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**RACHEL'S HAZARDOUS WASTE NEWS #45**

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## **PART 4: SCIENTISTS STUDY HOW 'MASS BURN' INCINERATORS PRODUCE DIOXIN, BUT PUBLIC'S FEARS MAY NOT DISAPPEAR**

When municipal garbage goes into a "mass burn" incinerator, one of the products that goes out the smokestack (or is trapped by a filter and ends up in an ash landfill) is the family of chemicals called dioxins. No one disputes that dioxins are produced by mass burn incineration, but scientists disagree on where the dioxins come from.

Just a few years ago, many scientists were saying that the dioxins was produced by low-temperature combustion (less than, say, 1400 degrees Fahrenheit). They advocated that incinerators should be designed to burn hotter to "burn up" the dioxins or perhaps not ever create the dioxins at all. Others scientists were saying that dioxins was produced by the burning of pvc plastic and if we would just keep the pvc out of the waste stream, all would be well.

Dr. Barry Commoner had a different idea. He thought that dioxins was being created inside the smokestack itself, after the smoke left the combustion chamber of the incinerator. If he was right, running the firebox hotter wouldn't prevent the formation of dioxins. He did some experiments, wrote up his results, and then began advocating his ideas. He's a persuasive speaker and a tough opponent in a debate. His effective arguments angered his opponents and they began to call him a charlatan and a "pseudo-scientist."

Recently, new research has confirmed Dr. Commoner's original ideas. In the JOURNAL OF CHROMATOGRAPHY, Vol. 389 (1987), pgs. 127-137 and in SCIENCE Vol. 237 (August 14, 1987), pgs. 754- 756, Canadian scientists report that they have found a major mechanism for creating dioxins in waste combustion: the fly ash (the particles that make up the smoke in the smokestack) acts as a catalyst (a chemical promoter) and causes the formation of dioxins. They reported experiments in which they created dioxins with chlorine-containing wastes but they also reported creation of dioxins from non-

chlorinated compounds. SCIENCE NEWS (Aug. 22, 1987, pgs. 118-119) quoted one of these researchers saying, "We found that [fly ash] is indeed a very strong catalyst which causes dioxins to form from almost anything." They are now hard at work trying to manipulate the composition of garbage to minimize the production of certain types of fly ash catalysts, especially those containing metals. Pigments in printing inks, for example, contain metals that may produce fly ash that produces dioxins. They think that getting the metal out of garbage might substantially reduce dioxin production.

Still other recent research throws additional light on the "dioxin from mass burn" problem. Experiments at an incinerator in Pittsfield, Massachusetts were aimed at discovering relationships between combustion conditions, garbage constituents, and dioxin production. The report, RESULTS OF THE COMBUSTION AND EMISSIONS RESEARCH PROJECT AT THE VICON INCINERATOR FACILITY IN PITTSFIELD, MASSACHUSETTS appeared in June, 1987. Some of its more interesting conclusions were:

\*\* There is no evidence that the amount of PVC plastic in the garbage affects the amount of dioxin produced (pg. 10-4);

\*\* Wet garbage produces more dioxins than drier garbage (pg. 10-4);

\*\* There is no consistent relationship between the amount of dioxin in the raw garbage and the amount of dioxin in the smoke stack gases (pg. 10-5);

\*\* There is a relationship between the amount of carbon monoxide in the smokestack gas and the amount of dioxin (pgs. 10-1, 10-5); "However," the report says, "one must be cautioned that the specific relationships between operating temperature, carbon monoxide levels, and levels of [dioxins] found during this study cannot necessarily be generalized to other incinerators, particularly of a different design."

\*\* The location of measuring devices in the incinerator affects how much dioxin is found (pg. 10-1).

What can we conclude from all this? Authors of the Pittsfield study say future research should focus on the effects of facility design and operation (especially carbon monoxide levels, operating temperature, and air pollution control systems) on the production of dioxins, instead of focusing on characteristics of the garbage.

On the other hand, the Canadian researchers believe that manipulating the contents of the garbage is the key to discouraging dioxin production.

From the citizen's perspective, faced with a machine that will be in operation for 20 to 30 years, during which time the chemical contents of American garbage are likely to change dramatically (if the last 20 or 30 years are any indication), trying to manipulate the contents of the garbage seems complicated, untrustworthy and doomed to fail. No government authority will ever be able to control the contents of

the stream of garbage entering a mass burn incinerator.

On the other hand, trying to find and maintain the exact operating conditions that minimize dioxin formation (a narrow range of temperatures, for example, and 100 ppm of carbon monoxide in the stack) seems equally hopeless. Garbage incinerators are not going to be run under laboratory conditions by chemists. They're going to be run by garbage companies who have demonstrated time and time again that they'll cut any corner necessary to make a buck. The garbage industry, including the incineration industry, is dominated by organized crime or by people who competed with organized crime and won out. These are not the kind of people to whom you want to entrust an enormous, complex and dangerous machine, the careful operation of which will dramatically affect public health and safety.

In any case, knowing what minimizes dioxin production under controlled conditions cannot ease the public's fear that mass burn will pollute the air. The fly ash researchers writing in Science noted that "more than 600 organic compounds" have been identified on incinerator fly ash. That's 600 more than the public wants to breathe or dump into the local landfill. Dioxin is simply No. 601 on the public's list of unwanted pollutants from mass burn.

The Pittsfield study is NYSERDA Report 87-16, available from Department of Communications, NY State Energy R&D Authority, Two Rockefeller Plaza, Albany, NY 12223; phone (518) 465-6251.  
--Peter Montague, Ph.D.

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