

**THE NATIONAL TECHNICAL WORKGROUP ON MIXED WASTE
TREATMENT STUDY ON MACT RULE PERMITTING AND COMPLIANCE
FOR MIXED WASTE TREATMENT FACILITIES**

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ABSTRACT

The National Technical Workgroup (NTW) on Mixed Waste Treatment was formed to assist EPA, DOE, States and applicants in the development and implementation of various tasks needed in the permitting and compliance of mixed waste treatment facilities. Over the last few years the NTW has served as the national coordinating group to identify and resolve technical issues and barriers to permitting and compliance of mixed waste treatment facilities and to facilitate the exchange of technical information among various groups across the nation. The National Technical Workgroup (NTW) for Mixed Waste Treatment was formed through an interagency agreement between DOE and EPA and includes both interagency cooperation as well as federal and State cooperation.

A major study area for NTW has been the impacts of the recently proposed Waste Combustion Performance Standards (the so-called "MACT", Maximum Achievable Control Technology) for waste thermal treatment. While EPA is responsible for the development and implementation of the rule, DOE is responsible for compliance with the rule. The rule is scheduled for promulgation early in calendar year 1999 and will have impacts on virtually all mixed waste thermal treatment systems. The proposed rule will directly affect DOE and commercially operated mixed waste incinerators. It will also indirectly but substantially impact remediation activities of mixed waste sites through "applicable or relevant and appropriate requirements" (ARARs) which typically borrow from RCRA requirements and non-incinerator treatment facilities due to 40 CFR Part 264 Subpart X requirements for miscellaneous facilities to use analogous standards when appropriate. With major impacts and relatively little time (3 years) to come in full compliance with these complex rules, it is critical that DOE and EPA work together to see through the implementation of these rules. The EPA, DOE, and States continue to work closely together on the technical issues involved with implementation of the MACT rule through the NTW. This paper will describe some of the results of the NTW supported activities related to the MACT rule.

INTRODUCTION

The National Technical Workgroup (NTW) on Mixed Waste Treatment was formed to assist EPA, DOE, States and applicants in the development and implementation of various tasks needed in the permitting and compliance of mixed waste treatment facilities. Over the last few years the NTW has served as the national coordinating group to identify and resolve technical issues and barriers to permitting and compliance of mixed waste treatment facilities and to facilitate the exchange of technical information

among various groups across the nation. The National Technical Workgroup (NTW) for Mixed Waste Treatment was formed through an interagency agreement between DOE and EPA and is an excellent example of interagency cooperation as well as federal and State cooperation. NTW's efforts to identify and resolve site specific issues through the use of multi-agency Technical Assistance Teams is a good example of NTW's direct benefit to DOE sites DOE has received supporting letters from States hosting DOE facilities and as well as from DOE operating sites. EPA has recently expanded support for this successful program. These cooperative activities are key to the successful implementation of DOE's "Path to Closure". Efforts such as the NTW allow DOE to work closely with EPA and the States in its efforts to achieve these goals.

As part of the continuing NTW dialogue, EPA, States and DOE have jointly identified high priority technical issues that could benefit from cooperative efforts. In the current fiscal year NTW is facilitating regulatory cooperation and address technical problems in areas such as

- **MACT Rule Permitting and Compliance for Mixed Waste Treatment Facilities.** The objectives of this task are to evaluate the impacts of and to support the implementation and compliance with the hazardous waste combustion Maximum Achievable Control Technology or (MACT) rules. Some of the activities associated with this area are described in more detail in the next section of this paper.
- **Technical Assistance Teams (TATs) for Permitting Mixed Waste Treatment Facilities.** The objective of this task is to provide a continuing mechanism by which owner/operators and permit writers can get rapid assistance on compliance and permitting technical issues for mixed waste treatment. The Technical Assistance Teams provide direct technical input to DOE and to permit writers by addressing specific technical issues arising from various case studies.
- **The Mercury Compliance Strategy.** The objective of this study is to develop the necessary information database on mercury control and compliance assurance in order to facilitate the rapid and environmentally protective compliance with the mercury provisions of the MACT standard. More details of the activities ongoing in this area are described in later sections of this paper.
- **Mixed Waste Characterization for Generators and Treatment Operators.** Under the sponsorship of the EPA/DOE Interagency Agreement, the NTW has previously developed a Technical Resource Document on Waste Characterization. This task builds upon this previous efforts and focuses on the impacts of the new MACT rules, advanced waste characterization techniques such as nondestructive assays, continuous emissions monitors and generator requirements.
- **Risk Assessment.** In this task, EPA and DOE together are investigating whether the various risk assessment methodologies can be combined and are defining approaches to resolve some of the inconsistencies among the different fate and

transport models, air models, and the other numerous input parameters used within a risk assessment. A focus meeting is planned to identify and resolve the various issues associated with risk assessment methodologies and results presentation formats.

