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Products of Incomplete Combustion from Direct Burning of Pentachlorophenol-Treated Wood Wastes

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16. ABSTRACT The report gives results of a study to identify potential air pollution problems from the combustion of waste wood treated with pentachlorophenol preservative for energy production in a boiler. The study emphasized the characterization of the products of incomplete combustion (PICs) in the combustion flue gas. The methodology used was to compare the flue gas concentrations of PICs prior to the air pollution control device of a pilot-scale combustor burning untreated wood and burning wood treated with pentachlorophenol preservative. The tests showed that combustion is an effective method of destroying the pentachlorophenol in the treated wood, with destruction efficiencies higher than 99.99%. Differences in the flue gas concentrations of various PICs from the combustion of untreated and treated wood fuels have been noted. The data do not enable identification of the exact cause of these differences in flue gas concentrations. These differences are possibly caused by the significantly different chlorine content of the two fuels. The difference in flue gas flow rate required for the combustion of these two fuels with different combustion characteristics (moisture content and heating value) may also cause the differences in PIC formation rates. These data are strongly influenced by the design, configuration, and operation of the combustor system.

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Wood Wastes	Stationary Sources	11L
Combustion	Pentachlorophenol	21B
Phenols	Products of Incomplete	07C
Wood Preservatives	Combustion (PICs)	11G
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FOREWORD

The U.S. Environmental Protection Agency is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory is the Agency's center for investigation of technological and management approaches for reducing risks from threats to human health and the environment. The focus of the Laboratory's research program is on methods for the prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites and groundwater; and prevention and control of indoor air pollution. The goal of this research effort is to catalyze development and implementation of innovative, cost-effective environmental technologies; develop scientific and engineering information needed by EPA to support regulatory and policy decisions; and provide technical support and information transfer to ensure effective implementation of environmental regulations and strategies.

This publication has been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

E. Timothy Oppelt, Director
National Risk Management Research Laboratory

ABSTRACT

This study was conducted to identify potential air pollution problems from the combustion of waste wood treated with pentachlorophenol preservative for energy production in a boiler. The emphasis of the study was placed on the characterization of the products of incomplete combustion (PICs) in the combustion flue gas. The methodology used was to compare the flue gas concentrations of PICs prior to the air pollution control device of a pilot-scale combustor burning untreated wood and burning wood treated with pentachlorophenol preservative. The tests showed that combustion is an effective method of destroying the pentachlorophenol contained in the pentachlorophenol-treated wood, with destruction efficiencies higher than 99.99 %. Differences in the flue gas concentrations of various PICs from the combustion of untreated and treated wood fuels have been noted. The data do not enable identification of the exact cause of these differences in flue gas concentrations. These differences are possibly caused by the significantly different chlorine content of the two fuels. The difference in flue gas flow rate required for the combustion of these two fuels with different combustion characteristics (moisture content and heating value) may also cause the differences in PIC formation rates. These data are strongly influenced by the design, configuration, and operation of the combustor system and may not be quantitatively comparable to other combustors.

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CONVERSION TABLE

Certain non-metric units are used in this report for the reader's convenience. Readers more familiar with metric units may use the following factors to convert to that system.

Nonmetric	Multiplied by	Yields Metric
°F	5/9(°F-32)	°C
psi	6.89	kPa
Btu/lb	2.326	J/g
CFM	2.832×10^{-2}	m^3/min
in.	2.54×10^{-2}	m
in. of H_2O	248.84	Pa

1.0 INTRODUCTION

The use of waste wood for producing energy is a promising supplement to burning fossil fuels for many regions of the country. Besides recovering energy and conserving landfill space, burning waste wood fuels also mitigates global warming by replacing fossil fuel combustion. If left to decay in the landfill, the waste wood will eventually release the global warming gases to atmosphere. By producing energy from burning the waste wood, fossil fuel will be conserved, thus reducing the release of the global warming gases. However, the environmental consequence resulting from emissions generated by combustion of waste wood that contains paints resins, or preservatives are not well understood. There are some indications that the combustion of waste wood treated with chemicals may produce potentially hazardous products of incomplete combustion (PIC) emissions such as dioxins and furans.[1,2] The possibility of these types of emissions has caused regulator and the public concern as to the risk that treated wood combustion poses to human health and the environment. With an understanding of pollutant formation processes under controlled pilot-scale conditions, better informed evaluations can be made for the full-scale combustion of treated waste wood.

A 1992 study[3] sponsored by the New York State Energy Research and Development Authority and others identified potential air and ash emissions of criteria and hazardous air pollutants (HAPs) based on existing test burn data, wood and ash composition data, and air impact analysis. While the report provided valuable data, a full characterization of the environmental and regulatory implications of burning treated wood could not be made because the test burn data were obtained using different test methods for a wide variety of boiler types, operating conditions, fuel sources and mixes, and air pollution control equipment. In addition, the emissions were not related to the composition of the wood fuel actually burned. For example, the wood used in the laboratory analyses to determine the chemical composition of waste wood and wood ash were not burned in a large-scale combustion device so that air and ash emissions could be measured.

The present project was designed to address some of the data limitations encountered in the NYERDA study. The main objective of the project was to characterize emissions (mainly

PICs) resulting from controlled test burns of untreated and pentachlorophenol treated wood. Utility poles and crossbars are typically treated with a preservative such as pentachlorophenol to prolong their service life. After being taken out of service, the treated woods are normally disposed of by land filling. Burning such wood waste in boilers for steam generation becomes an increasingly attractive management alternative as it contains substantial energy values and reduces land filling costs.

Pilot scale combustion tests were conducted under well controlled conditions using a pilot-scale combustion system, small enough to allow control over the key parameters that affect emissions, yet large enough to effectively simulate full-scale combustion systems. The pilot-scale approach for studying waste wood combustion offers the most efficient and cost-effective means of identifying and controlling variables that govern pollutant formation and destruction during combustion. Pilot facilities can mimic pollutant formation and destruction processes involved in waste wood combustion at a practical scale without the extensive time and cost required for operating a full-scale facility. With this approach, the important variables that control the formation and destruction of pollutants during combustion can be isolated and their effects determined. Measurements were made in the flue gas upstream of existing air pollution control equipment to characterize the formation of trace organic pollutants. Prior to burning each load of treated wood, a sample of that load was obtained and analyzed to determine the chemical composition of the wood. During combustion testing, sampling and analysis for a wide variety of PICs, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and dioxins and furans, were performed.

2.0 EXPERIMENTAL

2.1 Test Facility

The combustion testing was conducted using the multi-fuel combustor (MFC) located at EPA's National Risk Management Research Laboratory's research facility in Research Triangle Park, North Carolina. The MFC, shown in Figure 1, is a pilot-scale stoker combustor with 0.58 MW (2 million Btu/hr) maximum thermal output. The MFC can simulate the full range of conditions that might be encountered in commercial stoker-fired combustion facilities. The MFC

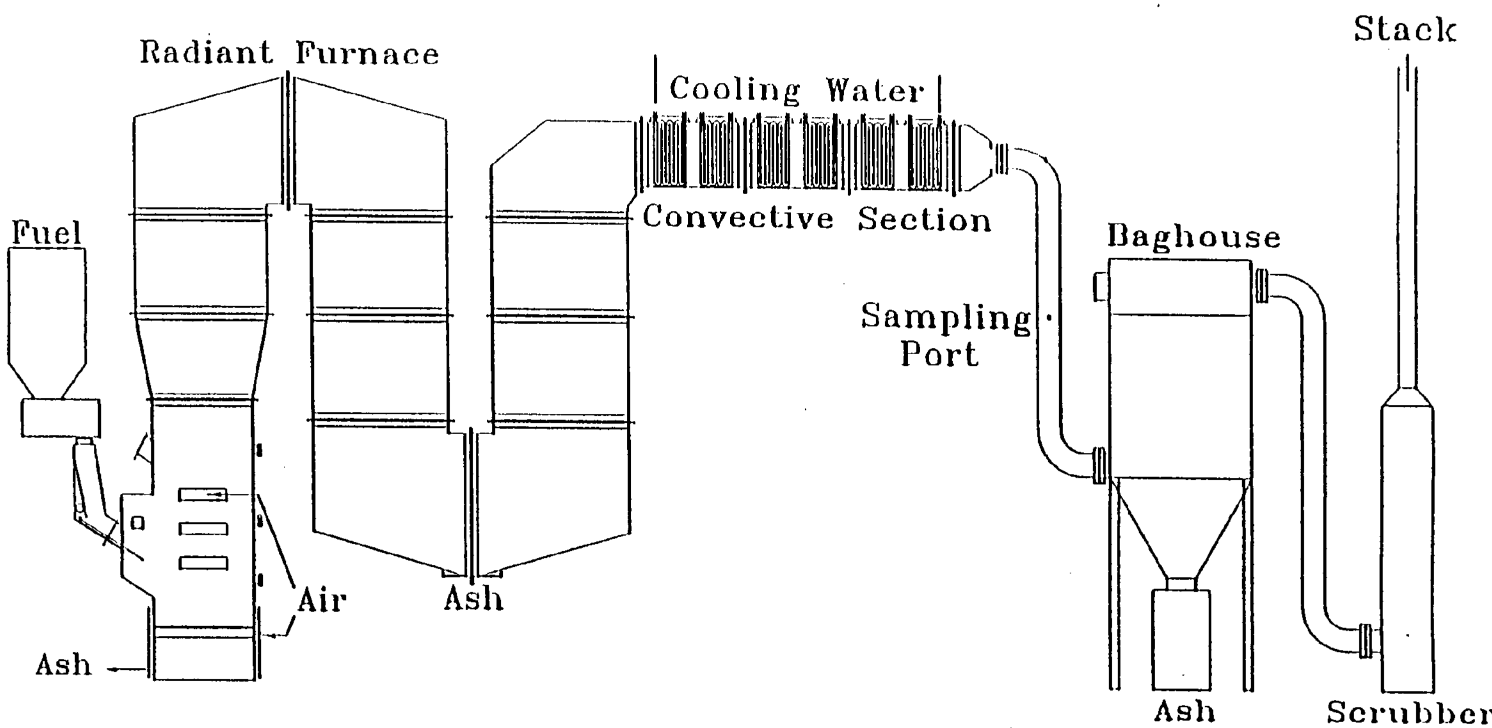


FIGURE 1-1 SCHEMATIC OF MULTIFUEL COMBUSTOR

is capable of burning a wide variety of solid fuels, including municipal solid waste (MSW), refuse derived fuel (RDF), biomass fuel, and coal, singly or in combination. The MFC stoker grate system was designed for operation under mass burn or spreader stoker (semi-suspension) firing conditions. Bottom ash is manually removed from the combustor on a periodic basis by cleaning of the fuel bed. The processes controlling pollutant formation and destruction can be studied during combustion on the fuel bed, in the radiant furnace or the convective section, as well as downstream of air pollution control devices, such as a baghouse and scrubber. The combustor is constructed with modular sections to provide maximum flexibility for modifying the combustor for research purposes. Access ports are installed throughout the combustor for sampling and visual observation. All process temperatures, pressures, feed, and flow rates of the MFC are monitored by sensors installed at various locations in the combustor. The MFC is equipped with a natural gas burner for preheating and start-up operations. The MFC facility consists of the following major component sections:

- **Combustor**

The combustor, sometimes called a spreader stoker, was designed and fabricated by Reaction Engineering International, Salt Lake City, Utah. It is designed to burn coal, RDF, and biomass as the main fuel. Gas burners are installed to maintain system temperature when the solid fuel is not burned. Preheated combustion air is provided under and over the grate.

- **Fuel Feeding System**

The fuel feeding system consists of a storage hopper, a feed conveyor, an activated feed bin, and a vibrating feeder. Fuel is moved from the storage hopper to an activated feed bin by means of a flight conveyor. The activated feed bin in concert with a vibrating feeder supplies fuel to the stoker combustor. The solid conveyer is a Model CWR2430-12 Camwall conveyor with a rated speed of 100 fpm. The activated bin and the vibrating feeder are both manufactured by Kinergy Corporation. The mass flow of the vibratory feeder is calibrated for control of the fuel feed rate. The feeder assembly is housed inside a gas-sealed cover, connecting the silo to the spreader stoker. In addition, the cover is used to prevent air leakage into the combustor since the combustor is operated at negative pressure to prevent flame leakage outside the combustor. The fuel travels horizontally along the vibrational feeder and drops vertically through a transition section into the lower feed injection port of the spreader stoker.

- **Freeboard Section**

The refractory-lined freeboard section provides ample residence time to complete combustion and provides a time temperature profile comparable to full scale units. The furnace is approximately 38-ft in length and contains two vertical and two horizontal sections to conserve floor space within the room. Thermocouples have been installed to provide temperature of the gas stream. View and sample ports have been installed at strategic locations in the freeboard.

- **Convective Section**

After leaving the freeboard section, the flue gases enter the convective section where they are cooled. A high pressure water system with six cooling coils is used to remove heat from the flue gas. The high pressure water system is designed to maximize cooling conditions associated with cooling the flue gas at water flow rates from temperatures up to 2700 °F down to 300 °F. The high pressure water system can operate at pressures up to 500 psi to prevent boiling of the coolant. The cooling coils are connected to the high pressure manifold using flexible stainless steel hoses rated to 727 psi and control valves. The valves can be used to control the flow of the cooling water to each coil to customize the time-temperature profile in the convective section.

- **Pulse-jet Baghouse**

After exiting the convective section, the fuel gases pass through stainless steel ducting and enter the pulse-jet baghouse where particulate is removed. The baghouse (Model SQ L72 B36) was manufactured by M & W Industries, Inc., Rural Hall, NC. There is 358 ft^2 of cloth area from 36 fiberglass bags with Gore-Tex membranes. The air to cloth ratio is 3.21:1. The pressure drop across the baghouse triggers the solid state timer to begin the pulsing for cleaning of the bags. A supply of 90-100 psi dry air is required for proper operation of the pulsing jets.

- **Packed Bed Scrubber**

After exiting the baghouse, the flue gases enter a packed bed scrubber (Model FRP Phaser V-1) manufactured by KCH Services, Inc., Forest City, NC. The scrubber is a countercurrent design for flows up to 1000 CFM with gases entering the bottom of the scrubber and exiting out the top into the induced draft fan. The scrubber solution is sprayed onto the packing media (2.3-in LANPAC) at the top of the packed bed. After leaving the bed, the gases pass through a section of mist eliminators to remove the excess moisture from the flow. The acidic effluent resulting from contact with the gases containing HCl and sulfur oxides is neutralized by the addition of sodium hydroxide using a pH controller coupled to a variable speed gear pump. Recirculation of the scrubbing liquid is achieved through a 1.5-hp centrifugal pump mounted at the sump of the scrubber. From the recirculation pump, the scrubber solution enters a heat exchanger to reduce its temperature before being recirculated into the spray header. Makeup water, to compensate for evaporation, is taken from the city water system and is controlled by a float switch mounted in the sump. In the event of a power or recirculation pump failure, city water is diverted directly into the spray nozzles to ensure adequate cooling. A discharge pump operating from an independent float switch is used to remove any excess water that may accumulate in the sump during this mode. The discharge pump is also used for periodic blowdowns of the sump. The system will not operate if city water is not available or if the pressure falls below safe limits.

- **Continuous Emission Monitoring (CEM) System**

The MFC is equipped with conventional continuous emission monitors (CEMs) as well as a state-of-the-art infrared multi-component analyzer to measure continuous air emissions. The CEMs used for the program are listed in Table 2.1.

TABLE 2.1 CONTINUOUS EMISSION MONITORS

Measurement	EPA Method	Instrument
NOx	Method 7E	Thermo Electron, Model 10, Range 0-10,000ppm Thermo Electron, Model 900, 9:1 dilution
CO2	Method 3A	Horiba, Model VIA-510, Ranges: 0-5, 0-10, 0-20, and 0-100 percent
CO	Method10	Horiba, Model VIA-510, Ranges: 0-500, 0-1000, 0-2000, 0-10,000 ppm
O2	Method 3A	Rosemont Analytical, Model 755R, Ranges 0-5, 0-10, 0-25, and 0-50 percent
THC	Method 25	J U M Engineering, Model VE 7
HCl	None	Perkin Elmer, MCS 100 Multi Component Analyzer, Ranges 0-10, 0-100, 0-1000, and 0-10,000 ppm

- **Air Flow Measurement System**

The flow rates of air and flue gas in the MFC were measured by orifice plates and venturi flow tubes (Flow-Lin Corporation/ Arlington, TX). Continuous flow measurements were made of total air supply, gas burner air, fresh overfire air, fresh underfire air, recirculation air, sweep air, overfire recirculation air, and underfire recirculation gas.

- **Temperature Measurement**

Temperature sensing throughout the system was achieved by ungrounded K-type thermocouples. The thermocouples are either wired directly to pyrometers or go to selector switches (OMEGA Engineering/ Stamford, CT) connected to pyrometers.

- Flue gas temperatures

Temperatures of the flue gases are measured using thermocouples inserted directly into the flow. Due to the corrosive environment and elevated temperatures, these thermocouples have Inconel 600 sheaths whereas all other thermocouples in the facility have 316 stainless steel sheaths. The thermocouples have been located at strategic locations within the system.

- Combustion air temperatures

  Fresh combustion air for the stoker was supplied from the outside or from the conditioned area inside the room (or any combination). The temperature of this combustion air is measured and then proportioned into four separate areas of the stoker as required: overfire, underfire, gas burner, and sweep. The gas burner air is used to provide combustion air directly to the area around the natural gas burner. The sweep air is used to spread the solid fuel across the stoker grate and contributes to the air available for combustion.

- **Pressure Measurement**

Pressure transmitters were used to monitor pressures in the system and pressure drops across components. These devices send 4-20 mA signals proportionate to the pressure back to the indicating device mounted in the control panel.

Pressure indicators are used to measure system static pressures, the proportion of overfire and underfire recirculation air, and to trigger an alarm to the programmable controller if the pressure below the grate exceeds a prescribed value. This safety is used to determine if the grate has become clogged with excessive solid fuel or ash.

