Department of Energy
Washington, DC 20585
November 16, 1998

Beth Antley
U.S. Environmental Protection Agency
Region IV
980 College Station Road
Athens, Georgia 30605

SUBJECT: ***Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities*** **(EPA530-D-98-002)**

Dear Ms Antley:

The U.S. Department of Energy (DOE) welcomes the opportunity to provide comments on the subject guidance, which was announced in the October 16, 1998 Federal Register (63 FR 55602). Accordingly, enclosed for your consideration is an electronic file (formatted in Wordperfect 6.0/6.1) containing the Department's consolidated comments and recommendations regarding the peer review draft.

Questions on these comments should be directed to Beverly Whitehead (202-586-6073; e-mail: beverly.whitehead@eh.doe.gov) of my staff.

Sincerely,

Thomas T. Traceski
Director, RCRA/CERCLA Division
Office of Environmental Policy and Assistance

Enclosure

cc: RCRA Docket

UNITED STATES DEPARTMENT OF ENERGY COMMENTS ON EPA GUIDANCE TITLED *COLLECTION OF EMISSIONS DATA TO SUPPORT SITE-SPECIFIC RISK ASSESSMENTS AT HAZARDOUS WASTE COMBUSTION FACILITIES* (EPA530-D-98-002)

SUMMARY

In April 1996, the U.S. Environmental Protection Agency (EPA) proposed *Revised Standards for Hazardous Waste Combustors* under the joint authority of the Resource Conservation and Recovery Act (RCRA) and the Clean Air Act (CAA). This proposal integrated the monitoring, compliance testing, recordkeeping, and permitting requirements of the RCRA and CAA and will govern the combustion of hazardous/mixed waste in cement kilns, incinerators, and lightweight aggregate kilns. Proposed standards also will limit the emissions of several hazardous air pollutants (HAPs) from affected sources to the level of the maximum achievable control technology (MACT).

Recognizing that (regardless of MACT standards) significant uncertainty may exist regarding potential risks due to hazardous waste combustor (HWC) emissions, the EPA proposal included a recommendation to continue requiring site-specific risk assessments (SSRAs) as part of the RCRA permitting process for HWC facilities. EPA believed that SSRAs provide a mechanism for assessing, on a site-specific basis, potential risks and uncertainties and for determining protective emission rates.

Section 3005(c)(3) of RCRA and 40 CFR Part 270.32(b)(2) give EPA the responsibility and authority to establish additional permit conditions on a case-by-case basis as necessary to protect human health and the environment. These provisions are generally referred to as EPA's omnibus authority. Under 40 CFR Part 270.10(k), EPA may use its omnibus authority to require a RCRA permit applicant to collect and submit additional information necessary to establish protective permit conditions. Any decision to add permit conditions based on an SSRA, however, must be justified in the administrative record for each facility, and the implementing agency must explain the basis for the additional conditions.

Collection of additional emissions data and completion of SSRAs can provide the information necessary to determine what, if any, additional permit conditions are necessary for maintaining risks within acceptable levels. In the October 16, 1998 Federal Register (63 FR 55602), the U.S. Environmental Protection Agency (EPA) announced the availability of a peer review draft guidance titled *Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities* (EPA530-D-98-002). EPA's draft provides guidance on collection of stack emissions data to support multi-pathway, SSRAs at HWC facilities.

The U.S. Department of Energy (DOE) offers the following general comments on the broad themes contained in the draft guidance. Specific comments focusing on particular sections of the draft guidance follow the general comments and are organized and presented using the same numbering convention as the guidance.

GENERAL COMMENTS

DOE appreciates EPA's efforts to prepare an approved methodology for performing indirect exposure (i.e., non-inhalation pathways) assessments during site-specific risk assessments and offers the following general comments for EPA's consideration.

1. In its initial HWC proposed rule (61 FR 17358, April 19, 1996), EPA explained it had conducted and was conducting further risk assessments under RCRA to determine the degree of protection afforded by the proposed MACT standards. At that time, EPA felt it could not assess, on a national basis, the magnitude of risks that could be routinely expected from burning hazardous waste in HWCs. To address this data need, however, EPA planned on collecting extensive and detailed emissions data in an attempt to make a policy judgement (i.e., determination), on a national basis, regarding the protectiveness of the proposed rule (61 FR 17371 - 17372).

