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ENVIRONMENTAL CONSIDERATIONS FOR MUNICIPAL WASTE
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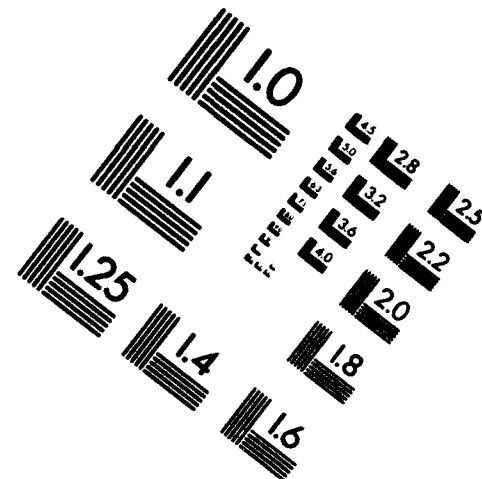
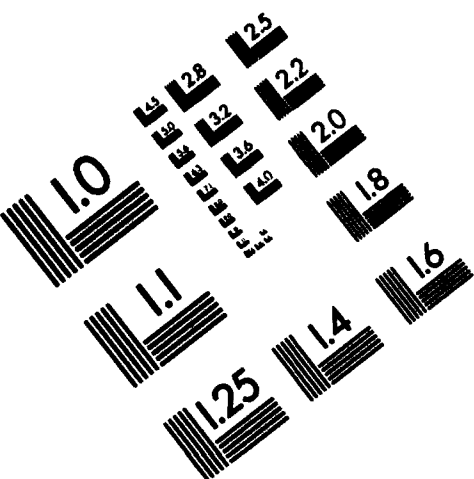


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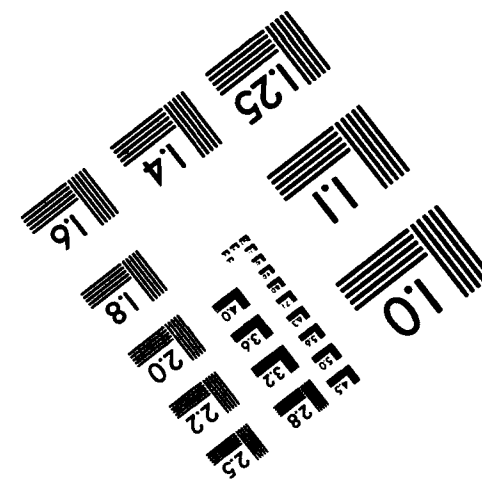
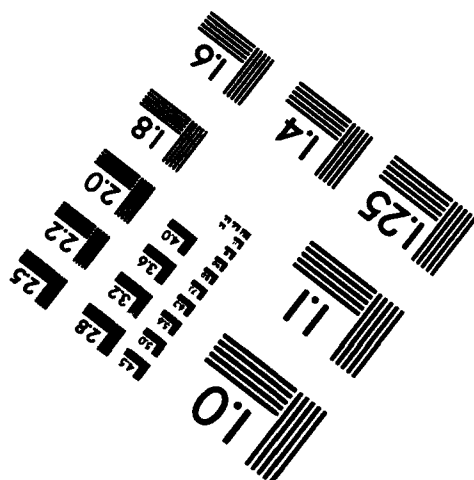
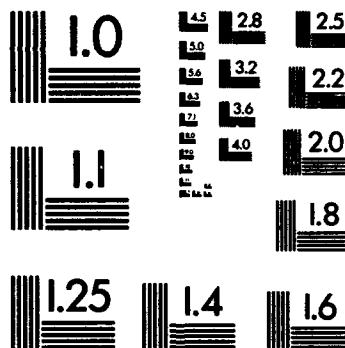
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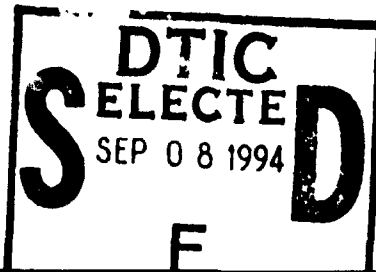
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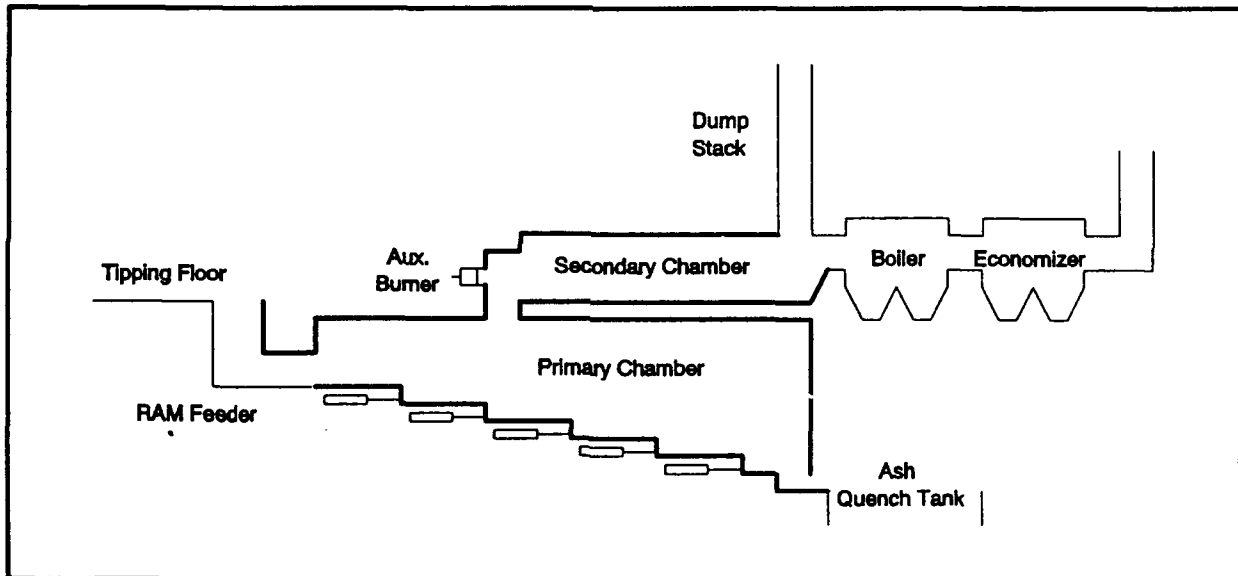
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Environmental Considerations for Municipal Waste Combustors

by
Michael R. Kemme



Strict Federal regulations have been developed to minimize adverse environmental impacts associated with both new and existing municipal waste combustors (MWCs). These regulations have led to development of many air pollution control technologies including combustion modifications and add-on control devices, fabric filters, and absorption techniques.

This report provides technical information on types of municipal waste combustors (MWCs) and environmental control technologies. The information will be useful to installations, Major Commands, and Corps of Engineers Districts involved in planning or designing MWC facilities.

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FOREWORD

This investigation was conducted for the Office of the Assistant Chief of Engineers (OACE) under Project 4A162720A896, "Environmental Quality Technology"; "Environmental Design and Construction"; Work Unit TR1, "Environmental Issues Related to Incinerator Emissions Control and Waste Management." The U.S. Army Center for Public Works (USACPW) technical monitor was Malcolm McLeod, CECPW-ES.

The work was done by the Environmental Engineering Division (EP), Environmental Sustainment Laboratory (EL), U.S. Army Construction Engineering Research Laboratories (USACERL). Michael R. Kemme was the USACERL principal investigator. Dr. Edgar D. Smith is Acting Chief of CECER-EP, and William D. Goran is Chief, CECER-EL. The USACERL technical editor was Gloria J. Wienke, Information Management Office.

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ENVIRONMENTAL CONSIDERATIONS FOR MUNICIPAL WASTE COMBUSTORS

1 INTRODUCTION

Background

The problems associated with municipal solid waste (MSW) management are approaching a critical point nationwide. The solid waste generation per capita in the United States is the highest in the world and has risen over the past several decades. Because of the continuing increase in generation rate, environmental concerns with landfilling or ocean dumping, the declining capacity of landfills, and increasing cost of disposal in landfills, communities have begun considering alternate ways of managing solid waste. The all-inclusive solution to the pressing issue of solid waste management lies in integrating source reduction, recycling, landfilling, and municipal waste combustion.

Many communities are considering or are using municipal waste combustors (MWCs) as part of their waste management programs. Currently about 15 percent of the solid waste stream is being burned by MWCs (U.S. Environmental Protection Agency 1989). Waste combustors can reduce waste volume by 70 to 90 percent, depending on the components of the waste and compaction of the waste stream. The reduction in volume will significantly extend the life of existing landfills. MWCs also recover the energy content of waste by generating electricity or steam from the combustion process.

Army installations are not immune to the solid waste dilemma. Installations can be compared to small urban areas with all the same MSW problems. Installations are also an important part of the communities in which they are located and therefore may wish to participate in regional solutions to solid waste management. In some cases, MSW combustion may be the most economically and environmentally sound management option for Army installations. One factor in favor of MWCs is that Army installations can be good customers for steam generated by MWCs to supply district heating systems or other steam-driven processes.

MWCs have a number of environmental problems associated with their operation. MWCs emit small particulate matter (PM_{10}), carbon monoxide, nitrogen oxides, toxic organics, acid gases, and heavy metals into the atmosphere. Regulations pertaining to these emissions are becoming stricter and effective pollution control is becoming more costly. In addition, MWCs can produce solid and liquid wastes that may be regulated.

Objective

The objective of this research is to provide installations, the Environmental Branch at Major Commands, and Corps of Engineers Districts involved in planning or designing MWC facilities with technical information about types of MWCs, environmental problems of MWCs, applicable environmental regulations, and environmental control technologies.

Approach

Literature related to the environmental considerations of recovering heat from and reducing the volume of municipal solid waste through combustion was thoroughly reviewed. The information included Army experience with MWCs. The important aspects of the literature review were extracted and categorized, and are summarized in this report.

Mode of Technology Transfer

It is recommended that the information in this report be used to update Corps of Engineers Guide Specification (CEGS) 11181, *Incinerators, General Purpose* (February 1990).

2 TYPES OF MUNICIPAL WASTE COMBUSTORS

Several technologies are used in MWC systems, including mass burn combustors (modular, traveling grate, and rotary combustors), refuse-derived fuel combustors, and fluidized-bed combustors.

Mass Burn Combustor

The mass burn combustor is the predominant type of incinerator being used for MSW. It can accept MSW that has undergone minimal preprocessing. A mass burn combustor may be a modular (or starved air), a traveling grate, or a rotary combustor type. A detailed description of all MWC technologies can be found in Griggs, et al. 1988.

Modular Combustor

A modular MWC typically is a small, prefabricated system with a capacity between 5 to 100 tons per day.* This system usually uses a two-chamber, starved air combustion approach. The low capacity and prebuilt structure of a modular combustor makes it the most logical choice for most Army applications. Figure 1 shows a flow diagram for a typical modular MWC.

Usually, MSW is taken from the tipping floor and fed by a ram feeder into the first combustion chamber where the waste is burned under low oxygen (starved air) conditions. In the first combustion chamber, both solid and gaseous products of incomplete combustion are formed. The gases and small particles pass into the second combustion chamber where the combustion process is completed. An auxiliary burner, usually fired by natural gas, keeps the temperature above 1800 °F in the secondary chamber. After leaving the second combustion chamber, the hot flue gas will pass through an economizer and heat recovery boiler where the flue gases are cooled to around 450 °F before entering the air pollution control system.

Ash from the primary combustion chamber (bottom ash) is pushed from the bottom of the chamber into an ash quench system. Two or more modular MWCs usually are installed at small facilities to allow for maintenance activities and to provide a more flexible operation under varying feed rate conditions.

Traveling Grate Combustor

A traveling grate mass burn combustor usually is much larger than a modular MWC, with a capacity ranging from about 150 to 750 tons per day. Figure 2 shows a flow diagram for a traveling grate MWC.

MSW is dumped into a tipping bay where large objects are removed by an overhead crane. The crane also loads the MSW into a feed hopper where it is fed into the combustion chamber by a hydraulic ram. The traveling grate moves the MSW through the combustion chamber with a tumbling action. Air is added at multiple points underneath the grate system to dry the MSW and as a source of combustion air. Additional combustion air is usually added above the traveling grates, in a burnout zone, to ensure good flue gas mixing and to complete the combustion process. The temperature in the burnout zone is maintained above 1800 °F to ensure destruction of organic compounds. The flue gas then passes through a boiler and economizer where the temperature is reduced to between 350 and 450 °F before entering the

*A metric conversion table is on page 27.

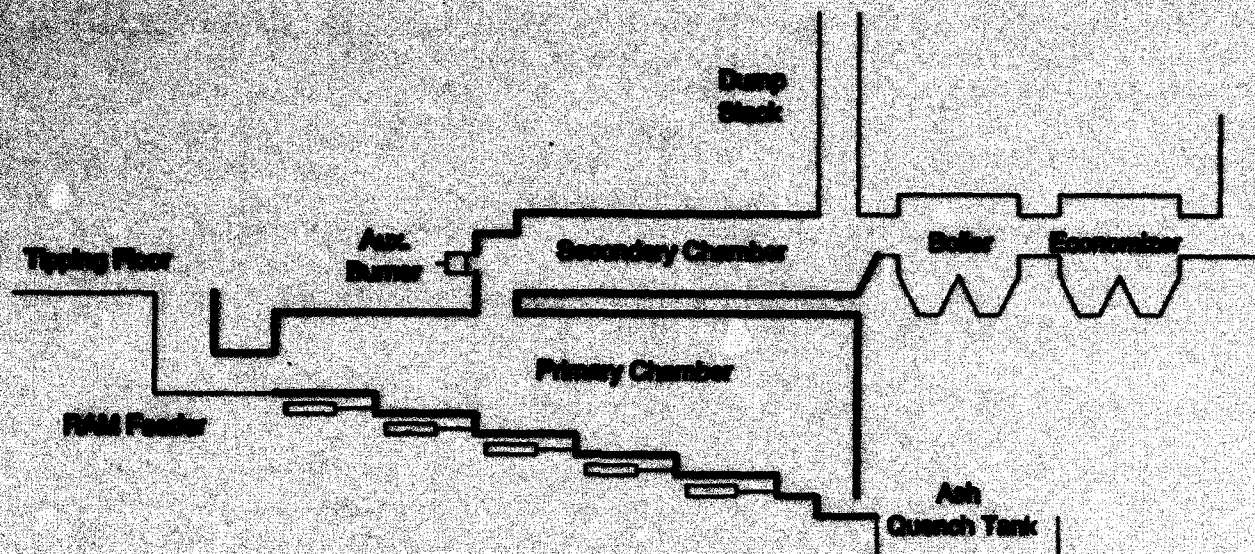


Figure 1. Modular Mass Burn Municipal Waste Combustor.

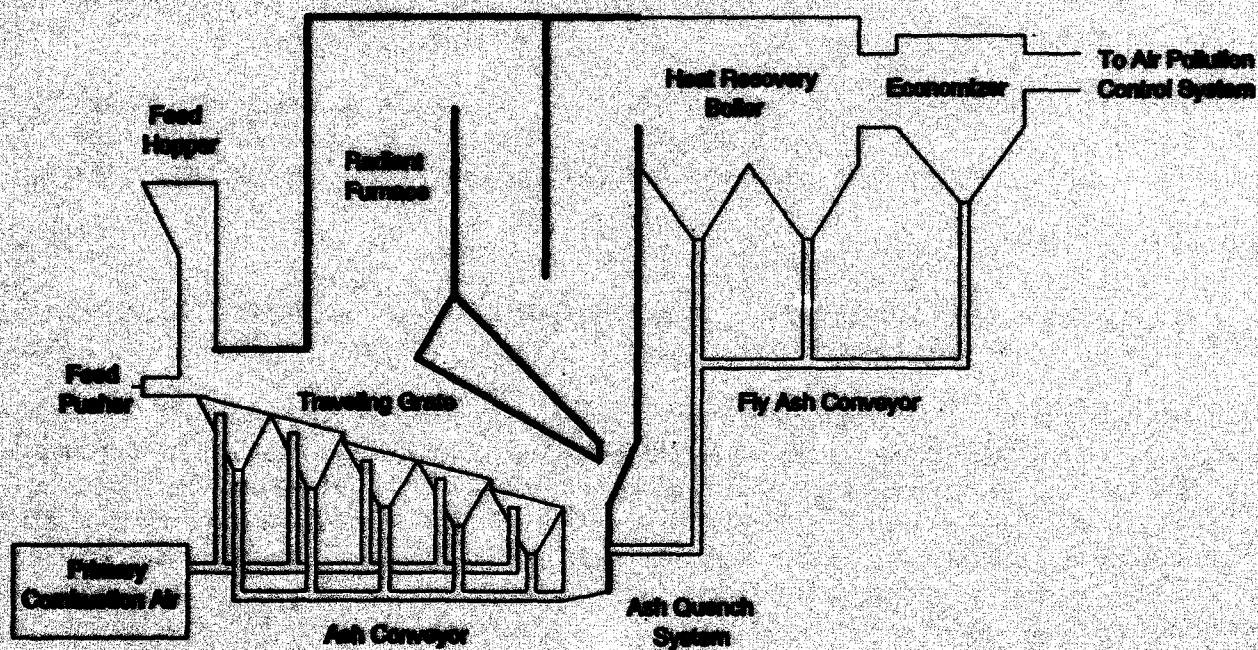


Figure 2. Traveling Grate Mass Burn Municipal Waste Combustor.

air pollution control system. The ash remaining at the end of the traveling grate falls into an ash quench system.

Rotary Combustor

Some mass burn MWCs use a water-cooled rotary combustion chamber. This system typically has a capacity range of 200 to 450 tons per day. Refuse is fed into the combustor in the same way as in a traveling grate system. The rotating combustor barrel is mounted on a slight angle and rotates at 10 to 20 revolutions per hour. The rotation and angle of the combustion chamber causes the waste to slowly tumble through the rotary combustor onto an ash burnout grate. Preheated combustion air is fed to the combustor through multiple points to provide good mixing and combustion control. The flue gas leaving the rotary combustor is maintained around 1800 °F. The flue gas passes through a boiler and economizer before entering the air pollution control system.

Refuse-Derived Fuel Combustors

A refuse-derived fuel (RDF) combustor is designed to use waste that has been processed to remove noncombustible or recyclable materials. The specific design of an RDF combustor depends on the degree of waste preprocessing. In its simplest form, RDF is formed by shredding refuse, magnetically removing ferrous metals, and using the air classification process to minimize potential ash production. RDF is often further processed to remove other noncombustible materials and to form pellets of fuel. RDF combustors are usually quite large, ranging in capacity from 400 to 1000 tons per day. Because of the large capacity and the need for specialized MSW preprocessing equipment, an RDF-fueled MWCs is not suited for typical Army installation use.

