ENVIRONMENTAL PROTECTION AGENCY

[AD–FRL–5327–4]

New Source Performance Standards and Emission Guidelines for Municipal Waste Combustors; Combustion of Lead-Acid Vehicle Batteries

AGENCY: Environmental Protection Agency (EPA).

ACTION: Supplemental notice/Review of decision.

SUMMARY: On December 20, 1989, the U.S. Environmental Protection Agency proposed standards of performance for new MWC's and emission guidelines for existing MWC's under section 111 of the Clean Air Act (Act). The proposed standards and guidelines included a prohibition on the combustion of lead-acid vehicle batteries in MWC's. On February 11, 1991, the EPA promulgated standards and guidelines for new and existing MWC's. The promulgated standards and guidelines did not prohibit the combustion of lead-acid vehicle batteries. The decision not to include a prohibition on the combustion of lead-acid vehicle batteries was challenged in the U.S. Court of Appeals. The U.S. Court of Appeals issued its decision on July 14, 1992 and remanded the issue of lead-acid vehicle battery combustion to the EPA for further explanation of its decision to remove the lead-acid battery combustion prohibition from the 1991 MWC regulations. This supplemental notice responds to the remand.

In response to the remand, the EPA presents the following discussion on the issue of lead-acid battery combustion in MWC's. Based on the information and test data discussed below, the EPA concludes it is unnecessary to include lead-acid battery combustion restrictions in the standards or guidelines and no lead-acid battery combustion prohibitions are being established. This notice describes the basis of the EPA's decision

ADDRESSES: *Docket:* Docket No. A–89–08, containing the information considered by the EPA in reaching a decision with respect to lead-acid battery combustion, is available for public inspection and copying between the hours of 8:30 a.m. and 5:30 p.m., Monday through Friday excluding Federal holidays, at the EPA's Air and Radiation Docket and Information Center, Room M1500, 1st floor, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Mr. Walt Stevenson, Emission Standards Division (MD–13), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541–5264.

SUPPLEMENTARY INFORMATION: The following outline is provided to aid in locating information in this Federal Register notice.

I. Background

On December 20, 1989, the EPA proposed standards (subpart Ea) and guidelines (subpart Ca) for new and existing MWC's under section 111 of the Act, 42 U.S.C. section 7411. The proposed standards and guidelines included a prohibition on the combustion of lead-acid vehicle batteries in MWC's. The EPA's intent in proposing the prohibition was to reduce the amount of lead (Pb) in the municipal solid waste (MSW) stream and, therefore, reduce the potential for Pb emissions from MSW combustion. Specifically, under the proposed standards and guidelines, all MWC's would be prohibited from combusting lead-acid batteries weighing more than 5 kilograms (kg) (11 pounds (1b)) (i.e., automobile-type batteries). Lead-acid batteries would have been separated from MSW by onsite mechanical or manual separation, a community-based material separation (recycling) program, or a combination thereof prior to combustion of the MSW. Monthly records and annual reports of the weight of batteries separated from the MSW stream would have been required.

Many public comments were received on the 1989 proposed standards and guidelines; some supported the combustion prohibition, others did not. Some commenters cited studies indicating that lead-acid batteries contribute to over 50 percent of the Pb found in the MSW stream. Other commenters questioned whether lead-acid batteries are actually a major source of Pb in MWC emissions.

Several comments on the 1989 proposal indicated that it would be too difficult or too costly to separate lead-acid batteries from MSW, even though technologies were commercially available for identifying large Pb objects in MSW. Other comments encouraged the use of deposit or mandatory take-back programs to encourage recycling and reduce the number of batteries being disposed of as MSW. Finally, several commenters felt that an absolute prohibition on combustion of batteries was unworkable and that 100-percent compliance would be impossible to achieve because neither deposit/take-back systems nor screening devices could ensure removal of all batteries from MSW. These commenters argued that requiring a ''best effort'' or ''reasonable effort'' to remove batteries was more reasonable and enforceable.