   DOE values and strongly supports EPA efforts to develop MACT standards that ensure the protection of human health and the environment. Moreover, the Department encourages EPA to follow through on its attempt to quantify, on a national basis, the risks to human health and the environment associated with complying with final MACT standards. DOE believes that MACT standards, once established and met, should supersede the requirement for site-specific risk assessments, provided EPA has confidence in its detailed evaluation of HWC emissions and the current state of technology involved in developing this proposed rule.

   DOE points out that no codified regulatory provisions requiring SSRAs for HWCs have been issued to date, nor does EPA codify its policy in the proposed MACT rule. According to the preamble (61 FR 17371), risk assessment beyond MACT will continue to be driven by Agency policy that will be implemented by EPA regional and authorized state permit writers. Although a legal/regulatory basis appears to exist supporting the EPA policy to require risk analyses beyond MACT when regulators determine it is "necessary to protect human health and environment," it is unclear when and/or if such a determination would be made. Therefore, an operator cannot be certain that a full-fledged risk analysis will be required as part of the permitting procedure. Lack of a definite rule or policy regarding the need for risk assessment poses a significant uncertainty for both the regulated community and the regulators. DOE requests that EPA explicitly codify in the final regulations the approach (SSRAs or implementation of the MACT standards) that is to be followed (e.g., when a determination of protectiveness is to be completed).

2. The unspeciated emissions factor is one way to ensure that emissions estimates overestimate rather than underestimate risks. Unlike uncertainty factors for toxicity values, there is no scientific basis for the underlying assumption that the average toxicity of the unspeciated compounds is either greater or less than the average toxicity of the speciated compounds or, for that matter, in any way related to the toxicity of the speciated compounds. The average toxicity of the unspeciated compounds is simply unknown and likely to vary widely. The toxicity of the unspeciated emissions will vary with the design of the unit, the nature of the waste, and the operating conditions. The primary value of

the unspeciated emissions factor is that it provides a formal process for addressing unspeciated emissions.

The current unspeciated emissions factor likely penalizes high-temperature processes that work in a reducing environment and produce relatively large quantities of light alkanes like methane, ethane, and propane. In the past, these light alkanes have mostly been accounted for as part of the unspeciated emissions. Recent work emphasizes the measurement of these species; however, whether or not they can be speciated accurately during thermal tests has yet to be demonstrated. Even if they are measured, the remaining unspeciated fraction is still subject to the same problematic interpretation discussed above.

An alternative to assuming arbitrarily that the average toxicities of the unspeciated and speciated emissions are equal would be to measure the toxicity of the emissions directly. This approach would reward highly destructive processes that produce clean emissions and discourage those that produce more toxic emissions.

A toxicity standard derived from direct measurements of the toxicity of total emissions from many facilities would serve as a benchmark for estimating the toxicity of the unspeciated emissions. For facilities with special concerns, such as the protection of salmon or threatened species like bald eagles, toxicity tests could be selected to address those concerns directly.

Introducing direct testing of toxicity into emissions characterization has had a mixed reception in industrial water treatment. In the San Francisco Bay area, Chevron and other major refineries have adapted well to toxicity-based standards. Chevron at one time had and may still have an aquarium in the lobby outside the company dining area in which the test organisms and other fish lived in effluent water from the refinery. The aquarium exhibit was a very effective employee motivator and public relations tool. Other, especially smaller, industries have had more trouble adapting to the rule.

In the case of the thermal treatment industry, a strategy such as direct toxicity testing that has the potential to boost public confidence is worthy of careful consideration. There are a myriad of technical problems associated with developing and applying toxicity tests to unspeciated emissions, the most obvious being how to separate the toxicity due to metals and speciated organics from that due to unspeciated emissions. However, the current approach to unspeciated emissions, which lacks any scientific basis, is likely to contribute to public skepticism and distrust of the industry and its regulators.

3. DOE requests that EPA furnish guidance in determining when methyl mercury can be eliminated from the SSRA, when a default emissions concentration value must be used, and what the default concentration should be when measurements cannot be made.

SPECIFIC COMMENTS

3.2. Test Conditions for Risk-Based Data Collection and Risk Burn

EPA states its belief that emissions data collected during normal (or average) operating conditions may be more directly related to risks posed by an HWC facility over its operating life because estimating potential risks based on data collected during worst-case DRE (destruction and removal efficiency) and/or SRE (system removal efficiency) conditions may be overly conservative. Accordingly, it appears that EPA is emphasizing that risk calculations should be based on average, or normal, operation of the unit, not the worst case DRE and/or SRE conditions. Spiking to increase metal feed rates above normal levels, for example, would not be required.