- **Alternative Technologies.** The objective of this task is to examine the capabilities and the permitting (Subpart X) of emerging alternative technologies. The technologies include: all forms of thermal (combustion and oxidation) and non-thermal treatment technologies for mixed waste and associated air pollution control devices, continuous emissions monitors, waste characterization techniques and unique integration schemes for system components.

IMPACT OF THE PROPOSED REVISED STANDARDS FOR HAZARDOUS WASTE COMBUSTORS ON MIXED WASTE THERMAL TREATMENT FACILITIES

The U.S. Environmental Protection Agency (EPA) has proposed revised standards for hazardous waste burning combustors (HWCs) under joint authority of the Clean Air Act Amendments of 1990 (CAAAAs) and the Resource Conservation and Recovery Act (RCRA) (Federal Register, Friday April 19, 1996, Vol. 61, No. 77, pp. 17358-17536). In addition, the Agency has published five notices of data availability (NODAs):

1. August 23, 1996 (61 FR 43501), inviting comment on information pertaining to a peer review of three aspects of the proposed rule and information pertaining to the since-promulgated "Comparable Fuels Rule" (see 63 FR 43501 (June 19, 1998));
2. January 7, 1997 (62 FR 960), inviting comment on an updated hazardous waste combustor database containing the emissions and ancillary data that the Agency used to develop the final rule;
3. March 21, 1997 (62 FR 13775), inviting comment on the Agency's approach to demonstrate the technical feasibility of particulate matter (PM) continuous emissions May 2, 1997 (62 FR 24212), inviting comment on several topics including the status of establishing MACT standards for HWCs using a revised emissions database and the status of various implementation issues, including compliance dates, compliance requirements, performance testing, and notification and reporting requirements; and
4. December 30, 1997 (62 FR 67788), inviting comment on several status reports pertaining to PM CEMS.

"Mixed" hazardous and radioactive waste thermal treatment systems will fall under this rule due to the hazardous component of the waste. Because the rule was designed for and focussed on hazardous-only waste treatment facilities (including cement and light weight aggregate kilns, and on-site and commercial hazardous waste incinerators), many issues related to mixed waste were not specifically considered.

The proposed rule will directly affect DOE and commercially operated mixed waste incinerators. The rule will also indirectly but substantially impact:

- (a) remediation activities of mixed waste sites through “applicable or relevant and appropriate requirements” (ARARs) which typically borrow from RCRA requirements; and
- (b) non-thermal treatment facilities due to 40 CFR Part 264 Subpart X requirements for miscellaneous facilities to use analogous standards when appropriate.

The following discussion addresses both the direct and indirect impacts. For more details on these impacts, the reader is referred to the NTW white paper on this subject (See NTW Website for latest draft (<http://wastenot.inel.gov/mwfa/NTW>)). When considering these impacts, it is important to note that the standards that are discussed are proposed and subject to significant changes when actually promulgated. The NTW is planning to develop a revised white paper and organize a workshop on the implementation of the rule to mixed waste treatment when it has been promulgated. The promulgation date is expected to be early in calendar year 1999.

Applicability of Proposed Rule

Under the CAAAs of 1990, “Maximum Achievable Control Technology” (MACT) standards are to be applied to “major” sources defined as having the potential to emit either greater than 10 tons/year of any one hazardous air pollutant (HAP), or greater than 25 tons/year of any combination of HAPs. However, EPA can establish lower threshold emitting levels for the regulation of lower emitting “area” sources under the MACT standards for major sources where appropriate; particularly when the sources emit high risk HAPs. For this HWC rule, EPA is proposing to impose MACT standards on all hazardous waste burning sources, regardless of size or potential to emit (major and area sources). This is because HWCs have the potential to emit a number of HAPs singled out as being of primary concern, including mercury, polychlorinated dioxins and furans, and polycyclic organic matter. This means that the proposed rule, if finalized, will be applicable to all mixed waste incinerators, regardless of size or potential to emit.