3 ENVIRONMENTAL PROBLEMS

MSW incineration has the potential to emit a wide range of pollutants to the environment. These potential emissions arise from compounds present in the MSW stream and are formed as a part of the normal combustion process, or as a result of incomplete combustion. Table 1 lists the principal emissions of concern and their sources. Table 2 shows emission factors for some of these pollutants. The emission factors can be used to compare the relative mass emissions of the contaminants.

Table 1
Principal MWC Emissions and Sources

Pollutant	Principal Source
Particulate matter	Ash in waste stream
Acid gases	
HCl	Chlorinated plastic in waste stream
SO ₂	Sulfur compounds in waste stream
SO ₃	Oxidation of SO ₂ in flue gas
HF	Fluorocarbons in waste stream
NO _x	Air and fuel nitrogen conversion
CO	Incomplete combustion
Heavy metals (arsenic, cadmium, lead, mercury)	Metal compounds in waste stream
Organic compounds (dioxin, furans)	Products of incomplete combustion or contained in waste stream

Table 2
Emission Factors for MWC

	Type of Incinerator		
	Modular Starved Air	Other Mass Burn	Refuse-Derived Fuel
Particulate Matter			
PM ₁₀	1.4*	14	44
Total	0.12	0.18	0.13
Lead	0.12	0.18	0.13
SO ₂	1.7	1.7	1.7
NO _x	4.4	3.6	5.0
CO	3.4	2.2	3.6

*All values are pounds per ton, uncontrolled.

In a study comparing results of 21 risk assessments at MWCs (Levin, et al. 1991), polychlorodibenzodioxins (PCDDs), polychlorodibenzofurans (PCDFs), and cadmium were found to contribute more significantly to the total carcinogenic risk from MWC stack emissions than other contaminants. In addition, the contribution to total risk of all indirect routes of exposure (ingestion and dermal contact) exceeded that of the direct inhalation route for most studies reviewed.

Particulate Matter

Particulate matter consists primarily of noncombustible inorganic material entrained in the flue gas. Particulate matter typically ranges in size from less than 1 micron to about 50 microns. The uncontrolled particulate matter emission rates vary substantially for the different types of MWCs. Modular incinerators produce the lowest levels of uncontrolled emissions with RDF-fired units having the highest.

Acid Gases

Hydrogen chloride (HCl), sulfur dioxide (SO₂), and hydrogen fluoride (HF) are formed during the combustion of waste materials containing chloride, sulfur, and fluoride compounds. A small fraction of the SO₂ is oxidized to sulfur trioxide (SO₃). In the presence of water, these gases react to form hydrochloric, sulfurous, hydrofluoric, or sulfuric acid. It is believed that the chlorinated plastics are the major contributor of chlorine for HCl formation.

Nitrogen Oxides

Nitrogen oxides (NO_x) are found predominantly in the form of nitrogen oxide (NO) and are a product of most combustion processes. Nitrogen, either bound to the fuel or found in the combustion air, is converted to NO_x at high temperatures. Conversion of atmospheric nitrogen (N₂) to NO_x requires much higher temperatures than the conversion of fuel-bound nitrogen. Most MWCs use a staged combustion design that limits the formation of NO_x from atmospheric nitrogen.

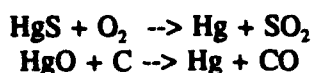
Carbon Monoxide

Carbon monoxide (CO) is a product of incomplete combustion of organic compounds found in MSW. Complete combustion refers to the complete oxidation of all fuel carbon to CO₂. Carbon monoxide is a good indicator of combustion efficiency. A high CO emission rate is indicative of poor combustion conditions within MWCs.

Heavy Metals

Heavy metals enter the MSW stream as components of a variety of consumer products such as batteries, plastics, paper products, and metal alloys. A review of lead and cadmium studies (Korzun and Heck 1990) determined that most of the cadmium enters the waste stream in the combustible fraction (plastics and pigments), while lead is contained in both combustible and noncombustible discards (batteries, plastics, and pigments). Lead, cadmium, mercury, and arsenic are the heavy metal emissions of greatest concern for MWCs.

Temperatures commonly encountered in MWCs usually lead to thermal decomposition of metallic compounds in waste. For example, the heating of metallic compounds to over 1300 °F during combustion can lead to reduction processes such as:



where the mercuric sulfide (HgS) and mercuric oxide (HgO) in the waste feed react with oxygen (O₂) in the combustion air and fuel carbon (C), respectively, to produce elemental mercury (Hg), sulfur dioxide (SO₂), and CO (Brna 1991). After the combustion gases are cooled, during energy recovery or before flue gas cleaning, some elemental metal species combine with O₂ to form metal oxides, while other species combine with chlorine (Cl₂) to form metal chlorides. Volatile metals and metallic compounds will condense on particles as flue gases cool. Condensation concentrates the volatile species on fine particles since smaller particles have a greater surface area per unit mass than larger particles. Therefore, the lower size fraction of the particulate matter is enriched with condensable volatile metals and metallic compounds.

Organic Emissions

Organic emissions result from incomplete combustion of organic compounds found in MSW. The organic pollutants of primary concern to the public and to regulators are PCDDs and PCDFs. Figure 3 shows the generalized molecular structures of all PCDDs and PCDFs. Many isomers are possible; 75 for PCDD and 135 for PCDF. Organic emissions can arise from incomplete destruction of PCDDs and PCDFs already in the waste stream and the formation of PCDDs/PCDFs somewhere within the MWC or downstream of the combustor. The incomplete destruction of organic PCDD/PCDF precursors is a factor in these compounds' formation. At temperatures typical of MWC systems, PCDDs and PCDFs will condense onto particulate matter.

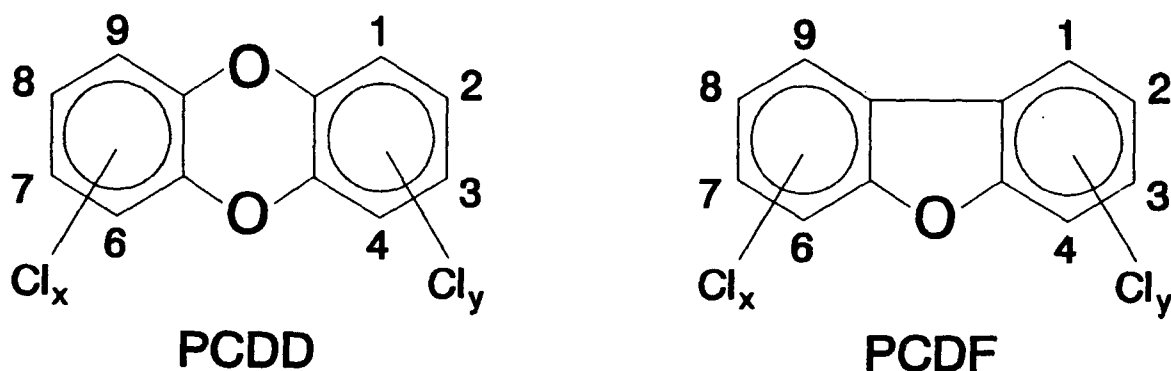


Figure 3. Generalized Molecular Diagram for Polychlorodibenzofurans and Polychlorodibenzodioxins.

4 REGULATORY CONSIDERATIONS

The regulation of MWCs on a national level is in a state of change. On February 11, 1991, the U.S. Environmental Protection Agency (USEPA) issued the New Source Performance Standards (NSPS) and Emission Guidelines for MWCs larger than 250 tons per day. The Clean Air Act Amendments of 1990 (CAA90) were enacted on November 15, 1990. During debate over the provisions of the CAA90, a controversy over which requirements should be included in the NSPS and Emission Guidelines for MWCs was also occurring. This confusion over MWCs led to the inclusion of provisions in the CAA90 that relate directly to MWCs. The USEPA was required to review and broaden the scope of the NSPS for MWCs by November 15, 1991 and to propose regulations for MWCs less than 250 tons per day by November 15, 1992. At the time of this report (summer 1993), neither activity had been completed. Because of the new language in the CAA90, the new requirements will be stricter. These national regulations are important since, by law, they serve as a minimum baseline for all state MWC regulations.

Existing MWC Regulations

The USEPA has promulgated regulations that affect both new and existing MWCs with a capacity over 250 tons per day (40 CFR 60). The regulations do not affect MWCs with a capacity less than 250 tons per day. Existing MWCs must comply with Emission Guidelines that divide MWCs into two size categories: (1) "large," with a capacity greater than 250 tons per day but not more than 1100 tons per day or (2) "very large," with a capacity greater than 1100 tons per day. New MWCs must comply with the NSPS, which generally are more stringent than Emission Guidelines.

The NSPS and Emission Guidelines establish emission limitations for metals (particulate matter is used as an indicator), organics (PCDD/PCDF), and acid gases (SO₂, HCl). Control of NO_x is also required for new MWCs, but not for existing MWCs. Table 3 is a summary of emission limitation values for existing and new MWCs. In addition, both the NSPS and Emission Guidelines require the application of good combustion practices (GCP). Carbon monoxide emission limits are set for different types of MWCs as an indicator of GCP. Table 4 shows CO emission limitations and other requirements for GCP.

Both NSPS and Emission Guidelines are based on the application of best demonstrated technology (BDT). Criteria for BDT depend on the size and age of the MWC facility. Table 5 shows BDT criteria for used by the USEPA to set emission limits for NSPS and Emission Guidelines. Other technologies may be used by MWC facilities to achieve required emission limitations.

Clean Air Act Amendments of 1990 (CAA90)

Under the new Air Toxics title, the CAA90 include a new Section 129 entitled "Solid Waste Combustion." Section 129 applies to a range of solid waste incinerators including MWCs, medical waste incinerators, infectious waste incinerators, and industrial waste incinerators. For MWCs, Section 129 directs that the NSPS be broadened and specifies a revision schedule. First, Section 129 authorizes USEPA to issue the final NSPS and Emission Guidelines, but limits the applicability of these standards to MWCs with a capacity greater than 250 tons per day. Second, Section 129 directs the USEPA to review and revise the NSPS and Emission Guidelines within a year, to be fully consistent with Section 129. The revised NSPS and Emission Guidelines must include emission limits for mercury, cadmium, and lead for both new and existing MWCs; the addition of MWC siting requirements; and the addition of NO_x standards for existing MWCs. The NSPS and Emission Guidelines must be based on the application of maximum achievable control technology (MACT) as defined in CAA90, Title III. The definition for

Table 3

Summary of USEPA's Emission Limitations for MWCs

Size of MWC	Pollutant Measure	Emission Limit ¹
<u>Existing MWCs</u>		
Large (>250 tpd and ≤ 1100 tpd)	PCDD/PCDF ²	125 ng/dscm
	PCDD/PCDF (RDF plants) ²	250 ng/dscm
	PM	69 mg/dscm
	HCl	50% reduction or 25 ppmv ³
	SO ₂	50% reduction or 30 ppmv (24-hr averaging period) ³
	Opacity	10% (6-min averaging period)
Very Large (>1100 tpd)	PCDD/PCDF ²	60 ng/dscm
	PM	34 mg/dscm
	HCl	90% reduction or 25 ppmv ³
	SO ₂	70% reduction or 30 ppmv (24-hr averaging period) ³
	Opacity	10% (6-min averaging period)
<u>New MWCs</u>		
Large (>250 tpd)	PCDD/PCDF ²	30 ng/dscm
	PM	34 mg/dscm
	HCl	90% reduction or 25 ppmv ³
	SO ₂	70% reduction or 30 ppmv (24 hr averaging period) ³
	NO _x	180 ppmv (24-hr averaging period)
	Opacity	10 % (6-min averaging period)

1 All emission limits are corrected to 7 percent O₂ on a dry basis.

2 PCDD/PCDF limits are measured as total tetra- through octa- chlorinated PCDDs and PCDFs.

3 Less stringent limit applies.

Table 4
Good Combustion Practices

Parameter	Limit
Maximum load	110% of load observed during PCDD/PCDF compliance test
Maximum temperature at particulate matter control device inlet	30 °F above temperature during PCDD/PCDF compliance test
<u>CO Emissions¹</u>	
Modular	50 ppmv (4-hr averaging period)
Mass burn waterwall	100 ppmv (4-hr averaging period)
Mass burn refractory	100 ppmv (4-hr averaging period)
Fluidized bed combustor	100 ppmv (4-hr averaging period)
Mass burn rotary water wall	100 ppmv (24-hr averaging period) ²
RDF stoker	150 ppmv (24-hr averaging period) ³
Coal/RDF cofired	150 ppmv (4 hour averaging period)
Operator certification and training	All operators certified by ASME or State; training manual and training for other personnel

1 All CO emission limits are corrected to 7 percent O₂ on a dry basis.

2 For Emission Guidelines, CO limit is 250 ppmv for mass burn rotary waterwall combustors.

3 For Emission Guidelines, CO limit is 200 ppmv for RDF stoker combustors.

Table 5
Best Demonstrated Technology Used to Set NSPS and Emission Guidelines for MWCs

MWC Size	Best Demonstrated Technology
<u>Existing MWCs</u>	
Large (>250 tpd and ≤ 1100 tpd)	GCP, dry sorbent injection, electrostatic precipitator (ESP)
Very Large (>1100 tpd)	GCP, spray dryer absorption (SDA), ESP
<u>New MWCs</u>	
Large (> 250 tpd)	GCP, SDA, fabric filter NO _x control: selective noncatalytic reduction

MACT is stricter than the definition for BDT, which was the control technology basis for the existing NSPS and Emission Guidelines. Third, Section 129 directs the USEPA, within 2 years, to adopt NSPS and Emission Guidelines for MWCs with a capacity equal to or less than 250 tons per day that are fully consistent with Section 129.

As of the summer 1993, neither the regulations for small or large MWCs have been proposed. The USEPA has decided to combine the two efforts into the same project. There is concern that the changes to the regulations required by the CAA90 may be too costly when compared to the environmental benefit. No timetable has been set as to when the new standards and guidelines will be issued. The new regulation(s) may apply to all MWC capacities or distinguish between various capacities.

State Regulations

In addition to USEPA standards, many states and local air pollution control districts have developed requirements for MWCs. Many of these standards or permit conditions are more stringent than USEPA standards. The Appendix lists addresses and telephone numbers for state and local air pollution regulatory bodies. These sources should always be contacted to answer questions relating to current MSW environmental regulations.

5 AIR POLLUTION CONTROL SYSTEMS

Carbon Monoxide Controls

Carbon monoxide (CO) emissions are controlled by using "good combustion practices." Complete combustion requires that MWCs be designed and operated to provide an excess of oxygen in the combustion air, adequate turbulence to create good mixing of air and combustible materials, a high temperature zone, and sufficient residence time in the high temperature zone. For MWCs, the high temperature combustion zone should be greater than 1800 °F and the residence time within this zone should be 1 or 2 seconds. Good combustion practices will also reduce the emissions of organic pollutants by completely oxidizing organics in the MSW stream and by inhibiting the formation of toxic organic compounds downstream of the combustion zone.

Maintaining proper combustion conditions within MWCs is challenging because of the widely varying fuel conditions (moisture content, energy content, etc.) of the waste stream. The combustor is normally equipped with adequate instrumentation to measure rapidly changing combustion conditions. MSW feed rates, combustion air control, and auxiliary fuel rates can all be controlled either manually or as part of a feedback control system to maintain optimal conditions.

Nitrogen Oxides Controls

Nitrogen oxide (NO_x) emissions are controlled by modifying combustion conditions to inhibit NO_x formation or through the use of add-on controls. Most MWCs use a staged combustion design. The initial combustion of MSW occurs in a fuel rich/oxygen lean zone followed by a fuel lean/oxygen rich zone to complete the combustion. The staged combustion approach lowers the peak flame temperature and limits the amount of oxygen available to react with nitrogen in the combustion air. Staged combustion is effective in reducing the formation of NO_x from air nitrogen conversion but is not very effective in limiting the conversion of fuel-bound nitrogen to NO_x. Therefore, some NO_x formation is expected in all MWCs.

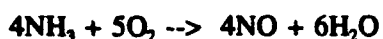
Another MWC design/operational feature that can reduce the formation of NO_x is flue gas recirculation. This system recycles relatively cool flue gas containing combustion products and lower oxygen contents into the primary combustion chamber. Nitrogen oxide formation is inhibited by the same phenomena that occur in staged combustion; lower peak flame temperature and reduced availability of oxygen to the flame. A process of injecting natural gas and recirculated flue gases above the combustor grate has been demonstrated to reduce NO_x and CO emissions while reducing excess air requirements (Abbasi et al. 1991).

Combustion modifications can lower NO_x emissions but some NO_x formation is inevitable; flue gas controls are necessary to reduce emissions even further. Two of the most used NO_x flue gas control technologies are selective catalytic reduction (SCR) and selective noncatalytic reduction (SNCR).

Control systems that use SCR inject ammonia upstream of a catalytic reactor. The catalytic material can be a number of shapes (honeycomb plates, parallel ridged plates, rings, tubes, or pellets) and can be made from a variety of base metals (titanium, copper, iron, chromium, nickel, molybdenum, cobalt, and vanadium). The reactor operates at a temperature between 600 and 650 °F and reduces NO_x to nitrogen. SCR control systems require less ammonia than SNCR systems because of the beneficial effects of the lower temperature of reaction and the presence of the catalyst. Selective catalytic reduction has been successfully applied to a wide range of combustion sources with a removal rate of about 80 to 85 percent.

However, because MWC flue gas contains compounds that can poison the catalyst, the reactor must be placed downstream of the acid gas and particulate control systems and the flue gas must be reheated to the reactor's operating temperature. These restrictions have limited the use of this technology for MWCs in the United States.

SNCR control systems also use ammonia to reduce NO_x , but injection takes place in the high temperature (1600 to 1900 °F) regions of MWCs. Anhydrous ammonia, gaseous ammonia, and urea solutions are all used as sources of ammonia. The ammonia and NO_x react according to the following competing reactions:



At flue gas temperatures above 1900 °F, the second reaction predominates; oxidation of ammonia to NO_x increases and SNCR can actually result in an increase in overall NO_x emissions. At temperatures below 1600 °F, NO_x reduction falls off and ammonia breakthrough increases. The excess ammonia can react with sulfuric acid and hydrochloric acid to form ammonia salts that can contribute to fouling and the formation of a visible ammonia chloride plume (Hurst and White 1986).

A process developed by the Exxon Corporation (Thermal De- NO_x) uses ammonia injected into the flue gas. This process has been applied to many combustion sources including MWCs. Large jets inject ammonia into the furnace at about a 2:1 to 3:1 ratio of ammonia to NO . Thermal De- NO_x is sensitive to MWCs' combustion conditions. Changes in fuel rate, fuel energy content, excess air rate, or boiler load can significantly change flue gas conditions at the ammonia injection site, and cause major changes in control efficiency. Therefore, MWCs using feedback control systems to stabilize combustion conditions, are more successful in limiting NO_x production by ammonia injection. Thermal De- NO_x can be retrofitted onto older MWCs, but there can be difficulties in locating the injection system at the optimal point. Ammonia injection has shown considerable potential on a bench scale as a simultaneous control technology for PCDD/PCDF, HCl and NO_x emissions (Takacs and Moilanen 1991).