2.2 Operation of the MFC

The combustor was operated in a spreader stoker firing mode for the present study. Wood fuel was stored in a large roll-off container located near the building which houses the MFC. A tote bin filled with the wood fuel was transported to the MFC facility and the fuel was dumped into a loading hopper installed outside the facility building with a lift truck. A conveyor moved the fuel to an active vibrating storage silo installed inside the building. The vibrating silo is designed to ensure homogeneous mixing and reduce wall sticking. The fuel was distributed from the silo onto an airtight horizontal vibrating feeder conveyor connecting the silo to the transition section of the spreader stoker. The mass flow of the conveyor was calibrated for control of the fuel feed rate. The fuel traveled horizontally along the conveyor and dropped through the transition section into the feed injection port of the spreader stoker. The vibrating transition section is designed with an inlet air plenum area and adjustable inlet angle plate to facilitate spreading fuel onto the stoker grate where a burning fuel bed is formed.

2.3 Waste Wood Fuel

Two different waste wood fuels, an untreated wood and a pentachlorophenol treated wood, were obtained from an industrial plant where wood utility poles are treated with pentachlorophenol. The untreated wood was green pine poles that are typically treated in the plant. The treated wood was a mixture of recently treated poles, mostly small pieces cut from the ends to meet customers' length specifications, and aged treated poles taken out of service. Both treated and untreated poles were ground into chips with less than 7.6 cm (3 in.) in size with a shredder. The two fuels were characterized by proximate, ultimate and chlorine analysis with the result showing in Table 2-2.

TABLE 2-2 FUEL ANALYSIS[a]

Component (as-received basis)	Untreated Wood	Treated Wood
Moisture, %	33.44	21.46
Ash, %	0.25	0.57
Volatiles, %	57.92	66.28
Carbon, %	33.83	43.24
Fixed Carbon, %	8.39	11.69
Hydrogen, %	4.20	4.92
Nitrogen, %	0.28	0.28
Sulfur, %	0.01	0.05
Oxygen, %	27.99	29.48
Heating Value, Btu/lb	5569	7237
pentachlorophenol, mg/kg	6.7	4100
2,4 -dimethylphenol, mg/kg	2.4	3.6
Chlorine, %	0.02	0.20

a - Analysis performed by Commercial Testing & Engineering Co.

It can be seen that the treated wood fuel is drier with higher heating value as compared with those of the untreated wood. The chlorine content of the treated wood fuel is ten times higher than that for the untreated wood.

2.4 Combustion Parameters

The only parameter investigated in the present study was to determine the difference in the flue gas concentrations of pollutants when burning treated vs. untreated wood under similar "good combustion conditions." No attempt was made to evaluate the effects of combustion conditions on the formation of PICs. In general, the operating conditions of the test were considered optimal when the fuel was burning at the designed heat release rate with approximately 160 percent excess air and a low level (<100 ppm) of carbon monoxide emission in the flue gas.

The amount of fuel burned was not measured continuously during a test. It was estimated by weighing the fuel before it was dumped into a loading hopper of the MFC and measuring the duration for its complete consumption to calculate an average feed rate. The average feed rate was used to estimate the amount of fuel burned during the known emissions sampling period. One-minute average readings of all the CEM measurements were recorded throughout the test by a data acquisition system. Flow rates of underfire air, overfire air, and sweep air as well as temperature measurements at various locations were continuously measured and recorded.

2.5 Manual Sampling and Analytical Procedures

The MFC is equipped with several sampling ports for collecting flue gas samples. The emission sampling port used for this study is located in the duct that connects the convective section of the furnace to the baghouse. The selection of a sampling location prior to any gas cleaning device was made to ensure that any difference in pollutants generated by combustion of treated and untreated wood fuels be observed. Measurements made after the flue gas cleaning device would mask this difference and would be reflective of the effectiveness of the baghouse and scrubber used. At the selected sampling location, the horizontally oriented duct (8-in SS pipe - nominal inside diameter 8.25-in) is sufficient in length and free of flow disturbances as required by the sampling method. The particulate matter (PM) could be sampled in only one axial direction meeting Method 1A PM sampling requirements[4]. A separate port was not available for simultaneous velocity measurements; as a result, radial sampling locations were determined by a separate velocity traverse performed before and after sampling at each axial sampling location. During sampling, the duct was traversed based on the initial velocity traverse. A Volatile Organic Sampling Train (VOST), Modified Method 5 sampling train (MM 5), and a Method 23 sampling train were attached to the ports for simultaneous measurements for each run.

- **Volatile Organic Compound (VOC) Sampling and Analysis**

VOCs were collected using the Volatile Organic Sampling Train (VOST) as described in SW-846 *Test Methods for Evaluating Solid Waste* Method 0030, "Volatile Organic Sampling Train."[5] Two sets of samples were collected for each test and at least six sets of samples were collected for each type of waste wood. A total volume of ~ 20 liters were collected for each sample. Sampling was performed at 0.5 liter/min for 40 min.

VOST samples were analyzed by purge and trap GC/MS as described in RCRA Methods 5040/8240.[6,7] Practical quantitation limits (PQLs), based on the lowest calibration concentration, were used to estimate upper limit concentrations of those compounds not detected. Compounds detected below the PQL were flagged and reported as estimated concentrations. The target analytes examined are listed in Table 2-3.

TABLE 2-3 VOLATILE ORGANIC COMPOUND TARGET ANALYTES

Compound	Typical Detection Limits in an Air Matrix (micrograms per VOST)
Acetone	0.013
Benzene	0.002
Bromodichloromethane	0.002
Bromomethane	0.002
Bromoform	0.008
2-Butanone	0.008
Carbon disulfide	0.004
Carbon tetrachloride	0.002
Chlorobenzene	0.001
Chlorodibromomethane	0.004
Chloroethane	0.002
Chloroform	0.002
Chloromethane	0.009

(Continued)

Table 2-3 (Cont.)

Compound	Typical Detection Limits in an Air Matrix (micrograms per VOST)
1,1-Dichloroethane	0.003
1,2-Dichloroethane	0.004
1,1-Dichloroethene	0.003
cis-1,2-Dichloroethene	0.002
trans-1,2-Dichloroethene	0.003
1,2-Dichloropropane	0.002
cis-1,3-Dichloropropene	0.002
trans-1,3-Dichloropropene	0.004
Ethyl benzene	0.004
2-Hexanone	0.014
Methylene chloride	0.002
4-Methyl-2-pentanone	0.006
Styrene	0.006
1,1,2,2-Tetrachloroethane	0.011
Tetrachloroethene	0.004
Toluene	0.002
1,1,1-Trichloroethane	0.001
1,1,2-Trichloroethane	0.003
Trichloroethene	0.001
Trichlorofluoromethane	0.001
Vinyl acetate	0.009
Vinyl chloride	0.001
o-Xylene	0.006
m/p-Xylene	0.010

- **Semivolatile Organics Compound (SVOC) Sampling** and Analysis

SVOCs were collected using the Modified MM5 train as described in SW-846 *Test Methods for Evaluating Solid Waste Method* 0010, "Modified Method 5 Sampling Train". [8] A total of at least 3 MM5 samples were collected for each wood type.

The MM5 samples were analyzed for SVOCs by GC/MS as described in RCRA Method 8270B[9]. The SVOC target analyte list is presented in Table 2-4. The target list reflects the majority of the target analytes presented in Method 8270 along with additional analytes of interest.

TABLE 2-4. SEMIVOLATILE ORGANIC COMPOUND TARGET ANALYTES

n-methyl-n-nitroso ethanamine
Bis (2-chloroethyl) ether
Aniline
Phenol (CCC)
2-Chlorophenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene (CCC)
1,2-Dichlorobenzene
Benzyl Alcohol
Bis (2-chloroisopropyl) ether
2-Methylphenol
Acetophenone
Hexachloroethane
4-methylphenol
N-nitrododipropylamine (SPCC)
Nitrobenzene
1-Nitrosopiperidine
Isophorone
2,4-Dimethylphenol
Bis (2-chloroethoxy) methane
2,4-Dimethylphenol
Bis (2-chloroethoxy) methane
2,4-Dichlorophenol (CCC)
1,2,4-Trichlorobenzene
Naphthalene
2-Nitrophenol (CCC)
2,6-Dichlorophenol
Hexachloropropene
4-Chloroaniline
Hexachlorobutadiene (CCC)
N-butyl-N-nitroso-butanamine
4-chloro-3-methyl-phenol (CCC)
2-methylnaphthalene
1,2,4,5-tetrachlorobenzene
Hexachlorocyclopentadiene (SPCC)
2,4,6-trichlorophenol (CCC)
2,4,5-Trichlorophenol
2-chloronaphthalene
2-nitroanilinne
3-nitroaniline
Acenaphthylene
Dimethylphalate
2,6-dinitrotoluene
Acenaphthene (CCC)
4-nitroaniline
2,4-dinitrophenol (SPCC)
Dibenzofuran
Pentachlorobenzene
2,4-dinitrotoluene
2,3,4,6-tetrachlorophenol
4-nitrophenol (SPCC)
Fluorene
Diethyl phathalate
4-Chlorophenyl phenyl ether
2-methyl-5-nitrobenzenamine
2-methyl-4,6-dinitrophenol
Diphenylamine
4-Bromophenyl phenyl ether
Phenacetin
Hexachlorobenzene
Pentachlorophenol (CCC)
Pentachloronitrobenzene
Phenanthrene
Anthracene
Dibutyl phthalate
Fluoranthene (CCC)
Pyrene
P-dimethylaminoazobenzene
Bensyl butyl phthalate
3,3'-Dichlorobenzidine
Benzo (a) anthracene
Chrysene
Di-N-octyl phthalate (CCC)
Benzo (b) fluoranthene
7,12-Dimethylbenz (a) anthracene
Benzo (k) fluoranthene
Benzo (a) pyrene (CCC)
3-methylcholanthrene
Indeno (1,2,3-cd) pyrene
Dibenz (a,h) anthracene
Benzo (ghi) perylene

- **PCDD/PCDF and PCB Sampling and Analysis**

PCDD/PCDF samples were collected as described in 40 CFR Part 60 Appendix A Method 23, "Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources".[10] This method is virtually identical to MM5 with minor changes. A total of six PCDD/PCDF samples were collected for the two types of waste wood tests. The Method 23 samples were analyzed for PCDD/PCDF by high resolution GC/MS in the selected ion monitoring mode (HRGC/HRMS-SIM).

In addition to the regular PCDD/PCDF analysis, a PCB analysis was conducted on the same extracts. An aliquot of the front and back half extract archive potions of each of the Method 23 trains was combined and analyzed by HRGC/HRMS-SIM for PCBs.

- **Aldehyde and Methane Sampling and Analysis**

The flue gas was sampled for general levels of aldehydes with an adsorbent tube technique, Modified Method 1P-6A for indoor air.[11] Between 10 and 15 liters of flue gas was pulled through a Waters DNPH on Silica Gel cartridge at a sampling rate of one liter per minute. The cartridges were analyzed by the Method 1P6A. A methane grab sample was pulled from the flue on the first two test days of untreated and treated wood tests using SW 846 Method 0040.[12] The one liter grab samples were analyzed for methane concentration with US EPA Method 18.[13]

- **Ash Sampling**

After each run, one batch of fly ash accumulated in the baghouse during the testing was collected. Fly ash batches were reduced to testing sizes according to the American Society of Testing Materials (ASTM) Standards for reducing field samples.[14] All fly ash samples from the untreated wood test were combined and the mixed samples were analyzed. The same procedure was repeated for the treated wood test. Toxicity Characteristic Leaching Procedure (TCLP) tests for metals were made for these ash samples using TCLP Method 1311.[15]

3.0 RESULTS AND DISCUSSION

3.1 Test Conditions

A total of six combustion tests, with three tests each for both the untreated and the treated wood fuels, were made under similar combustor operating conditions. The untreated wood tests were performed first followed by the treated wood tests in order to avoid any cross contamination with PCP. Triplicate runs were made to even out any possible variability of fuel characteristics, fuel feed rate, and nonuniform burning of wood chips on the grate surfaces. Since the fuel throughput rate cannot be measured in real time bases, combustor operating variables other than the fuel flow rate were used as the control parameter. The tests were performed under constant excess air level (nominally 160% excess air) and constant combustion gas temperature (850°C) measured by a thermocouple located 60 inches (152 cm) above the grate. The heat release rate for each test, as shown in Table 3-1, were estimated based on the average fuel feed rate

TABLE 3-1 COMBUSTOR OPERATING CONDITIONS

Test	Average Fuel Feed Rate kg/hr (lb/hr)	Combustor Thermal Output MW (Million Btu/hr)	Flue Gas Flow dscm
Untreated 1	134.4(296.4)	0.48(1.65)	19.4
Untreated 2	117.1(258.1)	0.42(1.44)	16.6
Untreated 3	114.1(251.6)	0.41(1.40)	17.9
Treated 1	100.6(221.8)	0.47(1.61)	25.0
Treated 2	102.3(225.6)	0.48(1.63)	21.0
Treated 3	102.5(225.9)	0.48(1.63)	25.8

calculated by the total amount of fuel consumed during the test period and the heating value of the fuel measured experimentally. As can be seen from Table 3-1, the calculated heat release rates and the measured flue gas flow rates for Untreated Tests 2 and 3 are lower than those of the other tests. The lower flue gas flows for Untreated Tests 2 and 3 are consistent with their low fuel feed rates. The heat release rate was approximately 1.6 million Btu/hr, which is 80% of the stoker grate's maximum designed output of the MFC. The fuel feed rate was adjusted manually throughout all tests in order to maintain a constant temperature of 850°C above the stoker grate and keep CO emission below 100 ppm, which were considered to be an acceptable combustion conditions. The average CEM-measured flue gas concentrations and gas temperatures are summarized in Table 3-2. CEM data over the test period for CO, CO_2, NO_X, HCl, SO_2, THC,

TABLE 3-2 SUMMARY OF FLUE GAS TEMPERATURE AND CEM DATA

Location	Temperature, °C					
	Untreated Test 1	Untreated Test 2	Untreated Test 3	Treated Test 1	Treated Test 2	Treated Test 3
Stoker Exit	849	801	827	869	921	870
Sampling Port	152	153	153	155	160	160
Constituent	Concentration, %					
O_2	12.5	13.2	12.9	13.1	13.3	13.3
CO_2	7.5	7.2	7.1	6.7	6.5	6.5
H_2O	11.0	9.8	9.8	8.7	8.7	9.0
CO[a]	203	249	456	66	21	20
NO[a]	103	133	83	295	178	210
THC[a]	77	56	2	4	3	3
HCl[a]	<1	<1	<1	195	194	183
SO_2	10	11	13	<1	<1	<1

[a] in ppm @ 7% oxygen

and H_2O for all six test are shown in Appendix I. In addition, temperature profile and gas residence times are displayed in Figures 3-1 to 3-2 and Figures 3-3 to 3-4, respectively. Although the temperature-distance profile for treated and untreated tests were quite similar, the residence times for the treated tests in the higher temperature zone (zone up to the high temperature heat exchanger) were considerably shorter than that of the untreated wood tests. This is probably due to the differences in heating value of treated and untreated fuel as well as the fact that the fuel feed rate was controlled manually by the temperature reading of a

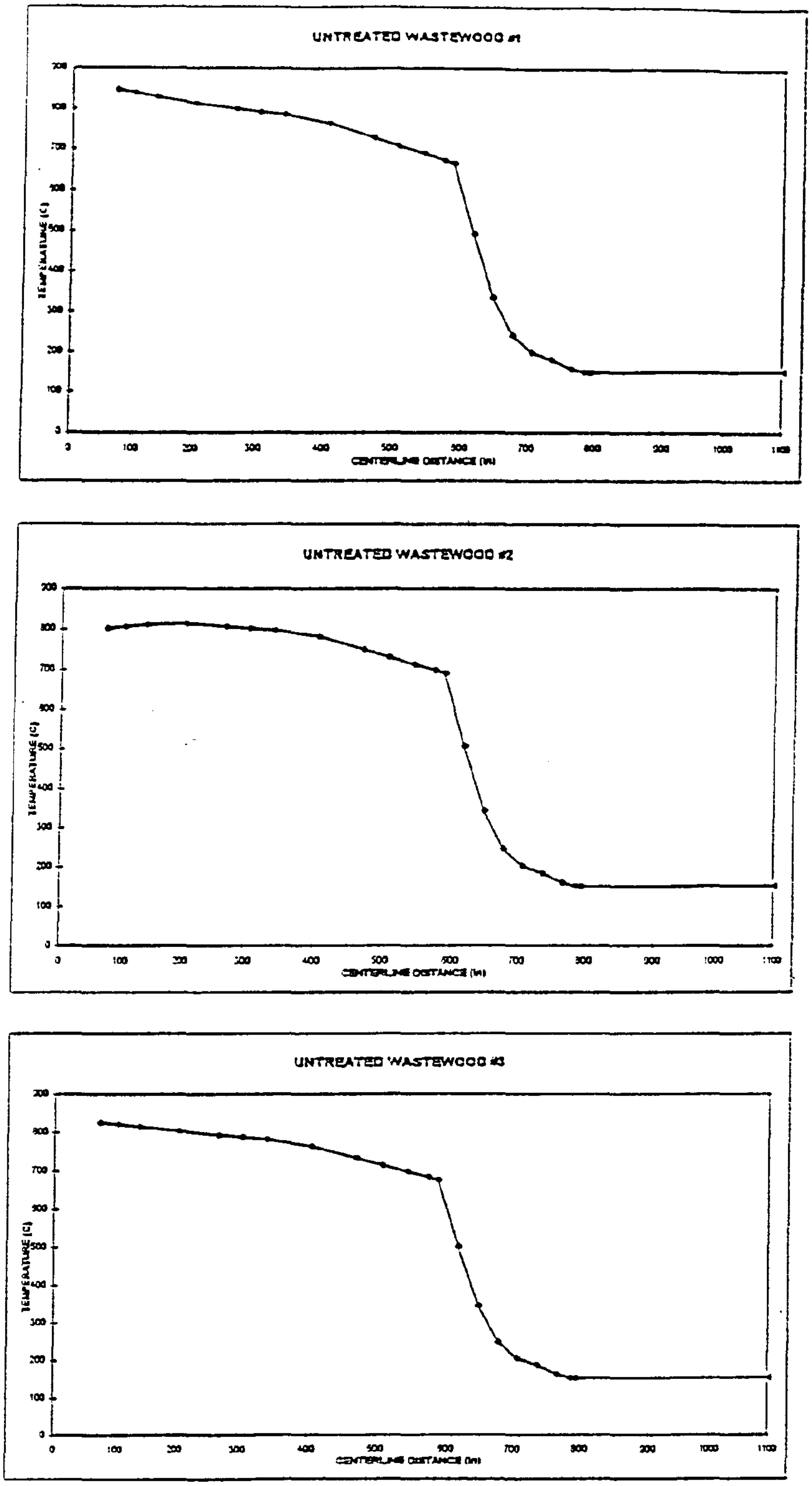


FIGURE 3-1 TEMPERATURE PROFILE FOR UNTREATED WOOD TESTS.
(Temperature of gas along centerline as measured from grate)