The final standards and guidelines promulgated on February 11, 1991 (subparts Ca and Ea) did not prohibit the combustion of lead-acid batteries. The EPA stated in the preamble to the 1991 standards and guidelines that although lead-acid batteries are a significant source of Pb in MSW, there are already regulatory mechanisms in place to discourage lead-acid battery combustion. In addition, the EPA stated that many commenters questioned whether it would be possible to achieve 100-percent compliance with a prohibition. For these reasons, the Agency did not believe that a prohibition was necessary, and one was not included in the standards and guidelines promulgated on February 11, 1991.

The decision by the EPA to delete the lead-acid battery combustion prohibition from the promulgated standards and guidelines was challenged in the U.S. Court of Appeals by the Natural Resources Defense Council (NRDC), the State of New York, and the State of Florida. The petitioners argued that if 100-percent compliance with the prohibition was not possible, then the EPA could have adopted a lesser restriction (such as a 99- or 95-percent ban) or could have required a best or reasonable effort to prevent battery combustion. The petitioners also argued that the mere existence of other regulations and programs to discourage lead-acid battery combustion and to promote recycling is not sufficient to explain why some type of combustion prohibition would not constitute the best demonstrated technology for reducing emissions if lead-acid battery combustion is a significant source of Pb emissions. The case was argued in court on February 6, 1992.

The U.S. Court of Appeals issued its decision on July 14, 1992. The Court remanded the issue of lead-acid vehicle battery combustion to the EPA and asked the EPA to explain its decision to remove the lead-acid battery combustion prohibition from the 1991

MWC standards and guidelines. A subsequent consent decree among the Sierra Club, NRDC, and the EPA established a schedule for the EPA to respond to the remand. The consent decree requires a final response to be published in the Federal Register. This notice constitutes the EPA's response to the remand.

II. Basis of the EPA's 1991 Decision

At the time the MWC standards and guidelines were promulgated in 1991, there was a lack of sufficient data to support a decision to adopt a lead-acid battery combustion prohibition. Only two studies were available that quantified the contribution of lead-acid batteries to the concentration of Pb in MSW. One study was based on a ''life-cycle'' analysis of products containing Pb that may become part of MSW and was not based on an analysis of actual MSW composition or MWC emissions data. Only one study, conducted in 1987 at a materials recovery facility in Gallatin, Tennessee, recorded the frequency of lead-acid batteries in MSW by sampling actual MSW. At the same time, there were no data available on the effect of lead-acid batteries on MWC emissions or on the effect of lead-acid batteries relative to other sources of Pb in MSW. Finally, the information available on the feasibility and effectiveness of lead-acid battery detection and removal procedures at MWC's was incomplete and inconclusive at the time the 1991 MWC standards and guidelines were promulgated.

As a result, the EPA had no reliable data on which to estimate the emission reductions or other environmental benefits that would be gained from a lead-acid battery combustion prohibition. The EPA also had no basis for estimating the cost impacts of such a prohibition. Furthermore, between proposal and promulgation of the standards and guidelines, the 1990 Amendments to the Clean Air Act became law. Section 129 of the 1990 Amendments required the EPA to reexamine the 1991 MWC regulations and also to establish numerical emission limits for Pb and other metals. Because of these requirements and the lack of sufficient data on the issue of lead-acid battery combustion in 1991, the EPA determined it would be more effective not to promulgate regulations in 1991. Instead, the EPA indicated ti would address lead-acid battery combustion at the same time it investigated and established numerical Pb emission limits under section 129.

The EPA has reviewed the lead-acid battery combustion issue. Additional data that have become available since the 1991 standards and guidelines were promulgated have been reviewed. These data confirm the EPA's original decision not to promulgate standards and guidelines to prohibit lead-acid battery combustion. These new data are discussed in sections III and IV, below, of this notice.

