A new technical paper presented at a recent meeting of the Air Pollution Control Association (but not yet published) strongly criticizes the U.S. Environmental Protection Agency's (EPA's) budding effort to regulate garbage incinerators. The EPA announced in August, 1987, that they plan to control air pollution from garbage incinerators by requiring "dry" acid gas scrubbers and fabric filters, to protect public health from the mass burning of garbage. A "dry" acid gas scrubber tries to clean smoke stack emissions without using liquids to wash them. A fabric filter is a huge box (called a baghouse) containing an enormous cloth filter; all the gases leaving the combustion chamber pass through the baghouse before escaping up the smoke stack. The fabric filter captures much of the sooty pollution, which is then collected and buried in a landfill. "Dry" scrubbers are much cheaper than the alternative, which is "wet" scrubbers.

The new paper, by Craig Volland, a Kansas City civil engineer, argues that EPA's proposal will not protect public health, and will lock American incinerators into technologies that have already been abandoned in Europe.

Mr. Volland attacks EPA's proposal from many points of view, among them:

EPA concluded incorrectly that dry scrubbers and baghouses would protect public health because EPA used risk assessment that was flawed in the following ways:

(a) EPA assumed that incinerators can be run for 20 years emitting pollutants at the relatively low levels achieved by a few brand-new incinerators operating under ideal conditions in carefully-controlled tests. Mr. Volland says, "Those of us with many years of experience in the pollution control industry know it is foolhardy to assume that this incinerator [pollution control] equipment will be consistently well operated and that it will not deteriorate over time." Mr. Volland argues that, as time passes, the buildup of soot and "chloride-related deterioration of the boiler tubes" will make it difficult for the incinerator operator to maintain optimal conditions. Operator error and carelessness are additional factors that will lead incinerators to produce more pollution than was produced by the incinerators the EPA studied in deciding that dry scrubbers and baghouses would adequately control air pollution.

(b) EPA did not take into account the conditions known as "upssets," "transient disturbances," and "breakdowns." These events are any unusual condition that leads to abnormal emission of pollutants; such conditions are readily caused by variations in the fuel fed into the incinerator. Because garbage itself is highly variable (some wet, some dry, some full of paper, some not, some containing flammable materials such as paint and gasoline, some not, etc.), it is common for garbage incinerators to experience upsets and breakdowns regularly. Mr. Volland cites evidence from Moody's Bond Advisory Service indicating newer incinerators are experience breakdowns more frequently than older incinerators. EPA should take such data into consideration, Mr. Volland argues.

(c) EPA selected dry gas scrubbers and baghouse filters on the assumption that all incinerators will be operated to maintain a temperature of 284 degrees Fahrenheit in the smoke stack. In reality, because heating value of the fuel (garbage) varies considerably from minute to minute, the temperatures in a garbage incinerator vary up and down quite a bit. Consequently, Mr. Volland argues, the temperature in an incinerator smoke stack may often exceed 284 degrees, with heavy metals consequently turned into a gaseous state not captured at all by dry scrubbers or baghouses. Arsenic, selenium, and cadmium will be emitted in gaseous form if the temperature reaches 392 degrees F., which could readily occur because of operator inattention, or from changes in the heat value of the fuel.

Even if the temperature never exceeds the standard operating temperature of 284 degrees, mercury will be emitted into the local environment continuously and in substantial quantities, Mr. Volland shows. He presents data from seven modern incinerators (built 1985 through 1987) showing that they emit an average of 3590 pounds of mercury for each million tons of garbage burned. A thousand-ton-per-day incinerator will thus put out 1300 pounds of mercury per year into the local environment. The toxicity of mercury to humans is measured in micrograms, so the emission of even a few pounds is a matter of public health concern. The dry scrubber and the baghouse filter do not capture any of this mercury, and it is emitted directly into the local environment.

To figure out whether this quantity of mercury is a lot or a little, you can look at it in two different ways. The EPA looked at it this way: they said, if this is emitted from the smoke stack and begins to mix with clean air and becomes diluted, will the resulting air be fit to breathe? They used a standard "air dispersion" mathematical model (Turner's) to figure out how the mercury would mix with the fresh air. However, as Mr. Volland points out, no one really knows how mercury moves when it is released into the air. The standard air dispersion model may be entirely inappropriate for estimating how the mercury will mix with fresh air. In addition, the standard air dispersion model assumes that the pollutant is being emitted into a rural environment with level, open ground. The standard model does not take into consideration the eddies and downdrafts in an urban environment--and the majority of incinerators are being built in urban environments. Additionally, Mr. Volland cites a recent German study showing that fog droplets accumulate and concentrate toxic heavy metals (such as mercury). Lastly, Mr. Volland argues that dispersion models are not very accurate, even under ideal conditions, and the wide variations in the characteristics of the garbage entering an incinerator make air dispersion modeling particularly subject to error. (The mercury in garbage will vary with the number of batteries, fluorescent light bulbs, electrical switches and so forth that local people have thrown away recently.)

Mercury attacks the human central nervous system, particularly the brain. It is a potent poison, the effects of which have been well documented. It is therefore a matter of great importance if the EPA's air dispersion models are in error and local people are exposed to mercury in greater concentrations than good health will allow.

The second way to ask whether a given release of mercury is large or small, is to look at the absolute amount released. Mercury readily enters the food chain and accumulates in fish and other wildlife. Many waters of the United States are already contaminated with mercury at levels that have caused health authorities to issue warnings and bans against eating fish from those waters. The emission of tons of mercury into the atmosphere by burning garbage represents a major new toxic assault upon the nation's environment, and one the EPA has so far evaluated by inappropriate methods, Mr. Volland argues.

Send $3.00 for copying and handling to: Craig S. Volland, President, Spectrum Technologists, 616 East 63rd St., Kansas City, MO 64110; phone (816) 523-2525. Ask for: "A Critical Review of EPA's Plan to Establish A Dry Scrubber Technology Standard for Municipal Solid waste Incinerators."

--Peter Montague

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Descriptor terms: air pollution; air quality standards; EPA regulations; incineration; scrubbers; heavy metals; mercury; health effects;