Session 11 Hazardous Waste Combustion

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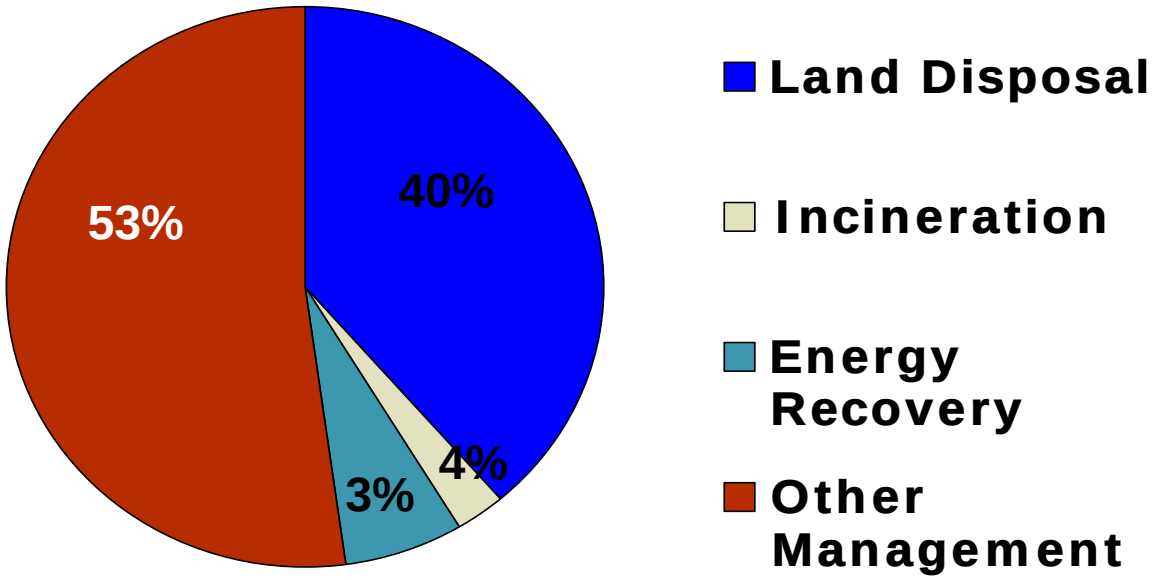
Session 11 Agenda:
Hazardous Waste Combustion

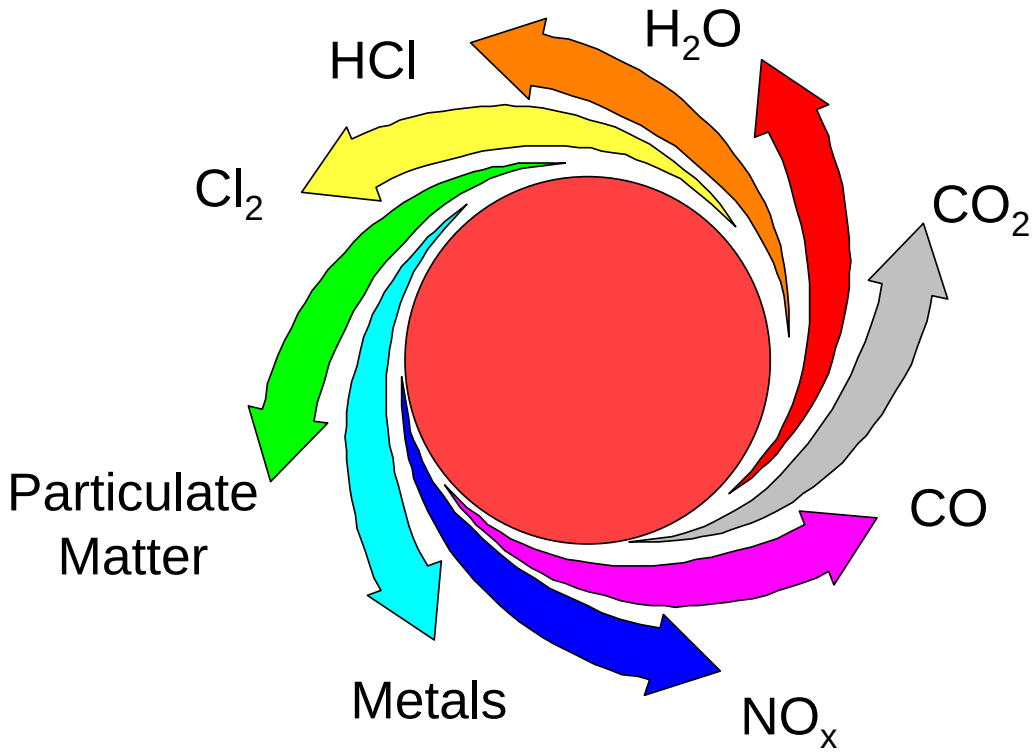
- Combustion Basics
- Hazardous Waste Combustion Units
- Regulatory Standards
  - Clean Air Act (CAA) Standards
  - RCRA Standards
- Risk Assessment
- Permitting and Testing