III. Supplemental Information on Lead-Acid Batteries in Municipal Solid Waste

The EPA supports a hierarchical integrated solid waste management (ISWM) approach. At the top of the hierarchy is solid waste reduction, followed by reuse and recycling. At the bottom of the ISWM hierarchy are disposal options including solid waste combustion or landfilling of the solid waste fraction that cannot be reduced, reused, or recycled.

In 1992, approximately 87.8 million used lead-acid batteries were generated in the United States. Most of these (about 66.7 million) were passenger car and light truck batteries; the remainder included batteries for heavy equipment, tractors, marine applications, motorcycles, aircraft, golf carts, and other miscellaneous uses. In 1992, the recycling rate for used lead-acid batteries was 94.4 percent. Recycling rates for 1987 through 1991 were 88.6, 91.0, 95.3, 97.8, and 96.8 percent, respectively. Lead-acid batteries are recycled at specialized recycling facilities known as secondary lead smelters. These facilities recover the Pb metal and compounds, plastic case material, and sulfuric acid electrolyte and, therefore, represent the best treatment option for used lead-acid batteries.

The recycling rate for used lead-acid batteries is relatively high because of the economic value of the lead they contain and because of the recycling infrastructure that is available. Lead is an internationally traded commodity and is subject to price fluctuations over which the battery manufacturers and secondary lead smelters have no control. In order to keep the price of lead-acid batteries constant, battery manufacturers and their distributors collect used batteries. The manufacturers exchange these batteries for an equivalent amount of recycled Pb bullion from secondary lead smelters, instead of having to purchase Pb at the current market price. The manufacturer pays the smelter only a fixed ''tolling fee'' for the cost of processing the used batteries into Pb bullion.

The battery manufacturers and distributors collect the used batteries from their retailers who, in turn, collect them from consumers purchasing new batteries. To encourage consumers to return used batteries, retailers accept used batteries for recycling, even without the purchase of a new battery. Most distributors and retailers will charge the consumer a ''core charge,'' usually between $5 and $10, if a used battery is not returned when a new battery is purchased. The core charge is refunded to the consumer if a used battery is later brought in after it has been replaced with the new battery.

Several nationwide battery distributors participate in a battery collection network similar to the one described above. According to one distributor contacted by the EPA, battery collection and recycling networks extend to every county in every State in the United States. Therefore, no used lead-acid batteries should be discarded in MSW for lack of a collection point for recycling.

Although there are strong economic incentives to encourage recycling, many States have also adopted regulations to encourage lead-acid battery recycling. A total of 37 States have adopted battery recycling laws based on a model rule developed by the Battery Council International (BCI). The BCI model rule encourages lead-acid battery recycling at the retailer level through mandatory take-back and deposit requirements. Only five States in which MWC's are located have not adopted a battery recycling rule based on the BCI model rule. However, in the service area of the MWC's located in these five States, there are retailers that have voluntarily adopted a take-back and deposit program or there are battery collection sites as part of household hazardous waste collection programs.

Based on a lead-acid battery recycling rate of 94.4 percent and a total of 87.8 million used batteries generated per year, approximately 5 million automotive-type lead-acid batteries were not recycled in 1992. Some of these batteries enter the MSW stream and are disposed of in landfills or MWC's. Some used batteries are stored in household garages or basements and then indirectly enter the MSW stream or the recycling network. A survey of 1,000 households found that 19 percent of households had at least one old battery (7 percent had one battery, 8 percent had two or three, 2 percent had four or five, and 2 percent had six or more). As many as 45 million batteries may be in storage in individual households. Battery storage by households, therefore, may represent a significant reservoir of automotive-type lead-acid batteries that do not immediately enter the MSW stream or the recycling system.