A hazardous waste incinerator is defined as any system treating hazardous waste that meets the following criteria:

- (1) is an enclosed device that uses controlled flame combustion and is not specifically classified as a boiler, or industrial furnace, or
- (2) meets the definition of infrared incinerator or plasma arc incinerator (both of which systems use a controlled flame combustion afterburner).

Thus certain thermal treatment systems being considered for mixed waste may not fall strictly under the HWC MACT rules, such as vitrification melters (based on metal and glass melters), molten salt oxidation, and wet chemical oxidation, and other systems which may not have a flame or an afterburner. However, typical practice is to apply hazardous waste combustor standards to other thermally-based treatment systems under 40 CFR Part 264, Subpart P. Subpart P is applicable to “thermal treatment systems” defined as “..those whose treatment uses elevated temperatures as the primary means to change the chemical, physical or biological character or composition of the hazardous waste in systems other than those covered in Subpart O (incinerators) and Subpart H (Boilers and Industrial Furnaces).” Additionally, requirements for other miscellaneous treatment processes (including non-thermal methods) are covered in Subpart X. For

miscellaneous systems under Subpart X, similar requirements are imposed from other systems (including hazardous waste combustors) as appropriate. Thus, the new proposed HWC MACT rule may indirectly affect requirements for non-thermal and thermal systems that may not be directly classified as incinerators.

For Superfund Site thermal treatments systems, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) implements technical standards that are appropriate to the specific waste and treatment technology combination through imposed “applicable or relevant and appropriate requirements” (ARARs). Thus the MACT standards for HWCs will typically be applicable to Superfund Site thermal treatment systems.

Proposed Stack Gas Emissions Standards for New and Existing Facilities

Stack gas emission standards are being proposed for HWCs based on the use of MACT for the following HAPs: polychlorinated dioxins and furans (PCDD/PCDF), mercury, semi-volatile metals (cadmium and lead), low-volatile metals (antimony, arsenic, beryllium, and chromium), particulate matter (as a surrogate for metals and condensed organics), total chlorine (hydrochloric acid and chlorine gas), and carbon monoxide (CO) and hydrocarbons (HC) (as surrogates for toxic organic emissions). The ability of current designs of mixed waste incinerators to meet these new performance standards is evaluated in the White Paper (reference 3).

A “new” source is defined as “.... any affected source the construction or reconstruction of which is commenced after the Administrator first proposes a relevant emission standard”. However one exception is for facilities which begin construction between the proposal and promulgation where the promulgated standard is more stringent than the proposed one; in this case, the facility may be allowed, like existing facilities, 3 years to comply with the more stringent promulgated standard. In the interim 3 years, it is assumed that the facility will comply with current standards.

Engineering Retrofit Costs to Comply With MACT Emissions Standards

Retrofit facility upgrade costs to come into compliance with the proposed MACT emissions standards for mixed waste systems may be significantly higher than those estimated in the proposed rule for non-radioactive waste facilities. This is due to the following factors:

- Equipment used in radioactive service typically needs to meet more stringent safety and durability requirements compared with that used for hazardous only service. Therefore, different construction materials, quality control levels, construction and design procedures etc. are required for mixed waste systems.
- Construction and installation procedures for retrofit equipment are complicated in a radioactive environment due to health and safety issues. Additionally, access to mixed waste facilities may be difficult due to security and other concerns related to the presence of radioactive materials.

Also, compliance testing which is described below will be more costly due to potential exposure of the sampling team and potential contamination of the sample equipment.

Site-Specific Risk Assessment Requirements

Current EPA RCRA policy and guidance recommends that, if judged necessary to protect human health and the environment, site-specific risk assessments be conducted. In particular risk assessments are deemed to be necessary for mercury and non-PCDD/PCDF PICs for which EPA does not have sufficient reliable data to assess on a national basis the magnitude of risks expected from HWCs. The proposed revised rule retains this guidance with the flexibility to exclude small on-site facilities which are not likely to present the same level of potential risk as other facilities. Factors considered in determining if a site specific risk assessment is necessary include:

- (a) levels of HAPs being emitted;
- (b) scope of waste minimization efforts;
- (c) proximity to receptors;
- (d) dispersions patterns;
- (e) proximity to other sources of HAPs;
- (f) proximity to sensitive ecological areas; and
- (g) volume and types of wastes being burned.

