HF, THC, SO<sub>2</sub>, NO<sub>x</sub>, and O<sub>2</sub>. No problems under a system of daily maintenance.

\* Kommunekemi uses CEM for CO, O<sub>2</sub>, CO<sub>2</sub>, SO<sub>2</sub>, and HCl. Typical CO values were reported to be about 50 mg/m<sup>3</sup>.

Other monitoring:

\* Stack testing for metals is done once a year at Ciba-Geigy.

\* In contrast, at HIM, a 6-hour sample of stack gases is isokinetically collected and analyzed every day for the whole range of heavy metals in their on-site laboratory. Workers are monitored twice a year, but we did not find out what was measured.

\* Metals and dioxins are measured once a year at Bayer.

\* At SAKAB, a 99.9% minimum combustion efficiency is required, based on CEM.

SWEAEN

DUST 200 mg/Nm<sup>3</sup> @ 10% CO<sub>2</sub>  
HCL < 100 mg/Nm<sup>3</sup> @ 10% CO<sub>2</sub>  
HF < 5 mg/Nm<sup>3</sup> @ 10% CO<sub>2</sub>

Emission standards:

Swiss federal emission standards for all incinerators are as follows (all in mg/m<sup>3</sup> at 11% O<sub>2</sub>):

dust	50
HCL	30
HF	5
NO <sub>x</sub>	500 (to be lowered to 100)
Cd	0.1
Hg	0.1
Pb + Zn	5 (for the sum)

Officials of the Swiss EPA said these standards are required to be met 90-95% of the operating time, but that there are not currently any limits on the magnitude or duration of excursions above these standards. Emissions from the newest plants are generally an order of magnitude below these standards.

New German standards under development include a standard for THC, and are as follows (in mg/m<sup>3</sup>):

dust	10
CO	50
THC	10
HCl	10
HF	1
SO <sub>2</sub>	50
NO <sub>x</sub>	100
Cd	0.1
Hg	0.1

Controls (unspecified) on metal content of incinerated wastes are employed at HIM; mercury-containing waste cannot be incinerated at Kommunekemi.

I hope you find this information useful. If you have more questions or want contacts in Europe, please feel free to given me a call.

Regards,

*Richard*

Richard A. Denison, Ph.D.  
Senior Scientist