Urea injection has been successfully used to control NO_x emissions from MWCs in the United States and Europe. Urea injection has the advantage of not using a hazardous material (ammonia) for operation. In this process, an aqueous solution containing urea and/or proprietary additives is injected into the MWC flue gas stream. These reagents react with NO_x to form nitrogen, carbon dioxide, water vapor, and small amounts of ammonia. One urea injection process uses urea injection followed by methanol injection within the heat transfer section of the boiler at temperatures of 1400 to 1900 °F. Methanol is used to provide substantial reduction of ammonia slip and/or ammonia salt deposits. Between 1740 °F and 1830 °F at 65 percent NO_x removal, ammonia slip (gaseous emission) of 2.5 to 5.0 ppm (without methanol) can be reduced to less than 1.0 ppm (Jones et al. 1989).

Particulate Controls

Particulate emissions are primarily controlled by electrostatic precipitators (ESPs) or fabric filters, although wet scrubbers are sometimes used on small MWCs or in series with ESPs for additional control. Electrostatic precipitators are installed either alone or as a component of an acid gas control system. Fabric filters usually are installed downstream of a quench tower or spray dryer where the conditions of increased flue gas humidity and lower flue gas temperatures protect filter bags from thermal degradation (Brown et al., 1988).

Electrostatic Precipitators

Electrostatic precipitators collect particulate matter by introducing a strong electrical field in the flue gas that imparts a charge to flue gas particles. The charged particulate matter is then collected on large surface area plates that have an opposite electrical charge. The collected particulate is removed from the plates by periodic rapping. The agglomerated material on the plates falls into a collection hopper for removal. Table 6 presents key design parameters typical of MWC particulate emission control.

The lower and upper ranges of design parameters reflect the use of an ESP for purely particulate control and the use of an ESP as part of an acid gas cleaning system, respectively. Although the particulate loading to an ESP is much higher when acid gas controls are used, the number of fields and the specific collection area required to achieve similar particulate emission levels does not change significantly because the lower ash resistivity and higher moisture content of the flue gas improves ESP performance. Incinerators that have been retrofitted with spray dryers generally have been able to maintain the same level of particulate emissions (e.g., 0.01 to 0.015 gr/dscf [grains/dry standard cubic foot] @ 12 percent CO₂).

Rigid frame and rigid electrode ESPs predominate over weighted wire types in MWC applications. These designs perform better in the environment of sticky fly ash and corrosive gases typical of MWC flue gas. Electrode failures are less frequent especially where higher rapping forces are used to dislodge sticky fly ash from collector plates.

The ESP's insulator compartment must be designed to minimize effects of corrosion and fly ash stickiness. A pressurized ventilation system with heated air is often used to keep insulators clean and reduce electrical tracking problems.

Fabric Filters

Both reverse-air and pulse-jet type fabric filters are used to control particulate emissions from MWCs. Each has advantages and disadvantages of operation that should be evaluated on a case-by-case basis. Either type is capable of controlling particulate emissions down to levels required by regulations. Table 7 presents design parameters typically used for MWC fabric filter applications.

Table 6

ESP Design Parameters

	Particulate	Acid Gas Control
Particulate loading, gr/acf (grains/actual cu ft)	0.5-9	0.5-9
Required efficiency, %	98-99.9	98-99.9
Number of fields	3-4	3-4
Specific collection area, sq ft/1000 acfm	400-550	400-550
Average secondary voltage, kV	35-55	35-55
Average secondary current mA/1000 cu ft	30-50	30-50
Gas velocity, ft/sec	3.0-3.5	3.0-3.5
Flue gas temperature, °F	350-450	230-300
Flue gas moisture, % vol	8-16	12-20
Ash resistivity, ohm-cm	109-1012	108-109

Table 7
Fabric Filter Design Parameters

	Reverse Air	Pulse Jet
Operating temperature, °F	230-450	
Fabric type	Woven fiberglass or Nomex	
Fabric coating	10% Teflon B or acid resistant	
Fabric weight, oz/yd ²	9.5	16 or 22
Bag diameter, inches	8	6
Net air-to-cloth ratio	1.5-2.0:1	3.5-4.0:1
Minimum compartments	6	4
Overall pressure drop, in. water gauge	4-6	8-10
Estimated bag life, years	3-4	1.5-2

The temperature ranges shown represent operation after both a dry quench chamber (350 to 450 °F) and a spray dryer (230 to 300 °F). For these temperature ranges, woven fiberglass is the most common fabric, although Nomex fabric is also used. The fabric is generally coated with 10 percent Teflon B; acid resistant coating also is used.

The main advantages of pulse-jet fabric filters are the lower capital cost and smaller size. However, these fabric filters operate at double the air-to-cloth ratio of reverse air filters and at nearly double the pressure drop and the cloth cleaning method more violently flexes the fabric material. These factors result in more frequent cleaning of the filter bags and substantially shorter bag life.

Reverse-air fabric filters are much larger than pulse-jet fabric filters because their design requires half the air-to-cloth ratio of pulse-jet filters. Although reverse-air fabric filters have a greater capital cost, the total evaluated cost for plants exceeding 15 years of life is lower than for pulse-jet filters. A reverse-air filter typically has lower particulate emissions than pulse-jet filters.

Most fabric filters are used in conjunction with an acid gas pollution control system. Compared with systems without acid gas control, the flue gas entering the fabric filter has a larger particulate loading, a lower temperature (240 to 300 °F), a higher moisture content (12 to 20 percent), and is closer to the dew point. These flue gas conditions can lead to severe corrosion and plugging of fabric material. Specific features must be incorporated into the fabric filter's design to combat these harsh flue gas conditions

Corrosion control is accomplished by maintaining flue gas temperature above the dew point. Insulation specifications for fabric filters usually require a minimum of 4 inches with double lapping on side panels and with insulation extending into the hopper. Air in-leakage is minimized by good quality control during construction and by minimizing the number of openings from the outside into the filter. Heating prevents cold spots in the hopper and maintains the flowability of the collected particulate matter. Some fabric filter designs also use an acid resistant coating on internal components that come into contact with flue gas.

When fabric filters are integrated into an acid gas control system, the fabric filter acts as a reactor to aid in acid gas absorption, especially for sulfur dioxide. Sulfur dioxide is absorbed by the alkaline

material found in the filter cake collected on the bags. Therefore the effectiveness of sulfur dioxide absorption on a filter bag is reduced after the bag is cleaned. Overall sulfur dioxide absorption can be increased by reducing the number of filter bags that are cleaned simultaneously.

Wet Scrubbers

Wet scrubbers are usually used as part of a two-stage particulate and acid gas cleaning system downstream of an ESP. Although in smaller MWCs, a wet scrubber may be the primary means of particulate control. The wet scrubber removes particles passing through the ESP and serves as the primary acid gas control mechanism. A venturi scrubber followed by a packed or tray tower absorber is the most common, but other types of scrubbers are also used. Figure 4 shows a typical two-stage wet scrubber system flow diagram.

Usually water is recycled in the venturi stage to achieve particulate removal. Some hydrogen chloride removal will take place here also. Additional removal of particulate and acid gases will take place in the second scrubbing stage including the absorption of sulfur dioxide. Typical wet scrubber design parameters for MWC application are shown in Table 8.

The venturi section is subjected to severe corrosive conditions from the low pH of the recirculated solution. The scrubber inlet temperatures are normally high enough to require high alloy steel for

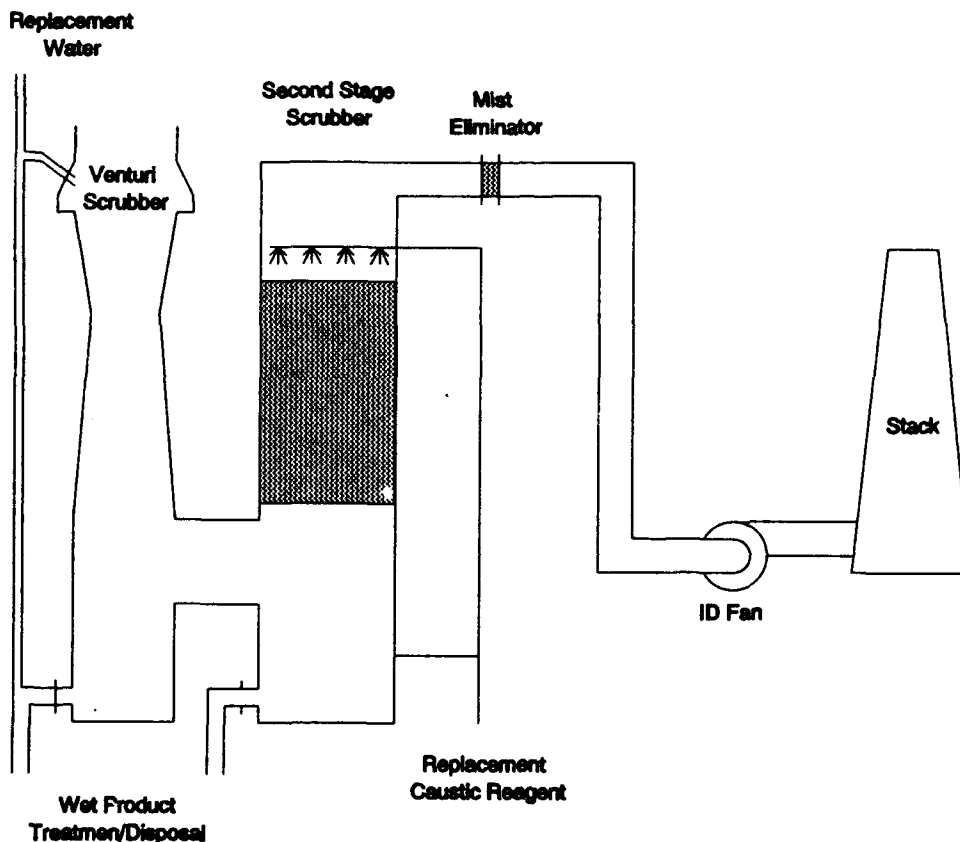


Figure 4. Two-stage Wet Scrubber Flow Diagram.

Table 8
Wet Scrubber Design Parameters

	Venturi Stage	Absorber Stage
Gas velocity, ft/s	90-150	6-10
Pressure drop, in. w.g.	40-70	4-8
Liquid/gas ratio, gal/Kacfm	10-20	20-40
Scrubbing media	Water	Caustic
Solution pH	< 1-2	6.5-9
Materials of Construction	High-alloy steel (e.g., Inconel, Hastelloy)	Fiberglass reinforced plastic, Lined carbon steel

construction. The absorber stage may be a packed tower, tray tower, or radial flow tower. The absorber section is usually constructed of fiberglass reinforced plastic although carbon steel vessels lined with corrosion resistant materials are also used.

Acid Gas Controls

Acid gas emissions from MWCs (HCl, SO₂, SO₃, and HF) are normally controlled by dry sorbent injection, spray dryer absorption, or wet scrubbing. Usually HCl control is of greater concern than control of other acid gases. However, SO₂ is more difficult to control and is present at much lower concentrations than HCl. All three of these technologies have been successfully applied to MWCs. The greater control capability of spray dryer and wet scrubbing systems have made these systems more popular in the face of stricter regulations and permit conditions.

Dry Sorbent Injection

In the dry sorbent injection (DSI) process, a dry alkaline material is introduced into the gas stream to react with the acid gases. The alkaline material, usually hydrated lime [CA(OH)₂] or soda ash [NA₂(CO₃)] react with the acid gases to form salts that can be collected in the particulate control device. This simple process is capable of reducing HCl emissions by 90 percent and SO₂ emissions by about 50 percent. However, the dry alkaline material requirements are twice that of the improved DSI processes explained below. The stoichiometric ratios (the amount of sorbent added compared to the amount of sorbent theoretically required for complete acid gas removal) are typically between 2 and 4.

Acid gas control efficiency and reagent consumption can both be improved in DSI systems by increasing the flue gas relative humidity and recycling reacted sorbent material back into the gas stream.

The relative humidity of the flue gas can be increased by using a heat exchanger and by quench towers that use water sprays. Both methods are used, but humidification through quench towers predominates. Figure 5 presents a flow diagram for a DSI system using flue gas humidification. Retention times within humidification devices typically are 3 to 5 seconds. If a water spray is used, the

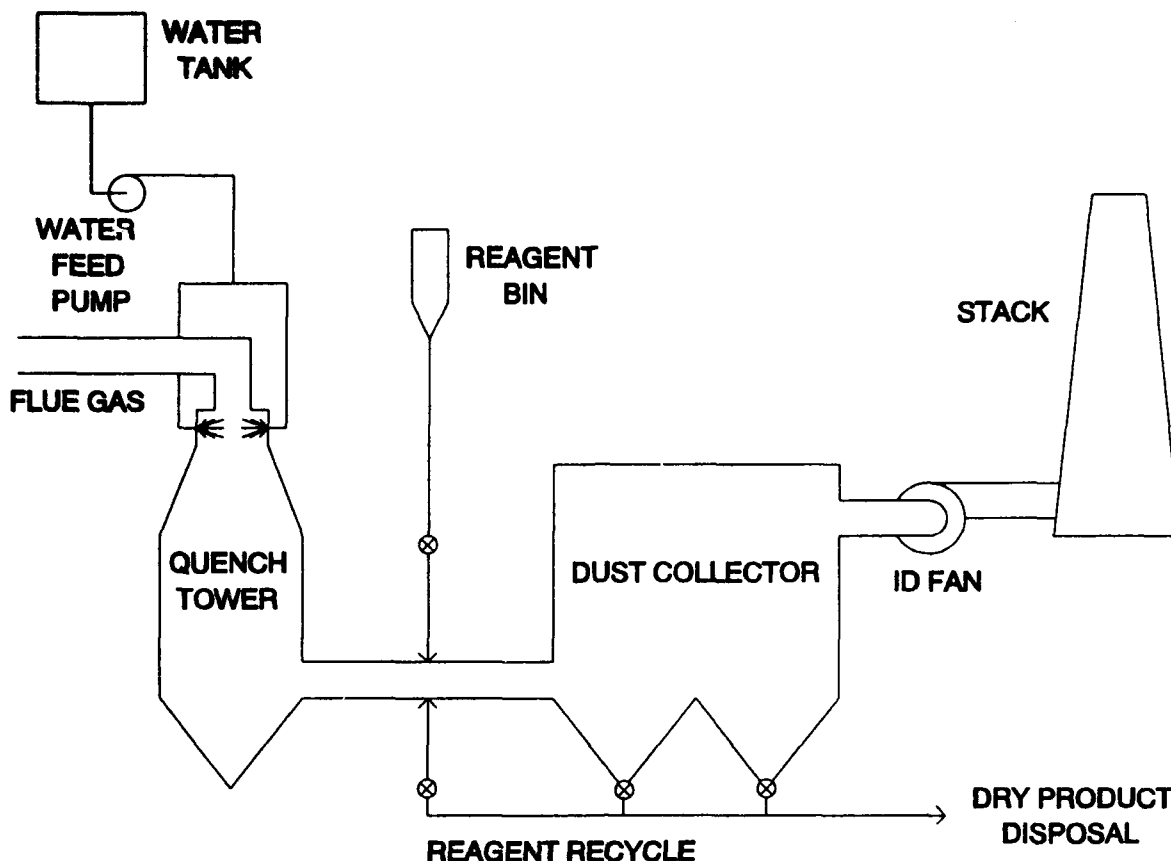


Figure 5. Dry Sorbent Injection Process Flow Diagram.

flue gas temperature leaving the cooling tower is maintained at a temperature high enough to evaporate all water droplets (300 to 350 °F).

Dry sorbent material is mixed with the flue gas after it is cooled. The sorbent reacts with acid gases to form a solid salt that is collected downstream in the particulate control device. Usually fabric filters are used to collect particulate since the reaction between the acid gases and the sorbent can continue on the filter cake surface. Frequently, a part of the collected reaction product is recycled back to the flue gas stream to improve removal efficiency and reduce the sorbent consumption rate. The DSI systems improved through humidification and recycling of reacted materials can achieve greater than 95 percent removal of HCl and 90 percent removal of SO₂ at stoichiometric ratios between 1 and 2.

Spray Dryer Absorption

Spray dryer absorption (SDA) has been widely used for MWC acid gas control. In fact, it is considered the best available control technology (BACT) for many MWC air permits. The SDA process combines a spray dryer with a particulate control device. In the spray dryer, flue gas humidification and some acid gas absorption occurs. In the particulate control device, additional acid gas absorption and the collection of fly ash/sorbent particulate matter takes place. The SDA process is capable of high removal efficiencies for all acid gases. The process is also capable of removing some heavy metals and organic compounds. The SDA process typically operates at stoichiometric ratios between 1 and 1.8. Figure 6 is a flow diagram for the SDA process.

MWC flue gas enters the spray dryer reactor where fine droplets of the sorbent/water slurry (usually hydrated lime) is sprayed into the flue gas stream. The reactor is designed to provide sufficient mixing

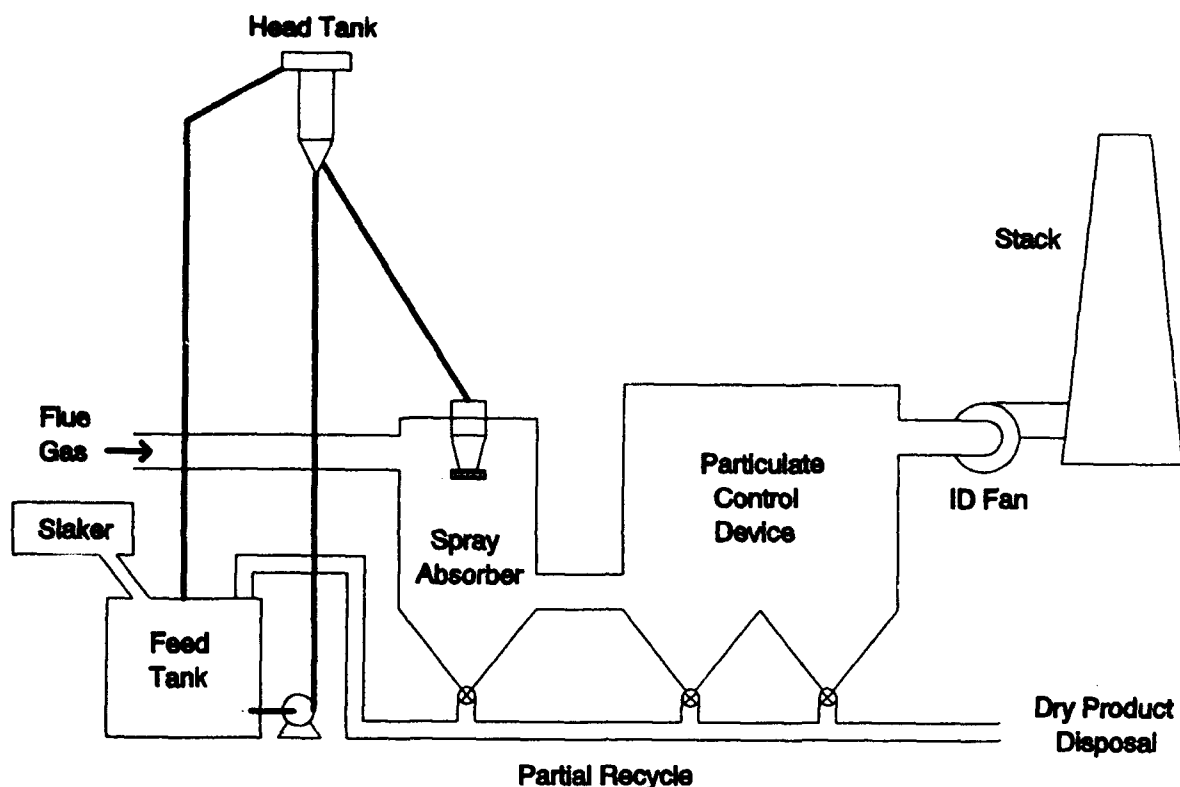


Figure 6. Spray Dryer Absorption Flow Diagram.

and retention time so that the sorbent/water slurry particles are dried completely before exiting. The evaporation of the slurry increases the humidity of the flue gas and reduces its temperature. Flue gas retention times range from 10 to 18 seconds and flue gas temperatures leaving the spray dryer range from 230 to 300 °F.