Note that (a) through (e) above and the relatively low volume aspect of (g) would tend to support an argument against requiring a site specific risk assessment for most mixed waste incinerators. However, the type of waste being burned (i.e., including radioactive wastes which have a very high public profile) make it likely that site specific risk assessments will be required for most mixed waste incinerators.

The EPA has recently released new draft guidance including

- Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities . Federal Register: October 30, 1998 (Volume 63, Number 210) Page 58381-58382
- Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities . August 1998, EPA 530-D-98-002

In addition, guidance is under development on Ecological risk assessments for waste combustion facilities. The current EPA guidance and planned guidance provides no specific guidance on incorporating radionuclides within the chemical risk assessment methods. There remains a number of the possible technical problems associated with assessing multi-pathway chemical and radionuclide modeling, exposure, and risk assessment. The NTW is conducting a study to investigate whether the various risk assessment methodologies can be combined and define approaches to resolve some of the inconsistencies among the different fate and transport models, air models, and the other numerous input parameters used within a risk assessment. A workshop is being planned and held in order to identify and resolve the various issues associated with risk assessment methodologies and results presentation formats. The ultimate goal of the

workshop is to understand the technical issues, identify potential problems and solutions, reach some consensus with the permit writers on preferred and alternative risk assessment methods, and promote consistency within DOE. The results of the workshop may be used help develop an NTW technical resource document (TRD) on radiological risk assessment methods. The workshop include State and Federal permit writers and risk assessment analysts, EPA Office of Radiation and Indoor Air (ORIA), EPA Office of Solid Waste (OSW), EPA Office of Research and Development (ORD), DOE combustion facility permitting staff and analysts, and National Technical Workgroup (NTW) members involved in risk assessment.

Compliance Period

Existing facilities have a 3 year implementation period during which time they must comply with the new standards and testing and monitoring requirements. This includes installation and operation of CEMs and completion of a successful “comprehensive” compliance test demonstrating achievement of the MACT emissions standards. The 3 year time period will start from the date the final rule is published in the Federal Register. New sources must comply with standards upon startup. As mentioned above, “new” sources include those that have begun construction between the proposed and promulgated rule.

The 3 year period was judged adequate for existing facilities to perform all of the necessary activities to come into compliance and become fully permitted under the new rules. EPA has acknowledged that these activities may include: (a) conduct tests and analysis to determine cost effective approaches to comply with standards; (b) perform engineering analysis and design; (c) fabricate, install, start-up and shakedown modified facility equipment; (d) conduct preliminary emissions tests; (e) conduct formal compliance testing; (f) analyze samples and evaluate test results; (g) prepare notification of compliance; and (h) obtain management certification of the results. This time period may be more difficult for DOE-operated mixed waste facilities (as well as other governmental facilities) to comply in this time frame due to:

- The multi-level decision making and funding process involved with many government-run operations.
- More stringent design and materials standards associated with mixed wastes (especially transuranic wastes).
- The typically lengthy contract procurement and equipment purchasing process due to restraints and requirements of the acquisition procedures.
- Security and safety limitations on access and availability of private sector contractors capable and/or willing to work in a radioactive contaminated environment (for example, to make modifications, install new equipment, perform testing, etc.).

Compliance Testing

Two types of test programs are proposed to demonstrate compliance with the new MACT emissions standards: “comprehensive” and “confirmatory” testing. Currently, RCRA-based trial burns are required prior to facility permitting, and subsequently whenever the permit is renewed. The new MACT comprehensive testing requirements of every 3 years for the commercial and large on-site facilities is generally about twice as frequent as currently required. The confirmatory and CEM Relative Accuracy Testing Audit (RATA) for the recently proposed particulate matter and mercury monitors are new additional testing requirements. Increased compliance testing requirements may be especially burdensome for mixed waste facilities. Testing is expensive and difficult due to potential radioactive exposure complications and facility access limitations. A trial burn type testing program for a mixed waste incinerator typically is in the range of \$1-2 million, significantly higher than that of hazardous-only waste incinerators, estimated at typically \$250,000. Additionally, because most mixed waste incinerators are relatively small sized facilities, and are well designed, operated, and maintained such that they have a relatively lower rate of system degradation (decrease in system performance over time), the cost/benefits ratio (i.e., the dollars per ton of pollutant controlled) may be much higher for mixed waste incinerators.