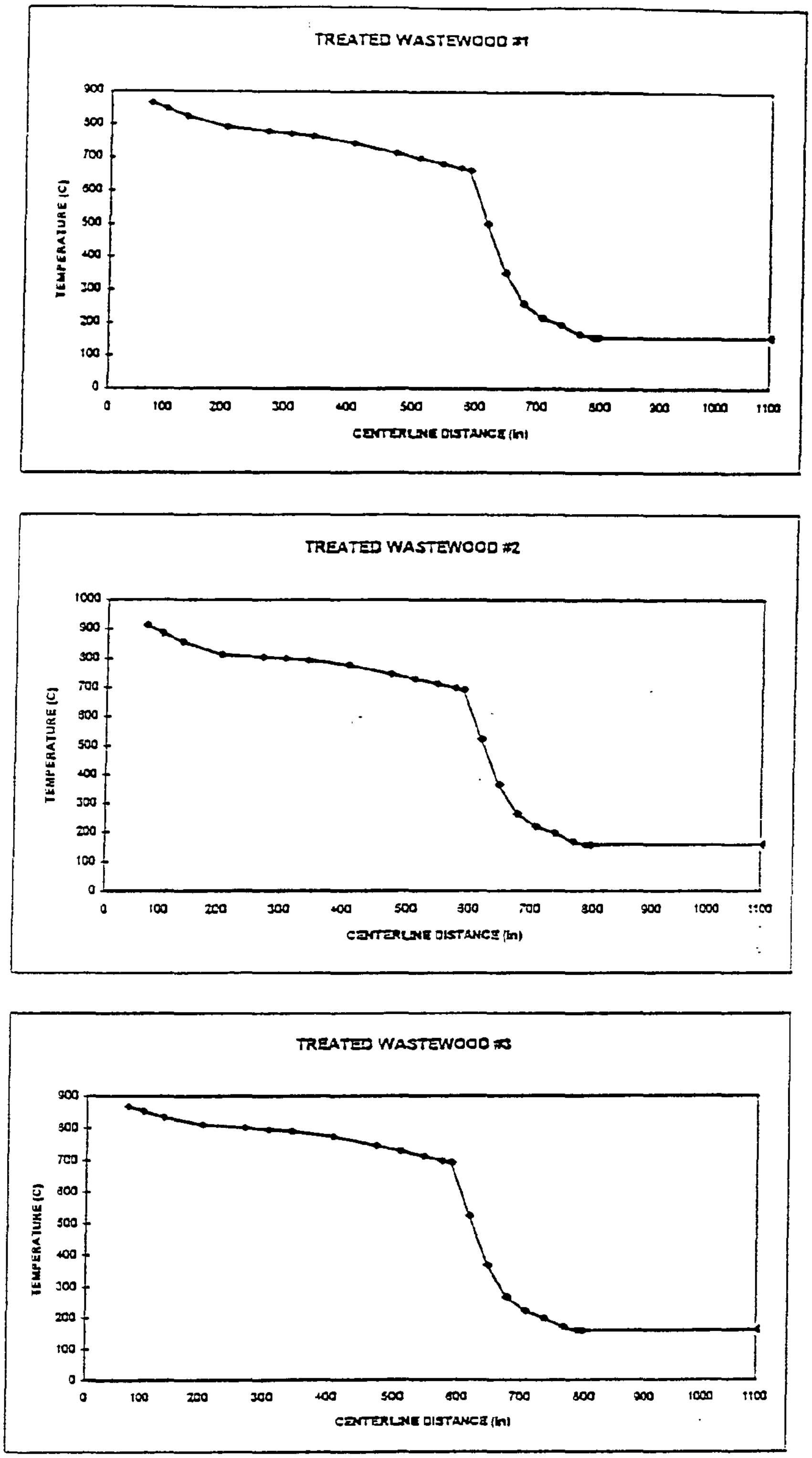
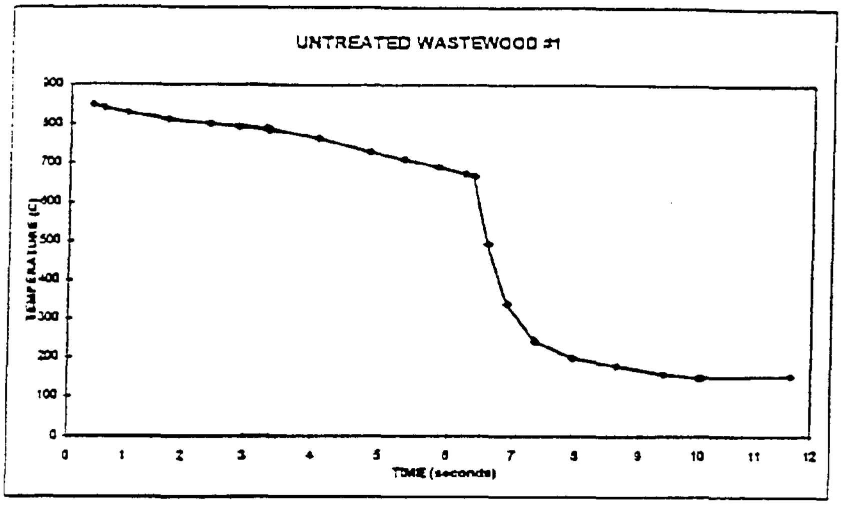
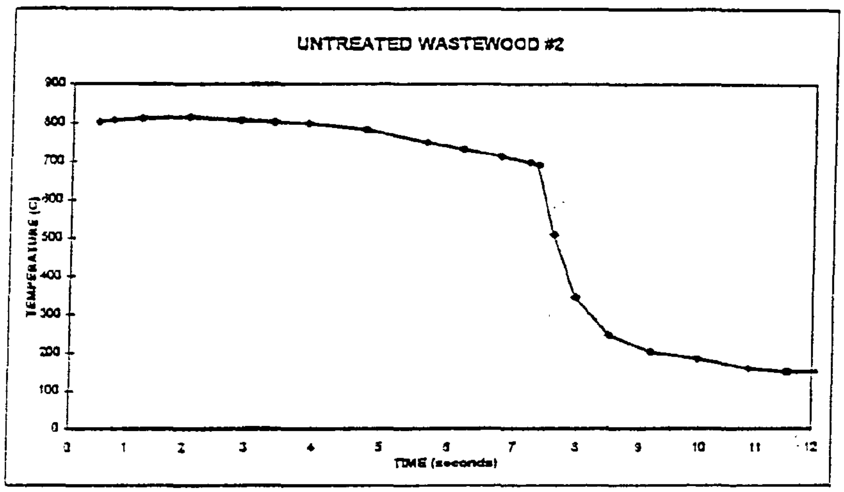


FIGURE 3-2 TEMPERATURE PROFILE FOR TREATED WOOD TESTS.
(Temperature of gas along centerline as measured from grate)





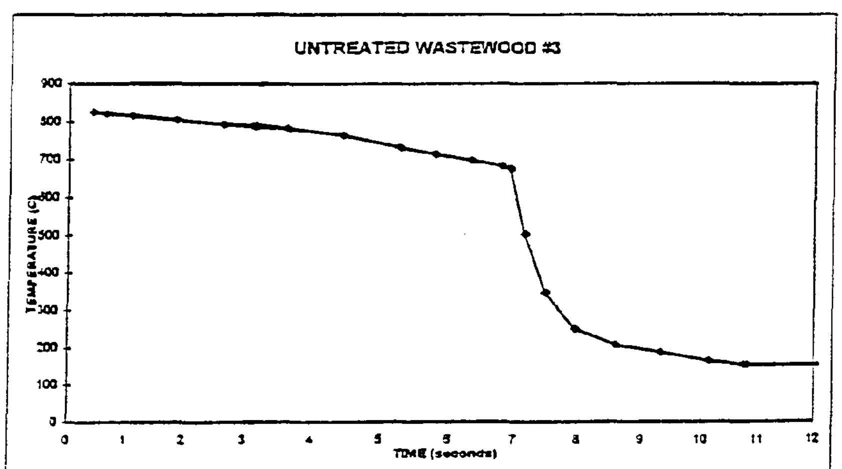


FIGURE 3-3 TEMPERATURE VS. FLUE GAS RESIDENCE TIME FOR UNTREATED WOOD TESTS.

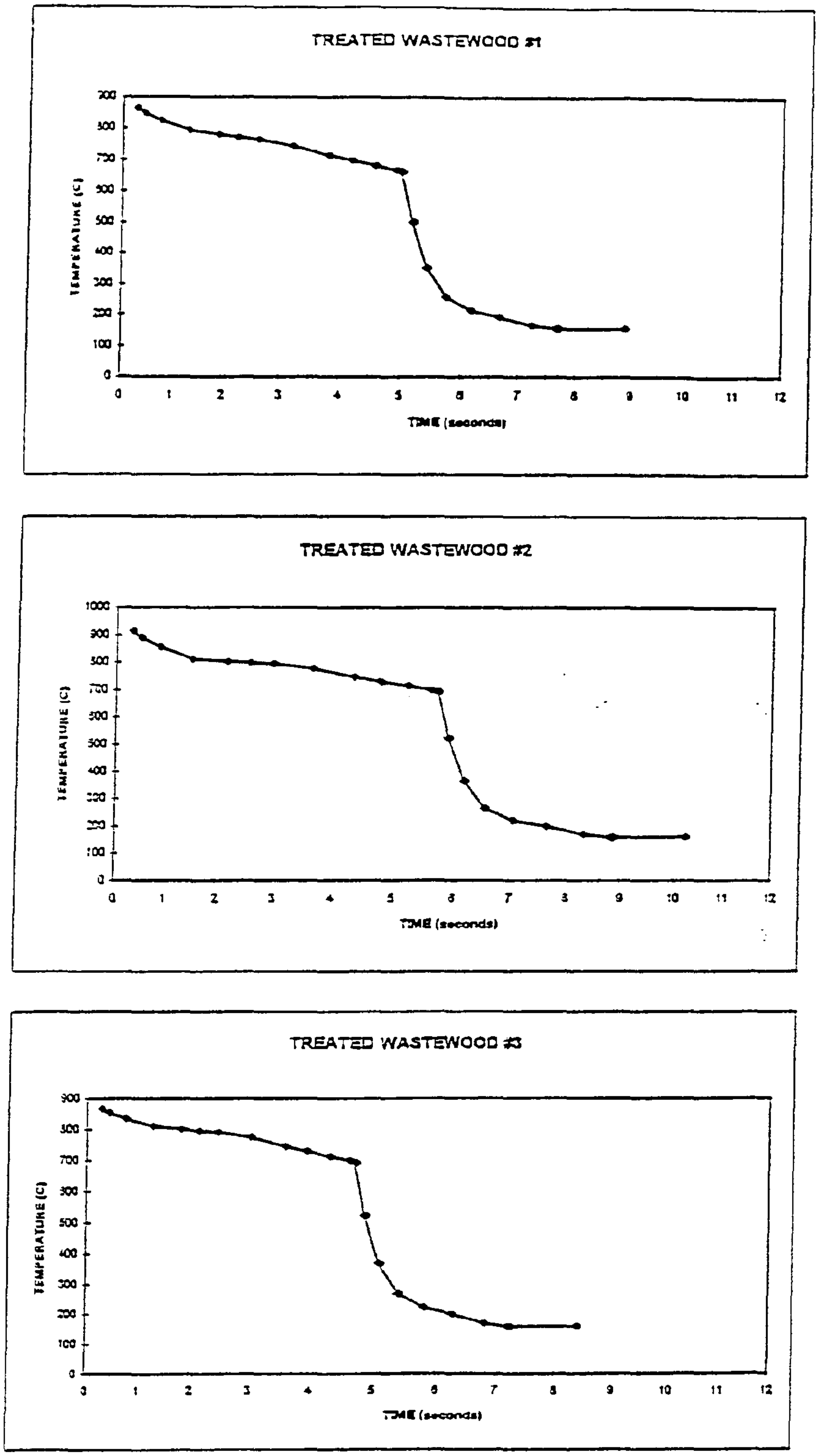


FIGURE 3-4 TEMPERATURE VS. FLUE GAS RESIDENCE TIME FOR TREATED WOOD TESTS.

thermocouple closest to the combustion zone. The differences in residence time may have significant effect on PIC level and possibly PCDD/PCDF emission level at the sampling point.

A number of factors might have introduced some uncertainty in measurements of the combustor thermal output and flue gas flow rate based on the total amount of fuel used and flue gas flow rates measured at beginning and end of the test, respectively. Since only one thermocouple was used at each downstream location of the combustor, the combustion gas temperature measured may not truly represent the average temperature of the gas stream at that location. The gas flow in the combustor appeared to be quite turbulent, and cold air introduced through the overfire nozzle into the combustor would require time to mix with hot combustion gas from the stoker grate. In addition, the wood fuel, both untreated and treated, may have been quite inhomogeneous. However, since the combustor heat release rate of the all the results were well below the design value of 2 million Btu/hr, quality of combustion and consequently the emission from the combustor would have been valid and acceptable.

It was difficult to produce exactly identical combustion conditions for all the tests, mainly due to the inhomogeneity of the two wood fuels used. The treated wood fuel contained aged wood, which is drier, has 30% higher heating value than those of the untreated wood fuel. In addition, uneven fuel feed rates resulting from the frequent adjustment of the fuel feeder in order to maintain a reasonably constant combustion condition as indicated by the temperature and the CO level caused fluctuations in air to fuel ratio. Fluctuations in the fuel feed may be the cause of CO and THC excursions observed during the tests. The nonhomogeneous nature of the fuels coupled with the practical difficulties in burning such fuels under well defined conditions made the accurate estimation of heat release rates during tests difficult. The high average CO concentrations for the untreated fuel tests, as shown in Table 3-2, are the result of a large number of CO excursions. The steady-state CO concentrations during normal operation were well below 100 ppm, but the high CO spikes during excursions resulted in significantly higher average concentrations. The high incidence of excursions were probably due to the fact that combustion conditions were difficult to control when burning the untreated wood, which has low heating value and high moisture content. However, CO_2 and H_2O concentrations, which are the measure of air to fuel ratio stayed constant for all six tests indicating similar steady-state combustion conditions for all the test runs. The repeatability of the tests are considered to be reasonable for this size of plant considering the inhomogeneous nature of the fuels coupled with the lack of means of accurately measuring and controlling the fuel flow rate

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3.2 Volatile Organic Compound (VOC) Concentrations

A total of 50 volatile organic compounds were analyzed for in the VOC samples obtained for the tests. The results of the analyses are reported Appendix II. Of the 50 compounds analyzed, only eight (8) compounds were found to be present above the analytical detection limit in at least one test and significantly above the level detected in the field and laboratory blanks. The emission rate of the eight compounds in µg/dscm at 7% O_2 for the six test runs are tabulated in Table 3-3.

TABLE 3-3 FLUE GAS VOC CONCENTRATIONS

VOCs	Flue Gas Concentrations, µg/dscm @ 7% O_2					
	Untreated Test 1	Untreated Test 2	Untreated Test 3	Treated Test 1	Treated Test 2	Treated Test 3
Chloromethane	53.3	28.5	16.9	55.8	96.7	51.5
1,3-Butadiene	0.6	0.2	1.2	0.1	0.1	0.1
Bromomethane	1.7	1.4	2.1	15.4	33.9	70.5
Iodomethane	0.8	2.4	5.7	1.7	5.1	24.1
Acetone	11.6	7.2	7.5	4.5	11.7	14.3
Chloroform	0.9	0.3	0.3	2.6	1.8	3.9
1,2-Dichloroethane	1.3	5.2	0.1	1.6	0.7	2.9
Benzene	25.4	16.2	27.9	2.1	2.6	3.0

Significant levels of benzene were found only in the untreated wood test samples, while chloroform was found only in the treated wood test samples. Chloromethane, bromomethane, iodomethane, acetone, and 1,2-dichloroethane were found in both untreated and treated wood test samples. The trace levels of chlorinated VOC emissions found in the untreated wood tests are attributed to the presence of small amount of naturally occurring chlorine in untreated woods. Higher concentrations of chlorinated VOCs were found in the treated wood tests, a result of higher chlorine content in the treated wood.

3.3 Semi-Volatile Organic Compound (SVOC) Concentrations

The results of SVOC analysesare summarized in Appendix III. Of the 87 semivolatile organic compounds analyzed for the SVOC samples, only the following five targeted compounds were found to be above the analytical detection limits and significantly above the field and laboratory blank results; phenol, acetophenone, naphthalene, 2-nitrophenol and penanthrene. Measurable amount of diethyl phthalate, di-n-butyl phthalate, and benzyl butyl phthalate were found in all test samples, but they were also found in the field blank sample, indicating that they were contaminants from the sampling or analytical procedure and not from the combustion of wood waste fuel.