It appears to the Department that rest of the document negates this thesis with extraordinarily stringent requirements (i.e., essentially invariant feed and operating conditions/emissions) for the use of "normal" or "average" conditions. In the April 19, 1996 notice, EPA presents its definition for normal operating conditions (relative to confirmatory performance testing) and representative conditions under which HWCs must operate to ensure emissions are representative of normal operating conditions. DOE suggests that EPA furnish more definitive guidance on its definition and use of "normal" or "average" conditions relative to SSRAs.

4.1.3. Combustion Conditions

In discussing the impact of combustion conditions on D/F emissions, EPA clarifies its belief that: (1) it is often difficult to determine a direct correlation between an individual combustion parameter (e.g., minimum combustion temperatures, maximum carbon monoxide, maximum total hydrocarbons) and D/F emissions, (2) the most influential combustion parameters may not always be the ones identified, (3) a change in a single independent variable can simultaneously impact several dependent variables, and (4) these changes may or may not impact D/F emissions. EPA goes on to recommend as a general guideline that D/F emission samples should be collected during all planned test runs.

DOE is cautiously optimistic that, although EPA does not appear to have sufficient data to determine "worst-case" D/F emissions, by the time the final MACT rule is issued, EPA and industry will be able to define "worst-case" conditions for D/F emissions, especially since so much has been published on the formation of D/F and the development of the proposed MACT standard. Regardless, DOE agrees that it is unrealistic to expect a facility to have sufficient stack ports and resources to collect samples during every possible scenario. Moreover, increasing the number of DOE hazardous/mixed waste incinerator emission samples that must be analyzed potentially exacerbates an already difficult waste management situation by further limiting the availability of laboratories equipped to analyze for radionuclides.

4.1.3.2. Containerized or Batch Wastes

In discussing its belief that transient operations due to batch waste feeds are fairly common, EPA states that the following batch feed parameters should be demonstrated during D/F testing:

- **Maximum feeding frequency**
- **Maximum batch size**
- **Maximum primary combustion chamber (PCC) combustion temperature**
- **Maximum kiln rotation speed**
- **Minimum oxygen concentration.**

DOE continues to advocate operating flexibility. The Department is concerned that defining operating parameters for maximum batch size and frequency (in addition to those for CO, O_2, CO_2, combustion efficiency, individual feed rates, and total feed rates) may be unnecessarily redundant and overly restrictive. If a facility demonstrates that it can batch feed a heavy solid waste at a specific frequency and maintain good combustion conditions, thereby managing any transients which occur, the HWC should be able to manage transient conditions feeding a light solid at more frequent intervals.

Although DOE agrees that requiring a facility to demonstrate feed frequency versus batch size makes sense if no other operating parameters are imposed, if such restrictions are imposed in addition to other parameters (e.g., waste content and feed rate limitations currently used to establish acceptable batch sizes and feeding frequencies), it will require a permittee to demonstrate for nearly every type and combination of waste feed, which will result in unnecessary expenditures of already limited resources. DOE requests EPA consider allowing batch size to be limited by the physical constraints of the feed system. A waste analysis plan, feed management plan, and operating experience should eliminate the need for these limits which are intended to ensure that the operators do not overwhelm the system.

4.1.3.3. High Carbon Monoxide

In discussing the relationship between carbon monoxide (CO) levels and D/F emissions, EPA states that HWCs with CO limits above 100 parts per million (ppm) should perform D/F emissions testing while carbon monoxide levels are maximized.

Currently, DOE's Toxic Substances Control Act Incinerator (TSCAI), located at the East Tennessee Technology Park, Oak Ridge, Tennessee, is permitted to operate an automatic waste feed cut-off (AWFCO) that is triggered when the CO operating limit of 100 ppm (@7% O_2) is exceeded; however, the unit typically operates in the 0 – 20 ppm range. EPA's draft guidance implies that when such an incinerator is performing D/F emissions testing, it should be operated so as to attempt to generate conditions of 100 ppm CO (i.e., CO levels should be maximized) in order to maximize dioxin/furan emissions.