The proposed rule sets feed rate limits on three groups of metals including low-volatility metals (Cr, As, Sb, and Be), semi-volatile metals (Pb and Cd), and high-volatility metals (Hg). The limits are set at the feedrates demonstrated in a comprehensive performance test in which the facility shows that it is in compliance with the MACT emissions standards. Facilities will typically need to spike metals in the comprehensive performance test in order to receive feed rate limits that can comfortably be complied with within the range of desired operation. This will likely require spiking of three metals (one from each group), which is a great simplification over the BIF rules which set feed rate limits on 10 individual metals, each of which may have needed to be spiked in a trial burn. Nonetheless, the facilities will need to monitor feed rates of all metals during normal operations. As will be discussed in more detail later for mercury, feedrate control based upon characterization of heterogeneous mixed waste may be problematic.

There are no specific discussions in the proposed rule on the applicability of the use of surrogate wastes for compliance testing. Current guidance on testing to provide input data for site specific risk assessments suggests the use of real waste since not all is known about the waste characteristic parameters which control the formation of byproducts. However, for mixed wastes, it may be desired to propose the use of surrogate waste materials due to economic and health and safety issues associated with the radionuclide component of mixed wastes (for example, radionuclide contamination of sampling equipment and treatment systems, potential radionuclide exposure to sampling and analytical personnel, etc.).

“De minimis” Chlorine and Metals Considerations

Facilities treating wastes with “de minimis” levels of chlorine and metals are not subject to MACT requirements (stack gas testing or monitoring activities). De minimis is

defined as the waste feed constituent concentration level which translates to the MACT stack gas emissions standard (based on the conservative assumption that all of the waste feed leaves the system as stack gas emissions). Waste analysis activities to demonstrate that the waste constituents (chlorine and metals) are below the de minimis level are required.

Compliance Monitoring

Currently, HWCs are required to use CO continuous emissions monitors (CEMs). Under omnibus authority (from BIF requirements) and additional local requirements, some permit writers require the use of hydrocarbon (HC) CEMs. The originally proposed rule would have required that all HWCs use CEMs for CO, HC, mercury, and particulate matter (PM). Since the initial proposal, EPA has dropped the requirement for mercury monitoring although it is possible to petition for alternative compliance techniques. Particulate matter CEMs will likely be incorporated as part of the rule promulgated in early 1999. However, EPOA expects to require in the near future. Performance specifications are included for all of these CEMs in the proposed rule. Performance specifications and testing requirements for the CEMs are summarized in the NTW White Paper.

Hydrocarbon CEMs are a new requirement for many facilities but are a mature technology that have been available and used on many different types of thermal treatment systems for many years. There are no application limitations of HC CEMs to mixed waste thermal treatment systems. Particulate matter CEMs are a new requirements for all HWCs. These CEMs are recently developed instruments. There have been no long-term demonstrations of these CEMs on any types of thermal treatment systems in the United States to-date. Certain types of these systems have had limited use in Europe, where they have been required to meet a different set of performance standards. Thus there are uncertainties with these instruments related to the consistent achievability of performance standards (calibrations, drift, relative accuracy, etc.) as well as monitor durability and performance over a long-term period of operation. These complications may be magnified for mixed waste systems, where maintenance and testing activities are complicated in a radioactive environment. Note that EPA is currently conducting demonstration tests for PM CEMs. Depending on the results of these tests, performance specification for these instruments may change, or the requirement of the use of these monitors may be changed in the final rule.

Other CEM issues related to mixed waste thermal treatment systems include:

- Stack "in-situ" instruments -- There may be added difficulties in applications of stack "in situ" measurements such as many of the light scattering PM CEMs due to stack access limitations and radionuclide hazards considerations.
- PM CEM calibration -- PM CEMs may be difficult to use on mixed waste facilities using High Efficiency Particulate Air (HEPA) filters where PM levels are extremely low. Many of the PM CEMs may not be able to respond (have the sensitivity) to the PM levels expected from HEPA filters.

Additional complications are related to the ability to calibrate these instruments at mixed waste facilities. The accuracy and repeatability of the standard PM Manual Sampling Train (EPA Method 5) which is used for CEM calibration is not well defined at low PM levels. Thus it may be difficult to establish an instrument calibration curve based on the PM reference method data. Additionally, a range of PM levels is recommended for CEM calibration. This may be difficult to achieve for HEPA filters which are extremely robust with respect to inlet PM loading. It may be necessary to remove the HEPA filters, by-pass them, or intentionally degrade them to allow for the required range of PM levels needed for PM CEM calibration.