The total SVOC flue gas concentrations for all six tests are calculated by adding all the quantifiable SVOC emissions in the test and are presented in Table 3-4. The typically low SVOC

TABLE 3-4 FLUE GAS SVOC CONCENTRATIONS

Test	Concentration, μg/dscm @ 7% O_2
Untreated Test 1	10.1
Untreated Test 2	11.4
Untreated Test 3	11.7
Treated Test 1	7.0
Treated Test 2	7.7
Treated Test 3	5.9

emissions for both the untreated and treated wood tests are an indication that good combustion conditions were achieved during the tests. The slightly lower SVOC emissions for the treated wood tests compared to those for the untreated wood tests also suggests that the combustion of the drier treated wood fuel produced lower PIC concentrations. More moisture released during the combustion of the "green" untreated wood fuel may lower the localized combustion zone temperature and cause more PIC formation.

3.4 Pentachlorophenol (PCP) Destruction Efficiency

SVOC sample analysis of all three treated wood tests indicated that the concentrationS of pentachlorophenol were below the detection limit. The maximum detection limit of pentachlorophenol for the analytical method used was 30μg/sampling train. The concentration of pentachlorophenol in the treated wood fuel was analyzed to be 4,100 mg/kg. The estimated destruction efficiency (DRE) for pentachlorophenol of each treated wood fuel test has been conservatively calculated based on the pentachlorophenol analysis practical quantitation limit (PQL). DRE results are presented in Table 3-5. The PLQ is based on the lowest calibration

TABLE 3-5 DESTRUCTION EFFICIENCY FOR PENTACHLOROPHENOL

Test	DRE, %
Treated Test 1	>99.9974
Treated Test 2	>99.9976
Treated Test 3	>99.9975

concentration and does not include factors such as percent recovery or matrix effects. It is evident from these results that burning of the pentachlorophenol-treated waste wood in a stoker combustor destroys the pentachlorophenol efficiently with a DRE higher than that required for the destruction inhazardous waste incinerators (99.99%).

3.5 Dioxin/furan (PCDD/PCDF) Concentrations

PCDD/PCDF samples were analyzed and the results in total PCDD/PCDF and I-TEQ are provided in Appendix IV. As shown in Table 3-6, total PCDD/PCDF flue gas

TABLE 3-6 TOTAL PCDD/PCDF CONCENTRATIONS

Test	Emission Rate @ 7% O_2			
	Total PCDD ng/dscm	Total PCDD ng/dscm	Total PCDD/PCDF ng/dscm	Total PCDD/PCDF ng I-TEQ/dscm
Untreated Test 1	8.43	22.29	30.72	0.509
Untreated Test 2	2.63	17.15	19.78	0.208
Untreated Test 3	0.95	11.12	12.06	0.107
Treated Test 1	15.03	42.19	57.22	1.304
Treated Test 2	20.88	56.47	77.35	1.217
Treated Test 3	18.72	45.04	63.76	1.051

concentrations from the untreated wood tests averaged 0.274 ng I-TEQ/dscm and from treated wood tests 1.190 ng I-TEQ/dscm. These concentrations are measured prior to any control devices, which could potentially remove part of this material from the gas stream, depending on the fly ash collection efficiency, PCDD/PCDF formation, and solid-to-vapor-phase partitioning of PCDD/PCDF with the device. It has been shown that most of the dioxin and furan formation will occur at the "temperature window" of 200 and 450 °C.[16] Since the temperature at the sampling point is below 160 °C, it is reasonable to expect that the formation of dioxins has been essentially completed by the time the gas reaches the sampling location and that the rates of formation and desorption of fly ash associated PCDD/PCDF in a subsequent particulate collection device would be low.[17] The PCDF concentrations are significantly greater than PCDD concentrations for both the untreated and treated wood tests, indicating *de novo* synthesis formation reactions rather than condensation reactions.[18] The PCDD/PCDF congener distribution for the treated and untreated tests also differ (see Figures 3-6 through 3-9). In the untreated wood tests, the distributions are peaked at the lower-chlorinated tetra-PCDD and di-PCDF congeners; in the treated wood tests, the distribution is shifted to the higher-chlorinated hexa-PCDD and penta-PCDF congeners. The PCDD/PCDF concentrations measured in both the untreated and treated wood tests can be compared to the stack emissions from commercial

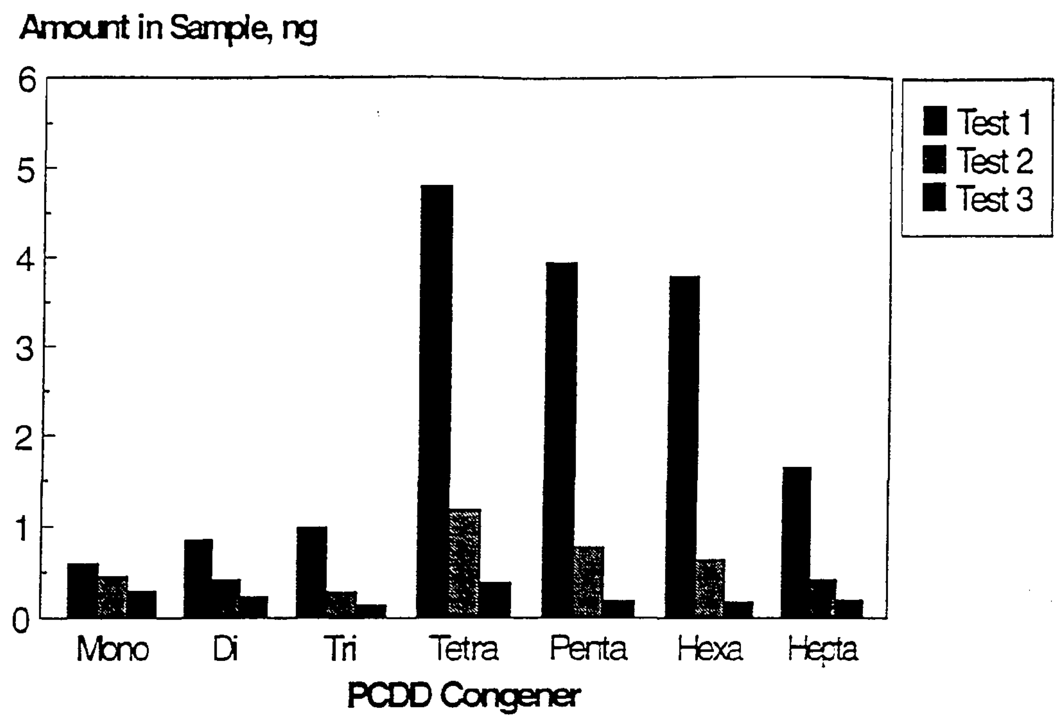

Figure 3.5 PCDD Congeners (Untreated Wood Tests)

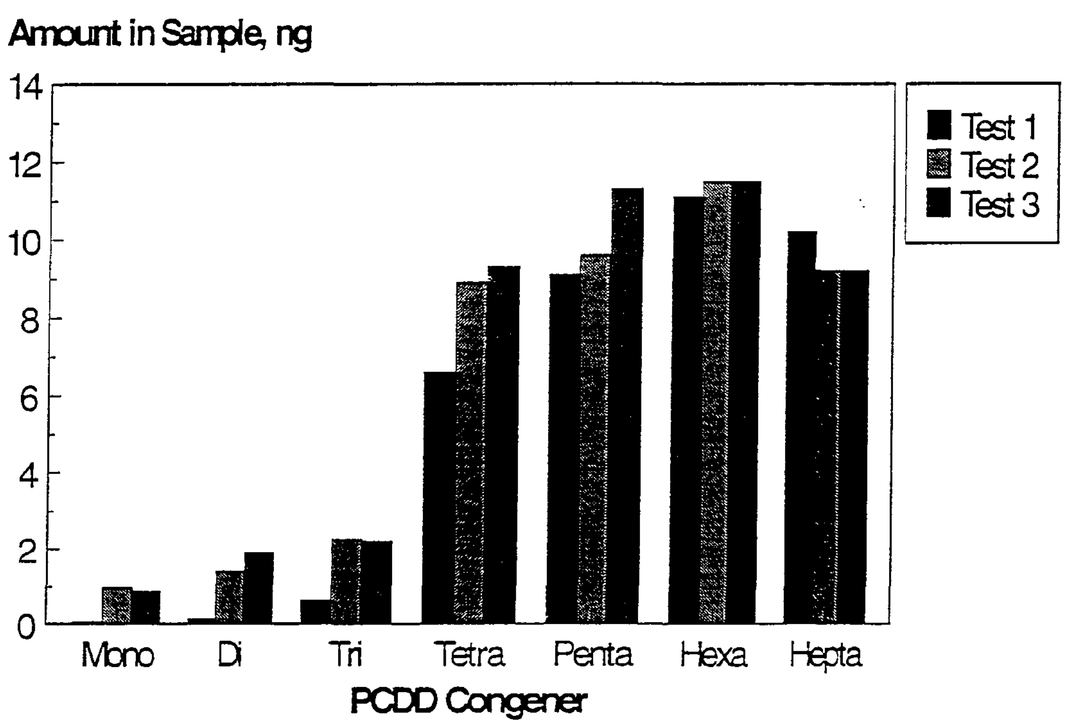

Figure 3.6 PCDD Congeners (Treated Wood Tests)

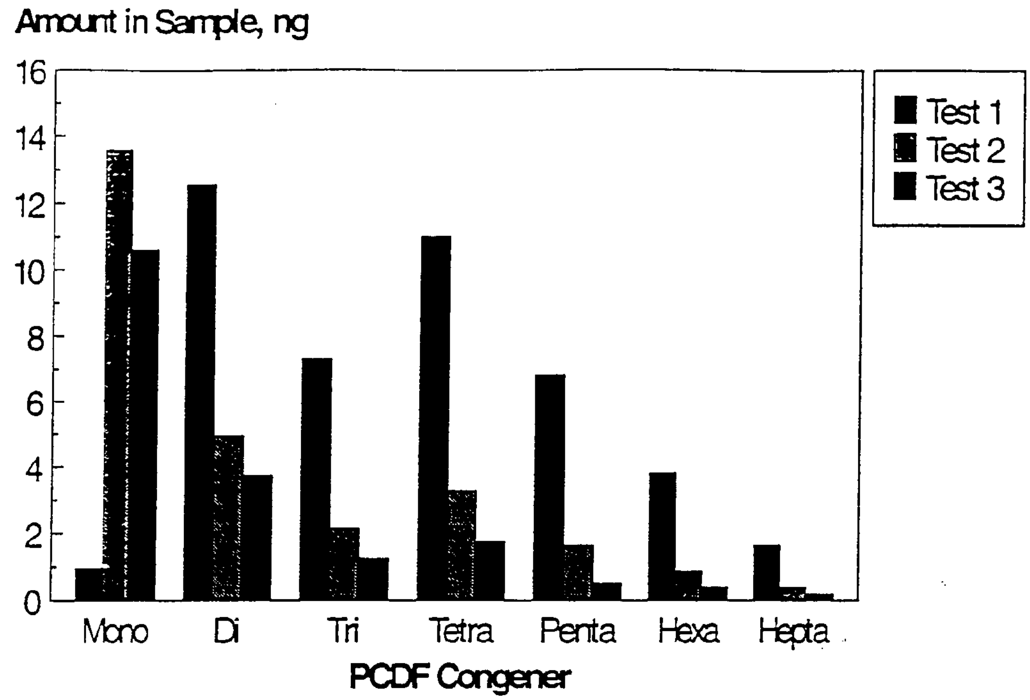

Figure 3.7 PCDF Congeners (Untreated Wood Tests)

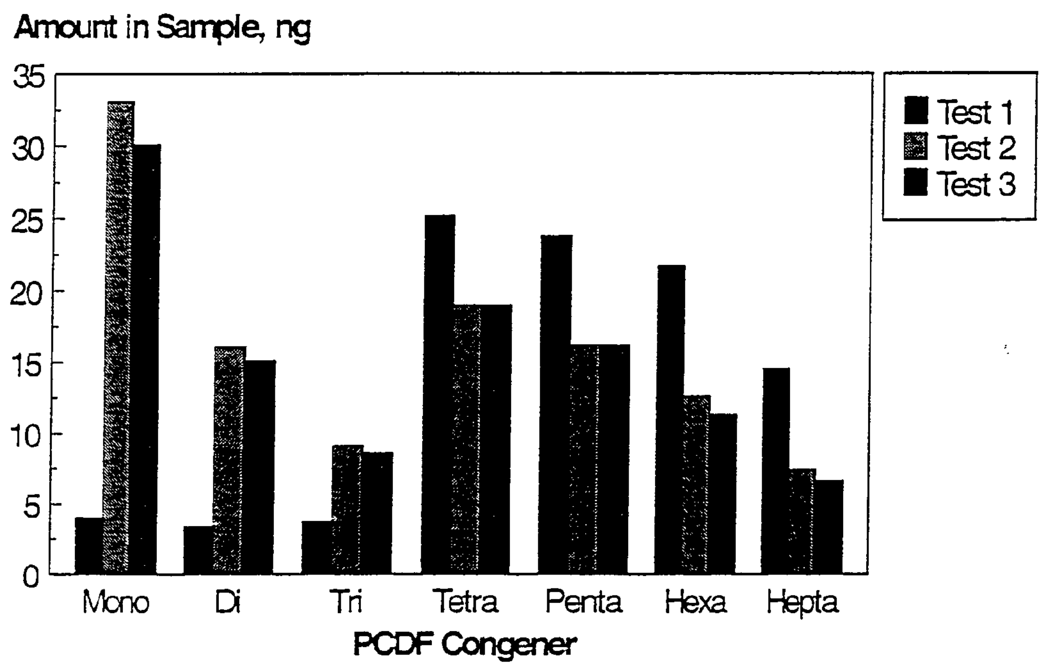

Figure 3.8 PCDF Congeners (Treated Wood Tests)

municipal waste combustors, which range from 0.01 to 400 ng I-TEQ/dscm.[18] The PCDD/PCDF concentrations measured in the untreated wood tests are similar to those found from burning natural wood, which range from 0.066 to 0.214 ng I-TEQ/dscm.[1] The PCDD/PCDF flue gas concentrations in the treated wood tests are higher than the emission concentrations measured after particulate control equipment (0.0359 ng I-TEQ/dscm) from a waste to energy plant burning a mixture of clean wood and pentachlorophenol treated waste wood.[19]

The higher PCDD/PCDF concentrations from the treated wood tests compared to those from the untreated wood tests are consistent with their higher chlorinated VOC emissions. Approximately 200 ppm of HCl was measured in flue gas from the treated wood tests, while HCl was not detected in the untreated wood tests. The PCDD/PCDF samples were collected into front half and back half of the sampling train and analyzed separately, which gives an indication of the PCDD/PCDF associated with the particulate material and as gaseous emissions. Table 3-7 shows that a higher portion of the total PCDD/PCDF in the treated wood tests is in the front half catch than in the untreated wood samples. The treated tests had a higher flue gas flow rate (see Table 3-1), which would enhance particulate load at the sampling point. The higher flue gas flow rates during the tests with treated wood are a consequence of the manner in which the

TABLE 3-7 DISTRIBUTION OF PCDD/PCDF IN SAMPLING TRAIN

Test	% of PCDD I-TEQ in Front Half	% of PCDF I-TEQ in Front Half	% of PCDD/PCDF I-TEQ in Front Half
Untreated Test 1	33.2	25.1	27.3
Untreated Test 2	51.4	38.7	42.7
Untreated Test 3	49.3	33.4	41.3
Treated Test 1	73.6	61.5	65.2
Treated Test 2	67.2	56.7	61.0
Treated Test 3	64.8	57.0	60.5

combustor was operated during the test. The treated wood had a higher heating value and higher levels of excess air were used during the treated wood tests to maintain temperature at the stoker outlet similar to temperatures obtained during the untreated wood tests. This information suggests that particulate carryover may affect the total amount of PCDD/PCDF, especially in the treated wood samples where a larger percentage is in the front half catch. Combustor operating conditions in addition to the wood treatment may also contribute to higher measured PCDD/PCDF flue gas concentrations for the treated wood tests.

3.6 Polychlorobiphenol (PCB) Concentrations

The result of the PCB analysis is attached in Appendix V and is summarized in Table 3-8.

TABLE 3-8 PCB TEST RESULTS

Test	Total PCBs ng/dscm @ 7% O_2
Untreated Test 1	79.7
Untreated Test 2	92.0
Untreated Test 3	109.1
Treated Test 1	81.0
Treated Test 2	150.2
Treated Test 3	232.3

PCB concentrations in treated wood tests are slightly higher than in the untreated wood tests. In general, they are very low, and in line with other wood combustion data available to date (57-103 ng/dscm @ 12% CO_2 for fluidized bed combustors and 297-22,780 ng/dscm @ 12% CO_2 for cell burners). [3]

3.7 Aldehyde and Methane Concentrations

Methane emission from both treated and untreated wood tests were below the detection limit of 5 ppm. Aldehyde test results are shown in Table 3-9.

TABLE 3-9 ALDEHYDE TEST RESULTS

Test	Formaldehyde ug/dscm @ 7% O_2	Acetaldehyde ug/dscm @ 7% O_2
Untreated 1	20.4	19.2
Untreated 2	41.7	43.8
Untreated 3	53.7	7.3
Treated 1	N/A	N/A
Treated 2	30.9	5.2
Treated 3	22.7	5.8

N/A -- Not available. Sample was contaminated

Within the measurement accuracy, there seem to be no clear differences between the treated and untreated wood tests.

3.8 Toxicity Characteristic Leachate Procedure (TCLP) Analysis of Flyash

Flyash samples of all three untreated wood test runs were combined and a representative sample was subjected to TCLP leachate analysis. Similarly, all three treated wood samples were combined and analyzed . TCLP analysis results are shown in Table 3-10.

TABLE 3-10 TCLP ANALYSIS RESULTS

Metals	Untreated Wood Tests ppm	Treated Wood Tests ppm	EPA Max. Level[20] ppm
Arsenic	0.190	0.232	5.0
Barium	0.322	0.342	100.0
Cadmium	0.705	1.15	1.0
Chromium	1.70	1.50	5.0
Lead	1.102	0.159	5.0
Mercury	below detection	below detection	0.2
Selenium	0.037	0.033	1.0
Silver	below detection	0.024	5.0

In both treated and untreated fuel tests, TCLP result were generally within the acceptable EPA limits and no significant differences between the two types of wood fuel could be found. Cadmium was slightly above the EPA limit in the treated wood sample, but this can not be explained.