Only limited data are available on the actual concentration of lead-acid batteries in MSW. A 1987 study at a materials recovery facility in Gallatin, Tennessee, removed about 70 batteries from 6,332 megagrams (Mg) (6,965 tons) of MSW over a 3-month period. This is equivalent to about one battery per 90 Mg (100 tons) of MSW. However, contacts with other material recovery facility operators indicate that the concentration of lead-acid batteries in MSW may range from one battery per 300 Mg of MSW up to one battery per 700 Mg MSW. Where lead-acid battery collection/separation programs have been implemented, battery contamination levels of less than one battery per 500 Mg of MSW are probably typical. One of the facilities contacted by the EPA reported finding no batteries in the MSW inspected at the facility over a 6-month period during which the facility processed 4,000 tons of MSW per month.

One lead-acid automotive battery (containing about 20 pounds of Pb) per 500 Mg (550 tons) of MSW is equivalent to a Pb concentration in MSW of about 20 parts per million (ppm). However, lead-acid batteries are not the sole source of Pb in MSW. Other sources are lead foils, light bulbs, circuit boards in electrical devices, automobile wheel weights, polyvinyl chloride plastics, yard waste, wood, food, textiles, paper, and inks for some newspapers, magazines, and packaging. One 1988 report estimated that the combustible fraction of MSW had a Pb concentration of 330 ppm based on a life-cycle analysis of lead-containing products.

The concentration of Pb in MSW can be estimated from the concentrations of Pb in MWC ash. There is a relatively constant relationship between the weight of MSW combusted and the weight of ash produced (bottom ash plus fly ash collected from the air pollution control devices (APCD's)). Furthermore, nearly all of the Pb (greater than 99 percent) entering the MWC in the MSW stream is retained in the bottom ash from the MWC and residue (ash) discharged from the APCD. The typical Pb concentration in combined MWC ash and APCD residue ash in about 2000 ppm, by weight, and combined ash represents about 30 percent, by weight, of the original MSW combusted. Based on these relationships, the estimated lead concentration in MSW is about 600 ppm. This estimate is considered to be a good estimate of the Pb concentration in MSW.

Based on a Pb concentration in MSW of 600 ppm, one battery per 100 tons of MSW would contribute about 100 ppm of Pb, or 16 percent of the total Pb in MSW. One battery per 500 tons of MSW would contribute about 20 ppm of Pb, or about 3 percent of total Pb input. At these contribution levels, additional efforts to remove lead-acid batteries from the MSW entering an MWC would have little impact on the amount of lead entering the MWC and little effect on controlled lead emissions.

IV. Supplemental Information on the Effects of Lead-Acid Battery Combustion on MWC Emissions

The remand requires the EPA to explain why it did not include a lead-acid battery prohibition in the February 11, 1991 standards and guidelines. The remand raises the question of whether lead-acid battery removal from MSW would reduce Pb emissions from MWC's. It is clear that Pb is contained in both the MSW stream being combusted and in MWC emissions discharged to the atmosphere. However, it is not clear whether uncontrolled and controlled Pb emissions are proportional only to the total amount of Pb input, or whether they may also be related to the form in which Pb or Pb compounds occur in the MSW. That is, is Pb more efficiently volatilized when it is in the metallic form, such as in lead-acid batteries, than when it is a trace component of paper, plastics, or other MSW material?

In order to determine the effect of lead-acid battery combustion on MWC emissions, a test program was sponsored by Environment Canada, the EPA, the International Lead Zinc Research Organization, and the Greater Vancouver Regional District in British Columbia, Canada. The test program studied the effect of lead-acid batteries on MWC stack emissions and on Pb levels in the fly ash and bottom ash by intentionally spiking MSW being combusted with lead-acid batteries.

Testing was performed on a 240 Mg/day (265 ton/day) mass burn/waterwall combustion unit at the Burnaby, British Columbia, MWC in June 1991. This MWC has a spray dryer/fabric filter-type acid gas/particulate matter APCD. The testing consisted of spiking MSW fed to the MWC unit with lead-acid batteries at the rate of four batteries per hour. This spiking increased the Pb input to the unit by about eight times (800 percent increase), from about 7 kg (15 lb) per hour (baseline) to about 56 kg (125 lb) per hour. The spiking was equivalent to 40 batteries per 90 Mg (100 tons) of MSW, or a Pb concentration in the MSW of about 4,000 ppm.