If the Department's interpretation of EPA's guidance is correct, DOE requests that EPA clarify: (1) whether an HWC will be allowed to set its AWFCO for CO to a higher limit (e.g., 200 ppm)

during the trial burn, (2) whether an HWC will be assigned an AWFCO of 20 ppm after the trial burn if the facility chooses to operate under typical conditions of 0 – 20 ppm CO with the AWFCO set at 100 ppm during the trial burn period, or (3) whether EPA's guidance pertains to "units with [CO] limits ***above*** 100 ppm" (emphasis added) only?

4.2. Operating Parameters Associated with D/F Production

In prioritizing operating parameters and conditions associated with D/F formation, EPA clarifies that primary operating parameters are those that have shown the highest correlation with D/F emission rates during full-scale testing and are expected to dominate D/F formation and include "temperature profiles over particulate holdup areas (including long runs of ductwork, economizers, and boiler tubes)." Furthermore, EPA states that, unlike secondary or tertiary operating parameters, primary parameters should always be demonstrated during the D/F test and should be limited in the permit by specific quantitative limits.

DOE recognizes that temperature profiles over particulate holdup areas are primary operating parameters for a facility, especially if a dry air pollution control device (APCD) or heat recovery device (e.g., boiler) is present. EPA, however, fails to define what it considers "long runs," which may be helpful to facilities attempting to distinguish whether additional thermocouples will be required during trial burn. Accordingly, DOE requests that EPA consider whether it can quantify the number of thermocouples that would be expected to satisfy a D/F test demonstration. Also, DOE requests EPA clarify whether such thermocouples should become permanent operating parameters and, therefore, require permanent installation. Finally, DOE strongly suggests that EPA consider the appropriateness of a waiver from demonstrating one or more of these parameters should a facility meet the final MACT D/F emission limit(s) and be able to demonstrate a clear and convincing correlation between compliance with the D/F limit and one or more operating parameters.

5.1. Organic Emissions from HWIs and Boilers

EPA clearly states that surrogate wastes or spiking of waste constituents can be used during the trial burn to collect certain data, such as calculating the DRE. In discussing the types of operating issues and parameters associated with DRE and organic emission testing (e.g., non-D/F organics) during the collection of data for the SSRA, however, EPA recommends (1) the use of "actual wastes," (2) discourages the use of surrogates, and (3) cautions against the use of collected data from a trial burn run (i.e., DRE test) that contains surrogate waste (e.g., spiked organics) due to the possible conflicts with the SSRA objective to use actual waste. EPA is quick to recognize, however, that in some instances (e.g., if a facility burns a large number of small waste streams, if sufficient quantities of uniform wastes are unavailable) it may not be possible to use actual wastes. Furthermore, as noted elsewhere in its guidance (i.e., 3.2. TEST CONDITIONS FOR RISK-BASED DATA COLLECTION AND RISK BURN), EPA states that, in some cases, "data for the SSRA may be collected during DRE or SRE test conditions if issues regarding the use of actual representative wastes can be

resolved." Restated, in some instances it appears that the use of the "worst-case" conditions of the trial burn may be most appropriate to include in the SSRA, whereas in other cases normal operating conditions may be appropriate.

The Department believes that EPA's guidance should furnish additional, more prescriptive guidelines as to what is acceptable in the use of actual versus surrogate wastes and spiking of actual wastes. Specifically, DOE requests additional guidance regarding the types of hazardous constituents and the quantities used to spike actual wastes, if any, that would be acceptable, as well as ensuring the emission testing and SSRA results remain admissible for use in the SSRA.

DOE believes that it may encounter situations when an HWC trial burn and SSRA data collection are required at a time when limited quantities or none of an HWC facility's actual waste is available. If actual waste is unavailable, DOE requests EPA clarify how much "modification," if any, can be done so that the waste feed more closely reflects a typical waste feed without risking that EPA will reject the waste and thus nullify the emission test results.

In addition, when mixed waste is burned, the combustion process does not destroy the radioactivity associated with the waste, only the chemical and physical forms of radionuclides. Therefore, using actual wastes, if available in sufficient quantities, will result in an increase in the amount of mixed waste generated, some of which may require long-term maintenance and storage involving significant extended cost outlays. This would be counterproductive to DOE's goal of reducing the generation of mixed wastes requiring treatment and disposal. Furthermore, due to factors such as precautions to reduce occupational exposure during feedstream analysis and disposal of additional quantities of mixed waste generated during the DRE and/or SSRA-related emission testing, costs associated with conducting emission testing using actual mixed wastes are expected to be much higher than those for emission tests of conventional waste streams. Accordingly, the Department requests EPA clarify whether a facility can use 100% surrogates if their use results in the most realistic information as well as supports the needs of the "worst-case" in a trial burn.