A large variety of spray dryer reactor designs are used in MWC applications. Spraying devices include: single rotary, multiple rotary, and multiple dual fluid nozzle atomization. The reactors may have single or multiple flue gas inlets and have upflow, downflow, or upflow with cyclonic precollection designs. In some systems, a portion of the dried sorbent particles and fly ash is collected in the bottom of the spray dryer. In other systems, all particulate matter is carried to the particulate control device. Material collected in the spray dryer is often recycled back into the system to reduce sorbent consumption.

The particulate control device downstream of the spray dryer may be an ESP, a reverse-air baghouse, or a pulse-jet baghouse. The type of particulate control device selected depends on the degree of particulate and acid gas control required, the available space, and the overall economics. Generally, a system requiring high acid gas removal efficiencies (greater than 95 percent HCl and greater than 85 percent SO₂) will use a baghouse because of its higher acid gas absorption capabilities. All particulate control devices must minimize heat loss to avoid the severe corrosion associated with the condensation of acid gases.

The end product of the SDA process is a fine hygroscopic material with a significant soluble fraction. The calcium chloride formed during the absorption of HCl in the spray dryer is a mixture of mono- and dihydrate forms (CaCl₂·H₂O, CaCl₂·2H₂O). At lower temperatures, the CaCl₂ will absorb moisture until it reaches the hexahydrate form (CaCl₂·6H₂O) and melts. Therefore, the design of the product conveying and storage systems must not expose the reacted sorbent to cool or moist air to maintain product flowability.

Wet Scrubbing

Wet scrubbing systems are capable of achieving high acid gas removal and have been applied to a large number of MWCs in Europe. Typical wet scrubber systems consist of a two-stage scrubber downstream of an ESP. The first stage uses water to remove the bulk of the HCl; the second stage uses hydrated lime to remove most of the SO₂. Figure 4 shows a typical wet scrubbing system flow diagram.

In some systems the acidic scrubbing liquid from the first scrubber stage is pumped into a fly ash leaching tank to remove heavy metals found in the fly ash collected from the particulate control device. After leaching, the fly ash may be usable for construction applications or disposed of in a landfill. The acidic stream leaving the leaching tank contains heavy metals. This stream may be treated with the caustic scrubbing liquid from the second scrubber stage to neutralize and precipitate the heavy metals.

Wet scrubbers have relatively low capital costs, high acid gas removal rates, they can remove other trace pollutants, and they require the lowest stoichiometric ratio of reagent material. However wet scrubbers produce a wet effluent that must be treated, they have a higher overall cost (capital plus operation and maintenance) than other alternatives, and they are more susceptible to corrosion problems.

Heavy Metals Control

Heavy metals typically are collected either by particulate control devices or by the acid gas control system. A large fraction of heavy metal emissions exit MWCs as solid particles and are collected as particulate matter. Most other metal species that exist in the vapor phase exiting a MWC are condensed onto particulate matter during the cooling of the flue gas that occurs in the air pollution control system. Since SDA and wet scrubber systems cool flue gases, they are also effective for controlling heavy metal emissions.

The cloud of finely atomized droplets found in a SDA reactor will serve as condensation or absorption sites for metals. The condensed metals will then be removed in the downstream particulate control device. Collection efficiencies for cadmium, lead, and arsenic for MWC systems with SDA acid gas control typically are greater than 90 percent.

Mercury is an especially difficult metal to control because of the volatility of some mercury species found in flue gas. Even at a temperature of 250 °F at the spray dryer absorption system outlet, a significant amount of mercury remains in the vapor phase. If mercury emissions are a problem, adding small amounts of activated carbon or sodium sulfide upstream of the SDA reactor can improve mercury control. Total mercury reductions of around 90 percent have been achieved using these additives (Bma 1991).

PCDD/PCDF Controls

PCDD/PCDF emissions can be controlled through a combination of good combustion practices, acid gas controls, and particulate controls. Combustion temperatures above 1800 °F for more than 2 seconds is considered adequate for destroying PCDDs/PCDFs found in the MSW stream and for destroying their precursors formed during the combustion of other organics in combination with compounds containing chlorine. However, some PCDDs/PCDFs may be formed downstream of the combustor on the surface of fly ash at lower temperatures (500 to 700 °F).

Fuel Cleaning

"Fuel cleaning" is the practice of removing certain constituents from the MSW stream to reduce air pollutant emissions. For certain fractions of the MSW, such as lead-acid batteries, the correlation between MSW component and air emissions is well known; these components are routinely removed from the MSW stream before combustion. However, the situation is not as clear for other MSW components. A case could be made that virtually all components of MSW contribute to air emissions. Components such as paper, plastic, and yard waste add to the fuel value of MSW and make combustion processes for MSW more economically feasible. Also, reduction of certain waste components may actually increase emissions due to incomplete combustion or higher combustion temperatures.

The issue of fuel cleaning is very controversial. USEPA has recently ruled that separation of certain municipal wastes (nitrogen-containing) must be evaluated as best available control technology (BACT) for preconstruction permits applicable to new MWC facilities (Levin 1992). The ruling dealt only with limiting yard waste and other nitrogen-containing waste to prevent NO_x formation. However, the ruling could set a precedent for banning other MSW components. If this ruling is interpreted broadly, there could be significant implications for future MWC facilities, including: permit delays for MWC siting, downsizing of planned MWC facilities, independent review of source separation and recycling requirements by air regulators, and difficulty in receiving financing since owners of MWC facilities cannot guarantee the material separation requirement will be fulfilled by the surrounding communities. In its broadest sense, this ruling attempts to inject pollution prevention into a single-medium statute. Fuel cleaning will certainly remain a hotly contested issue in the upcoming years.

6 SUMMARY

This report provided technical information about types of MWCs, environmental problems associated with MWC operation, regulations that apply to siting and operating MWCs, and the technologies capable of controlling these environmental problems. The information should be used by installations, The Environmental Branch at Major Commands, and Corps of Engineers Districts involved in planning, designing, siting, or operating MWC facilities.

This report detailed a number of environmental problems associated with MWC operation. MWCs emit PM_{10} , carbon monoxide, nitrogen oxides, toxic organics, acid gases, and heavy metals into the atmosphere. In addition, MWCs can produce solid waste (fly ash and reagent material used to treat acid gases) and liquid waste (wet scrubber absorbent) that may require further treatment.

Strict Federal regulations have been developed to minimize adverse environmental impacts from MWC operation. These regulations apply to new MWC facilities (NSPS) and existing MWC (Emission Guidelines). The CAA90 requires that the USEPA strengthen and broaden the scope of these regulations. These new Federal regulations may have a significant impact on future MSW management plans.

The strict environmental regulation of MWC facilities has led to the development of many air pollution control technologies. Good combustion practices can help control CO and organic emissions. A combination of combustion modifications and add-on control devices (SCR and SNCR) are used to control NO_x emissions. Particulate matter control is achieved primarily with fabric filters or ESPs although wet scrubbers also achieve some control. Acid gas emissions are controlled by applying three absorption techniques: DSI, SDA, and wet scrubbing. Heavy metal and additional toxic organic emission control occurs through good particulate matter and acid gas control. Some supplementary control for mercury emissions may be required to meet tough mercury regulations. These technologies are expected to continue increasing in complexity and cost as MWC regulations become stricter.

METRIC CONVERSION TABLE

$$\begin{aligned} 1 \text{ ton} &= 907.18 \text{ kg} \\ ^\circ\text{F} &= (^\circ\text{C} + 17.78) \times 1.8 \end{aligned}$$

REFERENCES

- Abbasi, Hamid A., et al., "Development of Natural Gas Injection Technology for NO_x Reduction from Municipal Waste Combustors," *Proceedings of the Second Annual International Specialty Conference for Municipal Waste Combustion* (Tampa, Florida, April 15-19, 1991).
- Brna, Theodore G., "Toxic Metal Emissions from MWCs and Their Control," *Proceedings of the Second International Specialty Conference on Municipal Waste Combustion* (Tampa, FL, April 15-19, 1991).
- Brown, B., J.R. Donnelly, T.D. Tarnok, R.J. Triscori, "Dust Collector Design Considerations for NWS Acid Gas Cleaning Systems," EPA/EPRI 7th Particulate Symposium (Nashville, TN, March 1988).
- Code of Federal Regulations, title 40, part 60, also Federal Register, vol 56, no. 28, 11 February 1991 (commonly called *New Source Performance Standards and Emissions Guidelines for Existing Municipal Waste Combustors*).
- Corps of Engineers Guide Specification (CEDGS)-11181, *Incinerators, General Purpose* (Headquarters, U.S. Army Corps of Engineers [HQUSACE], February 1990).
- Griggs, K., et al., *Characteristics of Incinerators with Heat Recovery Capability*, USACERL Technical Report E-88/04/ADA194537 (U.S. Army Construction Engineering Research Laboratory [USACERL], April 1988).
- Hurst, Boyd, and C.M. White, "Thermal De-NO_x: A Commercial Selective Noncatalytic NO_x Reduction Process for Waste-to-Energy Applications," *Proceedings of the ASME Solid Waste Division Biennial Meeting* (Denver, CO, June 2, 1986).
- Jones, Dale G., et al., "Two-Stage DeNO_x Process Test Data for 300 TPD MSW Incineration Plant," *Proceedings of the 82nd Annual Meeting of the Air and Waste Management Association* (Anaheim, CA, June 25-30, 1989).
- Korzun, Edwin A., and Howell H. Heck, "Sources and Fates of Lead and Cadmium in Municipal Solid Waste," *Journal of the Air and Waste Management Association*, vol 40, no. 9 (September 1990).
- Levin, Michael H., "Fuel Cleaning and Materials Separation at Waste-to-Energy Plants," *Journal of the Air and Waste Management Association*, vol 42, no. 6 (1992) pp 767-769.
- Levin, Michael H., et al., "Comparative Analysis of Health Risk Assessments for Municipal Waste Combustors," *Journal of the Air and Waste Management Association*, vol 41, no. 1 (January 1991).
- Standards of Performance for New Stationary Sources and Final Emission Guidelines for Municipal Waste Combustors, Final Rule, 56 Federal Register 5987 (February 11, 1991).
- Takacs, Laszio, and George L. Moilanen, "Simultaneous Control of PCDD/PCDF, HCl and NO_x Reduction Process from Municipal Solid Waste Incinerators with Ammonia Injection," *Journal of the Air and Waste Management Association*, vol 41, no. 5 (May 1991).
- U.S. Environmental Protection Agency [USEPA], *Decision-Makers Guide to Solid Waste Management*, EPA/530-500-89-072 (USEPA Office of Solid Waste and Emergency Responses, November 1989).

APPENDIX: State and Local Regulatory Agencies

■ ALABAMA - STATE AGENCY

Air Pollution Control

Alabama Department of Environmental Management
1751 Congressman Williams L. Dickinson Drive
Montgomery, AL 36130
Telephone: (205) 271-7861
Alabama Environmental Management Commission
(same address and phone as above)

Waste Management

Land Division Alabama Department of Environmental Management
1751 Congressman Williams L. Dickinson Drive
Montgomery, AL 36130
Telephone: (205) 271-7700
Environmental Management Commission (EMC) (same address and phone as above)

BIRMINGHAM (See Jefferson County)

CULLMAN COUNTY (See State Agency)

HUNTSVILLE

Air Pollution Control

City of Huntsville
Natural Resources & Environmental Mgmt.
305 Church Street
Huntsville, AL 35801
Telephone: (202) 535-4206
Air Pollution Control Board (same address and phone as above)

JEFFERSON COUNTY (Includes Birmingham)

Air Pollution Control

Jefferson County Department of Health
1400 Sixth Avenue South
Birmingham, AL 35233
Telephone: (205) 933-9110
Jefferson County Board of Health (same address and phone as above)

LAWRENCE COUNTY (See State Agency)

LIMESTONE COUNTY (See State Agency)

MORGAN COUNTY (See State Agency)

TRICOUNTY (See State Agency)

■ ALASKA - STATE AGENCY

Air Pollution Control

Alaska Department of Environmental Conservation
410 Willoughby Avenue
Room 105
Juneau, AL 99801-5100
Telephone: (907) 465-5100

Waste Management

Alaska Department of Environmental Conservation
410 Willoughby Avenue
Juneau, AK 99801
Telephone: (907) 465-5150
Fax: (907) 465-5164

FAIRBANKS NORTH STAR BOROUGH

Vehicle Inspection/Maintenance (I/M) Program

Fairbanks North Star Borough
Air Quality Division
3175 Peger Rd
Fairbanks, AK 99701
Telephone: (907) 459-1325

Waste Management

Fairbanks North Star Borough
P.O. Box 71267
Fairbanks, AK 99707-1267
Telephone: (907) 459-1321
Pollution Control Commission (same address and phone as above)

SOUTH CENTRAL CLEAN AIR AUTHORITY (Includes Anchorage Air Pollution Control Agency)

Air Pollution Control

Anchorage Air Pollution Control Agency
825 L Street
Anchorage, AK 99501
Telephone: (907) 343-4713
South Central Clean Air Authority (same address and phone as above)

■ ARIZONA - STATE AGENCY

Air Pollution Control

Office of Air Quality
Arizona Department of Environmental Quality
P.O. Box 600
Phoenix, AZ 85001-0600
Telephone: (602) 207-2308
Air Pollution Control Hearing Board (same address as above)

Waste Management

Office of Waste Programs
3033 North Central Ave.
Phoenix, AZ 85004
Telephone: (602) 207-2300

MARICOPA COUNTY

Air Pollution Control

Maricopa County Air Pollution Control
2406 S. 24th Street
Suite E
Phoenix, AZ 85034
Telephone: (602) 506-6700
Fax: (602) 506-6862
Maricopa County Air Pollution Control Hearing Board
(same address and phone as above)

PIMA COUNTY

Air Pollution Control

Pima County Department of Environmental Quality
130 West Congress Street
3rd Floor
Tucson, AZ 85701-1317
Telephone: (602) 740-3340
Pima County Environmental Quality Advisory Council
(same address and phone as above)

PINAL-GILA COUNTIES

Air Pollution Control

Pinal County Air Quality Control District
P.O. Box 1076
Florence, AZ 85232
Telephone: (602) 868-6760
Fax: (602) 868-0225
Pinal County Air Quality Control Advisory Council
P.O. Box 8
Hayden, AZ 85235

■ ARKANSAS - STATE AGENCY

Air Pollution Control

Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209
Telephone: (501) 562-7444
Arkansas Commission on Pollution Control and Ecology
(same address and phone as above)

Waste Management

Arkansas Department of Pollution Control and Ecology,
Hazardous Waste Management Division
8001 National Drive
Little Rock, AR 72209
Telephone: (501) 570-2872

■ CALIFORNIA - STATE AGENCY

Air Pollution Control

California Air Resources Board
1102 Q Street
Sacramento, CA 95814
Telephone: (916) 322-2990

Waste Management

Department of Toxic Substances Control
400 P Street
4th Floor
P.O. Box 806
Sacramento, CA 95812-0806
Telephone: (916) 323-6042

ALAMEDA COUNTY (See Bay Area)

ALPINE COUNTY (See Great Basin Valley)

AMADOR COUNTY

Air Pollution Control

Amador County Air Pollution Control District
108 Court Street
Jackson, CA 95642
Telephone: (209) 223-6406

Waste Management

Amador County Health Department
Environmental Health Division
108 Court Street
Jackson, CA 95642
Telephone: (209) 223-6439
Board of Supervisors (same address and phone as above)

(California Continued)

BAY AREA (Includes Counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Sonoma and Solano)

Air Pollution Control

Bay Area Air Quality Management District

939 Ellis Street

San Francisco, CA 94109

Telephone: (415) 771-6000

Fax: (415) 928-8560

Bay Area Air Quality Management District Board of Directors (same address and phone as above)

BUTTE COUNTY

Air Pollution Control

Butte County Air Pollution Control District

9287 Midway

Suite 1A

Durham, CA 95938

Telephone: (916) 891-2882

Butte County Board of Supervisors

25 County Center Drive

Oroville, CA 95965

Telephone: (916) 538-7643

CALAVERAS COUNTY

Air Pollution Control

Calaveras County Health Department

Government Center

San Andreas, CA 95249

Telephone: (209) 754-6399

Calaveras County Board of Supervisors (same address as above) Telephone: (209) 754-6400

COLUSA COUNTY

Air Pollution Control

Colusa County Air Pollution Control District

100 Sunrise Blvd

Suite F

Colusa, CA 95932

Telephone: (916) 458-5891

Colusa County Board of Supervisors

546 Jay Street

Colusa, CA 95932

Telephone: (916) 458-2101

CONTRA COSTA COUNTY (See Bay Area)

DEL NORTE COUNTY (See North Coast Unified)

EL DORADO COUNTY

Air Pollution Control

El Dorado County Air Pollution Control District

2850 Fairland Court

Placerville, CA 95667

Telephone: (916) 621-6662

El Dorado County Air Pollution Control Board

330 Fair Lane

Placerville, CA 95667

FRESNO COUNTY

Air Pollution Control

Fresno County Air Pollution Control District

1221 Fulton Mall

Fresno, CA 93721

Telephone: (209) 445-3239

Fresno County Board of Supervisors

2281 Tulare Street

Fresno, CA 93721

GLENN COUNTY

Air Pollution Control

Glenn County Air Pollution Control District

720 North Colusa Street

Willows, CA 95988

Telephone: (916) 934-6500

Glenn County Air Pollution Control board

526 W. Sycamore Street

Willows, CA 95988

GREAT BASIN VALLEY (Includes Counties of Alpine, Inyo and Mono)

