

# EPA REPORTS TO CONGRESS ON UTILITY AIR EMISSIONS<sup>1</sup>

## OVERVIEW

With its passage of the 1990 Clean Air Act amendments, Congress directed the U.S. Environmental Protection Agency (EPA) to study the potential public health impacts of hazardous air pollutant emissions from utilities that are greater than 25 megawatts in size and burn coal, oil, or gas to generate electricity. Congress granted EPA authority within the Act to proceed with rulemaking activities to control these emissions if the agency found such regulation appropriate and necessary after considering the results of its study.

Following several years of extensive research and input from outside scientific experts and major stakeholders, the agency released its report to Congress in early 1998. EPA found that, for the majority of utility plants, the cancer risk from inhalation exposure to utility emissions is estimated to be less than one in one million.<sup>2</sup> Moreover, finding that uncertainties in the analysis exist and “further research and evaluation are needed,” the agency deferred making any regulatory determinations.

Beginning in July 1999, electric utilities will — for the first time — be required to report emissions data under the Toxics Release Inventory (TRI). The TRI program, created by Congress under the Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA), collects chemical release information at the facility level. EPA analyzes TRI data and then compiles a report for public distribution. TRI data cannot be used to determine actual toxicity, exposure, or risk associated with the releases that are reported.

Many of the emissions that utilities are required to report under the TRI program have been analyzed by EPA within its report to Congress. This paper summarizes the methodology and findings of that report. Again, the results of the agency’s investigation indicate that utility air emissions pose extremely low risks to human health.

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<sup>1</sup> U.S. Environmental Protection Agency. *Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units — Final Report to Congress* (EPA-453/R-98-004a; February 1998).

Copies of this report and its executive summary, prepared by the Office of Air Quality and Planning, are available through the EPA website at [<http://www.epa.gov/ttncaaa1/t3rc.html>].

<sup>2</sup> According to EPA, a risk level of one in one million implies that one person, out of one million equally-exposed people, would contract cancer over a lifetime as a result of exposure. This one cancer case would be in addition to those cancer cases that would normally occur in an unexposed population of one million people.

## EPA'S METHODOLOGY

In conducting its study, EPA:

- Analyzed test data from 52 utility units (i.e., boilers), including a range of coal-, oil-, and natural gas-fired utility units. The agency then used this data to estimate emissions from all 684 utility plants in the U.S.
- Completed a screening level hazard/risk assessment to prioritize air emissions for further analyses. The agency identified a total of 67 of the 188 air pollutant emissions listed in the Clean Air Act as potentially being emitted by utilities and analyzed them for potential inhalation (breathing) and non-inhalation (e.g. food ingestion, skin absorption) exposures and risks. Four utility air emissions — radionuclides, mercury, arsenic, and dioxins — were identified by EPA as being “highest priority to assess for multipathway exposures and risks” and were subjected to further analyses.
- Based the study on both 1990 base year emissions (when the amendments to the Clean Air Act were passed) and projected 2010 emissions (to represent emissions remaining after regulations and other requirements under the Act are implemented).
- Estimated inhalation exposures and risks due to dispersion of emissions within 50 kilometers of each of the 684 plants (i.e., local analysis) and conducted long-range transport analyses to estimate the dispersion of emissions from the facility stack out to the borders of the continental U.S.

## EXCERPTS FROM EPA'S REPORT

### **About its screening assessment...**

“To screen for inhalation exposures, the EPA used the Human Exposure Model (HEM)...utilizing generally conservative assumptions (i.e., assumptions that are more likely to overestimate rather than underestimate risks) to estimate inhalation risks for maximally exposed individuals (MEI). If the MEI risk was above a minimum measure (e.g., cancer risk greater than 1 chance in 10 million),” then the air emission was chosen for more study.

For non-inhalation exposures, EPA prioritized air emissions “by considering five criteria: (1) persistence; (2) tendency to bioaccumulate; (3) toxicity; (4) emissions quantity; and (5) radioactivity.”

Overall, a total of 14 of the 67 air emissions were considered priority. “The other 53 were not evaluated beyond the screening assessment.”

### **About inhalation cancer risks for gas-fired plants...**

“The cancer risks for all gas-fired plants were well below one chance in one million and no noncancer hazards were identified. Therefore, gas-fired plants are omitted from the following discussions.”

### **About inhalation cancer risks for coal- and oil-fired utilities based on local analysis...**

“The vast majority of coal-fired plants (424 of the 426 plants) are estimated to pose lifetime cancer risks (i.e., increased probability of an exposed person getting cancer during a lifetime) of less than [one in one million] due to inhalation exposure” to utility air emissions.

The cancer incidence in the U.S. due to inhalation exposure to air emissions (including radionuclides) “from all 137 oil-fired utilities, based on the local analysis, is estimated to be no greater than 0.5 cancer case/year.”

Based on the overall assessment (considering local and longer range analyses), “no greater than 1.8 cancer cases/year are estimated to occur in the U.S. due to inhalation exposure” to air emissions from all coal- and oil-fired utilities.

### **About mercury...**

“Given the current scientific understanding of the environmental fate and transport of this element, it is not possible to quantify how much of the methylmercury in fish consumed by the U.S. population is contributed by U.S. emissions relative to other sources of mercury (such as natural sources and re-emissions from the global pool).”

“Mercury is considered the highest priority for multipathway analyses because it is an environmentally persistent, toxic element. ...The EPA recognizes that there are substantial uncertainties that make it difficult to quantify the magnitude of the risks due to utility mercury emissions, and that further research and/or evaluation would be needed to reduce these uncertainties.”

### **About arsenic...**

“It was not possible to model every utility plant for arsenic multipathway exposures. Therefore, a screening level model plant approach was used. Four model plants (i.e., a large coal-fired, a medium coal-fired, a small coal-fired, and a medium oil-fired utility boiler) were designed to characterize typical utility plants.”

“There are uncertainties associated with the cancer risk estimates from arsenic. ...Further analyses are needed to better characterize the risks posed by arsenic emissions from utilities.”

### **About radionuclides and dioxins...**

“The estimated cancer incidence in the U.S., due to emissions and dispersion of radionuclides within 50 km of each utility, is estimated to be 0.3 cancer deaths/year.”

“The emissions data for dioxins from utilities, which are the basis of exposure modeling, are considered more uncertain” than the emissions data for many of the other air emissions.

### **About cadmium, lead, nickel and chromium...**

“...since the emission quantities and inhalation risks are relatively low, the EPA does not plan to conduct future evaluations of multipathway exposures of cadmium and lead from utilities.”

“...EPA does not plan to assess multipathway exposures for nickel and chromium for utilities.”

### **About emissions and risks for the year 2010...**

“There are substantial data gaps and uncertainties in the projections to the year 2010. ...However, based on EPA’s exposure modeling analysis for the year 2010, the inhalation risks in 2010 for coal-fired utilities are estimated to be roughly equivalent to the 1990 inhalation risks. For oil-fired plants, emissions and inhalation risks are estimated to decrease by 30 to 50 percent by the year 2010.”