6.0. Metal Emissions

EPA explains that, in general, hourly rolling average (HRA) metal feed rate limits have been established based on either a boiler and industrial furnace (BIF) Tier I approach or high-temperature (i.e., SRE) test results. EPA also states that the emission rates associated with maximum Tier I or SRE metal feed rates could exceed target risk levels (e.g., 10-5) when evaluated in a multi-pathway SSRA because the include direct and indirect exposure routes for all contaminants of potential concern (COPCs). The Agency goes on to indicate that in addition to the 10 BIF metals, several metals including aluminum, cobalt, copper, manganese, nickel, selenium, vanadium, and/or zinc will be considered as COPCs for the SSRA.

Although EPA is quite clear regarding which metals must be considered as COPCs when conducting an SSRA, DOE suggests EPA consider whether the guidance for metal emissions measurements should be clarified to explain if, and under what circumstances, any of the 10 BIF metals plus aluminum, cobalt, copper, manganese, nickel, selenium, vanadium, and zinc could be

eliminated from the required metals emissions measurements, based on feed limits for the individual metals and insignificant calculated contribution to risk.

6.2.3. Low-Volatile Metals

EPA points out that operating parameters associated with the low-volatile metals are consistent with those described for the semivolatile metals with two exceptions, the first of which is EPA's recommendation that facilities establish a separate limit for low-volatile metals in pumpable feed streams, since these may partition at a higher rate to the combustion flue gas.

DOE requests EPA elaborate on the implications of separate feed rate limits for metals in pumpable versus solid feed streams. For example, is a facility allowed to establish a single permitted feed limit for each metal constituent based on liquid feed rate of each metal if it chooses to spike the liquid wastes with the low-volatile metals during the trial burn? This would, according to the guidance, result in the "worst-case." As a result, the facility would be subject to a single feed rate of which it could assign a portion to solid and a portion to liquid subsequent to the trial burn, especially if the facility had those air pollution control systems (APCSs) that were found to be effective in controlling these emissions.

7.2. Measuring Particle Size Distribution

Although it will be issuing guidance that provides a nine-category particle-size default assumption for HWCs equipped with electrostatic precipitators (ESPs) or fabric filters, EPA clarifies that the default assumptions will not be appropriate for facilities equipped with wet APCDs or facilities with no APCD. EPA goes on to recognize the inherent uncertainties associated with collecting particle-size distribution data and the inherent problems associated with measuring very low masses of particulates, as would be the case for HWCs equipped with high efficiency particulate air (HEPA) filters .

Although DOE appreciates EPA's effort to accommodate HWC owners/operators by furnishing particle-size default assumptions and recognizes that technical limitations exist, the Department regrets that its hazardous/mixed waste incinerators will be ineligible to use the particle-size default assumptions. Unless DOE personnel can obtain particle-size data from the APCD vendor, affected DOE facilities will need to conduct additional testing for which EPA has no reliable method. DOE suggests that EPA define the conditions under which the regulators can or should accept facility-generated, particulate-size data so that the facility-generated data can be gathered in a technically justifiable, legally defensible manner.

App. A. Trial Burn Conditions and Permit Limits for an Example HWC Facility

This Appendix includes a detailed list of Group A, B, and C control parameters (and associated monitoring requirements) for an example hazardous waste incinerator (HWI), Facility Z. Facility Z includes a liquid injection combustion chamber burning organic liquid and aqueous wastes, a heat recovery boiler, and

an air pollution control device (APCD) system consisting of a fabric filter and venturi scrubber.

In the example system that includes liquid only waste feed, a heat recovery boiler, and an APCD system consisting of a fabric filter and venturi scrubber, the facility is capable of defining and maintaining a normal operating condition. DOE requests that EPA furnish additional guidance that addressees batch-fed HWC facilities and HWC facilities that have widely varying feeds (i.e., facilities that have difficulty or cannot maintain normal operating conditions as defined in this guidance).

App. B. Sampling and Analysis

B.8 Polychlorinated Biphenyls

EPA explains the need for sampling and analysis of PCBs and offers some general guidelines that may be considered in conjunction with site-specific concerns. EPA goes on to explain that knowledge of the PCB distribution by homologue group is necessary in order to determine which toxicity value to apply; however, Method CARB 428, as written, provides guidelines for analysis to determine the total homologue group concentrations but does not provide information on the 13 dioxin-like co-planar PCBs. In contrast, guidelines on isotope dilution high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS) analysis for the 13 co-planars have been published as Draft Method 1668 (EPA 1997b).