Air Pollution Control

Great Basin Unified Air Pollution Control District

157 Short Street

Suite 6

Bishop, CA 93514

Telephone: (619) 872-8211

Great Basin Unified Air Pollution Control Board

P.O. Box 43

Mammoth Lakes, CA 93546

HUMBOLDT COUNTY (See North Coast Unified)

(California Continued)

IMPERIAL COUNTY

Air Pollution Control

Imperial County Air Pollution Control District

150 South Ninth Street

El Centro, CA 92243-2801

Telephone: (619) 339-4606

Air Pollution Control Board

Imperial County Board of Supervisors

940 W. Main Street

El Centro, CA 92243

INYO COUNTY (See Great Basin Valley)

KERN COUNTY

Air Pollution Control

Kern County Air Pollution Control District

2700 M Street

Suite 290

Bakersfield, CA 93301

Telephone: (805) 861-2593

Kern County Air Pollution Control Board

1115 Truxton Avenue

Bakersfield, CA 93301

Waste Management

Kings County Health Department

330 Campus Drive

Hanford, CA 93230

Telephone: (209) 584-1411

Kings County Board of Supervisors

Kings County Government Center

1400 W. Lacey Blvd.

Hanford, CA 93230

LAKE COUNTY

Air Pollution Control

Lake County Air Quality Management District

883 Lakeport Blvd.

Lakeport, CA 95453

Telephone: (707) 263-7000

Lake County Board of Supervisors

255 North Forbes

Lakeport, CA 95453

LASSEN COUNTY

Air Pollution Control

Lassen County Air Pollution Control District

175 Russell Avenue

Susanville, CA 96130

Telephone: (916) 257-8311 ext. 110

Lassen County Air Pollution Hearing Board

707 Nevada Street

Susanville, CA 96130

LOS ANGELES COUNTY (See South Coast AQMD)

Waste Management

Environmental Health

135 W. Yosemite Avenue

Madera, CA 93637

Telephone: (209) 675-7823

Madera County Board of Supervisors

209 W. Yosemite Avenue

Madera, CA 93637

MARIN COUNTY (See Bay Area)

MARIPOSA COUNTY

Air Pollution Control

Mariposa County Health Department

P.O. Box 5

Mariposa, CA 95338

Telephone: (209) 966-3689

Mariposa County Board of Supervisors

P.O. Box 247

Mariposa, CA 95338

MENDOCINO COUNTY

Air Pollution Control District

Mendocino County Air Quality Management District

306 E. Gobbi Street

Ukiah, CA 95482

Telephone: (707) 463-4354

Fax: (707) 463-5707

Air Quality District Board

Courthouse Square

Ukiah, CA 95482

Telephone: (707) 463-4354

MERCED COUNTY

Air Pollution Control

Merced County Air Pollution Control District

385 E. 13th Street

Merced, CA 95340

Telephone: (209) 385-7391

Merced County Air Pollution Control Board

2222 M Street

Merced, CA 95340

MODOC COUNTY

Air Pollution Control

Modoc County Air Pollution Control District

202 W. Fourth Street

Alturas, CA 96101

Telephone: (916) 233-6401

Modoc County Air Pollution Control Board (same address and phone as above)

(California Continued)

MONO COUNTY (See Great Basin Valley)

MONTEREY BAY UNIFIED (Includes Counties of Monterey, Santa Cruz and San Benito)

Air Pollution Control

Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940

Telephone: (408) 647-9411

Monterey Bay Unified Air Pollution Control District
Board (same address and phone as above)

NAPA COUNTY (See Bay Area)

NEVADA COUNTY

Air Pollution Control

Northern Sierra Air Quality Management District
1300 E. Main Street
P.O. Box 2509

Grass Valley, CA 95945

Telephone: (916) 265-1398

Fax: (916) 265-1264

Northern Sierra Air Quality Management District Board
P.O. Box 6100
Nevada City, CA 95959

NORTH COAST UNIFIED (Includes Del Norte, Humboldt, and Trinity Counties)

Air Pollution Control

North Coast Unified Air Quality Management District
2389 Myrtle Avenue
Eureka, CA 95501

Telephone: (707) 443-3093

North Coast Air Quality Management District Board
(same address and phone as above)

NORTHERN SONOMA COUNTY

Air Pollution Control

Northern Sonoma County Air Pollution Control District
109 North Street

Healdsburg, CA 95448

Telephone: (707) 433-5911/5742

Northern Sonoma County Air Pollution Control District
Board of Directors

575 Administration Drive
Santa Rosa, CA 95401

ORANGE COUNTY (See South Coast AQMD)

PLACER COUNTY

Air Pollution Control

Placer County Air Pollution Control District
11464 B Avenue

Auburn, CA 95603

Telephone: (916) 889-7130

Placer County Board of Supervisors
175 Fulweiler Avenue
Auburn, CA 95603

PLUMAS COUNTY (See Nevada County)

PLUMAS COUNTY

Waste Management

Plumas County Environmental Health Department
P.O. Box 480

Quincy, CA 95971

Telephone: (916) 283-6355

Plumas County Board of Supervisors
P.O. Box 207

Quincy, CA 95971

RIVERSIDE COUNTY (See South Coast AQMD)

SACRAMENTO COUNTY

Air Pollution Control

Sacramento Metropolitan Air Quality Management
District

A Division of Sacramento County Environmental
Management Department

8411 Jackson Road

Sacramento, CA 95826

Telephone: (916) 386-6650

SMAQMD Board of Directors

700 H Street

Sacramento, CA 95814

SAN BENITO COUNTY (See Monterey Bay Unified)

SAN BERNARDINO COUNTY

Air Pollution Control

San Bernardino County Air Pollution Control District
15428 Civic Drive

Victorville, CA 92392

Telephone: (619) 243-8920

San Bernardino County Air Pollution Control Board

385 N. Arrowhead Avenue

Fifth Floor

San Bernardino, CA 92415-0110

Telephone: (909) 387-4811

(California Continued)

SAN DIEGO COUNTY

Air Pollution Control

San Diego County Air Pollution Control District

9150 Chesapeake Drive

San Diego, CA 92123-1096

Telephone: (619) 694-3307

Air Pollution Control Board

County Administration Center

1600 Pacific Highway

San Diego, CA 92101

Waste Management

Department of Health Services

Environmental Health Services

County of San Diego

P.O. Box 85261

San Diego, CA 92186-5261

Telephone: (619) 338-2211

SAN FRANCISCO COUNTY (See Bay Area)

SAN JOAQUIN COUNTY

Air Pollution Control

San Joaquin Valley Unified Air Pollution Control District

1999 Tuolumne Street

Suite 200

Fresno, CA 93721

Telephone: (209) 497-1000

Governing Board (same address and phone as above)

SAN LUIS OBISPO COUNTY

Air Pollution Control

San Luis Obispo County Air Pollution Control District

2156 Sierra Way

Suite B

San Luis Obispo, CA 93401

Telephone: (805) 781-5912

Air Pollution Control Board

County Government Center

San Luis Obispo, CA 93408

SAN MATEO COUNTY (See Bay Area)

SANTA BARBARA COUNTY

Air Pollution Control District

Santa Barbara County Air Pollution Control District

26 Castilian Drive B-23

Goleta, CA 93117

Telephone: (805) 961-8800

Air Pollution Control District

Board of Directors (Board of Supervisors)

105 E. Anapamu

Santa Barbara, CA 93101

SANTA CLARA COUNTY (See Bay Area)

SANTA CRUZ COUNTY (See Monterey Bay Unified)

SHASTA COUNTY

Air Pollution Control

Shasta County Air Quality Management District

1415 West Street

Redding, CA 96001

Telephone: (916) 225-5674

Air Pollution Control Board

P.O. Box 8000

Redding, CA 96099

NORTHERN SIERRA AIR QUALITY MANAGEMENT DISTRICT (Sierra, Nevada, and Plumas Counties)

Northern Sierra Air Quality Management

P.O. Box 2509

Grass Valley, CA 95945

Telephone: (916) 265-1398

Northern Sierra Air Quality Management District Board

(same as address and phone as above)

SISKIYOU COUNTY

Air Pollution Control

Siskiyou County Air Pollution Control District

525 S. Foothill Drive

Yreka, CA 96097

Telephone: (916) 842-8029

Siskiyou County Air Pollution Control Board

Courthouse

Yreka, CA 96097

SOLANO COUNTY (See Bay Area, Yolo-Solano)

(California Continued)

**SOUTH COAST AIR QUALITY
MANAGEMENT DISTRICT (Includes Los
Angeles, Orange, San Bernardino (non-desert)
and Riverside Counties)**

Air Pollution Control

South Coast Air Quality Management District

21865 E. Copley Drive

Diamond Bar, CA 91765

Telephone: (909) 396-2001

South Coast Air Quality Management District
Governing Board (same address and phone as above)

STANISLAUS COUNTY

Air Pollution Control

Stanislaus County Air Pollution Control District

1716 Morgan Road

Modesto, CA 95351

Telephone: (209) 525-4152

Stanislaus County Air Pollution Control Board

1100 H Street

Modesto, CA 95354

SUTTER COUNTY & YUBA COUNTY

Air Pollution Control

Feather River Air Quality Management District

463 Palora Avenue

Yuba City, CA 95991

Telephone: (916) 634-7659

Feather River Air Quality Management District Board

215 5th Street

Marysville, CA 95901

Waste Management

Sutter County Underground Tank Storage Program

142 Garden Highway

Yuba City, CA 95991

Telephone: (916) 741-7500

Sutter County Board of Supervisors

1160 Civic Center Blvd.

Yuba City, CA 95993

TEHAMA COUNTY

Air Pollution Control

Tehama County Air Pollution Control District

1760 Walnut Street

P.O. Box 38

Red Bluff, CA 96080

Telephone: (916) 527-3717

Tehama County Air Pollution Control Board

P.O. Box 250

Red Bluff, CA 96080

TRINITY COUNTY (See North Coast Unified)

TULARE COUNTY

Air Pollution Control

Tulare County Air Pollution Control District

County Civic Center

Visalia, CA 93291

Telephone: (209) 733-6441

Tulare County Air Pollution Control District Board

Administration Building

County Civic Center

2800 West Burrell

Visalia, CA 93291

TUOLUMNE COUNTY

Air Pollution Control

Tuolumne County Air Pollution Control District

2 South Green Street

Sonora, CA 95730

Telephone: (209) 533-5693

Tuolumne County Air Pollution Control Board

VENTURA COUNTY

Air Pollution Control

Ventura County Air Pollution Control District

702 County Square Drive

Ventura, CA 93003

Telephone: (805) 645-1400

Ventura County Air Pollution Control Board (Board of
Supervisors)

YOLO-SOLANO

Air Pollution Control

Yolo-Solano Air Pollution Control District

1947 Galileo Court

Suite 103

Davis, Ca 95616

Telephone: (916) 757-3650

Yolo-Solano Air Pollution Control District Board (same
address and phone as above)

■ COLORADO STATE AGENCY

Air Pollution Control

Colorado Department of Health Air Pollution Control
Division

4210 E. 11th Avenue

Denver, CO 80220

Telephone: (303) 331-8500

Colorado Air Quality Control Commission (same
address and phone as above)

(Colorado Continued)

Waste Management

Hazardous Materials and Waste Management Division
Colorado Department of Health
4300 Cherry Creek Drive South
Denver, CO 80222
Telephone: (303) 692-3300

BOULDER COUNTY

Air Pollution Control

Boulder County Health Department
3450 Broadway
Boulder, CO 80304
Telephone: (303) 441-1180
Boulder County Board of Health (same address and phone as above)

COLORADO SPRINGS (See El Paso County)

DENVER CITY-COUNTY

Air Pollution Control

Denver Environmental Health Service
605 Bannock Street
Room 333
Denver, CO 80207
Telephone: (303) 436-7305
Fax: (303) 436-5074
Denver Board of Health and Hospitals
17777 S. Harrison St. #909
Denver, CO 80210

EL PASO COUNTY (Includes Colorado Springs)

Air Pollution Control

El Paso County Department of Health and Environment
301 S. Union Blvd.
Colorado Springs, CO 80910
Telephone: (719) 578-3139
El Paso County Department of Health and Environment
(same address and phone as above)

Waste Management

El Paso County Sheriff's Special Operations
15 East Cucharas
Colorado Springs, CO 80903
Telephone: (719) 520-7125
El Paso County Board of County commissioners
27 E. Vermijo
Colorado Springs, CO 80903

JEFFERSON COUNTY

Air Pollution Control

Jefferson County Department of Health & Environment
260 S. Kipling
Lakewood, CO 80212
Telephone: (303) 232-6301
Fax: (303) 239-7076
Jefferson County Board of Health (same address and phone as above)

LARIMER COUNTY

Air Pollution Control

Larimer County Health and Environment department
1525 Blue Spruce Dr.
Fort Collins, CO 80525
Telephone: (303) 498-6776
Fax: (303) 498-6772
Larimer County Board of Health and Environment
(same address and phone as above)

MESA COUNTY

Air Pollution Control

Mesa County Health Department
515 Patterson Road
Grand Junction, CO 81506
Telephone: (303) 248-6960

PUEBLO CITY-COUNTY

Air Pollution Control

Pueblo City-County Health Department
151 Central Main Street
Pueblo, CO 81003-4297
Telephone: (719) 544-8376
Fax: (719) 545-9800

Waste Management

Pueblo City-County Health Department
151 Central Main
Pueblo, CO 81003-4297
Telephone: (303) 544-8376
Fax: (719) 545-9800
Pueblo City-County Health Department Board of Health
(same address and phone as above)

WELD COUNTY

Air Pollution Control

Weld County Health Department
1517 16th Ct.
Greeley, CO 80631
Telephone: (303) 353-0635
Weld County Board of Commissioners
915 10th Street
Greeley, CO 80631

■ CONNECTICUT - STATE AGENCY

Air Pollution Control
Bureau of Air Management
165 Capitol Avenue
Hartford, CT 06106
Telephone: (203) 566-2506

Waste Management
Connecticut Department of Environmental Protection
Waste Management Bureau
165 Capitol Avenue
Hartford, CT 06106
Telephone: (203) 566-8476

BRIDGEPORT

Air Pollution Control
Department of Air Pollution Control
Bridgeport Office of Humane Affairs
752 E. Main Street
Bridgeport, CT 06608
Telephone: (203) 576-7474
Environmental Commission (same address and phone as above)

BRISTOL-BURLINGTON

Air Pollution Control
Bristol-Burlington Health Department
240 Stafford Avenue
Bristol, CT 06010-4617
Telephone: (203) 584-7682
District Board of Health (same address and phone as above)

GREENWICH

Air Pollution Control
Greenwich Department of Health
101 Field Pt Rd.
Greenwich, CT 06830
Telephone: (203) 622-7838
Board of Health (same address and phone as above except 7836)

MERIDEN

Air Pollution Control
City of Meriden
Department of Human Services
Division of Health
165 Miller Street
Meriden, CT 06450-4283
Telephone: (203) 630-4226

NEW HAVEN

Air Pollution Control
New Haven Health Department
One State Street
New Haven, CT 06511
Telephone: (203) 787-8173
Board of Health, City of New Haven

NORWALK

Air Pollution Control
Department of Health
137 East Avenue
Norwalk, CT 06851
Telephone: (203) 854-7821
Board of Health (same address and phone as above)

STAMFORD

Air Pollution Control
Stamford Health Department
229 North Street
Stamford, CT 06902
Telephone: (203) 358-4396
Stamford Health Commission (same address and phone as above)

■ DELAWARE - STATE AGENCY

Air Pollution Control
Department of Natural Resources and Environmental Control
Division of Air and Waste Management
89 Kings Highway
Richardson and Robbins Building
Dover, DE 19903
Telephone: (302) 739-4791
Cabinet Secretary of the Dept. (same address and phone as above)

Waste Management

Delaware Department of Natural Resources and Environmental Control
Hazardous Waste Management Branch
89 Kings Highway
P.O. Box 1401
Dover, DE 19903
Telephone: (302) 739-3689

■ DISTRICT OF COLUMBIA - STATE AGENCY

Air Pollution Control
Air Resources Management Division
2100 Martin Luther King Ave, SE
Washington, DC 20020
Telephone: (202) 404-1180

(District of Columbia Continued)

Waste Management

Environmental Regulation Administration (ERA)
Pesticide, Hazardous Waste and Underground Storage
Tank Division (PHW&USTD)

2100 Martin Luther King, Jr. Avenue, SE
Room 203

Washington, DC 20020

Telephone: (202) 404-1167

Pesticide, Hazardous Waste, and UST Division (same
address and phone as above)

■ FLORIDA - STATE AGENCY

Air Pollution Control

The Florida Department of Environmental Regulation
2600 Blair Stone Road

Twin Towers Office Building

Tallahassee, FL 32399-2400

Telephone: (904) 488-0114

Environmental Regulation Commission (same address
and phone as above)

Waste Management

Department of Environmental Regulation

Twin Towers Office Building

2600 Blair Stone Road

Tallahassee, FL 32399-2400

Telephone: (904) 487-3299

Environmental Regulation Commission (same address
and phone as above)

ALACHUA COUNTY

Waste Management

Alachua County Office of Environmental Protection
1 SW 2nd Place

Gainesville, FL 32601

Telephone: (904) 336-2442

Alachua County Board of County Commissioners

P.O. Drawer CC

Gainesville, FL 32602

BROWARD COUNTY

Air Pollution Control

Broward County Office of Natural Resource Protection

621 S. Andrews Avenue

Fort Lauderdale, FL 33301

Telephone: (305) 765-4436

Fax: (305) 765-4109

Broward County Board of Commissioner

115 South Andrews Avenue

Fort Lauderdale, FL 33301

Waste Management

Board of County Commissioners

115 S. Andrews Avenue

Room 421

Ft. Lauderdale, FL 33301

Telephone: (305) 357-7000

Waste Management

Department of Natural Resource Protection

500 E. Broward Blvd.

Fort Lauderdale, FL 33394

Telephone: (305) 765-5181

Broward County Board of Commissioner

Governmental Center

115 S. Andrews Avenue

Ft. Lauderdale, FL 33301

DUVAL COUNTY (See Jacksonville)

HILLSBOROUGH COUNTY

Air Pollution Control

Air Management Division/Environmental Protection
Commission

1410 N. 21st Street

Tampa, FL 33605

Telephone: (813) 272-5530

Environmental Protection Commission of Hillsborough
County

P.O. Box 1101

Tampa, FL 33601

JACKSONVILLE (Includes Duval County)