Note that at the top of the Agency's proposed "compliance monitoring hierarchy" is the use of direct stack gas CEMs. Increased reliance on CEMs for demonstration of compliance is emphasized (e.g., new requirements for HC, PM, and mercury monitors), with subsequent elimination of waste feed rate characterization requirements for compliance demonstration. For example, with the use of a PM CEM, waste feed rate ash characterization is not strictly required to show compliance with the stack gas PM standard. As an alternative compliance strategy, the use of a mercury CEM, could potentially be use in lieu of waste feed rate mercury characterization. This may be advantageous for some mixed waste facilities for which there may be an added desire to minimize intrusive waste characterization activities due to risks associated with waste handling from radiation exposure of higher level wastes. This could be especially advantageous if by using HCl, Cl₂, and multimetals CEMs as well as the required PM and mercury CEMs, feed rate monitoring could be avoided. This encourages DOE mixed waste facilities to continue to take the lead in providing support for the development and demonstration of innovative CEMs. However, the use of CEMs will not entirely replace the need for waste characterization as specified in waste analysis plans. This is due to the fact that CEMs can only provide an after-the-fact notice that emissions occurred. There will likely remain a strong emphasis on waste characterization prior to thermal treatment to avoid the treatment of inappropriate wastes and prevent system upsets and excursions.

MERCURY COMPLIANCE

Mercury is one of the prime focuses of EPA at this time. The EPA is implementing or modifying various regulations to control or prevent mercury from entering the environment. These new or revised rules can be expected to impact all phases of environmental regulations including air, water, and waste. These new rules are expected to increase emphasis on mercury in the commercial world and the DOE system in many ways. DOE facilities should expect impacts on several fronts, but especially on incinerators and other mixed waste treatment systems. These changes are expected to include:

- Increased demand for better characterization of waste, especially heterogeneous waste such as debris
- Increased emphasis on pollution prevention to keep mercury out of waste streams

- Alternative treatment technologies to incineration to prevent volatilization of mercury
- Better control of mercury in existing treatment systems to prevent releases to the environment
- Continuous emission monitors for mercury to more accurately measure mercury emissions to the environment
- Better technologies to remove mercury from waste streams prior to other treatments
- Better stabilization processes for high mercury content wastes
- Increased emphasis on risk assessment

One of the most important challenges facing the DOE in the future is the control of mercury stack emissions during the thermal treatment of mixed waste. Incinerable DOE waste includes a wide range of sources of mercury that are not concentrated in a few locations or waste types; rather mercury is ubiquitous throughout the DOE mixed waste inventory. The EPA has proposed stringent new emissions standards on existing and new incinerators burning hazardous waste including mixed waste. These new standards, which are expected to be promulgated at the end of 1998, will not only impact DOE's four existing incinerators but will impact all mixed waste treatment due to applicable and relevant regulations (ARARs). Preliminary tests and trial burns at existing DOE mixed waste thermal treatment facilities have indicated that these systems as currently configured and operated have little mercury control and will not meet the proposed standards if the waste contains any appreciable mercury, i.e., most D009 wastes.

In the development of these new MACT rules the EPA concluded that mercury feed rate control was a viable control option. This control approach is problematic for treatment of DOE mixed waste which is largely heterogeneous and nonuniform waste contaminated with radioactive components. The extensive characterization of the heterogeneous waste that would be necessary to ensure feedrates would be in conflict with DOE's safety orders on "As Low as Reasonable Achievable" ALARA. This is due to the difficulty of obtaining representative samples of heterogeneous and non-uniformly contaminated waste which mandates that many samples must be taken and analyzed to obtain statistically representative data. For this reason the DOE will need to rely more on active monitoring and control of the emissions from the treatment process rather than feedrate control. In fact, DOE probably will not be able to achieve the degree of confidence needed for feed control of nonuniform mercury wastes due to technical or budgetary constraints and therefore must turn to emissions control and monitoring to avoid exceeding emissions limits. The EPA identified wet scrubbers and feedrate control as the Maximum Achievable Control Technology (MACT) for hazardous waste incinerators. For those units not capable of using the MACT approach, the EPA also considered carbon injection and bed technologies for mercury control which will achieve even higher removal efficiencies for mercury.