Approximately 7% of hazardous waste generated is treated using a combustion technology



Approximately 2.7 million tons of hazardous waste were combusted in 2003

There are many byproducts of the combustion process that could cause harm to human health and the environment



There is often great public concern for the location of hazardous waste combustors

- Not-in-my-backyard (NIMBY)
- Human Health Effects
- Acid Rain
- Other Environmental Factors

Types of Combustion Units

- There are 3 kinds of hazardous waste combustion units:
  - Incinerators
  - Boilers
  - Industrial Furnaces

Types of Units: Incinerators

- An incinerator is an enclosed device using controlled flame combustion
- Includes infrared incinerators and plasma arc incinerators
- Does not include industrial furnaces, boilers, sludge dryers, and carbon regeneration units

There are 121 hazardous waste incinerators in the United States

Types of Units: Boilers

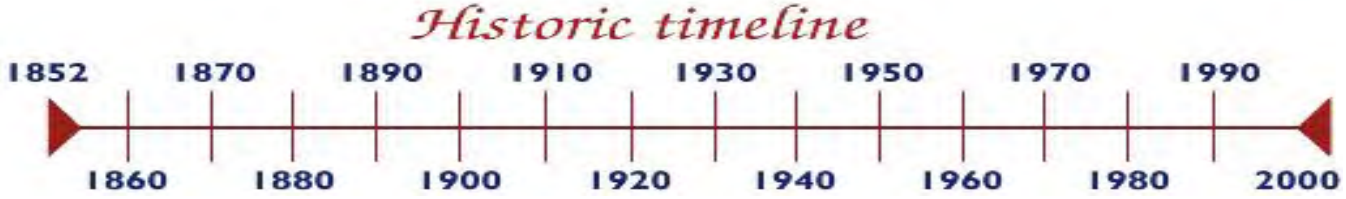
- A boiler is an enclosed device using controlled flame combustion that has an energy recovery system
- The combustion chamber and primary energy recovery system are of integral design
- Thermal energy recovery efficiency must be > 60%
- Energy exportation and utilization must be > 75%

Types of Units: Industrial Furnaces

- An industrial furnace is an enclosed device that is an integral component of a manufacturing process and uses thermal treatment to recover materials or energy

- Includes:
  - Cement, lime, phosphate, and aggregate kilns
  - Blast, methane reforming, and halogen acid furnaces
  - Titanium dioxide chloride process oxidation reactors
  - Coke ovens, smelting, melting, refining furnaces
  - Pulping liquor recovery furnaces
  - Combustion devices used in the recovery of sulfur values from spent sulfur acid

Combustion



- 1980-1982 – Interim status and permitted incinerator regulations (Part 264/265, Subpart O)
- 1991 – Boiler and industrial furnace regulations (Part 266, Subpart H)
- 1994 – Strategy for Hazardous Waste Minimization and Combustion
- 1998-2005 – RCRA/CAA integrated standards

Regulating Hazardous Waste Combustors

- RCRA obligates EPA to ensure hazardous waste combustors (HWCs) are operated in a manner protective of human health and the environment
- In addition to this statutory obligation, the 1994 Hazardous Waste Combustion Strategy committed EPA to upgrading emissions standards for HWCs
- RCRA standards governing HWC operations and emissions are ultimately implemented through a RCRA permit