Air Pollution Control

Air Quality Division

City of Jacksonville

421 West Church St.

Suite 412

Jacksonville, FL 32202

Telephone: (904) 630-3666

Environmental Protection Board (same address and
phone as above)

MANATEE COUNTY

Air Pollution Control

Manatee County Environmental Action Commission
(MCEAC)/Air Quality Program

202 6th Avenue, East

Bradenton, FL 34206

Telephone: (813) 742-5980

Environmental Action Commission of Manatee County
(MCEAC)

P.O. Box 1000

Bradenton, FL 34208

METROPOLITAN DADE COUNTY**Air Pollution Control**

Metropolitan Dade County Dept. of Environmental
Resources Management

33 S.W. 2nd Avenue

Miami, FL 33130

Telephone: (305) 372-6666

Environmental Quality Control Board (same address and
phone as above)

Waste Management

Metro-Dade Department of Environmental Resources
Management

111 NW First Street

Suite 1310

Miami, FL 33128-1971

Telephone: (305) 375-3376

Environmental Quality Control Board (same address and
phone as above)

ORANGE COUNTY (See Reedy Creek
Improvement District)

OSCEOLA COUNTY (See Reedy Creek
Improvement District)

PALM BEACH COUNTY**Air Pollution Control**

Palm Beach County Public Health Unit

901 Evernia Street

West Palm Beach, FL 33401

Telephone: (407) 355-3070

Palm Beach County Environmental Control Board
Government Complex

North Olive Street

West Palm Beach, FL 33401

Waste Management

Palm Beach County Public Health

901 Evernia Street

West Palm Beach, FL 33401

Telephone: (407) 355-4535

Palm Beach County Environmental Control Board
Government Complex Building

N. Olive Street

West Palm Beach, FL 33401

PINELLAS COUNTY**Air Pollution Control**

Pinellas County Department of Environmental
Management

Air Quality Division

300 S. Garden Avenue

Clearwater, FL 34616

Telephone: (813) 462-4422

Fax: (813) 462-4422

Pinellas County Board of County Commissioners

315 Court Street

Clearwater, FL 34616

Waste Management

Pinellas County Department of Environmental
Management

315 Court Street

Clearwater, FL 34616

Telephone: (813) 462-4761

Pinellas County Board of County Commissioners (same
address and phone as above)

SARASOTA COUNTY**Air Pollution Control**

Sarasota County Air Quality Program

Natural Resources Department

1301 Cattleman Road

Bldg. B

Sarasota, FL 34232-6299

Telephone: (813) 378-6137

Sarasota County Board of commissioners

P.O. Box 8

Sarasota, FL 34230

■ GEORGIA - STATE AGENCY**Air Pollution Control**

Georgia Air Protection Branch

4244 International Parkway

Suite 120

Atlanta, GA 30354

Telephone: (404) 363-7000

Fax: (404) 363-7100

Department of Natural Resources (same address and
phone as above)

Waste Management

Environmental Protection Division

Department of Natural Resources

Floyd Towers East

205 Butler Street SE

Atlanta, GA 30334

Telephone: (404) 656-2833

Board of Natural Resources (same address and phone as
above)

■ **HAWAII - STATE AGENCY**

Air Pollution Control

Clean Air Branch

500 Ala Moana Blvd

Honolulu, HI 96813

Telephone: (808) 586-4200

Waste Management

Hawaii Department of Health

Environmental Management Division

5 Waterfront Plaza

Suite 250

500 Ala Moana Blvd

Honolulu, HI 96813

Telephone: (808) 586-4424

■ **IDAHO - STATE AGENCY**

Air Pollution Control

Idaho Department of Health and Welfare

Division of Environmental Quality

1410 N. Hilton Street

Boise, ID 83706

Telephone: (208) 334-0502

Board of Health and Welfare

450 W. State Street

Boise, ID 83720

Waste Management

Dept of Health & Welfare

Division of Environmental Quality

Planning & Program Development Bureau

1410 North Hilton Street

3rd Floor

Boise, ID 83706

Telephone: (208) 334-5879

■ **ILLINOIS - STATE AGENCY**

Air Pollution Control

Illinois Environmental Protection Agency

Division of Air Pollution Control

2200 Churchill Road

P.O. Box 19276

Springfield, IL 62794-9276

Telephone: (217) 782-7326

Department of Energy and Natural Resources

325 W. Adams

Room 300

Springfield, IL 62704

Telephone: (217) 785-2800

Waste Management

Illinois Environmental Protection Agency

2200 Churchill Road

Springfield, IL 62706

Telephone: (217) 782-6760

Department of Energy and Natural Resources

Office of Solid Waste and Renewable Resources

325 W. Adams

Room 300

Springfield, IL 62704

Telephone: (217) 524-4545

Department of Energy and Natural Resources

hazardous Waste Research and Information Center

1808 Woodfield Drive

Savoy, IL 61874

Telephone: (217) 333-8941

BEDFORD PARK

Air Pollution Control

Bedford Park Environmental Quality Control Board

6701 South Archer Road

Bedford Park, IL 60501

Telephone: (708) 458-2067

Bedford Park Environmental Quality Control Board

P.O. Box 128

Bedford Park, IL 60501

BENSENVILLE

Air Pollution Control

Bensenville Pollution Control Agency

1253 Roosevelt Avenue

Glenview, IL 60025

Telephone: (708) 390-2610

CHICAGO

Air Pollution Control

City of Chicago

Department of Environment

320 N. Clark Street

Room 600A

Chicago, IL 60610

Telephone: (312) 744-7606

Waste Management (See Air Pollution Control above)

(Illinois Continued)

COOK COUNTY

Air Pollution Control

Cook County Department of Environmental Control
Maybrook Civic Center
1500 Maybrook Drive
Maywood, IL 60153
Telephone: (708) 865-6165
Cook County Board of Commissioners
Room 537
County Building
118 N. Clark Street
Chicago, IL 60602

DUPAGE COUNTY

Air Pollution Control

DuPage County Health Department
111 North County Farm Road
Wheaton, IL 60187
Telephone: (708) 682-7400

Waste Management

DuPage County Health Department
111 North County Farm Road
Wheaton, IL 60187
Telephone: (312) 682-7400
DuPage County Board of Health (same address and
phone as above)

EVANSTON

Air Pollution Control

City of Evanston Department of Building and Property
Services
2100 Ridge Avenue
Evanston, IL 60201
Telephone: (312) 328-2100
Evanston Environmental Control Board (same address
and phone as above)

MCCOOK

Air Pollution Control

Village of McCook Environmental Board
50th and Glencoe Avenue
McCook, IL 60525
Telephone: (312) 447-1231

INDIANA - STATE AGENCY

**Office of Solid & Hazardous Waste
Management**

Indiana Dept. of Environmental Management
105 S. Meridian Street
P.O. Box 6015
Indianapolis, IN 46206-6015
Telephone: (317) 232-3210
Air Pollution Control Board (same address as above)

Waste Management

Office of Solid and Hazardous Waste/Indiana Dept. of
Environmental Management
105 South Meridian Street
Indianapolis, IN 46225
Telephone: (317) 232-3210
Solid waste Management Board (same address and
phone as above)

ANDERSON

Office of Air Management

Office of Air Management
P.O. Box 2100
Anderson, IN 46018
Telephone: (317) 646-9835
Fax: (317) 646-9657
Air Management Board (same address and phone as
above)

EAST CHICAGO

Air Pollution Control

Department of Air Quality Control
4525 Indianapolis Blvd.
East Chicago, IN 46312
Telephone: (219) 391-8297

EVANSVILLE

Air Pollution Control

Evansville Protection Agency
1 N.W. M.L. King Blvd.
Civic Center Room 207
Evansville, IN 47708
Telephone: (812) 426-5597
Environmental Protection Agency Board (same address
and phone as above)

GARY

Air Pollution Control

Gary Air Pollution Control
846 Broadway Second Floor
Gary, IN 46402
Telephone: (219) 882-3000

(Indiana Continued)

HAMMOND

Air Pollution Control

Hammond Air Pollution Control

5925 Calumet Avenue

Hammond, IN 46320

Telephone: (219) 853-6306

Air Pollution Control Board (same address and phone as above)

INDIANAPOLIS

Air Pollution Control

Air Pollution Control Division

2700 South Belmont Avenue

Indianapolis, IN 46221-2097

Telephone: (317) 327-2264

Indianapolis Air Pollution Control Board (same address and phone as above)

LAKE COUNTY

Air Pollution Control

Lake County Air Pollution Control

2293 N Main Street

Crown Point, IN 46307

Telephone: (219) 755-3655

Lake County Board of Health (same address and phone as above)

ST. JOSEPH COUNTY

Air Pollution Control

St. Joseph County Air Pollution Control

County City Bldg

8th & 9th Floors

South Bend, IN 46601

Telephone: (219) 235-9775

St. Joseph County Board of Health (same address and phone as above)

VIGO COUNTY

Air Pollution Control

Vigo County Air Pollution Control

201 Cherry Street

Terre Haute, IN 47807

Telephone: (812) 462-3433

Fax: (812) 235-7558

Vigo County Air Pollution Control Board (same address and phone as above)

■ IOWA - STATE AGENCY

Air Pollution Control

Iowa Department of Natural Resources

Henry A. Wallace Building

Des Moines, IA 50319

Telephone: (515) 281-5145

Environmental Protection Commission (same address and phone as above)

Waste Management

Iowa Department of Natural Resources

Henry A. Wallace Building

Des Moines, IA 50319

Telephone: (515) 281-5145

Environmental Protection commission (same address and phone as above)

CEDAR RAPIDS-LINN COUNTY

Air Pollution Control

Linn County Health Department

501 13th Street, NW

Cedar Rapids, IA 52405-3700

Telephone: (319) 398-3551

Linn County Board of Health (same address as above)

POLK COUNTY

Air Pollution Control

Polk County Public Works

1530 N.E. 58 Ave.

Des Moines, IA 50313

Telephone: (515) 286-3351

Polk County Board of Supervisors/Health

2nd & Court Avenue

Des Moines, IA 50309

■ KANSAS - STATE AGENCY

Bureau of Air and Radiation

Forbes Field

Building 740

Topeka, KS 66620

Telephone: (913) 296-1600; (913) 296-6247

Waste Management

Bureau of Air and Radiation

Forbes Field

Building 740

Topeka, KS 66620

Telephone: (913) 296-1600; (913) 296-6247

(Kansas Continued)

KANSAS CITY-WYANDOTTE COUNTY

Air Quality Division

Wyandotte County Health Department

619 Ann Avenue

Kansas City, KS 66101

Telephone: (913) 573-6700

Wyandotte County Board of Commissioner

KCK Courthouse

710 N. 7th St.

Kansas City, KS 66101

SEDGWICK COUNTY (See Wichita-Sedgwick County)

TOPEKA-SHAWNEE COUNTY

Air Pollution Control

Topeka-Shawnee County Health Agency

1615 W. Eighth Street

Topeka, KS 66606

Telephone: (913) 233-8961

Topeka City Council

Shawnee County Commission

City Building

215 E. Seventh Street

Topeka, KS 66606

WICHITA-SEDGWICK COUNTY

Air Pollution Control

Wichita-Sedgwick County Department of Community Health

1900 E. 9th Street

Wichita, KS 67214

Telephone: (316) 268-8351

Wichita-Sedgwick County Board of Health (same address as above)

WYANDOTTE COUNTY (See Kansas City-Wyandotte County)

■ KENTUCKY - STATE AGENCY

Air Pollution Control

Division for Air Quality

Department for Environmental Protection

316 St. Clair Mall

Frankfort, KY 40601

Telephone: (502) 564-3382

Kentucky National Resources and Environmental Protection Cabinet

Capital Plaza Tower

5th Floor

Frankfort, KY 40601

Waste Management

Division of Waste Management

18 Reilly Road

Frankfort, KY 40601

Telephone: (502) 564-6716

Kentucky Natural Resources and Environmental Protection Cabinet

Capitol Plaza Tower

5th Floor

Frankfort, KY 40601

JEFFERSON COUNTY

Air Pollution Control

Air Pollution Control District of Jefferson County

850 Barret Avenue

Louisville, KY 40204-1745

Telephone: (502) 574-6000

Air Pollution Control Board of Jefferson County (same address and phone as above)

■ LOUISIANA - STATE AGENCY

Air Pollution Control

Department of Environmental Quality

Office of Air Quality and Radiation Protection

7290 Bluebonnet

Baton Rouge, LA 70810

Telephone: (504) 765-0219

Louisiana Department of Environmental Quality

P.O. Box 82135

Baton Rouge, LA 70884

Waste Management

Louisiana Dept. of Environmental Quality

7290 Blue Bonnet

Baton Rouge, LA 70884-2178

Telephone: (504) 765-0261

■ MAINE - STATE AGENCY

Air Pollution Control

Bureau of Air Quality Control

Department of Environmental Protection

State House

Station 17

Augusta, ME 04333

Telephone: (207) 289-2437

Board of Environmental Protection (same address and phone as above)

(Maine Continued)

Waste Management

Bureau Hazardous Materials and Solid Waste Control
Statehouse

Station 17

Augusta, ME 04333

Telephone: (207) 287-2651

Board of Environmental Protection (same address and
phone as above)

■ MARYLAND - STATE AGENCY

Air Pollution Control

Air & Radiation Management Administration

2500 Broening Highway

Baltimore, MD 21224

Telephone: (410) 631-3255

Air Quality Control Advisory Council (same address as
above)

Waste Management

Management Administration

2500 Broening Highway

Baltimore, MD 21224

Telephone: (410) 631-3304

Maryland Department of the Environment (same address
and phone as above)

ALLEGANY COUNTY

Air Pollution Control

Allegany County Health Department

Willowbrook Road

Cumberland, MD 21502

Telephone: (301) 777-5653

Allegany County Board of Commissioners

County Office Building

3 Pershing Street

Cumberland, MD 21502

ANNE ARUNDEL COUNTY

Air Pollution Control

Air Quality Control Program/Anne Arundel County
Health Department

3 Harry S. Truman Parkway

Annapolis, MD 21401

Telephone: (301) 222-7250

BALTIMORE

Air Pollution Control

Baltimore City Health Department

Bureau of Community & Industrial Hygiene

Air Pollution Control

303 E. Fayette Street

4th Floor

Baltimore, MD 21202

Telephone: (410) 396-4428

Fax: (410) 396-5986

BALTIMORE COUNTY

Air Pollution Control

Baltimore County Bureau of Air Quality and Waste
Management

401 Bosley Avenue

Towson, MD 21204

Telephone: (410) 887-3775

FREDERICK COUNTY

Air Pollution Control

Frederick County Health Department

350 Montevue Lane

Frederick, MD 21701

Telephone: (301) 694-2165

Frederick County Board of County Commissioners

12 East Church Street

Frederick, MD 21701

Telephone: (301) 694-1100

HARFORD COUNTY

Air Pollution Control

Harford County Health Department

P.O. Box 191

Bel Air, MD 21014-0191

Telephone: (301) 838-3047 ext.33

HOWARD COUNTY

Air Pollution Control

Howard County Health Department

P.O. Box 476

Ellicott City, MD 21043

Telephone: (410) 313-2645

Fax: (410) 313-2648

MONTGOMERY COUNTY

Air Pollution Control

Montgomery County Dept. of Environmental Protection

Office of Environmental Policy and Compliance

101 Monroe Street

Executive Office Building

Rockville, MD 20850

Telephone: (301) 217-2380

Fax: (301) 217-6718

(Maryland Continued)

PRINCE GEORGE'S COUNTY

Air Pollution Control

Prince George's County Health Department
Division of Air Quality Control
10210 Greenbelt Road
Seabrook, MD 20706
Telephone: (301) 794-6800

Waste Management

Prince George's County Health Department
Directorate of Environmental Health
10210 Greenbelt Road
Seabrook, MD 20706-2292
Telephone: (301) 794-6800

■ MASSACHUSETTS - STATE AGENCY

Air Pollution Control

Division of Air Quality Control
One Winter Street
Boston, MA 02108
Telephone: (617) 292-5593

Waste Management

Department of Environmental Protection
Bureau of Waste Prevention
One Winter Street
5th Floor
Boston, MA 02108
Telephone: (617) 292-5589
Hazardous Waste Advisory Committee (same address
and phone as above)

BOSTON

Air Pollution Control

Boston Air Pollution Control Commission
Room 805
Boston City Hall
Boston, MA 02201
Telephone: (617) 653-4417
Air Pollution Control Commission (same address and
phone as above)

CENTRAL MASSACHUSETTS

Air Pollution Control

Dept. Environmental Protection Central Region Air
Quality Control
75 Grove Street
Worcester, MA 01605
Telephone: (508) 792-7692

**METROPOLITAN BOSTON-NORTHEAST
REGION**

Air Pollution Control

Merrimack Valley and Metropolitan Boston Air
Pollution Control Districts
5 Commonwealth Avenue
Woburn, MA 01801
Telephone: (617) 935-2160

SOUTHEAST REGION

Air Pollution Control

SE Region Air Quality Control Section/Department of
Environmental Protection
Lakeville Hospital
Lakeville, MA 02347
Telephone: (508) 946-2770
Division of Air Quality Control
One Winter Street
Boston, MA 02108

Waste Management

Bureau of Waste Prevention: Industrial Waste
Water/RCRA
Air Quality Control Solid Waste Mgmt.
Lakeville Hospital
Lakeville, MA 02347
Telephone: (508) 946-2700
Department of Environmental Quality Engineering
One Winter Street
Boston, MA 02108

WESTERN MASSACHUSETTS

Air Pollution Control and Waste Management

Department of Environmental Protection
Bureau of Waste Prevention
State House West
436 Dwight Street
Springfield, MA 01103
Telephone: (413) 784-1100

■ MICHIGAN - STATE AGENCY

Air Pollution Control

Air Quality Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909
Telephone: (517) 373-7023
Michigan Air Pollution Control Commission (same
address and phone as above)

(Michigan Continued)
Waste Management
Waste Management Division
Michigan Department of Natural Resources
P.O. Box 30241
Lansing, MI 48909
Telephone: (517) 373-2730

GRAND RAPIDS
Air Pollution Control
Grand Rapids Air Pollution Control Division
City of Grand Rapids Utilities Department
1101 Monroe N.W.
Grand Rapids, MI 49503
Telephone: (616) 456-3158

WAYNE COUNTY
Air Pollution Control
Wayne County Air Pollution Control Division
640 Temple
Suite 700
Detroit, MI 48201
Telephone: (313) 832-5000
Fax: (313) 832-5066

■ **MINNESOTA - STATE AGENCY**
Air Pollution Control
Air Pollution Control
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155
Telephone: (612) 296-7331
Minnesota Pollution Control Agency Board (same address and phone as above)