DOE questions the value of recommending draft methods for which there are still unresolved issues. Accordingly, the Department recommends EPA issue improved guidance on PCB determinations and/or revise the toxicity approach and its data requirements to reflect current data capabilities. Also, the Department requests EPA issue improved guidance on the measurement of Total Organic Emissions and on issues with detection limits.

B.9 Analysis of MM5 Samples for Multiple Pollutant Classes

Determination from Two Sampling Trains

EPA states, "In order to determine PCBs from Method 0023A, it is recommended that at least four isotopically labeled PCB surrogates be spike onto the XAD-2 resin together with the D/F surrogate prior to sampling." In addition, "The Method 0023A train components would be subject to a single Soxhlet extraction with toluene, and the extract would be split."

DOE requests EPA clarify whether these statements mean that all sample container contents should be combined prior to the extraction process. Also, the analytical summary scheme within EPA Method 0023A (page 30) depicts containers 1 and 2 (front half rinse and filter) combined and soxhlet extracted. The scheme also depicts containers 3 and 4 (back half rinse and sorbent trap) combined and soxhlet extracted. This analysis scheme appears to compromise the analysis for PCBs and PCDD/PCDF by having separate extraction of the filter and the sorbent trap. DOE

requests EPA furnish clarification regarding which analytical scheme should be used for PCBs and which for the PCDD/PCDF determination.

B.11. Facility-Specific Compounds

In discussing additional compounds which individual facilities may need to sample and analyze, EPA states "Potential candidates for additional facility-specific determinations include any highly toxic, persistent, or bioaccumulative constituents burned in *large quantities*." (emphasis added)

DOE requests EPA furnish additional guidance regarding what constitutes "large quantities."

B.12. Total Organics

1. In discussing the importance of and approach for determining the total organic (TO) mass, EPA clarifies that the estimated TO is represented by the sum of the constituent concentrations in three fractions. These fractions are based on boiling point ranges and include: (1) the volatile field gas chromatography (FGC) fraction (boiling point less than 100 ºC), (2) the semivolatile, total chromatographable organics (TCO) fraction (boiling point between 100 and 300 ºC), and (3) the nonvolatile, gravimetric (GRAV) fraction (boiling point greater than 300 ºC).

Division of the unspeciated emissions into three ranges based on volatility is a conceptually sound idea. In practice, however, mass balances are likely to prove difficult to close. Chromatographic methods are best for estimating relative concentrations of closely related compounds in similar matrices. Comparison of absolute estimates of masses of the same semi-volatile compound in a gas matrix and then in a solvent matrix may differ significantly, especially if the unknown species interact in the liquid matrix. The EPA indicated in the peer review draft that accurate estimates of the nonvolatile (GRAV) fraction are likely to be especially difficult to obtain.

Rather than develop better analytical methods for an approach based on an assumption of convenience rather than of science (see General Comments above), DOE suggests that the return on investment may be higher for an approach based on the direct measurement of toxicity outlined in the General Comments. Also, DOE requests EPA clarify the following information: (1) whether it compared measurements of the same compound using a gas sample directly and a liquid extract of a sample collected on an XAD-2® resin, (2) whether it was able to close mass balances during development of the methods, and (3) if the answer to the second question is yes, the kinds of waste matrices for which EPA was able to close mass balances.

2. EPA explains that its attempts to characterize the GRAV fraction more specifically have met with mixed results. The GRAV fraction may include organic and/or inorganic mass (i.e., "artifacts") not directly attributable to organic incinerator emissions. These artifacts may be composed of inorganic salts, super-fine particulate, fractured XAD-2® resin, or some other unknown (Lemiuex and Ryan 1998).

DOE believes that the artifacts in the gravimetric mass fraction of the TOs are problematic and requests EPA furnish detailed guidance on how to estimate the contribution of these artifacts to the total gravimetric mass.