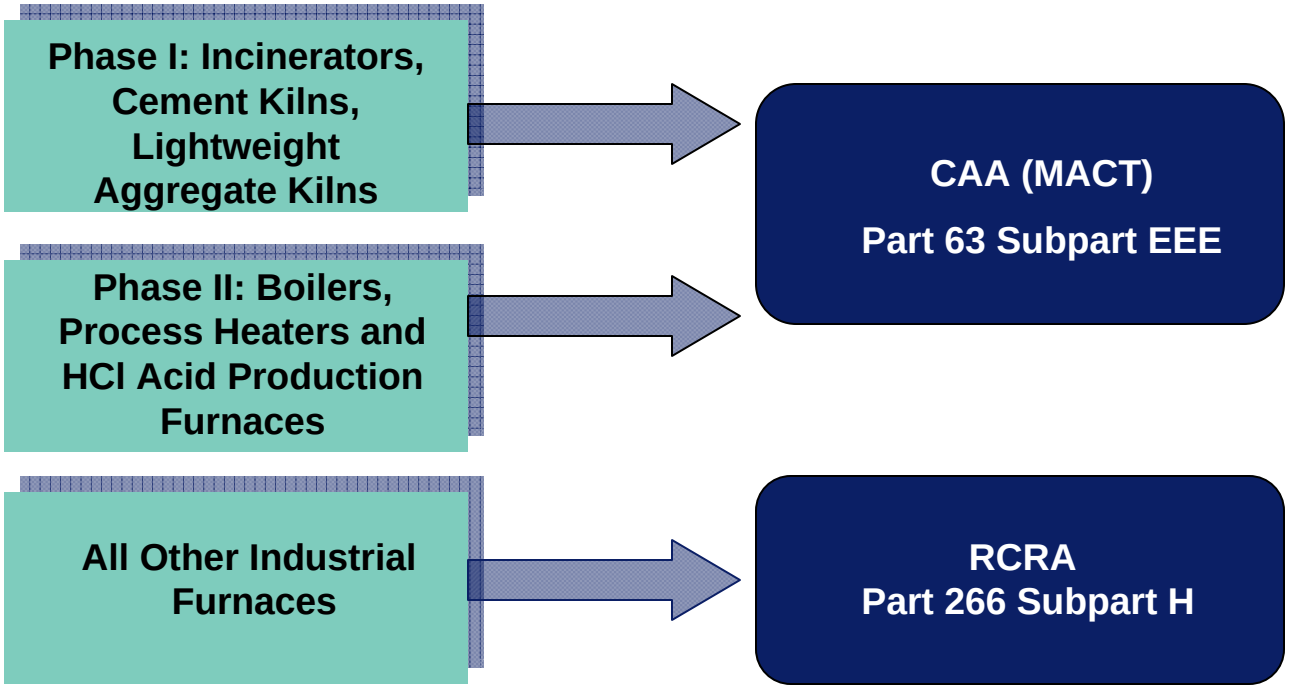
Regulating Hazardous Waste Combustors (cont.)

- Section 112 of the CAA also obligates EPA to establish emissions standards for HWCs. Section 112 standards are based on the performance of the Maximum Achievable Control Technology (MACT).
- MACT standards are ultimately implemented through Title V permits

Regulating Hazardous Waste Combustors (cont.)

- The challenge in developing an implementation scheme for the HWC MACT rule…
  - to consolidate the requirements imposed by statutes into a single set of regulations
  - to implement the new standards through a single permit, to the extent possible
- Ultimately, it was determined that all sources subject to the HWC MACT rule will have to obtain both RCRA and Title V permits
  - Each permit will address different aspects of the facility
  - In general, there should be no duplicative requirements between the two permits

Different combustion units are subject to standards under different regulations



"Non-MACT Units" are subject only to RCRA standards

- Units not subject to MACT standards (i.e., some industrial furnaces and units that have not yet transitioned to MACT) are subject only to RCRA standards

Performance standards:

- Organics
- Particulate Matter
- Metals
- Hydrogen Chloride and Chlorine Gas

Operating conditions:

- Waste feed rate
- Production rate
- Firing system controls
- Combustion temperature
- Gas flow rate

"Non-MACT Units" are subject only to RCRA standards (cont.)

- During the permitting process, the operating conditions that result in compliance with the performance standards are defined by testing the unit during a trial burn

- Trial burn requirements
  - Trial feed based on anticipated concentrations and difficulty to destroy constituents
  - Engineering description of incinerator
  - Sampling procedures, methods, and test protocols
  - Pollution control equipment operation
  - Shutdown procedures

"Non-MACT Units" are subject only to RCRA standards (cont.)