Waste Management
Minnesota Pollution Control Agency
Hazardous Waste Division
520 Lafayette Road, N
St. Paul, MN 55155
Telephone: (612) 643-3408 June 30, 1991; (612) 296-7300
Minnesota Pollution Control Agency Board (same address and phone as above)

BLOOMINGTON
Air Pollution Control
City of Bloomington
Environmental Pollution Section
2215 W. Old Shakopee Road
Bloomington, MN 55431
Telephone: (612) 881-5811

MINNEAPOLIS
Air Pollution Control
Pollution Control Division
Department of Inspections
Public Health Center
Room 300
250 South 4th Street
Minneapolis, MN 55415
Telephone: (612) 673-5897

RICHFIELD
Air Pollution Control
City of Richfield
6700 Portland Avenue
Richfield, MN 55423
Telephone: (612) 861-9881

■ **MISSISSIPPI - STATE AGENCY**
Air Pollution Control
Mississippi Department of Environmental Quality
2380 Highway 80 West
Jackson, MS 39204
Telephone: (601) 961-5171
Mississippi Commission on Environmental Quality
P.O. Box 10385
Jackson, MS 39289-0385

Waste Management
Mississippi Department of Environmental Quality
P.O. Box 10389 (2380 Highway 80 West)
Jackson, MS 39289-0385
Telephone: (601) 961-5171
Commission on Environmental Quality (same address and phone as above)

■ **MISSOURI - STATE AGENCY**
Air Pollution Control
Missouri Department of Natural Resources/Air Pollution Control Program
205 Jefferson
Jefferson City, MO 65102
Telephone: (314) 751-4817
Missouri Air Conservation Commission (same address and phone as above)

Waste Management
Hazardous Waste Program
Division of Environmental Quality
Missouri Department of Natural Resources
205 Jefferson Street
Jefferson, MO 65102
Telephone: (314) 751-3176
Solid Waste Advisory Board (same address and phone as above)

(Missouri Continued)

**GREENE COUNTY-CITY OF SPRINGFIELD
Air Pollution Control**

Greene County-City of Springfield Air Pollution Control
Authority
227 East Chestnut Expressway
Springfield, MO 65802
Telephone: (417) 864-1662

KANSAS CITY

Air Pollution Control

Kansas City Air Quality Control Program
21st Floor
City Hall
414 E. 12th Street
Kansas City, MO 64106
Telephone: (816) 274-2501
Fax: (816) 274-2503
Air Quality Control Board (same address and
phone as above)

ST. LOUIS CITY

Air Pollution Control

City of Saint Louis Air Pollution Control
1220 Carr Lane Avenue
St. Louis, MO 63104
Telephone: (314) 664-7877
Board of Air Pollution AP (same address and phone as
above)

ST. LOUIS COUNTY

Air Pollution Control

St. Louis County Air Pollution Control Branch
111 South Meramec
Clayton, MO 63105
Telephone: (314) 854-6921
Air Pollution Control Appeal Board
111 South Meramec
Clayton, MO 63105

**SPRINGFIELD (See Greene County-City of
Springfield)**

■ MONTANA - STATE AGENCY

Air Pollution Control

Montana State Department of Health and Environmental
Sciences
Air Quality Bureau
Cogswell Building
Helena, MT 59620
Telephone: (406) 444-3454
Board of Health and Environmental Sciences (same
address and phone as above)

Waste Management

Department of Health and Environmental Sciences
Solid and Hazardous Waste Bureau
Cogswell Building
Helena, MT 59601
Telephone: (406) 444-1430
State Board of Health (same address and phone as
above)

CASCADE COUNTY

Air Pollution Control

Cascade City-County Air Pollution Control Program
1130 17 Avenue S
Great Falls, MT 59405
Telephone: (406) 761-1190
Fax: (406) 761-1192
City-County Board of Health (same address and phone
as above)

MISSOULA COUNTY

Air Pollution Control

Missoula City-County Health Department
301 West Alder Street
Missoula, MT 59802
Telephone: (406) 523-4755
Missoula City-County Air Pollution Control Board
(same address and phone as above)

YELLOWSTONE COUNTY

Air Pollution Control

Yellowstone County Air Pollution Control
3306 2nd Avenue North
Billings, MT 59101
Telephone: (406) 256-6841
Yellowstone County Air Pollution Control Board (same
address and phone as above)

■ NEBRASKA - STATE AGENCY

Air Pollution Control

Air Quality Program
NE Department of Environmental Quality
Suite 400, The Atrium
1200 N Street
P.O. Box 98922
Lincoln, NE 68505
Telephone: (402) 471-2189
Environmental Quality Council (same address and phone
as above)

(Nebraska Continued)

Waste Management

NE Dept of Environmental
Quality/Air & Waste Management
1200 N Street, Suite 400
Lincoln, NE 68509
Telephone: (402) 471-2186
Environmental Quality Council (same address and phone
as above)

**LANCASTER COUNTY (See Lincoln-Lancaster
County)**

LINCOLN - LANCASTER COUNTY

Air Pollution Control

Lincoln-Lancaster County Health Department
2200 St. Mary's Avenue
Lincoln, NE 68502
Telephone: (402) 441-8000
Lincoln-Lancaster County Air Pollution Control
Advisory Board (same address and phone as above)

Waste Management

Environmental Health Division/Lincoln-Lancaster
County Health Department
Solid Waste Section
2200 St. Mary's Avenue
Lincoln, NE 68502
Telephone: (402) 471-8000
Hazardous Pollutants Advisory Committee (same
address and phone as above)

OMAHA CITY

Air Pollution Control Board

Air Quality Control Division
5600 South 10 Street
Omaha, NE 68107
Telephone: (402) 444-6015
Omaha City Council (same address and phone as above)

■ NEVADA - STATE AGENCY

Air Pollution Control

Bureau of Air Quality/Division of Environmental
Protection
123 West Nye Lane
Carson City, NV 89710
Telephone: (702) 687-5065
State Environmental commission (same address as
above) Telephone: (702) 687-4670

Waste Management

Division of Environmental Protection
Bureau of Waste Management
333 W. Nye Lane
Carson City, NV 89710
Telephone: (702) 687-5872 X 3042
State Environmental Commission (same address
as above) Telephone: (702) 687-4670

CLARK COUNTY

Air Pollution Control

Health District Division
Clark County Air Pollution Control
625 Shadow Lane
Las Vegas, NV 89127
Telephone: (702) 383-1276
Clark County District Board of Health (same address
and phone as above)

WASHOE COUNTY

Air Pollution Control

Washoe County District Health Department
1001 E. Ninth Street
Reno, NV 89520
Telephone: (702) 328-2491
Washoe County District Board of Health

■ NEW HAMPSHIRE - STATE AGENCY

Air Pollution Control

Dept. of Environmental Services
Air Resources Division
64 N. Main Street
Caller Box 2033
Concord, NH 03302-2033
Telephone: (603) 271-1370
New Hampshire, Air Resources Council (same address
and phone as above)

Waste Management

Waste Management Division
Dept. of Environmental Services
6 Hazen Drive
Concord, NH 03301-6509
Telephone: (603) 271-2905
Waste Management Council (same address and phone as
above)

■ NEW JERSEY - STATE AGENCY**Air Pollution Control**

New Jersey State Dept. of Environmental Protection and Energy

Air Pollution Control Program

401 East State Street, CN 027

Trenton, NJ 08625

Telephone: (609) 292-6704

Clean Air Council (same address and phone as above)

Waste Management

Site Remediation Program

401 East State Street, CN 028

Trenton, NJ 08625

Telephone: (609) 292-1250

ELIZABETH**Air Pollution Control**

City of Elizabeth City Hall

Elizabeth, NJ 07201

Telephone: (908) 820-4068

Fax: (908) 820-0112

HUDSON COUNTY**Air Pollution Control**

Hudson Regional Health Commission

215 Harrison Avenue

Harrison, NJ 07029

Telephone: (201) 485-7001 (2)

Board of Commissioners (same address and phone as above)

MIDDLESEX COUNTY (Includes Linden and Rah-way in Union County)**Air Pollution Control**

Middlesex County Dept. of Environmental Health

Air Pollution Control Program

841 Georges Road

North Brunswick, NJ 08902

Telephone: (908) 745-4350

Fax: (908) 745-2410

County of Middlesex

Board of Chosen Freeholders

1 J.F. Kennedy Square

New Brunswick, NJ 08903

SUBURBAN (Includes Belleville, Cedar Grove, East Orange, Irvington, Maplewood, Millburn, Montclair, Newark, Nutley, Orange, South Orange, Union, West

Caldwell, and West Orange, Livingston)

Air Pollution Control

Suburban Regional Health Commission

2 Babcock Place

West Orange, NJ 07052

Telephone: (201) 325-3212

Montclair Health Dept.

205 Claremont Ave

Montclair, NJ 07042

■ NEW MEXICO - STATE AGENCY**Air Pollution Control**

Environment Department/Air Quality Bureau

1190 St. Francis Drive

Santa Fe, NM 87502

Telephone: (505) 827-2850

Environmental Improvement Board (same address and phone as above)

Waste Management

Hazardous and Radioactive Materials Bureau

525 Camino De Los Marquez, Suite 4

Santa Fe, NM 87502

Telephone: (505) 827-4300

Fax: (505) 827-4361

Environmental Improvement Board

P.O. Box 26110

Santa Fe, NM 87502

ALBUQUERQUE - BERNALILLO COUNTY**Air Pollution Control**

Albuquerque Environmental Health and Energy Department

P.O. Box 1293

Albuquerque, NM 87103

Telephone: (505) 768-2600

Albuquerque-Bernalillo County Air Quality Board

P.O. Box 1293

Albuquerque, NM 87103

Waste Management

Environmental Services Division

One Civic Plaza

P.O. Box 1293

Albuquerque, NM 87103

Telephone: (505) 768-2600

Albuquerque Hazardous Waste Management Advisory Committee (same address and phone as above)

■ NEW YORK - STATE AGENCY

Air Pollution Control

New York Department of Environmental Conservation
Division of Air Resources
50 Wolf Road
Albany, NY 12223-3250
Telephone: (518) 457-7230
State Environmental Board (same address as above)
Telephone: (518) 457-3446

Waste Management

Department of Environmental Conservation
Division of Hazardous Substances Regulation
50 Wolf Road
Albany, NY 12233-7250
Telephone: (518) 457-6934

ALBANY COUNTY

Air Pollution Control

Albany County Department of Health
S. Ferry and Green Streets
Albany, NY 12201
Telephone: (518) 447-4580
Albany County Board of Health (same address and
phone as above)

COLUMBIA COUNTY (See State Agency)

INTERSTATE (See New York Metropolitan Area)

NASSAU COUNTY

Air Pollution Control

Nassau County Department of Health
Center for Environmental Protection
Room 504
240 Old County Road
Mineola, NY 11501
Telephone: (516) 535-3315
Fax: (516) 535-3369
Nassau County Board of Health (same address as
above) Telephone: (516) 535-2037

Waste Management

Nassau County Department of Health
Center for Environmental Protection
Room 504
240 Old County Road
Mineola, NY 11501
Telephone: (516) 535-3315
Fax: (516) 535-3369
Nassau County Board of Health (same address as
above) Telephone: (516) 535-2037

NEW ROCHELLE (See Westchester)

NEW YORK

Air Pollution Control

Bureau of Air Policy and Programs
59-17 Junction Blvd
Corona, NY 11368
Telephone: (718) 595-3622
Environmental Control Board
Department of Environmental Protection

Waste Management

NYC Dept. of Environmental Protection
Division of Hazardous Materials Programs
59-17 Junction Blvd
Elmhurst, NY 11373
Telephone: (718) 595-4636

NEW YORK METROPOLITAN AREA

Air Pollution Control

Interstate Sanitation Commission
311 W. 43 Street
New York, NY 10036
Telephone: (212) 582-0380
Interstate Sanitation Commission (same address and
phone as above)

NIAGARA COUNTY

Air Pollution Control

Niagara County Health Dept.
Air Resources Bureau
10th and E. Falls Street
Niagara Falls, NY 14302
Telephone: (716) 284-3128
Niagara County Board of Health (same address and
phone as above)

RENSSELAER COUNTY

Air Pollution Control

Rensselaer County Department of Health
Division of Environmental Health
County Office Building
1600 Seventh Avenue
Troy, NY 12180
Telephone: (518) 270-2664

(New York Continued)

ROCKLAND COUNTY

Air Pollution Control

Rockland County Department of Health

Air Pollution Control

Sanatorium Road

Pomona, NY 10970-9990

Telephone: (914) 364-2605

Rockland County Board of Health (same address and phone as above)

SUFFOLK COUNTY

Waste Management

Office of Pollution Control

15 HorseBlock Place

Farmingville, NY 11738

Telephone: (516) 854-2536

WESTCHESTER COUNTY

Air Pollution Control

Westchester County Department of Health

19 Bradhurst Avenue

1st Floor

Hawthorne, NY 10532

Telephone: (914) 593-5100

Westchester County Board of Health (same address and phone as above)

Waste Management

Westchester County Department of Health

Office of Envir. Health Risk Control

112 East Post Road

White Plains, NY 10601

Telephone: (914) 285-5044

Westchester County Board of Health (same address as above) Telephone: (914) 285-5050

■ NORTH CAROLINA - STATE AGENCY

Air Pollution Control

Division of Environmental Management

P.O. Box 29535

Raleigh, NC 27626-0535

Telephone: (919) 733-3340

Fax: (919) 733-5317

Environmental Management Commission (same address and phone as above)

Waste Management

Division of Solid Waste Management/Hazardous Waste Section

401 Oberlin Rd

PO Box 27687

Raleigh, NC 27611-7687

Telephone: (919) 733-2178 (Section), 733-4996 (Division)

North Carolina Commission for Health Services (same address and phone as above)

BUNCOMBE-HAYWOOD COUNTIES (See Western North Carolina)

CLEVELAND COUNTY

Air Pollution Control

Cleveland County Health Department

315 Grover Street

Shelby, NC 28150

Telephone: (704) 484-5130

Cleveland County Board of Health (same address and phone as above)

CUMBERLAND COUNTY

Air Pollution Control

227 Fountainhead Lane

Fayetteville, NC 28301

Telephone: (919) 433-3660

Cumberland County Board of Health (same address and phone as above)

DURHAM COUNTY (See State Agency)

FORSYTH COUNTY

Air Pollution Control

Forsyth County Environmental Affairs Department

537 N. Spruce Street

Winston-Salem, NC 27101

Telephone: (919) 727-8060

Forsyth County Environmental Affairs Board (same address and phone as above)

GASTON COUNTY (See State Agency)

HAYWOOD COUNTY (See Western North Carolina Region)

(North Carolina Continued)
MECKLENBURG COUNTY
Air Pollution Control

Mecklenburg County Department of Environmental Protection
700 N. Tryon Street, Suite 205
Charlotte, NC 28202
Telephone: (704) 336-5500
Environmental Protection Commission, Advisory Board
(same address as above)

WESTERN NORTH CAROLINA REGION
(Includes Buncombe and Haywood Counties)
Air Pollution Control

Western North Carolina Regional Air Pollution Control Board
Buncombe County Courthouse
Asheville, NC 28801-3569
Telephone: (704) 255-5655
Western North Carolina Regional Air Pollution Control Board (same as above)

■ **NORTH DAKOTA - STATE AGENCY**

Air Pollution Control
North Dakota State Department of Health
1200 Missouri Avenue
Bismarck, ND 58502-5520
Telephone: (701) 221-5188
Fax: (701) 221-5200
State Air Pollution Advisory Council (same address and phone as above)

Waste Management

Waste Management Division/Dept of Health & Consolidated Laboratory
1200 Missouri Avenue
Bismarck, ND 58501
(mailing P.O. Box 5520, Bismarck, ND 58502)
Telephone: (701) 221-5166

■ **OHIO - STATE AGENCY**

Air Pollution Control
Ohio Environmental Protection Agency
1800 WaterMark Drive
Columbus, OH 43266-0149
Telephone: (614) 644-2270

Waste Management

Ohio Environmental Protection Agency
1800 Water Mark Dr.
P.O. Box 1049
Columbus, OH 43266-0149
Telephone: (614) 644-3020

**AKRON, BARBERTON, KENT, RAVENNA,
MEDINA, SUMMIT AND PORTAGE
COUNTIES**

Air Pollution Control
Akron Regional Air Quality Management District
177 S. Broadway
Akron, OH 44308
Telephone: (216) 375-2480

BARBERTON (See Akron, etc.)

BELMONT COUNTY (See Steubenville)

BUTLER COUNTY (See Cincinnati)

CANTON

Air Pollution Control
Canton City Health Department
Air Pollution Control Division
420 Market Ave. N.
Canton, OH 44702
Telephone: (216) 489-3385
Canton City-Board of Health (same address and phone as above)

CARROLL COUNTY (See Steubenville)

**CINCINNATI (Includes Butler, Clermont,
Hamilton, and Warren Counties)**

Air Pollution Control
Hamilton County-Southwestern Ohio Air Pollution Control Agency
1632 Central Parkway
Cincinnati, OH 45210
Telephone: (513) 651-9391
Hamilton County Board of Commissioners
1000 Main Street
Cincinnati, OH 45202

CLARK COUNTY (See Montgomery)

CLERMONT COUNTY (See Cincinnati)

CLEVELAND

Air Pollution Control
Cleveland Air Pollution Control
1925 St. Clair Avenue
Cleveland, OH 44114
Telephone: (216) 664-2324
Bureau of Technical Services
Board of Building Standards and Appeals
Room 15
City Hall
Cleveland, OH 44114

(Ohio Continued)

COLUMBIANA COUNTY (See Steubenville)

DARKE COUNTY (See Montgomery)

GREEN COUNTY (See Montgomery)

HAMILTON COUNTY (See Cincinnati)

HARRISON COUNTY (See Steubenville)

IRONTON (See Portsmouth)

JEFFERSON COUNTY (See Steubenville)

KENT (See Akron, etc.)

LAKE COUNTY

Air Pollution Control

Lake County General Health District

Administration Center

105 Main Street

P.O. Box 490

Painesville, OH 44077

Telephone: (216) 357-2543

Board of Health for Lake County General Health District (same address and phone as above)

LUCAS COUNTY (See Wood and Lucas Counties)

MAHONING-TRUMBULL (Includes Youngstown)

Air Pollution Control

Mahoning-Trumbull Air Pollution Control Agency

9 West Front Street

Youngstown, OH 44503

Telephone: (216) 744-1928

Youngstown Board of Health

City hall

26 S. Phelps

Youngstown, OH 44503

MEDINA COUNTY (See Akron, etc.)

MIAMI COUNTY (See Montgomery)

MIDDLETOWN, (See Cincinnati)

MONROE COUNTY (See Steubenville)

MONTGOMERY COUNTY (Includes Clark, Darke, Greene, Miami, Montgomery, and Preble Counties)

Air Pollution Control

Regional Air Pollution Control Agency

451 W. Third Street

P.O. Box 972

Dayton, OH 45422

Telephone: (513) 225-4435

OREGON (See Toledo)

PORTAGE COUNTY (See Akron, etc.)