3. **In clarifying why the TO measurement is an estimate (page B-40, first paragraph), EPA states, "TO measurements may be very conservative measurements of uncertainty because the GRAV fraction may contain inorganic species" and recommends that the individual boiling point category and subcategory data from the various components of a TO determination be reported.**

The Department is concerned that the method used to estimate the fraction of the nonvolatile compounds (the GRAV fraction) will prove problematic for mixed waste thermal treatment facilities. Unlike conventional HWCs (i.e., facilities that deal only with chemical-related waste), mixed waste facilities must filter the gas streams before they are exhausted to the atmosphere. HEPA filters remove nonvolatile radionuclides such as cesium, while carbon filters remove gaseous radionuclides such as iodine. Small pieces of the HEPA filters and of the carbon can break off and become particulate matter in the gas stream. The particulates from the HEPA filters and from the carbon, both inorganic, are likely to contribute to the GRAV fraction.

DOE suggests EPA consider the appropriateness of the following modification of the GRAV method, which DOE believes will reduce but not eliminate interference from inorganic particulates when TO filtered estimate is lower than the unfiltered estimate.

When TOE Filtered Estimate is Lower Than Unfiltered Estimate:

A. If microscopic examination shows that the dried residue of the unfiltered extracts is primarily inorganic in nature (e.g., sharp edges, regular or crystalline structure), use the filtered estimate.

B. If microscopic examination shows that the dried residue of the unfiltered extracts may be primarily organic in nature (e.g., amorphous, sticky), analyze the sample for total organic carbon by combusting it and measuring the resulting CO2. Calculate the GRAV mass as a function of the mass of CO2 released. (If carbon particulates are present, this approach may still overestimate the GRAV mass.)

DOE believes that the method in Step A will account for all the organics extracted from the particulates. Those organics that do not extract with methylene chloride are unlikely to pose a threat through indirect pathways as natural processes will extract these residual organics very slowly, if at all. Similarly, even if these particles are inhaled or ingested directly, the residual organics are unlikely to be bioavailable.

DOE further believes that data from the GRAV fraction determination should not be required to be analyzed for or included in the SSRA if EPA cannot resolve the issue regarding the presence of organic and/or inorganic mass not directly attributable to organic incinerator emissions.

B.14. Metals

In discussing sampling considerations and determinations related to total metals [i.e., the 10 BIF metals and the additional metals which will be evaluated in SSRAs (aluminum, cobalt, copper, manganese, nickel, selenium, vanadium, and zinc)], EPA states that metals chemical speciation data, especially for mercury, represents a new data need. EPA further clarifies that the new human health risk assessment (HHRA) guidance will provide default assumptions for ratios of divalent particulate mercury, divalent mercury vapor, and elemental mercury vapor. However, these default assumptions could be replaced by site-specific data if mercury speciation sampling were performed.

DOE is unaware of any field-validated method for determining mercury speciation in HWC emissions, making it important that valid default speciation values be provided. The default values provided in this guidance will not represent emissions from many HWCs. The highly variable efficiency of mercury removal by scrubbers at different HWCs represented in the EPA MACT database (from 0 to > 90%) indicates how variable the mercury speciation is between elemental and oxidized species, since scrubbers are only highly effective for removal of the soluble, oxidized mercury species. Therefore, DOE requests that EPA consider developing, if possible, and furnishing different default speciation value sets for different major classes of APCD systems. These default values should be able to be adjusted for quench rates and HCl/Cl_2 concentrations in the flue gas.

B.15. Particle Size Distribution

In discussing select procedures for collecting particle-size data, EPA again clarifies that there are no default assumptions for facilities equipped with APCD components other than ESPs or fabric filters (e.g., HEPA filters, dry scrubber systems) or wet APCD systems or for facilities with no APCD. EPA goes on to recognize that HWC facilities equipped with ESPs or fabric filters may be able to demonstrate, via preliminary air dispersion and deposition modeling, a reduced need for site-specific particle-size information.

A default particle-size distribution for wet APCS and for HEPA-filtered emissions is needed as is guidance for determining this distribution for wet APCS and HEPA-filtered emissions on a site-specific basis. DOE also requests EPA develop and issue guidance for acceptably determining particle-size distribution for HEPA-filtered emissions. Furthermore, DOE believes EPA should recognize that, in addition to facilities equipped with EPS or fabric filters, HWC facilities equipped with HEPA filters should also, on a case-by-case basis, be able to conduct preliminary modeling to demonstrate a reduced need for site-specific particle-size information. To do otherwise appears arbitrary and capricious. Therefore, DOE suggests EPA furnish guidance clarifying the criteria that should be used to "demonstrate a reduced need for site-specific particle-size information."