The RCRA permit will also establish all other facility requirements:

- Management prior to burning
- General TSDF standards
- Waste analysis
- Automatic waste feed cutoff
- Inspection and monitoring
- Direct transfer
- Recordkeeping
- Closure

"MACT units" must have both a RCRA and CAA Title V permit

- A CAA permit includes:
  - Feed rate
  - Operating conditions
  - Emission standards

- A RCRA permit includes:
  - General facility standards
  - Corrective action
  - Combustor-specific concerns, such as materials handling
  - Risk-based emissions limits and operating requirements under omnibus (3005(c)(3)) if appropriate

MACT Standards: Emission Limits

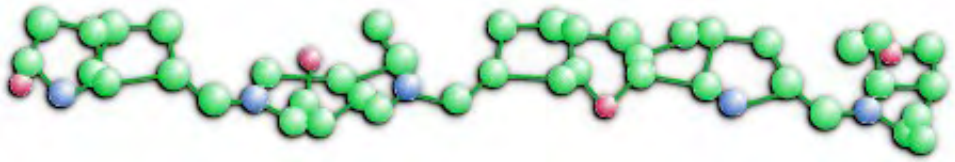
- Emission limits for each type of unit were developed by:
  - Identifying the control techniques used by the median of the best performing 12% of sources
  - Identifying the emission level being achieved by sources using the control techniques identified in step 1

MACT Standards: Emission Limits (cont.)

- The MACT standards limit emissions of:
  - Dioxins and furans
  - Mercury
  - Semi-volatile metals (cadmium and lead)
  - Low volatile metals (arsenic, beryllium, and chromium)
  - Particulate matter, as a surrogate for non-mercury metal hazardous air pollutants (including antimony, manganese, selenium, nickel, cobalt)
  - Hydrogen chloride and chlorine gas
  - Organic hazardous air pollutants

MACT Standards: Destruction and Removal Efficiency (DRE)

- Units must meet specified DRE requirements
  - 99.99% DRE for each principal organic hazardous constituents (POHC)
  - 99.9999% for each POHC if unit burns specific dioxin wastes
- POHCs are established based on the specific waste being combusted



§§63.1203-63.1205

MACT Standards: Operating Conditions

- Operating Parameters
  - Temperature
  - Pressure
  - Waste feed rate
- Continuous Monitoring Systems (CMS)
  - Used to ensure compliance with standards
  - Monitors operating parameters
- Continuous Emissions Monitoring System (CEMS)
  - Directly measures hazardous air pollutants exiting the unit

MACT Standards: Notification, Recordkeeping and Reporting

- Notification requirements §63.1210
  - Notification of Compliance (NOC)
- Recordkeeping and Reporting §63.1211
  - Must keep specific records for five years
    - Most recent two years must be kept on site
    - Remaining three years may be kept off site
  - Must submit reports to Administrator

RCRA Standards: Risk Assessment

- The RCRA omnibus provision (3005(c)(3)) requires all RCRA permits include terms and conditions necessary to protect human health and the environment
- To meet this requirement for HWCs, the 1994 Hazardous Waste Combustion Strategy recommended that site-specific risk assessments (SSRAs) be conducted as part of the RCRA permitting process
- If a SSRA shows that risk-based permit limits (that are more stringent than those required under MACT) are needed, they would be placed in the RCRA permit

RCRA Standards: Risk Assessment (cont.)

- Site-specific considerations include:
  - Facility's proximity to receptors and unique air dispersion factors
  - Possible non-dioxin PICs
  - Presence of other sources of pollutants (on-site or off-site)
  - Presence of significant ecological considerations as:
    - High background levels of a particular contaminant
    - Proximity to a particularly sensitive ecosystem
  - Volume and type of waste to be burned
  - Proximity to schools, hospitals, nursing homes, day care centers, and parks, that would indicate the presence of potentially sensitive receptors
  - Concerns raised by the public

RCRA Standards: Risk Assessment (cont.)

- If emissions data are not available for a SSRA, a risk burn can be conducted to collect data
- To avoid duplicative testing, however, risk testing should be coordinated with MACT performance testing.