PORTSMOUTH (Includes Ironton)

Air Pollution Control

Portsmouth Local Air Agency

740 Second street

Portsmouth, OH 45662

Telephone: (614) 353-5156

Portsmouth Board of Health (same address and phone as above)

PREBLE COUNTY (See Montgomery)

RAVENNA (See Akron, etc.)

ROSSFORD (See Toledo)

STEUBENVILLE (Includes Jefferson, Belmont, Columbiana, Monroe, Carroll, and Harrison Counties)

Air Pollution Control

North Ohio Valley Air Authority

814 Adams Street

Steubenville, OH 43952

Telephone: (614) 282-3908

North Ohio Valley Air Authority Control Board

Jefferson County Courthouse

Steubenville, OH 43952

SUMMIT COUNTY (See Akron, etc.)

TOLEDO (Includes Lucas County and City of Rossford)

Air Pollution Control

Toledo Division of Pollution Control

City of Toledo

International Park

26 Main Street

Toledo, OH 43605-2032

Telephone: (419) 693-0350

(Ohio Continued)

Waste Management

Toledo Division of Pollution Control
City of Toledo
International Park
26 Main Street
Toledo, OH 43605-2032
Telephone: (419) 693-0350

WARREN COUNTY See Cincinnati)

YOUNGSTOWN (See Mahoning-Trumbull)

■ OKLAHOMA STATE AGENCY

Air Pollution Control

Air Quality Service
1000 Northeast 10th Street
Oklahoma City, OK 73117-1299
Telephone: (405) 271-5220
Air Quality Council (same address and phone as above)

Waste Management

Hazardous Waste Management Service-0205
Oklahoma State Department of Health
1000 N.E. 10th
Oklahoma City, OK 73117-1299
Telephone: (405) 271-5338
Board of Health (same address and phone as above)

OKLAHOMA CITY-COUNTY

Air Pollution Control

City-County Health Department of Oklahoma County
Air Quality Control Section
921 N.E. 23rd Street
Oklahoma City, OK 73105
Telephone: (405) 427-8651
Oklahoma Air Quality Council
P.O. Box 5355
Oklahoma City, OK 73152

TULSA CITY COUNTY

Air Pollution Control

Tulsa City-County Health Department
4616 E. 15th Street
Tulsa, OK 74112
Telephone: (918) 744-1000
Environmental Advisory Council (same address and phone as above)

Waste Management

Tulsa City-County Health Department
4616 E. 15th Street
Tulsa, OK 74112
Telephone: (918) 744-1000
Tulsa City-County Board of Health (same address and phone as above)

■ OREGON - STATE AGENCY

Air Pollution Control

State of Oregon
Dept. of Environmental Quality Air Quality
Division
811 SW 6th Avenue
11th Floor
Portland, OR 97204
Telephone: (503) 229-5397
Environmental Quality Commission (same address and phone as above)

Waste Management

Department of Environmental Quality
Hazardous and Solid Waste Division
811 SW 6th Avenue
Portland, OR 97204
Telephone: (503) 229-5913
Environmental Quality Commission (same address as above) Telephone: (503) 229-5395

LANE COUNTY

Air Pollution Control

Lane Regional Air Pollution Authority
225 North 5th
Suite 501
Springfield, OR 97477
Telephone: (503) 726-2514
Board of Directors
Lane Regional Air Pollution Authority (same address and phone as above)

■ PENNSYLVANIA - STATE AGENCY

Air Pollution Control

Bureau of Air Quality Control/Dept of Environmental
Resources
101 South Second Street
P.O. Box 2357
Harrisburg, PA 17105-2357
Telephone: (717) 787-9702
Environmental Quality Board
9th Floor
Fulton Building
P.O. Box 2063
Harrisburg, PA 17120
Telephone: (717) 787-4526

(Pennsylvania Continued)

Waste Management

Department of Environmental Resources
Bureau of Waste Management
P.O. Box 8471
Harrisburg, PA 17105-8471
Telephone: (717) 787-9870

ALLEGHENY COUNTY

Air Pollution Control

Bureau of Air Pollution Control
Allegheny County Health Department
301 39th Street
Pittsburgh, PA 15201
Telephone: (412) 578-8111
Board of County Commissioners
119 Court House
Grant Street
Pittsburgh, PA 15222

PHILADELPHIA

Air Pollution Control

Air Management Services
Philadelphia Department of Public Health
321 University Avenue
Philadelphia, PA 19104
Telephone: (215) 823-7584
Fax: (215) 823-7593
Philadelphia Air Pollution Control Board
7th Floor
1600 Arch Street
Philadelphia, PA 19103

■ RHODE ISLAND - STATE AGENCY

Air Pollution Control

Rhode Island Division of Air and Hazardous Materials
291 Promenade Street
Providence, RI 02908-5767
Telephone: (401) 277-2808
Department of Environmental Management
9 Hays St.
Providence, RI 02908

Waste Management

Division of Air & Hazardous Material
291 Promenade Street
Providence, RI 02908-5676
Telephone: (401) 277-2797

■ SOUTH CAROLINA - STATE AGENCY

Air Pollution Control

South Carolina Department of Health and Environmental
Control
Bureau of Air Quality
2600 Bull Street
Columbia, SC 29201
Telephone: (803) 734-4750
Board of Health and Environmental Control (same
address as above)

Waste Management

Bureau of Solid and Hazardous Waste Management
2600 Bull Street
Columbia, SC 29201
Telephone: (803) 734-5200
Board of Health and Environmental Control (same
address as above)

COLUMBIA

Air Pollution Control

City of Columbia
1225 Laurel Street
Columbia, SC 29217
Telephone: (803) 733-8320
Pollution Control
Appeals Board (same address and phone as above)

■ SOUTH DAKOTA - STATE AGENCY

Air Pollution Control

Department of Environmental and Natural Resources
Division of Environmental Regulation
Joe Foss Building
Pierre, SD 57501
Telephone: (605) 773-3351
Board of Minerals and Environment (same address and
phone as above)

Waste Management

Department of Environment and Natural Resources
Division of Environmental Regulation
319 S. Coteau
c/o 500 East Capitol Avenue
Pierre, SD 57501
Telephone: (605) 773-3153
Board of Minerals and Environment (same
address and phone as above)

■ TENNESSEE - STATE AGENCY

Air Pollution Control

Tennessee Division of Air Pollution Control
Customs House

4th Floor

701 Broadway

Nashville, TN 37243-1531

Telephone: (615) 741-3931

Tennessee Air Pollution Control Board (same address
and phone as above)

Waste Management

Tennessee Division of Solid Waste Management

Customs House

4th Floor

410 Church Street

L&C Towers

5th Floor

Nashville, TN 37243-1535

Telephone: (615) 543-0780

CHATTANOOGA-HAMILTON COUNTY

Air Pollution Control

Chattanooga-Hamilton County Air Pollution Control
Bureau

3511 Rossville Blvd.

Chattanooga, TN 37407

Telephone: (615) 867-4321

Chattanooga-Hamilton County Air Pollution Control
Board (same address and phone as above)

DAVIDSON COUNTY (See Nashville-Davidson County)

HAMILTON COUNTY (See Chattanooga- Hamilton County)

KNOX COUNTY

Air Pollution Control

Knox County Department of Air Pollution Control

400 Main Avenue

City-County Building

Room 459

Knoxville, TN 37902

Telephone: (615) 521-2488

Knox County Air Pollution Control Board (same address
and phone as above)

MEMPHIS SHELBY COUNTY

Air Pollution Control

Memphis and Shelby County Health Department

814 Jefferson Avenue

Memphis, TN 38105

Telephone: (901) 528-3828

NASHVILLE-DAVIDSON COUNTY

Air Pollution Control

Metropolitan Health Department of Nashville and
Davidson County

311 23rd Avenue, N.

Nashville, TN 37203

Telephone: (615) 340-5653

Metropolitan Board of Health for Nashville and
Davidson County (same address and phone as above)

SHELBY COUNTY (See Memphis-Shelby County)

■ TEXAS - STATE AGENCY

Air Pollution Control

Texas Air Control Board

6330 Highway 290 East

Austin, TX 78723

Telephone: (512) 451-5711

Texas Air Control Board (same address and phone as
above)

Waste Management

Industrial and Hazardous Waste Division

Texas Water Commission

P.O. Box 13087

Capitol Station

Austin, TX 78711-3087

Telephone: (512) 908-2334

Texas Water Commission (same address and phone as
above)

BEXAR COUNTY (See San Antonio-Bexar County)

DALLAS

Air Pollution Control

City of Dallas

Health and Human Services

Environmental Health Division

320 E. Jefferson LL13

Dallas, TX 75203

Telephone: (214) 948-4435

EL PASO CITY-COUNTY

Air Pollution Control

El Paso County Health Unit

222 S. Campbell Street

El Paso, TX 79901

Telephone: (915) 543-3513

El Paso City County Board of Health (same address as
above)

(Texas Continued)

FORT WORTH

Air Pollution Control

Fort Worth Air Pollution Control

5000 M.L. King Freeway

Fort Worth, TX 76119

Telephone: (817) 483-0207

Fax: (817) 483-2416

GALVESTON COUNTY

Air Pollution Control

Galveston County Health District

1207 Oak Street

P.O. Box 939

La Marque, TX 77568

Telephone: (409) 938-2251

Fax: (409) 938-2243

Galveston County United Board of Health (same address and phone as above)

HARRIS COUNTY

Air Pollution Control

Harris County Pollution Control Department

107 N. Munger

Pasadena, TX 77506

Telephone: (713) 920-2831

Harris County Commissioners Court

1001 Preston Street

Houston, TX 77002

HOUSTON

Air Pollution Control

City of Houston

Bureau of Air Quality Control

7411 Park Place Blvd.

Houston, TX 77087-4441

Telephone: (713) 640-4200

Department of Health and Human Services

8000 N. Stadium Drive

Houston, TX 77054

Waste Management

City of Houston

Bureau of Public Health Engineering

7411 Park Place Blvd.

Houston, TX 77087

Telephone: (713) 640-4399

Department of Health and Human Services

8000 Stadium Drive

Houston, TX 77054

LUBBOCK CITY

Air Pollution Control

Lubbock City Health Department

1902 Texas Avenue

P.O. Box 2548

Lubbock, TX 79408

Telephone: (806) 767-2918

Lubbock Board of Health (same address and phone as above)

NUECES COUNTY (See Corpus Christi, etc.)

SAN ANTONIO-BEXAR COUNTY

Air Pollution Control

Texas Air Control Board

4335 Piedras West

Suite 101

San Antonio, TX 78228

Telephone: (512) 734-7981

■ UTAH - STATE AGENCY

Air Pollution Control

Division of Air Quality

State of Utah

Department of Environmental Quality

1950 West North Temple

Salt Lake City, UT 84114-4820

Telephone: (801) 536-4000

Utah Air Quality Board (same address and phone as above)

Waste Management

Division of Solid and Hazardous Waste

288 North 1460 West

Salt Lake City, UT 84114-4880

Telephone: (801) 538-6170

Utah Solid and Hazardous Waste Control Board (same address and phone as above)

■ VERMONT - STATE AGENCY

Air Pollution Control

Air Pollution Control Division

Agency of Natural Resources

103 S. Main Street

Waterbury, VT 05671-0402

Telephone: (802) 244-8731

Waste Management

Vermont Department of Environmental Conservation

Hazardous Materials Mgmt. Division

103 S. Main Street

Waterbury, VT 05671-0404

Telephone: (802) 244-8702

■ VIRGINIA - STATE AGENCY

Air Pollution Control

Dept. of Air Pollution Control
P.O. Box 10089
Richmond, VA 23240
Telephone: (804) 786-2378
State Air Pollution Control Board

Waste Management

Department of Waste Management
Monroe Building
11th Floor
101 North 14th Street
Richmond, VA 23219
Telephone: (804) 225-2667
Virginia Waste Management Board (same address and phone as above)

ALEXANDRIA

Air Pollution Control

Alexandria Health Department
Division of Environmental Health
Office of Environmental Quality
517 N. Saint Asaph Street
Alexandria, VA 22314
Telephone: (703) 838-4850/4860
Environmental Policy Commission
c/o Alexandria Health Department
City Hall
301 King Street
Alexandria, VA 22314

FAIRFAX COUNTY

Air Pollution Control

Fairfax County Air Pollution Control
10777 Main Street
Suite 115
Fairfax, VA 22030
Telephone: (703) 246-2541

Waste Management

Division of Solid Waste Disposal and Resource Recovery (DSWD&RR)
Division of Solid Waste Collection and Recycling (DSWC&R)
12000 Government Center Parkway
Fairfax, VA 22035
Telephone: (703) 324-5230 or (703) 324-5040

ROANOKE

Air Pollution Control

Roanoke City Engineering Department
215 West Campbell Avenue
Roanoke, VA 24011
Telephone: (703) 981-2731

SALEM (See Roanoke, etc.)

■ WASHINGTON - STATE AGENCY

Air Pollution Control

Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
Telephone: (206) 459-6256
Ecological Commission (same address and phone as above)

Waste Management

Washington State Department of Ecology
Solid and Hazardous Waste Program
4224 6th Ave. S.W.
Lacey, WA 98504-7600
Telephone: (206) 459-6316
Section Supervisor, Hazardous Waste

BENTON-FRANKLIN-WALLA WALLA COUNTIES

Air Pollution Control

Air Pollution Authority
650 George Washington Way
Richland, WA 99352
Telephone: (509) 946-4489
Board of Directors (same address and phone as above)

NORTHWEST (Includes Island, Skagit and Whatcom Counties)

Air Pollution Control

Northwest Air Pollution Authority
302 Pine Street
Suite 207
Mount Vernon, WA 98273
Telephone: (206) 428-1617
NWAPA Board of Directors (same address and phone as above)

(Washington Continued)

OLYMPIC REGION (Includes Clallam, Grays Harbor, Jefferson, Mason, Pacific and Thurston Counties)

Air Pollution Control

Olympic Air Pollution Control Authority (OAPCA)

120 E. State Avenue

Olympia, WA 98501

Telephone: (206) 586-0593

Board of Directors (same address and phone as above)

PUGET SOUND (Includes King, Kitsap, Pierce and Snohomish Counties)

Air Pollution Control

Puget Sound Air Pollution Control Agency

110 Union Street

Suite 500

Seattle, WA 98101

Telephone: (206) 343-8800

Puget Sound Air Pollution Control Agency Board of Directors (same address and phone as above)

SOUTHWEST (Includes Clark, Cowlitz, Lewis, Skanania and Wahkiakum Counties)

Air Pollution Control

Southwest Air Pollution Control Authority

1308 NE 134th Street

Vancouver, WA 98685-2747

Telephone: (206) 574-3058

Southwest Air Pollution Control Board (same address and phone as above)

SPOKANE COUNTY

Air Pollution Control

Spokane County Air Pollution Control Authority

West 1101 College Avenue

Suite 403

Spokane, WA 99201

Telephone: (509) 456-4727

Spokane County Air Pollution Control Authority Board of Directors (same address and phone as above)

YAKIMA COUNTY

Air Pollution Control

Yakima County Clean Air Authority

6 S. 2nd Street

Yakima, WA 98901

Telephone: (509) 575-4116

Yakima County Clean Air Authority Board of Directors (same address and phone as above)

■ WEST VIRGINIA - STATE AGENCY

Air Pollution Control

West Virginia Air Pollution Control Commission

1558 Washington Street, East

Charleston, WV 25311

Telephone: (304) 348-4022

West Virginia Air Pollution Control Commission (same address and phone as above)

Waste Management

Department of commerce

Labor and Environmental Resources

Division of Natural Resources

1356 Hansford Street

Charleston, WV 25301

Telephone: (304) 348-5929

West Virginia Water Resources Board

1260 Greenbrier Street

Charleston, WV 25311

Telephone: (304) 348-5002

■ WISCONSIN - STATE AGENCY

Air Pollution Control

Wisconsin Department of Natural Resources

Bureau of Air Management

Box 7921

Madison, WI 53707

Telephone: (608) 266-7718

Natural Resources Board (same address and phone as above)

Waste Management

Wisconsin Department of Natural Resources

101 S Webster

P.O. Box 7921

Madison, WI 53707

Telephone: (608) 266-0833

Natural Resources Board (same address and phone as above)

EAU CLAIRE CITY-COUNTY

Air Pollution Control

Eau Claire City-County Health Department

720 2nd Avenue

Eau Claire, WI 54701

Telephone: (715) 839-4718

Eau Claire Board of Health (same address and phone as above)

(Wisconsin Continued)

MADISON

Air Pollution Control

Madison Department of Public Health

210 Martin Luther King, Jr. Blvd.

Room 507

Madison, WI 53710

Telephone: (608) 266-4821

Fax: (608) 266-4858

Public Health Commission (same address and phone as above)

MILWAUKEE COUNTY

Air Pollution Control

Milwaukee County DPW

Professional Services Division

Engineers, Environmental and Energy Services Section

901 N. 9th Street

Milwaukee, WI 53233

Telephone: (414) 278-4874

■ WYOMING - STATE AGENCY

Air Pollution Control

Air Quality Division

Department of Environmental Quality

122 W. 25th Street

Cheyenne, WY 82002

Telephone: (307) 777-7391

Air Quality Advisory Board (same address and phone as above)

Waste Management

Solid Waste Management Program

Dept of Environmental Quality

122 West 25th Street

Cheyenne, WY 82002

Telephone: (307) 777-7752

Environmental Quality Counsel

Barret Building

Cheyenne, WY 82002

USACERL DISTRIBUTION

Chief of Engineers
ATTN: CEHEC-MA-LH (2)
ATTN: CEHEC-MA-LP (2)
ATTN: CERD-L

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ATTN: CECPW-ES 22080
ATTN: CECPW-EM 22080

US Army Engr District
ATTN: Library (40)

US Army Engr Division
ATTN: Library (13)

4th Infantry Div (MECH)
ATTN: AFZC-FE

US Army Materiel Command (AMC)
Alexandria, VA 22333-0001
ATTN: AMCEN-F
Installations: (19)

FORSCOM
Forts Gillem & McPherson 30330
ATTN: FCEN
Installations: (23)

8th Infantry Division (Light)
ATTN: APVR-DE 99505
ATTN: APVR-WF-DE 99703

TRADOC
Fort Monroe 23851
ATTN: ATBO-G
Installations: (20)

Fort Belvoir 22080
ATTN: CECC-R 22080

CEWES 39180
ATTN: Library

CECRL 03755
ATTN: Library

USA Engr Activity, Capital Area
ATTN: Library 22211

US Army ARDEC 07808
ATTN: SMCAR-ISE

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US Army Envr Hygiene Agency
ATTN: HSHB-ME 21010

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Natl Institute of Standards & Tech
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Defense Tech Info Center 22304
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