4.0 CONCLUSIONS

This study was conducted to identify potential air pollution problems associated with the combustion of waste utility poles treated with pentachlorophenol preservative for energy production in a boiler. The emphasis of the study was placed on the characterization of the PICs in the combustion flue gas. The methodology used was a comparative test of emissions prior to air pollution control device of a pilot scale combustor burning untreated wood and wood treated with pentachlorophenol preservative. The tests showed that combustion of pentachlorophenol treated wood is an effective method of destroying the pentachlorophenol contained in the wood, with destruction efficiencies higher than 99.99 percent. Differences in VOC, SVOC, and PCDD/PCDF emissions from the combustion of untreated and treated wood fuels have been noted. The data do not enable identification of the exact cause of these differences in emissions.

These differences are possibly caused by the significantly different moisture content, heating value, and chlorine content of the two fuels. The difference in flue gas flow rate required for the combustion of these two fuels with different combustion characteristics (moisture content and heating value) may also cause the differences in PCDD/PCDF emissions. The flue gas concentrations are strongly influenced by the design and operation of the combustor system and may not be quantitatively comparable to other combustors.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The project was performed following the guides established under the EPA, Office of Research and Development Level III Quality Assurance Project Plan (QAPP) procedures. All procedures and methods noted in the QAPP were implemented with the exception of the method employed to determine the fuel throughput rates.

The overall results of all quality assurance and quality control (QA/QC) measures, undertaken to assess the quality of the collected data, are summarized in this section. Included in this section is a brief description of the data quality analysis procedures that were implemented. The following subsections briefly address the quality of data achieved and provide QA/QC considerations. A separate subsection summarizes the results of a Performance Evaluation Audit (PEA).

Nearly all the objectives for the Data Quality Indicators (DQIs) were met for the project. As noted in the QAPP, the most critical measurements were the following;

O_2, CO, and CO_2 CEM measurements,
Underfire, overfire, sweep and total air flow rates,
Air and flue gas temperatures,
PCDD/PCDF analysis from the sampled flue gas,
VOC analysis from the sampled flue gas,
SVOC analysis from the sampled flue gas, and
Waste wood feed rates.

All of the calculated critical measurement objectives were met or exceeded. The results of all the calculated data quality indicators are summarized in the appropriate subsections.

5.1 Data Quality Indicators

The DQIs that were considered in planning and executing the project were accuracy, precision, and completeness. The calculation for each of these parameters is presented separately below.

5.1.1 Accuracy

Accuracy is assessed by comparing measured values to certified or "known" standards. For determining the accuracy of CEM analyzers, values as measured and recorded by the CEM sampling system are compared to known concentrations of certified gases introduced into the analyzers. Accuracy for the integrated samples is assessed by spiking samples with a known quantity of the target analyte(s) onto the clean sampling media prior to analysis. Another method is to analyze known surrogates following and prior to analyzing the samples. The accuracy can then be reported as either a percent error (% bias) or as a percent recovered (% accuracy). Bias can be determined using the following formula:

$$Percent\ Bias = \frac{measured\ concentration - known\ concentration}{known\ concentration} \times 100$$

Accuracy, expressed as percent recovered, can be determined from the following formula:

$$Percent\ Recovery = \frac{measured\ concentration}{known\ concentration} \times 100$$

In many cases, multi-component spikes or surrogates are measured to determine DQIs. In such cases, the average of the bias or recovery for all spikes is used to determine an overall percent bias or recovery for the measurement system.

5.1.2 Precision

Precision is defined as the reproducibility of measured results. Method precision can be assessed through the collection, analysis, and measurement of duplicate samples that are collected simultaneously or at similar conditions. From this method, precision can be determined as a relative difference between the duplicate results. As a relative difference, the precision limits can be calculated from the following:

$$RPD = \frac{C_1 - C_2}{(C_1+C_2)/2} \times 100$$

where:

C_1 = larger of the two measured values

C_2= smaller of the two measured values

In some cases, replicate data is pooled to determine precision as a relative standard deviation (RSD) of the measured data. This method of determining the precision can be calculated as follows:

$$RSD = \frac{\textit{standard deviation of replicate measurements}}{\textit{average of replicate measurements}} \times 100$$

For continuous monitors, precision was determined as the relative difference between measurements for pre-test and post-test calibrations. For integrated samples with multi-component spikes or surrogates, precision is better represented as a relative standard deviation.

5.1.3 Completeness

Completeness is defined as the ratio of the number of valid analytical results obtained to the number of samples required in the prescribed test matrix. Causes for not producing valid analytical results include sample loss from breakage, mis-identified samples, errors in the sample recovery or analysis, or instrument failure during sampling operations. Completeness is derived from the following:

$$Completeness = \frac{\textit{amount of valid data collected}}{\textit{intended collectable data}} \times 100$$

Nearly all aspects of the project were completed. No deviations from the original test matrix were made except for the elimination of a duplicate PCDD/PCDF sample that was to be extracted during the second treated waste wood test. The only other incomplete item from the original test matrix was a VOST sample tube that was broken during transportation to the analytical lab. All other samples and measurements as defined by the QAPP were fully completed. Therefore, completeness will not be discussed or presented in the following subsections.

5.2 Summary of Quality Assurance and Quality Control Results

Specific information relating to the sampling and analysis results is presented in Appendices II, III, IV, and V along with the details pertaining to the data quality evaluation effort. The QA/QC assessment summary is provided in the appropriate following subsections. The summaries include the DQI objectives, as posted in the QAPP, and results obtained for each measurement. Measurement parameters that exceed DQI objectives are further explained in the appropriate subsections.

5.2.1 Continuous Emission Monitors

The CEM sampling system is divided into three subsystems. The first subsystem is devoted to analyzing O_2, CO_2 and CO which are insoluble or nearly insoluble in water. The second subsystem is devoted to measuring NOx and THC gases which may be dissolved or scrubbed by condensation. The third subsystem is the Perkin Elmer Multi-Component Analyzer. The O_2, CO_2 and CO analyzers were leak checked and calibrated daily, prior to the tests, according to EPA Method 3A and EPA Method 10. The calibration was a two point calibration with nitrogen for zero and a span gas of a value greater than 80% of the anticipated range. A two point drift check with the same gases was performed daily at the end of tests. The NO_x and THC analyzers were leak checked and calibrated according to EPA Method 7E and EPA Method 25 respectively. Prior to testing, the analyzers were calibrated at two points with zero and span gases. Following the test the instruments were drift checked with the same zero and span gases. Likewise, the Perkin Elmer system was calibrated with a two point check prior to the test. The Perkin Elmer however could not be drift checked upon the completion of the test. The system is designed to automatically purge and recalculate the measured values during the calibration procedure; any drift information would have been lost during a post-test check. All sample systems were bias checked according to EPA Method 6C prior to the start of the first test.

The values recorded for the calibrations and the drift check are used to determine the accuracy and precision of the measurement devices. Because the Perkin Elmer could not be drift checked the accuracy and precision for HCl, a non-critical measurement, could not be determined. For the other instruments, the percent bias was calculated from the difference between the measured spans for system drift check and the known concentration of the certified span gases. The precision was calculated as the relative percent difference between the values measured during the pre-test calibrations and the drift checks. The summary of data quality achieved for each test and the system bias check is presented in Table 5-1.

In two tests, the second untreated wood and the first treated wood, the CO_2 precision barely missed the DQI goal. In multiple test runs the DQI goals were not met for THC and NO_x. However, THC and NO_x are non-critical measurements for this project.

5.2.2 Overfire, Underfire, Sweep and Total Air Flows

The flow measuring devices were not specifically calibrated for this project. The flows for the system are measured with restrictive type venturi and orifice type devices coupled with pressure transducers and accompanying panel meters. Because of the limited number of variables which can affect the performance of the venturi, calibrations are performed biannually only on the pressure transducers and panel meters. A detailed description of the calibration procedures was presented in the QAPP. The pressure transducers deliver a 4 mA output signal when the differential pressure is zero and a 20 mA output signal when the differential pressure is 25 inches of water pressure. The transducers were calibrated at their limits and compared to a hand-held pressure calibrator. The hand-held calibrator was then used to verify the transducer to meter outputs when the transducer was exposed to a mid-range differential pressure. The summary of the data quality achieved for the flow measuring transducers is presented in Table 5-2.

Although the transducers alone displayed non-linearity in the middle of the range and thus greater percent bias, when connected to the panel meter, a square root extracting meter, the non-linear tendencies are removed. The overall result is a system that is much more accurate than the individual components. The system measurements are very repeatable, yielding precision calculated as relative standard deviations less than 1 percent. The DQI objectives for bias and precision , as noted in the QAPP, were set at 10 percent; all measurements met the DQI objectives.

TABLE 5-1 SUMMARY OF DATA QUALITY ACHIEVED FOR CONTINUOUS EMISSION MONITORS

Test		O_2		CO_2		CO		THC		NO_x	
		Objective	Result	Objective	Result	Objective	Result	Objective	Result	Objective	Result
SystemBias	Bias	5%	<1%	5%	2.6%	5%	1.7%	5%	4.5%	5%	<1%
Untreated1	Bias	5%	2.3%	5%	3.1%	5%	<1%	5%	5.3%	5%	31%
	Precision (RPD)	5%	2.3%	5%	2.8%	5%	<1%	5%	4.45%	5%	26.4%
Untreated2	Bias	5%	2.5%	5%	3.8%	5%	<1%	5%	7.9%	5%	8%
	Precision (RPD)	5%	3.3%	5%	6%	5%	1.3%	5%	6%	5%	8.2%
Untreated3	Bias	5%	4.6%	5%	3.7%	5%	<1%	5%	4.7%	5%	9.5%
	Precision (RPD)	5%	4.6%	5%	2.8%	5%	<1%	5%	4.7%	5%	9.9%
Treated1	Bias	5%	4.1%	5%	4.4%	5%	<1%	5%	3.6%	5%	10.3%
	Precision (RPD)	5%	4.9%	5%	5.3%	5%	<1%	5%	4.1%	5%	10.3%
Treated2	Bias	5%	3.6%	5%	3.7%	5%	<1%	5%	2.3%	5%	13.5%
	Precision (RPD)	5%	3.8%	5%	3.0%	5%	<1%	5%	1.4%	5%	15.5%
Treated3	Bias	5%	3.8%	5%	3.9%	5%	<1%	5%	<1%	5%	17.9%
	Precision (RPD)	5%	4.2%	5%	3.7%	5%	<1%	5%	<1%	5%	15.9%

TABLE 5-2 SUMMARY OF DATA QUALITY ACHIEVED FOR FLOW MEASUREMENT DEVICES

		Pressure Transducer						Pressure Transducer and Meter			
		Zero Differential Pressure			Differential Pressure at Span			Differential pressure set at arbitrary middle of range			
		measured	expected		measured	calculated		measured	calculated		Precision
		mA	mA	bias	mA	mA	bias	cfm	cfm	Bias	RSD
301	Total Air	3.990	4	0.25 %	19.907	19.92	0.08 %	500	504.2	0.83 %	<1%
302	Burner Air	3.982	4	0.45 %	19.837	19.94	0.53 %	123	123.3	0.24 %	<1%
303	Overfire Air	3.983	4	0.43 %	19.846	19.37	2.44 %	172	158.0	8.80 %	<1%
304	Underfire Air	3.986	4	0.35 %	19.857	19.79	0.34 %	490	497.1	1.43 %	<1%
305	Recirculation	3.990	4	0.25 %	19.867	19.80	0.33 %	246	263.7	6.70 %	<1%
306	Sweep Air	3.988	4	0.30 %	19.873	19.91	0.19 %	79	75.9	4.08 %	<1%

5.2.3 Temperatures

The thermocouples throughout the system were not removed for calibration purposes. Most of the thermocouples are mounted through the walls of the combustor. Removal of the thermocouple would result in destroying the thermocouples or damaging the refractive lining of the combustor. The thermocouple used to measure the combustor temperature nearest the fuel bed was a Type B, platinum/rhodium, thermocouple. The B type thermocouples are rated by the manufacturer for a bias of 0.5 C^o over 800 ^oC and a maximum temperature of 1700 ^oC. The remaining thermocouples are all K-type, nickel-chromium/nickel-aluminum, thermocouples rated for a bias of 2.2 C^o above 0 ^oC and a maximum temperature of 1250 ^oC. All the test conditions throughout the project were maintained well below the ratings for the thermocouples. In addition, the measured temperatures are critical for comparative reasons. The temperatures are used to set the system conditions and relate the conditions from one test to another. Although the temperatures are considered critical, errors in the temperature measurements will not affect the overall scope or objectives of the project.

5.2.4 PCDD/PCDF Sampling and Analysis

All PCDD/PCDF samples were collected, prepared, and analyzed according to the prescribed methods referenced in the QAPP. The samples were analyzed by a commercial laboratory with a high resolution GC/MS. Appendix IV contains the PCDD/PCDF analysis data. Also included are the data quality indicators for each sample analysis. Recovery of a known standard was used to determine the bias and precision for each sample analyzed. Because the lab reported the percent recovered from the known standards, the bias was determined from the average and the precision from the relative standard deviation. This is not in keeping with the strict definition of precision because the deviation is not determined for repeated analysis of the same surrogate. This does however determine the precision for each specific analysis over the spectrum of the instrument. The PCDD/PCDF samples were analyzed as front half and back half portions of the sampling train. The summary of the data quality achieved for the analyses of each portion for each test is presented in Table 5-3. All recoveries and precision were maintained within the limits prescribed by the QAPP.

TABLE 5-3 DATA QUALITY ACHIEVED FOR THE PCDD/PCDF ANALYSES

Test	Front Half Portion				Back Half Portion			
	Average Bias		Average Precision		Average Bias		Average Precision	
	Objective	Result	Objective	Result	Objective	Result	Objective	Result
Blank	50%	17.0%	30%	12.7%	50%	9.50%	30%	9.20%
Untreated1	50%	31.2%	30%	27.5%	50%	23.7%	30%	13.1%
Untreated2	50%	12.0%	30%	20.1%	50%	16.4%	30%	13.0%
Untreated3	50%	24.6%	30%	18.2%	50%	10.9%	30%	16.7%
Treated1	50%	1.70%	30%	9.39%	50%	13.2%	30%	12.5%
Treated2	50%	14.7%	30%	14.3%	50%	25.2%	30%	16.8%
Treated3	50%	2.69%	30%	31.9	50%	26.9%	30%	17.4%
Field Blank	50%	5.60%	30%	12.4%	50%	17.5%	30%	13.3%

5.2.5 SVOC Sampling and Analysis

All SVOC samples were prepared and analyzed according to the prescribed methods referenced in the QAPP. The samples were analyzed by the on-site laboratory with GC/MS. Appendix III contains the SVOC analysis data. Also included are the data quality indicators for each sample analysis. Recoveries of known surrogates were used to determine the bias and precision for each sample analyzed. Because the lab reported the percent recovered from the surrogates, the bias was determined from the average and the precision from the relative standard deviation. This is not in keeping with the strict definition of precision because the deviation is not determined for repeated analyses of the same surrogate. This does however determine the precision for each specific analysis over the spectrum of the instrument. The summary of the data quality achieved for the analyses is presented in Table 5-4. All recoveries and precision were maintained within the limits prescribed by the QAPP.

5.2.6 PCB Sampling and Analysis

All PCB samples were prepared and analyzed according to the prescribed methods referenced in the QAPP. The samples were analyzed by a commercial laboratory with a high resolution GC/MS. Appendix V contains the PCB analysis data. Also included are the data quality indicators for each sample analysis. Recovery of known standards was used to determine the bias and precision for each sample analyzed. Because the lab reported the percent recovered from the standards, the bias was determined from the average and the precision from the relative standard deviation. This is not in keeping with the strict definition of precision because the deviation is not determined for repeated analysis of the same surrogate. This does however determine the precision for each specific analysis over the spectrum of the instrument. The summary of the data quality achieved for the analyses is presented in Table 5-5. All recoveries and precision were maintained within the limits prescribed by the QAPP.

5.3 Internal Audits

An internal technical systems audit (TSA) was performed by the Acurex Environmental QA Officer on August 14, 1996. The auditor observed sampling activities which included the

TABLE 5-4 DATA QUALITY ACHIEVED FOR SVOC ANALYSES

Test	Bias		Precision	
	Objective	Result	Objective	Result
Field Blank	50%	12.7%	30%	11.4%
Untreated1	50%	6.40%	30%	12.2%
Untreated2	50%	22.1%	30%	22.1%
Untreated3	50%	9.90%	30%	25.3%
Treated1	50%	10.3%	30%	17.2%
Treated2	50%	7.87%	30%	13.2%
Treated3	50%	14.7%	30%	15.4%

TABLE 5-5 DATA QUALITY ACHIEVED FOR PCB ANALYSES

Test	Bias		Precision	
	Objective	Result	Objective	Result
Blank	50%	30.7%	30%	12.1%
Untreated1	50%	25.0%	30%	13.3%
Untreated2	50%	37.3%	30%	10.0%
Untreated3	50%	33.7%	30%	10.4%
Treated1	50%	33.1%	30%	12.8%
Treated2	50%	35.3%	30%	9.49%
Treated3	50%	25.1%	30%	14.8%
Field Blank	50%	30.1%	30%	9.20%
Lab Blank	50%	38.0%	30%	5.98%
Lab Blank	50%	31.3%	30%	8.62%

review of sampling and analytical documentation procedures. The auditor observed setup and breakdown procedures for VOST, MM5, and Method 23 sampling trains and sampling for methane and aldehydes using Tedlar bags and DNPH cartridges. Calibration records for sampling pumps and weigh balances were verified. It was noted by the WA Leader that the fuel (chipped wood) did not feed as well as expected due to larger pieces. At times, the feed had to be manually shoved down into the burner. The day of the audit there were some minor problems controlling the temperature which were related to the inconsistency in the feed. All problems were recorded in the project notebook. The internal TSA resulted in no major findings.