Implementation of MACT Standards

- Permit Requirements
  - Notice of Intent to Comply (NIC) and progress reports
  - Permit modifications
  - Notice of compliance
  - Permit transition (from RCRA to Title V)
- Testing
  - Conformance testing

Notice of Intent to Comply (NIC)

- Sources must certify whether or not they intend to comply with the requirements of the HWC MACT rule
- Certification must be made one year following the publication of the final rule (effective date)
- Sources that intend to comply must hold a public meeting to discuss their compliance plans prior to submittal of NIC
- The meeting must occur one month following release of draft NIC and ten months following publication of the Final Rule

Progress Report

- Sources intending to comply must submit a progress report two years following the publication date
- Sources that do not intend to comply (as stated in their NIC) must cease burning hazardous waste two years following the publication date
- The progress report must demonstrate that the source is making sufficient progress towards compliance

Permit Modifications

- Some sources may have to make design or operational changes in order to meet the new standards
- If they already have RCRA permits, they have to modify their permits before making changes.
- Sources must complete the mod process in time to make changes and conduct testing by the three-year compliance deadline.
- Streamlined mod procedures promulgated on a “fast track”

Permit Modifications

- RCRA § 270.42 addresses permit modifications necessary to comply with MACT
  - Changes are designated as class 1
  - Sources wanting to take advantage of this provision must first complete NIC process
  - Agencies have 90 days to act on mod requests (+ possible 30 day extension)
  - RCRA class 1 permit mods do not require meeting with the public (public participation attained through NIC public meeting)

Notification of Compliance (NOC)

- NOCs can either document compliance or non-compliance. To transition out of RCRA, the NOCs must show compliance.
- The test results in the NOCs include the operating parameters shown during the test to ensure compliance with the required emission levels.
- NOCs are ultimately incorporated into Title V permits. If a source already has a Title V permit when they submit their initial NOC, the NOC should be incorporated using the significant permit modification procedures.

Notification of Compliance (NOC)

- Initial Review
  - Usability verification by reviewing CEMS data, isokinetic sampling, and chain of custody reports.
- Comprehensive NOC review
  - Field data review and lab data review
- Emission rate calculations
  - Conversion to mass based emission rates
- Risk assessment (if applicable)
- Finding of Compliance (FOC)
  - Operating Parameter Limits (OPLs) for permit
- State RCRA/Air coordination for Title V permit

Permit Transition

- Since Title V permits are the vehicle to establish combustion standards under the MACT rule, sources with RCRA permits have to transition to Title V permits.

- RCRA performance standards will no longer apply when a source demonstrates compliance by:
  - Completing a comprehensive performance test
  - Submitting an NOC

Permit Transition (cont.)

- Timing for their transition depends on a variety of “local” considerations:
  - Status of the facility in the RCRA permit process
  - Regulatory agency’s priorities and schedule
  - Level of environmental concern at a given site
  - Number of similar facilities in the permitting pipeline

Testing Requirements

- Comprehensive Performance Test
- Confirmatory Performance Test

Comprehensive Performance Test

- The Comprehensive Performance Test (CPT) is conducted in order to:
  - Demonstrate compliance with emissions standards
  - Establish (or revise) limits for operating parameters
  - Demonstrate compliance with the performance specifications for continuous monitoring systems (CMS)
- A CPT plan must be submitted for approval 12 months before the scheduled test
- Initial CPT must be performed no later than six months after the compliance date

§63.1207

Comprehensive Performance Test (cont.)

- CPTs must be conducted every five years with a one-month extension (i.e., 61 months) following the anniversary date of the previous CPT
- Designed to be performed under worst-case operations similar to RCRA trial burns
- Testing must be completed within 60 days of initiating testing
- Results must be submitted to the permitting agency 90 days following completion of the test

Comprehensive Performance Test (cont.)

- CPT Plan Review
  - Test conditions
  - Risk burn conditions
  - CMS Performance Evaluation Test Plan
  - Feedstream Analysis Plan
  - QAPP
  - AMAs
  - SSMP
- Observe CPT
  - Compliance with CPT plan
  - Compliance with QAPP
  - Stack sampling
  - Audit samples
  - Verification of process conditions

Confirmatory Performance Test

- Demonstrate compliance with dioxin/furan emission standards
- Performance evaluation of dioxin/furan CMS
- Completed midway between CPTs (every 31 months after commencing CPT)

MACT Timeline

- The MACT standards were issued in two phases, and there has been considerable litigation regarding their issuance

Phase I (Incinerator, CK, LWAK)