The DOE and commercial mixed waste treatment operators will need to develop and implement a comprehensive compliance plan in order to meet these new MACT

regulations. The EPA and States permit writers will need the knowledge base to review and approve of these compliance procedures. For this reason the National Technical Workgroup has initiated a Mercury Compliance Study in order to generate the data needed by the members. The objective of this study is to develop the necessary information database on mercury control and compliance assurance in order to facilitate the rapid and environmentally protective compliance with the mercury provisions of the MACT standard.

The NTW has initiated a Mercury Compliance Study which integrates engineering analysis and experimental activities. The study begins by clearly defining the mercury compliance issues. This is accomplished through discussions with personnel from DOE mixed waste treatment sites and personnel familiar with the proposed MACT standards. The performance data from the various operating facilities relative to mercury control will be evaluated to determine the level of mercury control currently achieved and the level necessary to meet the proposed regulations.

The next activity will identify the potential monitoring and control technologies that could potentially be suitable for mercury MACT compliance. NTW is currently conducting a state of the art assessment of mercury control technologies for DOE in order to identify all of the alternatives that should be considered. From these technologies, the NTW has identified the most promising technologies for mixed waste thermal treatment systems. NTW will evaluate these technologies in order to identify all of the alternatives that should be considered. NTW is further evaluating these technologies relative to the specific requirements of the new MACT standards and the existing mixed waste incinerator configurations. These engineering analysis tasks will lead to a short list of monitoring and control technologies that should be considered further for compliance.

A mercury monitoring and control workshop was recently held to discuss these findings with federal and state regulators and DOE researchers and facility operators. The goals of the workshop include:

- Develop a better understanding of changing regulations and their impacts
- Evaluate implementation of the new rules
- Target research to specific needs
- Define continuous compliance assurance techniques
- Evaluate feed and system operation relative to mercury
- Identify and evaluate control technologies

The results of the workshop will be developed into a technical document .

None of the monitoring and control technologies for mercury have been experimentally evaluated for the specific conditions that exist in mixed waste treatment systems. A direct test on the DOE mixed waste treatment systems is not practical due to the expense, systems constraints and regulatory restrictions. For this reason it is necessary to first conduct evaluations on pilot scale and control. NTW is planning to conduct pilot scale tests to provide important information to the DOE operating facilities

about the proper design and operation of the mercury control and monitoring technologies. In addition, these tests will provide data to regulators and permit writers on the expected performance and constraints of applying these technologies to mixed waste treatment systems.

The final NTW activity will be to document the results of this study in a Technical Resource Document. This document can be used by regulators, permit writers and DOE facility operators in their decision making on the design and operation of the best mercury monitoring and control technologies for system configurations specific to DOE and similar incinerators. A report and information database will be developed under the direction of the NTW which includes the results of the testing and engineering analysis as well as recommendations for technology design and operation and permit parameters suitable for ensuring continuous proper operation. It will also include an evaluation of the permitting parameters and concepts that would be necessary to ensure continual compliance assurance.

Summary of Issues and Impacts of Proposed MACT Rules on Mixed Waste Treatment

In summary, the proposed rule:

- Directly applies to RCRA mixed waste incinerators of all sizes, and may indirectly apply to CERCLA mixed waste incinerators and other thermal and non-thermal treatment devices through application of ARARs.
- Establishes emissions limits which are within the level of achievability for a well designed and operated facility, but includes a site-specific PM limit which does not allow PM control to degrade to the point where emissions exceed those demonstrated in a comprehensive performance test.
- Does not change EPA's policy and guidance recommending site-specific risk assessments.
- Allows only three years for a facility to come into compliance.
- Requires trial-burn-like comprehensive performance tests every 3-5 years and simpler dioxin emissions "confirmatory" performance tests halfway between the comprehensive tests.
- Requires advanced PM and mercury continuous monitors which must meet performance specifications that may be difficult to achieve for a very well controlled system.
- Allows for the use of metals, HCl, and Cl₂ CEMs which (coupled with PM and Hg CEMs) eliminate the need for feed rate limits and may reduce the waste characterization requirements.

- Establishes operating limits on fabric filters, but not on HEPAs. Fabric filter limits may not be appropriate for HEPAs.