An internal performance evaluation audit (PEA) was performed to evaluate the Organic Support Laboratory's (OSL's) ability to identify and quantitate semivolatile organic compounds (SVOCs). The Acurex Environmental QA Officer prepared a PEA sample using a 2000 ug/mL mix of SVOCs that included the target compounds for the project. The mix (25 uL) was spiked onto a cleaned XAD cartridge and submitted to the Organic Support Laboratory for analysis. The cartridge was spiked to result in a 1 mL final extraction volume with a final concentration of 50 ug for each target analyte. The sample was extracted by the OSL and a report was submitted to the QA Officer from the OSL. Table 5-6 shows OSL results for target analytes and percent recovery for each compound. All compounds were correctly identified and recovered within the data quality indicator goals established for accuracy for this project.

TABLE 5-6 PERFORMANCE EVALUATION AUDIT

Compound	Reported (ug)	% Recovery*
Naphthalene	36.7	73.4
Acenaphthylene	34.6	69.2
Acenaphthene	39.3	78.6
Fluorene	42.3	84.6
Phenanthrene	45.7	91.4
Anthracene	45.4	90.8
Di-n-butyl phthalate	41.7	83.4
Fluoranthene	40.3	80.6
Pyrene	49.7	99.4
Benzo(a)anthracene	41.9	83.8
Chrysene	42.1	84.2
Benzo(b)fluoranthene	42.3	84.6
Benzo(k)fluoranthene	49.0	98.0
Benzo(a)pyrene	44.9	89.8
Indeno(1,2,3-cd)pyrene	42.5	85.0
Dibenzo(a,h)anthracene	37.6	75.2
Benzo(g,h,i)perylene	45.3	90.6

* Based on theoretical concentration of 50 ug for each target analyte.

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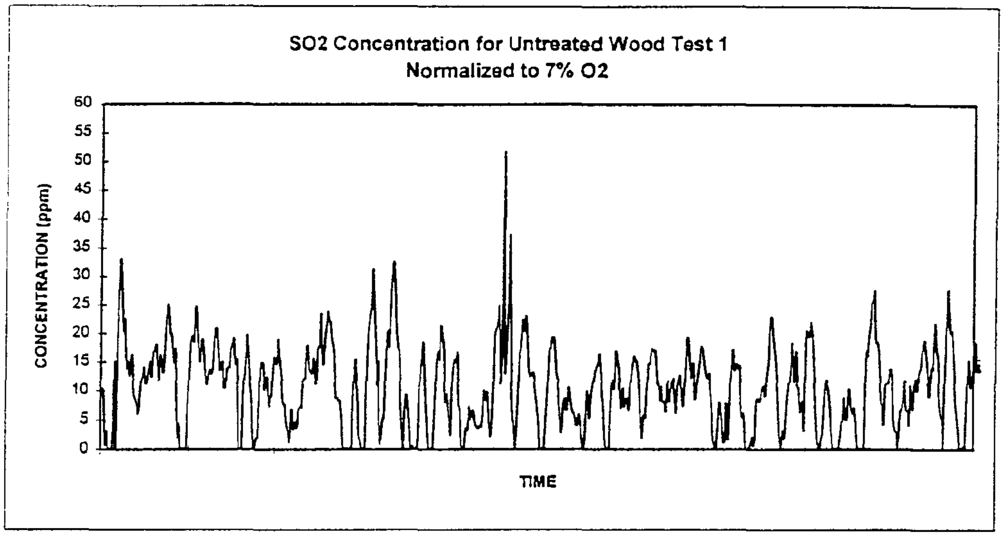
APPENDIX I CEM DATA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Normalized to 7% O2
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45
40
35
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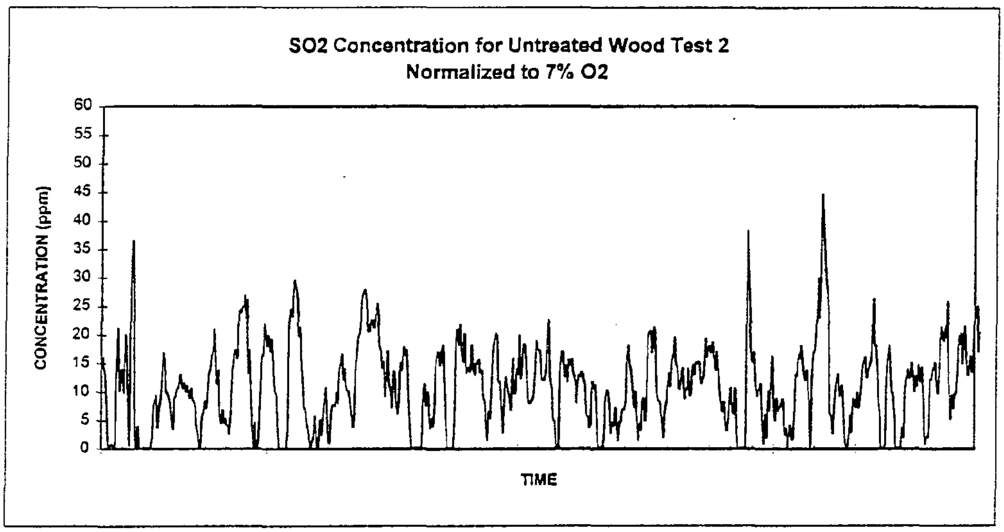
15
10
5
0
TIME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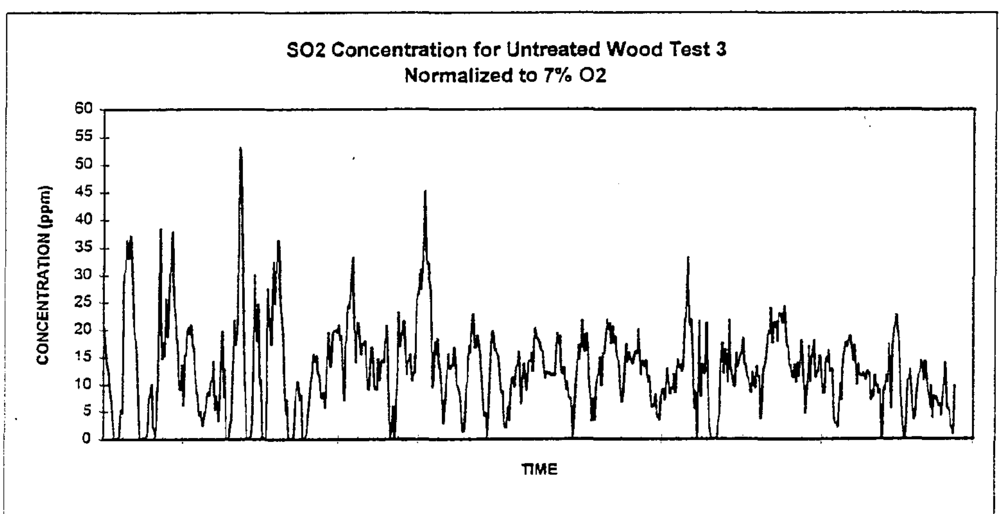
15
10
5
0
TIME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15
10
5
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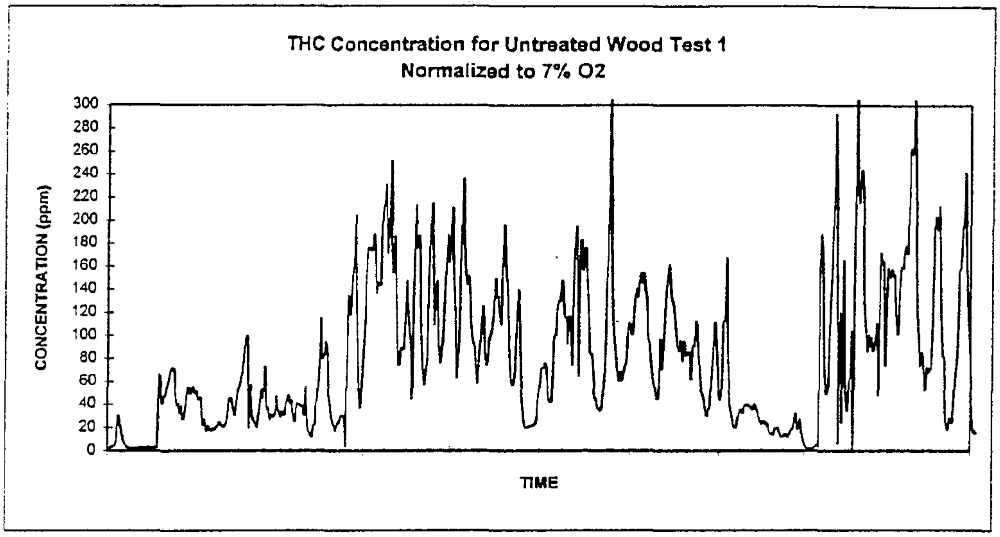
TIME


THC Concentration for Untreated Wood Test 1
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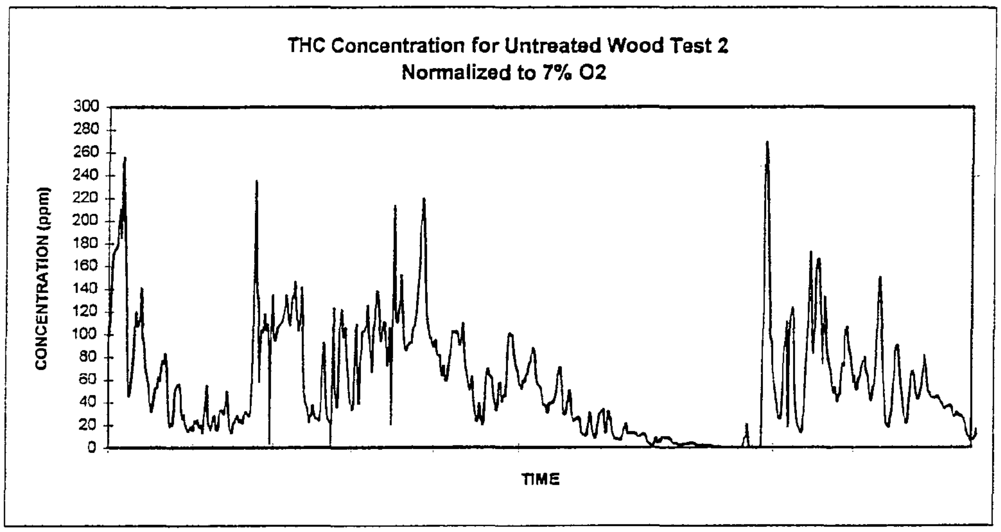
80
60
40
20
0
TIME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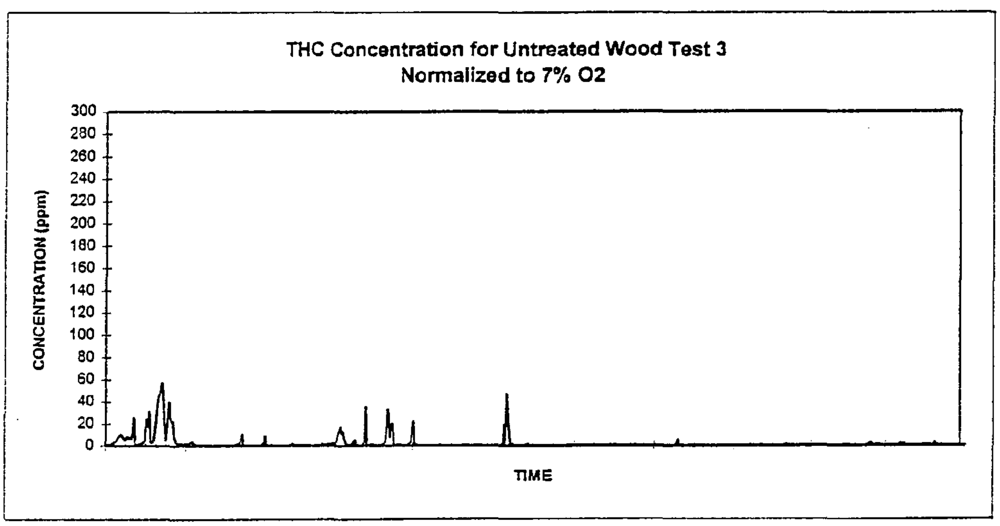
60
40
20
0
TIME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CONCENTRATION (ppm)
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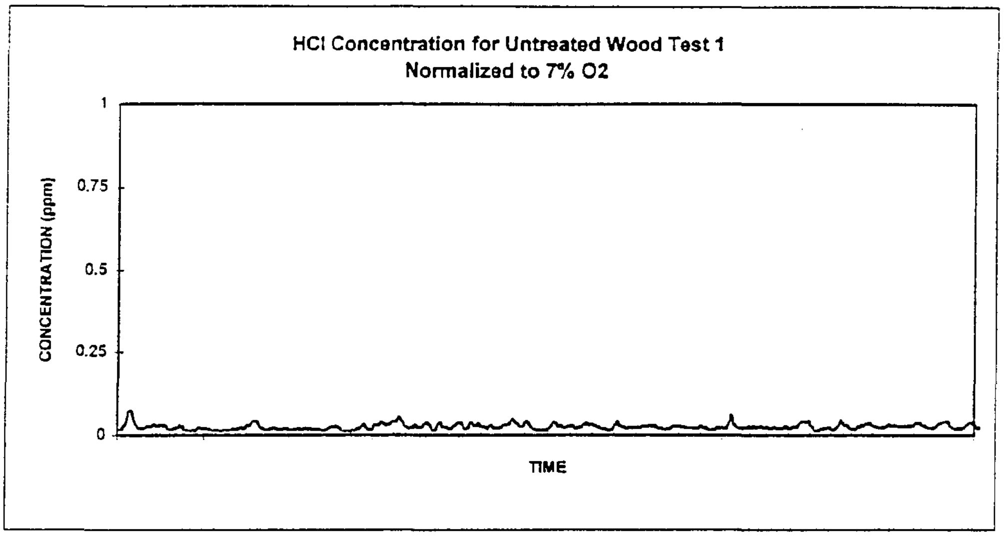
60
40
20
0
TIME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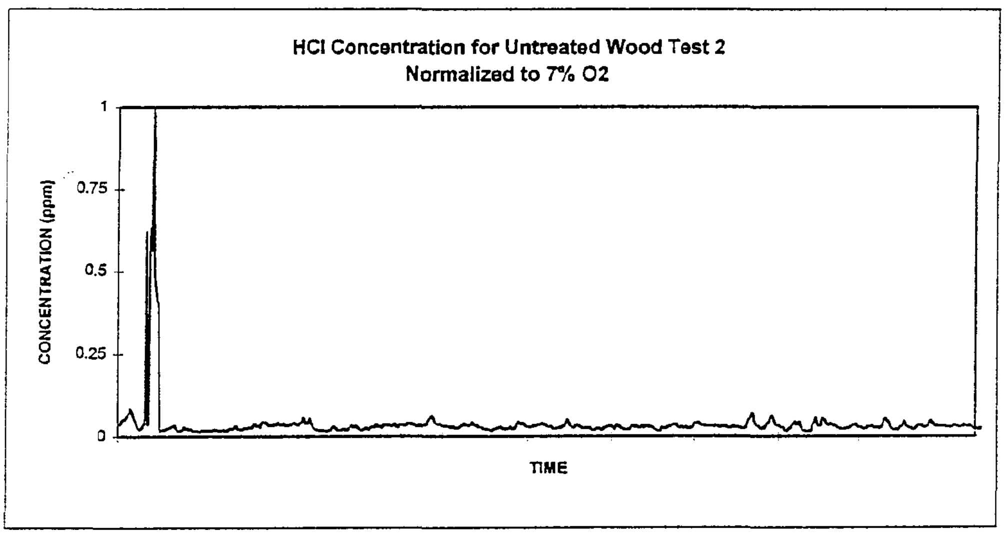
CONCENTRATION (ppm)
1
0.75
0.5
0.25
0
TIME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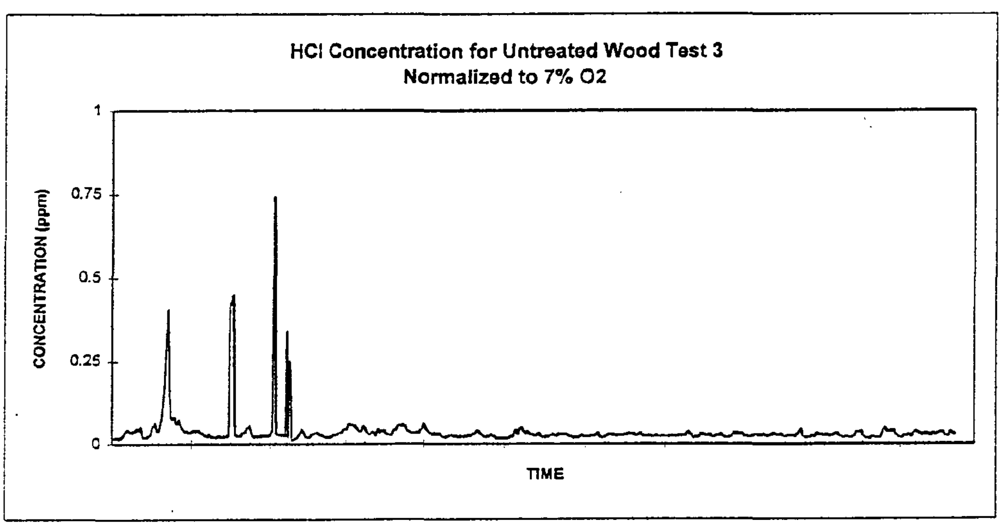
0.25
0
TIME