Original issuance: 9/30/1999

Vacated by court: 7/24/2001

Interim Standards: 2/13/2002

Proposed Replacement Standards: 4/20/2004

Final Replacement Standards: 10/12/2005

Compliance Date: 9/30/2003

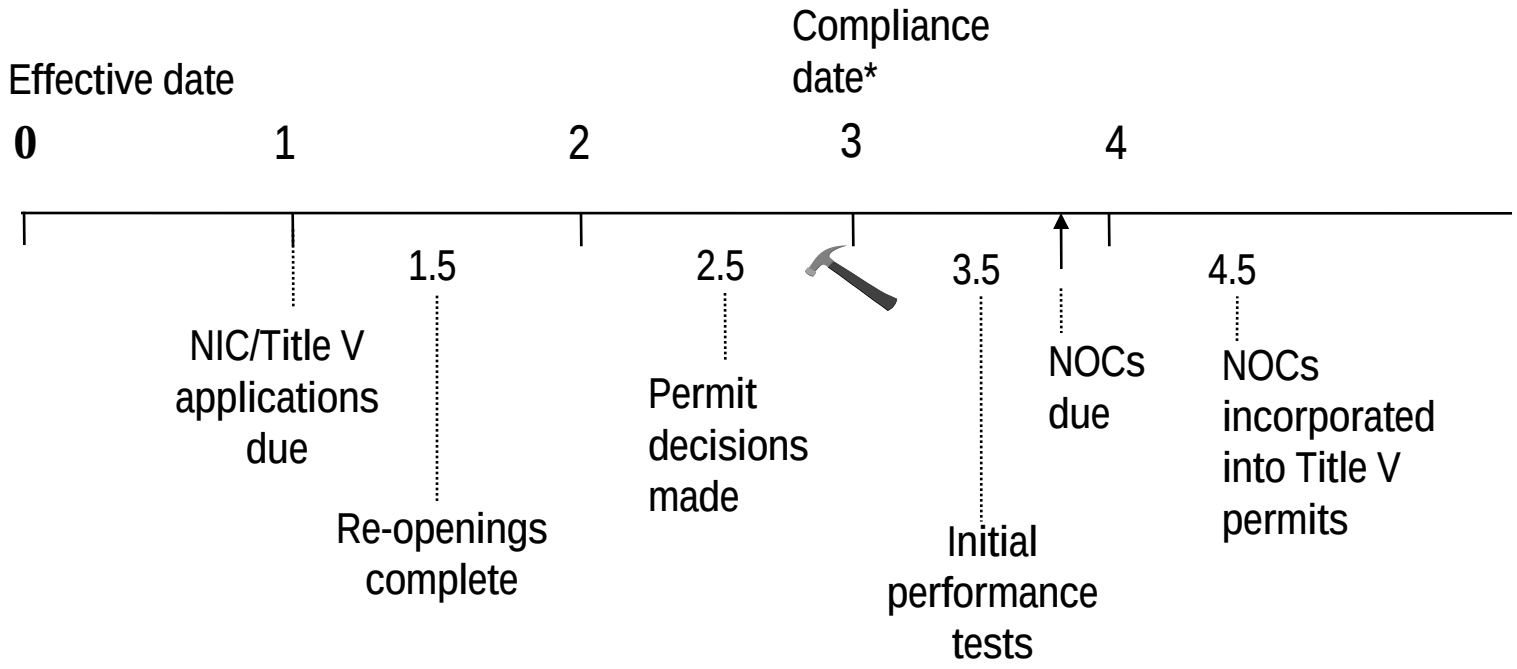
Phase II (Boilers, Process Units, HCl Acid Furnaces)

Proposed: 4/20/2004

Final Standards: 10/12/2005

Compliance Date: 10/14/2008

MACT Timeline: General Overview



*** Compliance date is 9/3/2003 for Phase I units (incinerators, CK, LWAK) and 10/14/2008 for Phase II units (boilers and HCl acid production furnaces)**

MACT Timeline: Phase II Units – Boilers, Process Units, Halogen Acid Furnaces

- Dec 12, 2005: Phase II regulations effective
- Dec 12, 2006: Notice of intend to comply (NIC)
- April 14, 2008: Submit CPT plan
- Oct 14, 2008: Compliance date
- Jan 14, 2009: Test plan approved/denied
- June 14, 2009: Performance test completion
- Sep 14, 2009: Submit NOC

Summary

- Hazardous waste combustors (HWC) include incinerators, boilers, and industrial furnaces
- Some HWC are regulated exclusively by RCRA; others are regulated jointly by RCRA/CAA
- HWC subject to CAA must determine whether they intend to comply with the MACT standards and perform the appropriate upgrades and permit transition to come into compliance with the new standards
- For more information, visit: ***http://www.epa.gov/epaoswer/hazwaste/hazcmbst.htm***