At the Burnaby MWC, about 1 hour is needed for MSW to travel from one end of the combustion grate to the other. At a spiking rate of four batteries per hour, there were four batteries, on average, on the grate at any given time during the spiking tests.

Testing at the Burnaby MWC consisted of 10 4-hour test runs over a 5-day period. Spiking with lead-acid batteries was performed during two of the runs. Other runs served as baseline control runs. During each run, the MSW fed to the unit was sampled, sorted into 78 categories, and analyzed for metals content. This test is the first to perform controlled spiking of lead-acid batteries to an MWC to study their effect on stack Pb emissions. It is also one of the most through analyses of the metals content of MSW.

The spiking of batteries to the Burnaby MWC did not measurably alter the Pb concentration in the stack gases either before or after the APCD. There were significant Pb increases in the ash residues from the boiler and from below the combustor grate. In the boiler, Pb increased in the section where the temperature is low enough to promote lead chloride (PbCl) condensation. The Pb increase in the grate siftings ash is caused by the Pb metal and Pb sulfate in the battery melting and dripping through the grate and forming beads of Pb metal in the grate siftings and bottom ash. The Pb in lead-acid batteries is not exposed to the appropriate conditions to be volatilized and carried into the flue gas to the APCD's or to the stack. The results of the Burnaby MWC testing program are summarized in table 1.

TABLE 1.—LEAD CONCENTRATION AT AIR POLLUTION CONTROL DEVICE INLET AND OUTLET DURING CONTROL AND BATTERY SPIKING RUNS

Test condition	APCD inlet (μg/dscm)[a]	APCD outlet (μg/dscm)[a b]	APCD efficiency (percent)
Baseline condition	8,764	51.8	99.4
(Range)	.....	(42.0–61.6)	.....

TABLE 1.—LEAD CONCENTRATION AT AIR POLLUTION CONTROL DEVICE INLET AND OUTLET DURING CONTROL AND BATTERY SPIKING RUNS—Continued

Test condition	APCD inlet (μg/dscm)[a]	APCD outlet (μg/dscm)[a b]	APCD efficiency (percent)
Spiking test	6,412	56.0	99.1
(Range)	(3766–9058)	(47.6–63.0)	

[a] Micrograms per dry standard cubic meter, corrected to 7 percent oxygen; original data were reported at 11 percent oxygen.
[b] The APCD consisted of a spray dryer followed by a fabric filter.

In summary, lead-acid batteries do not appear to be a measurable source of stack gas Pb emissions. Lead emissions from MWC's result from other sources of Pb in MSW and prohibiting lead-acid battery combustion is unnecessary.

V. Conclusions Regarding the EPA's 1991 Decision

Based on the information discussed in sections III and IV of this notice, the EPA has determined that lead-acid batteries do not measurably contribute to Pb stack emissions from MWC's. Prohibiting the combustion of lead-acid batteries would not reduce stack gas Pb emissions. Furthermore, lead-acid batteries only represent a small fraction of the Pb found in MSW entering MWC's because most batteries (greater than 90 percent) are being recycled. There are battery retailers in every community in the United States that will accept used lead-acid batteries for recycling. Relative to the lead-acid battery remand discussed in section I of this notice, the EPA is not proposing any change to the standards or guidelines promulgated February 11, 1991 for existing and new MWC's (40 CFR 60.30a and 40 CFR 60.50a) and is not including a prohibition on the combustion of lead-acid batteries in the subpart Eb standards or subpart Cb guidelines promulgated elsewhere in today's Federal Register.

List of Subjects

Environmental Protection, Air pollution control.

Dated: October 31, 1995.

Carol M. Browner,

Administrator.

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