HCl Concentration for Untreated Wood Test 3
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CONCENTRATION (ppm)
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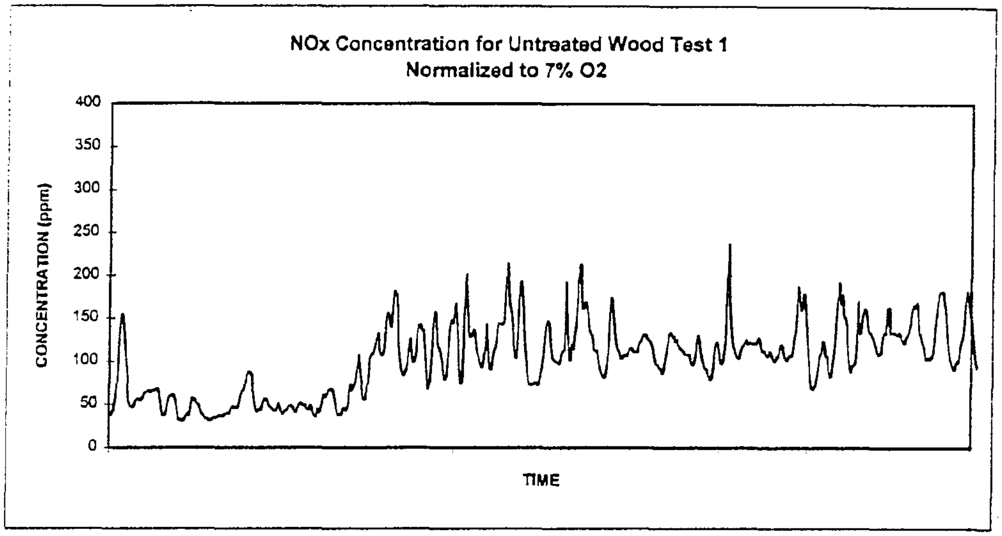
0.25
0
TIME



NOx Concentration for Untreated Wood Test 1
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CONCENTRATION (ppm)
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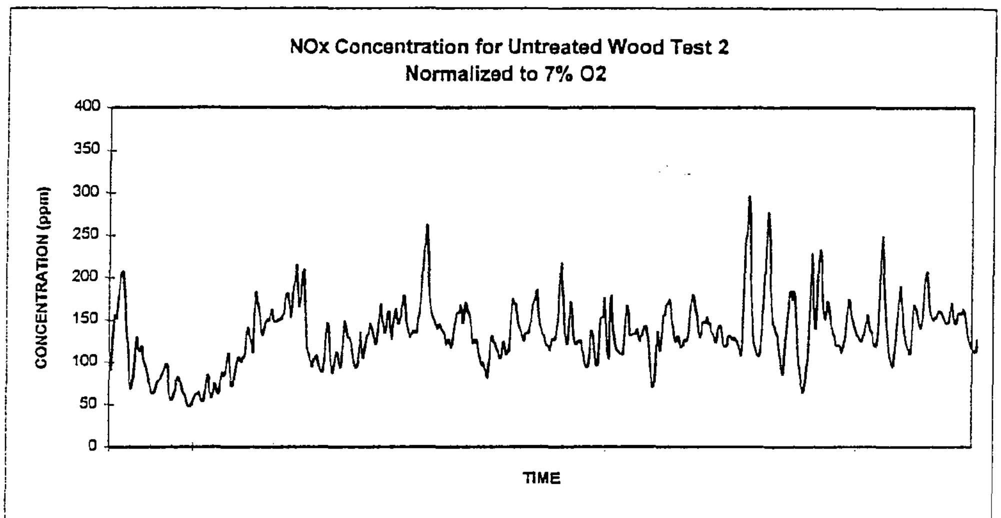
300
250
200
150
100
50
0
TIME



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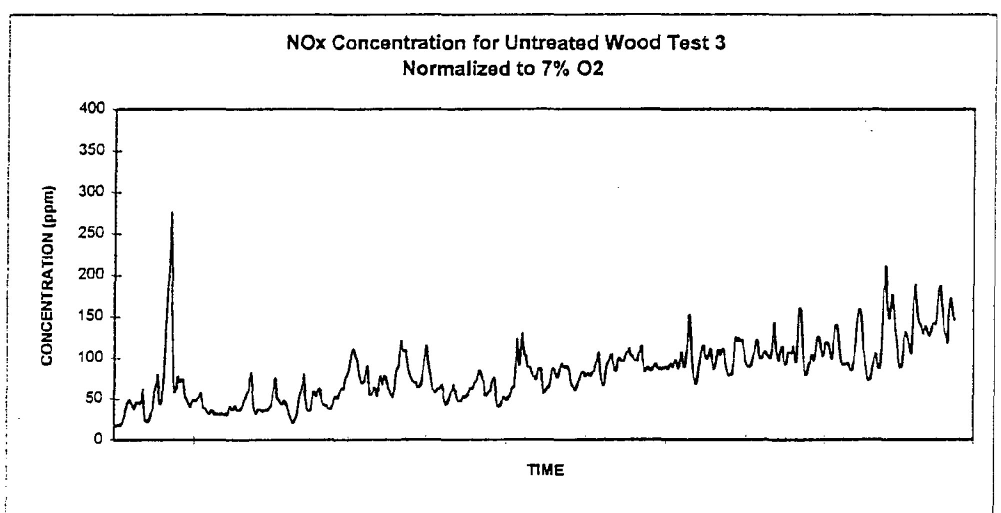
200
150
100
50
0
TIME



NOx Concentration for Untreated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
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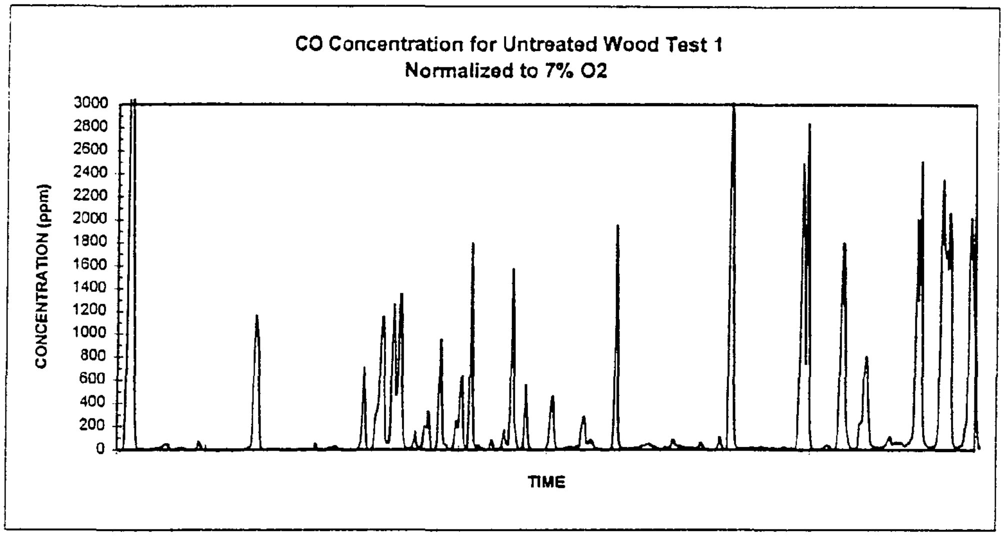
250
200
150
100
50
0
TIME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Normalized to 7% O2
CONCENTRATION (ppm)
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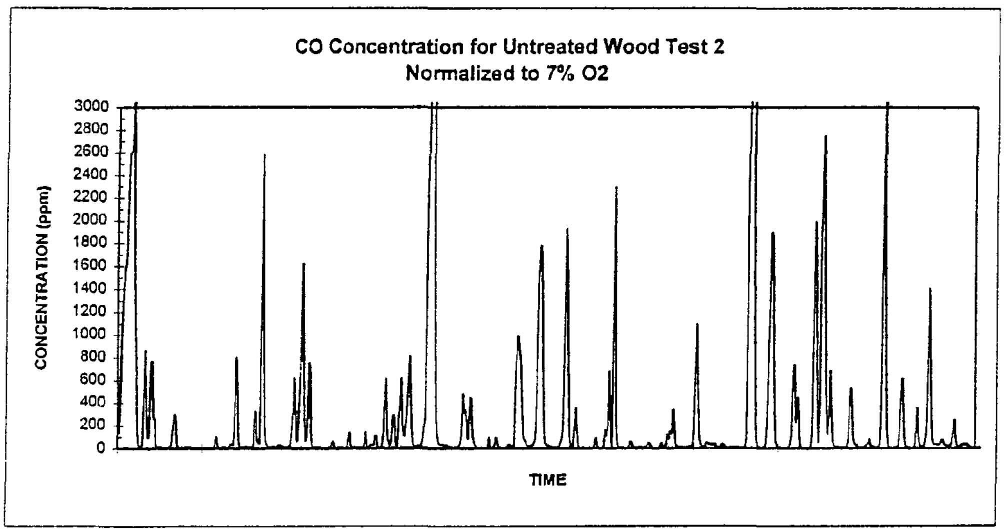
1800
1600
1400
1200
1000
800
600
400
200
0
TIME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Normalized to 7% O2
CONCENTRATION (ppm)
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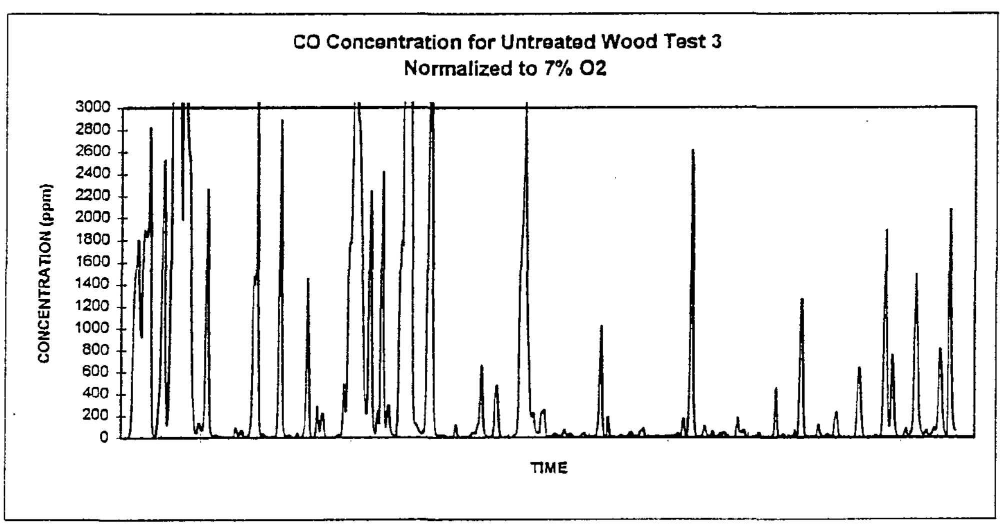
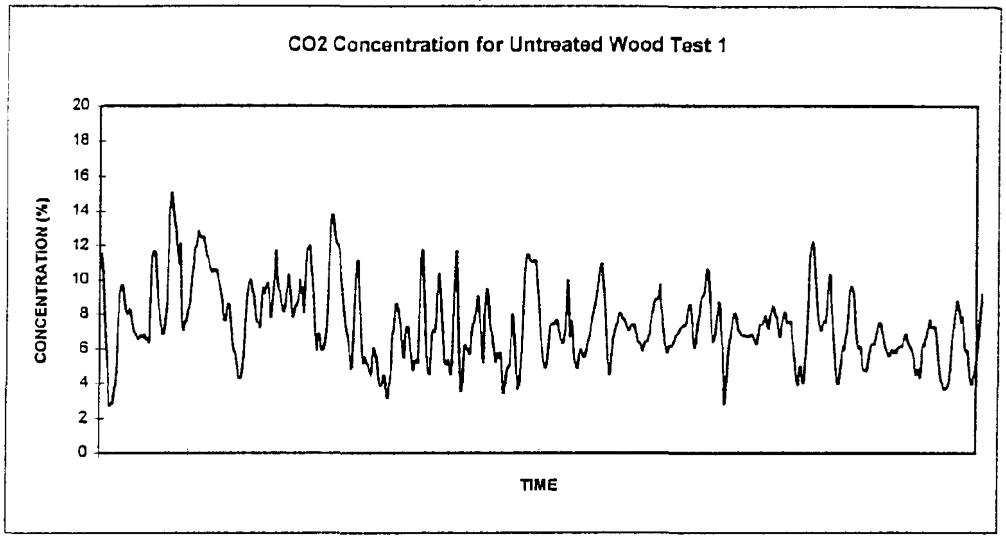
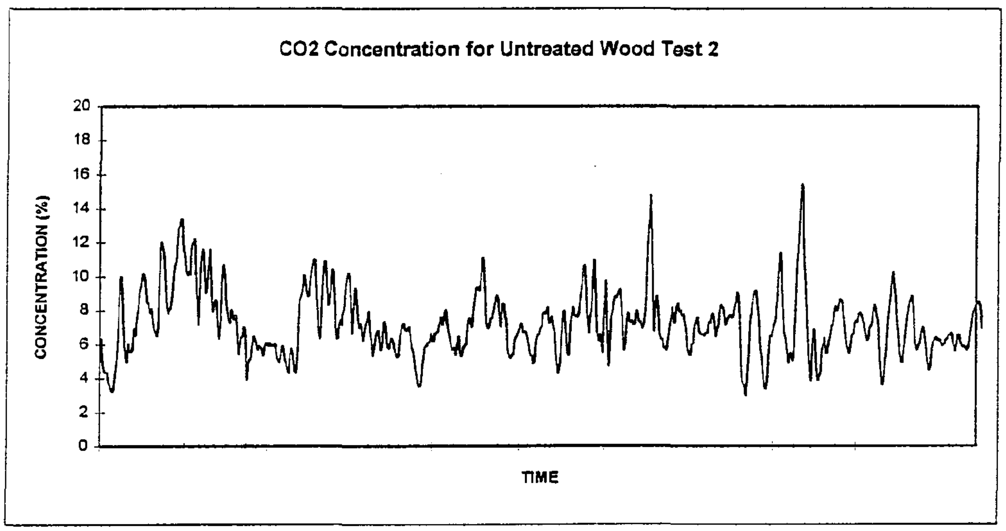
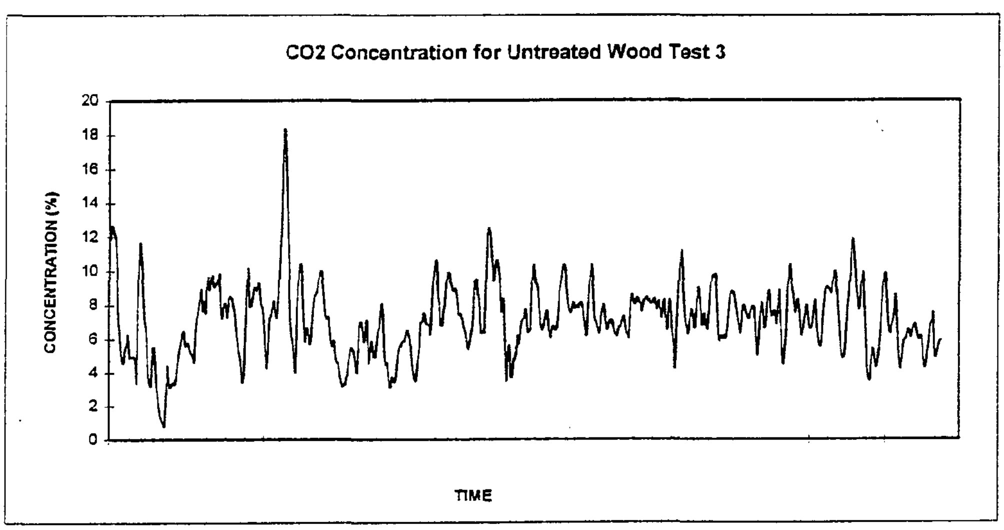
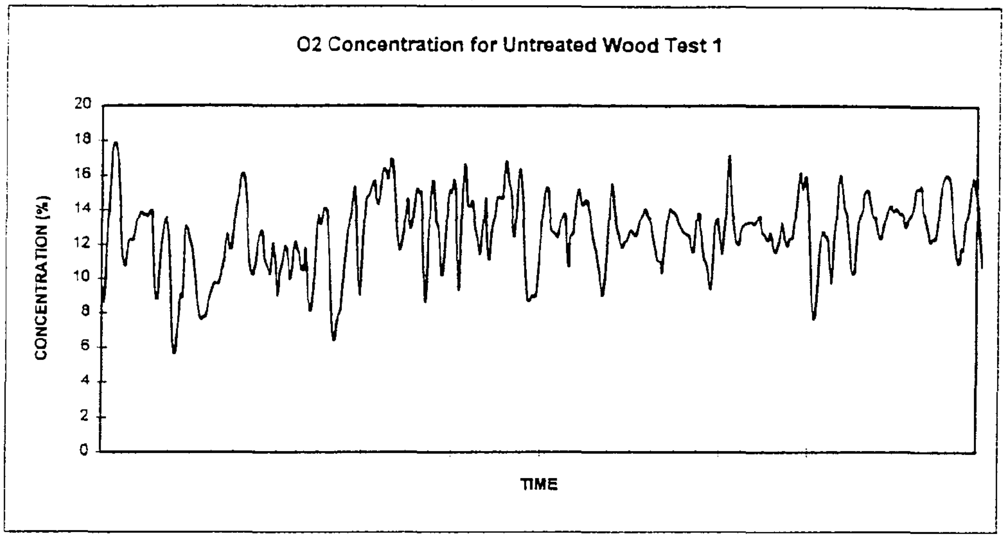
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
TIME


CO Concentration for Untreated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
TIME

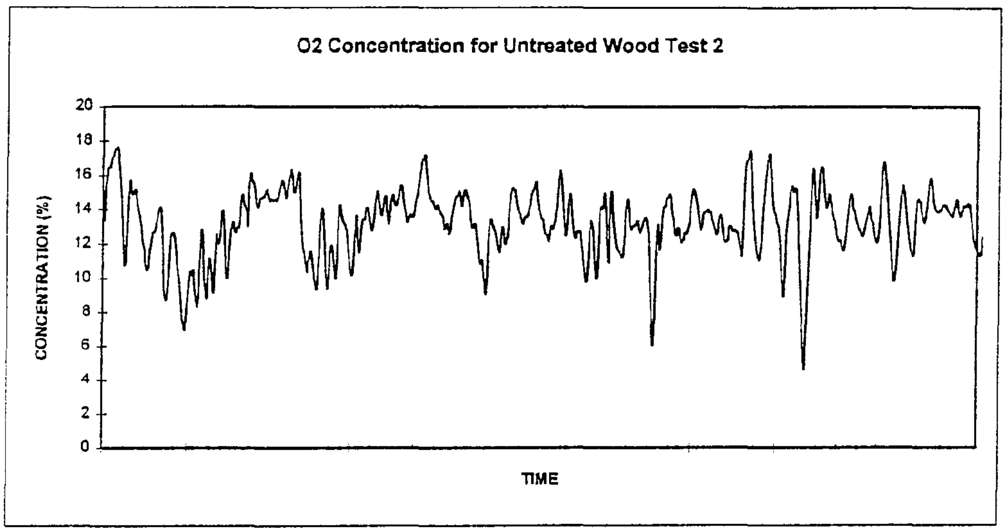

CO2 Concentration for Untreated Wood Test 1
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME


CO2 Concentration for Untreated Wood Test 2
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

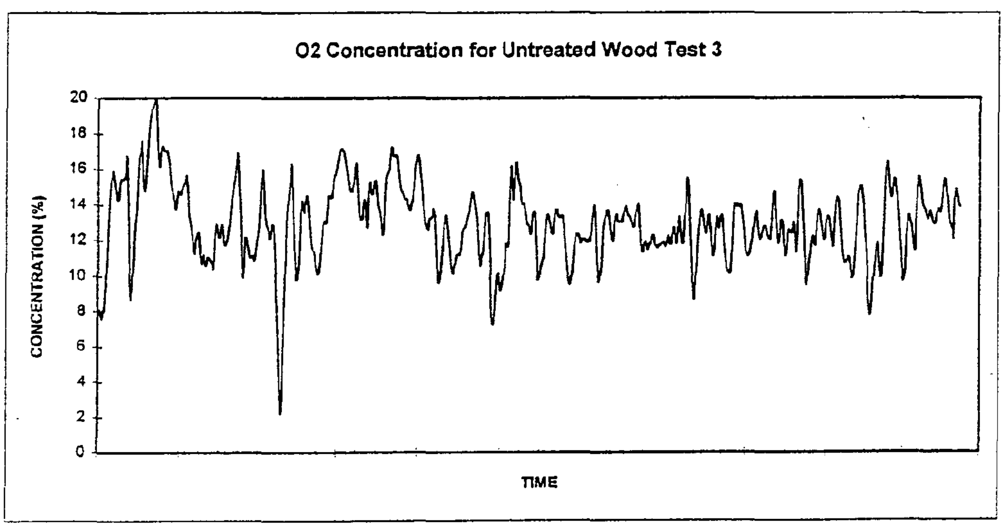

CO2 Concentration for Untreated Wood Test 3
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME



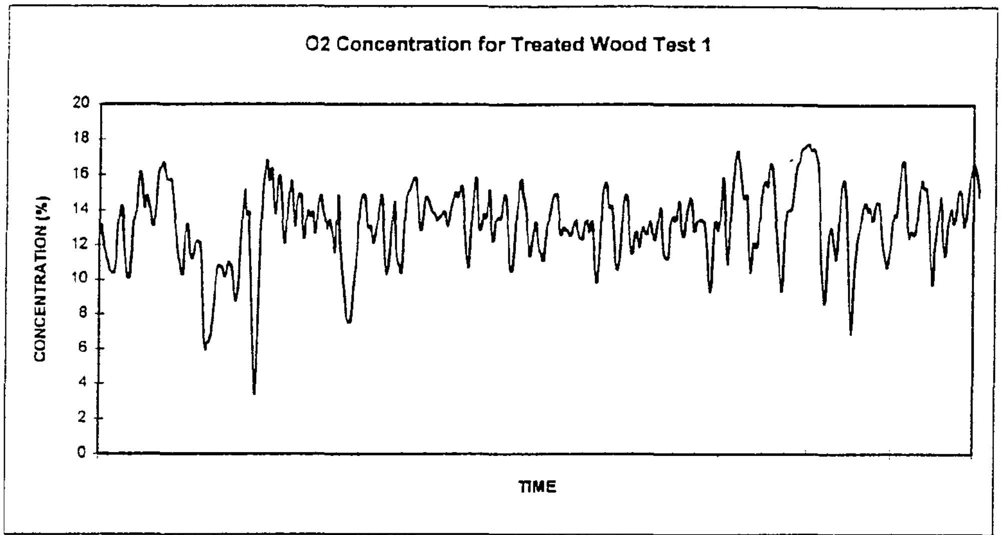
02 Concentration for Untreated Wood Test 1
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

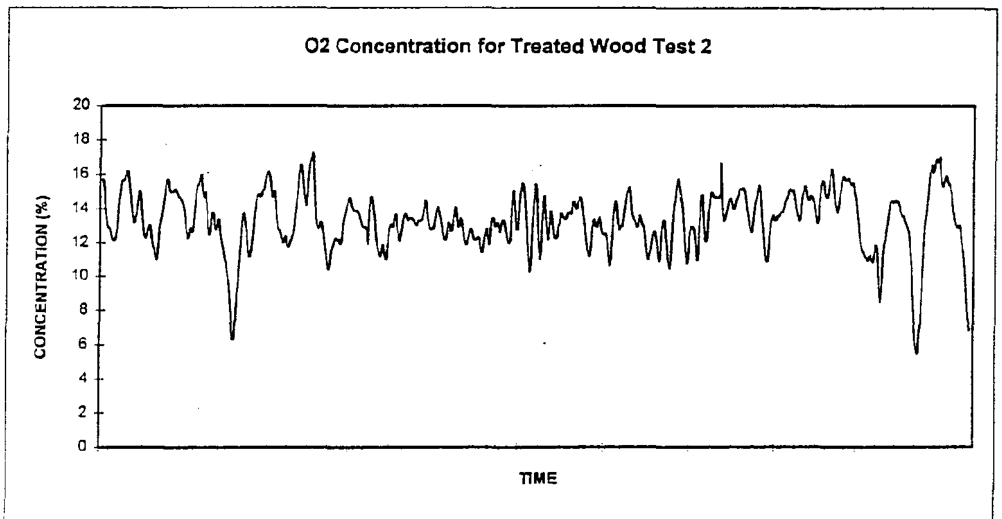


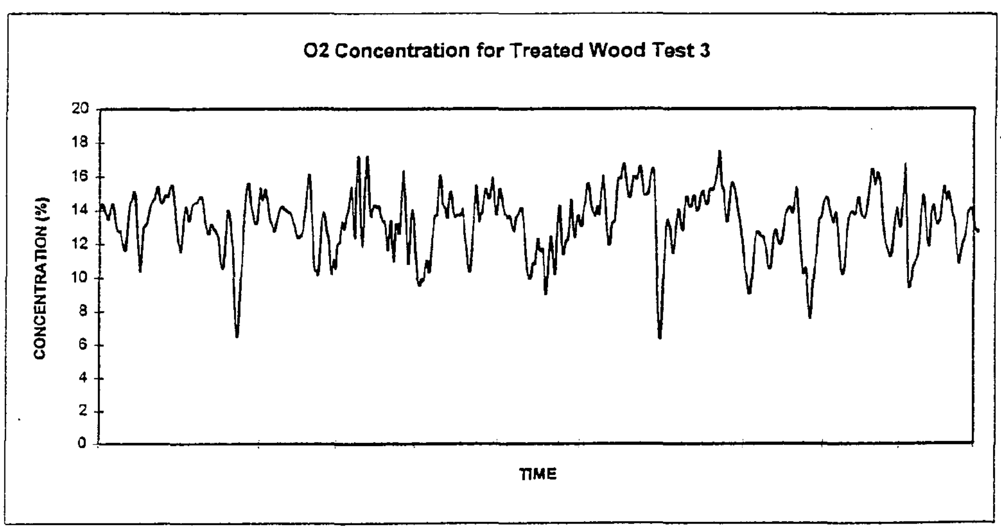
02 Concentration for Untreated Wood Test 2
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

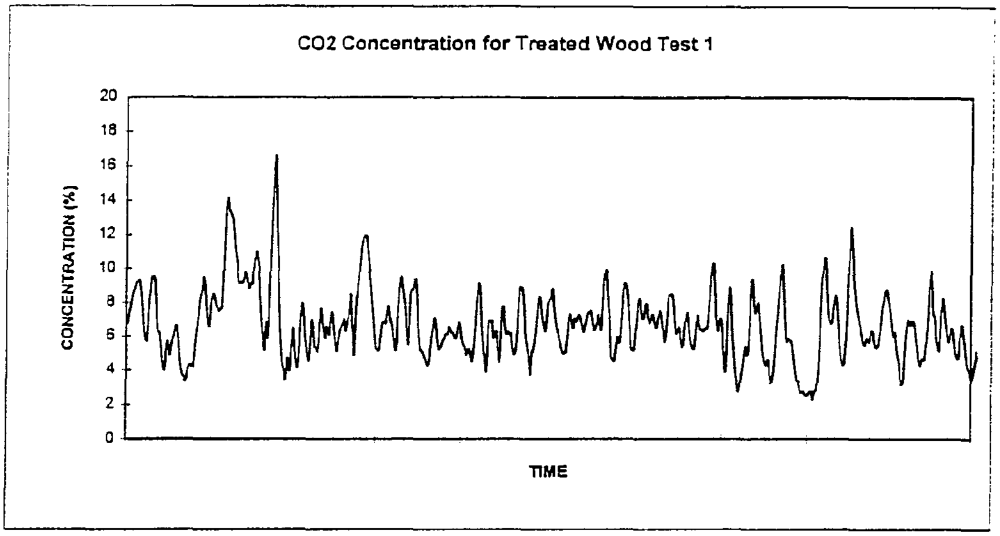


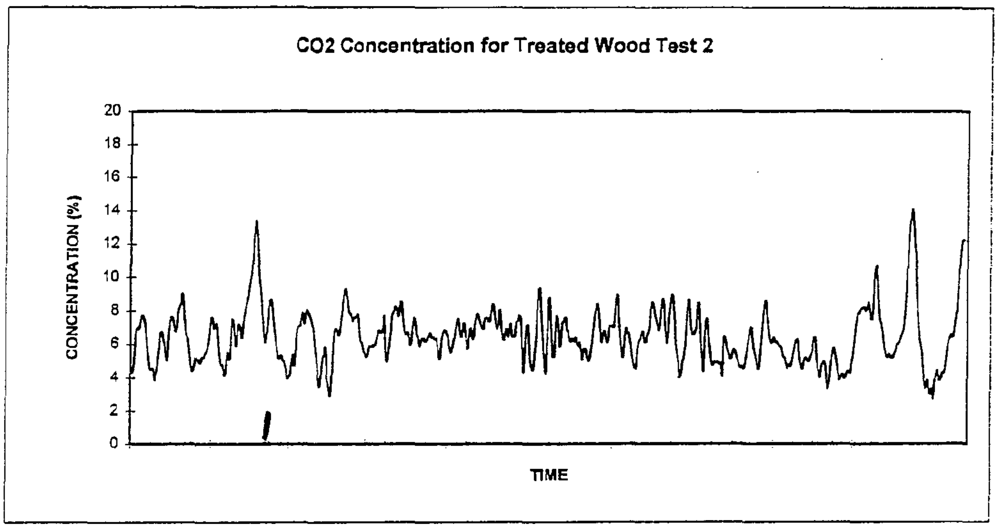
02 Concentration for Untreated Wood Test 3
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

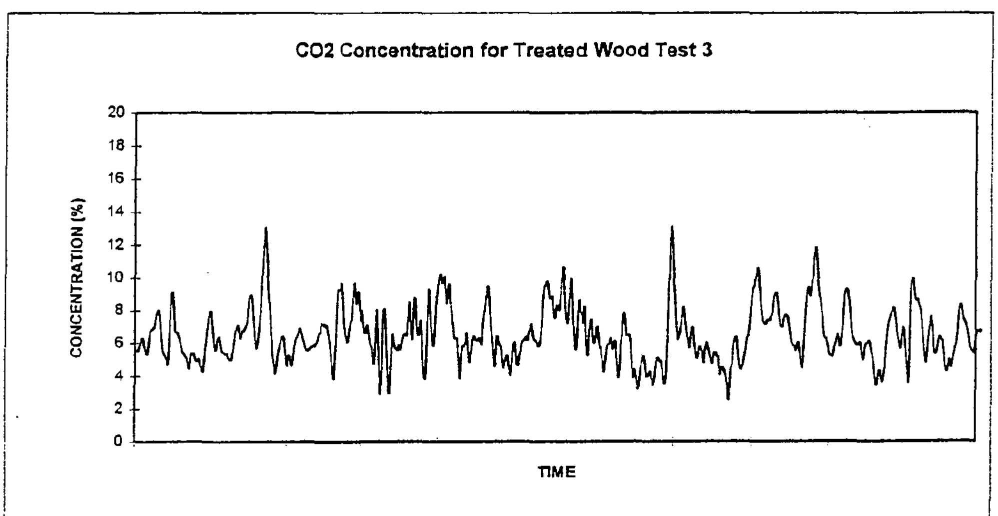

O2 Concentration for Treated Wood Test 1
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

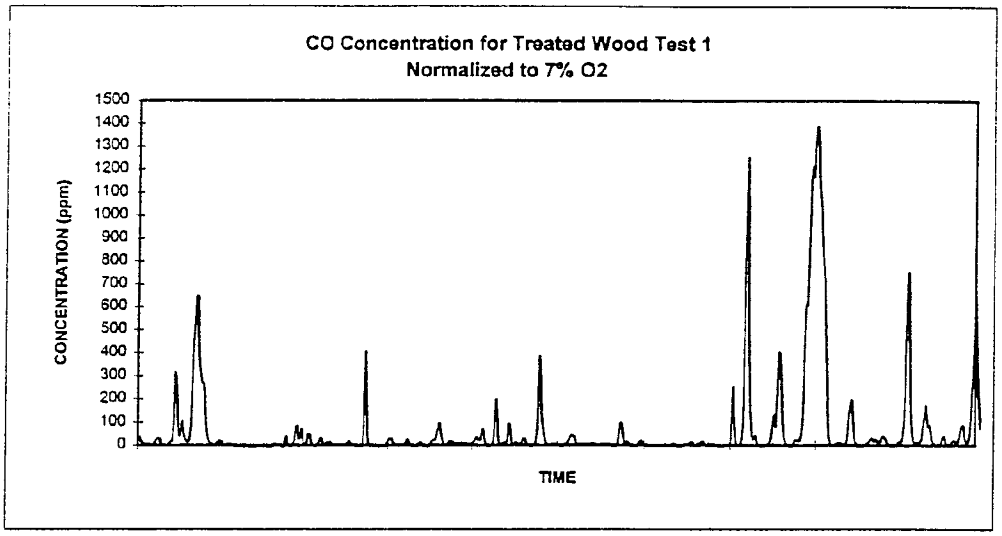

O2 Concentration for Treated Wood Test 2
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

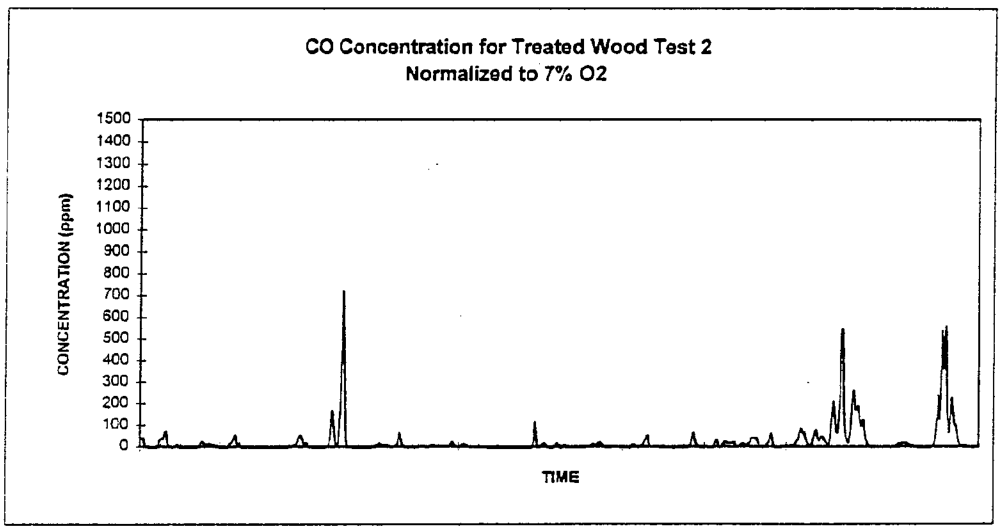

O2 Concentration for Treated Wood Test 3
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

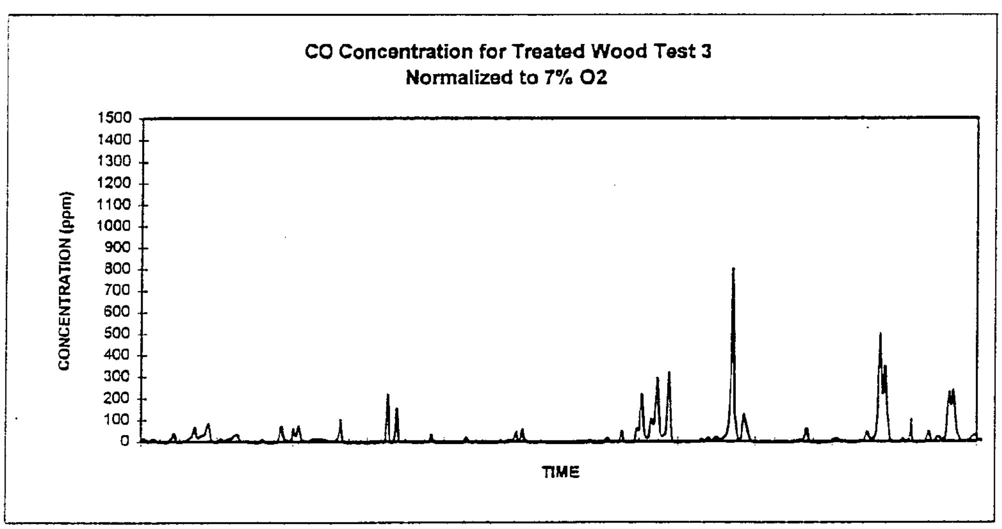

CO2 Concentration for Treated Wood Test 1
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

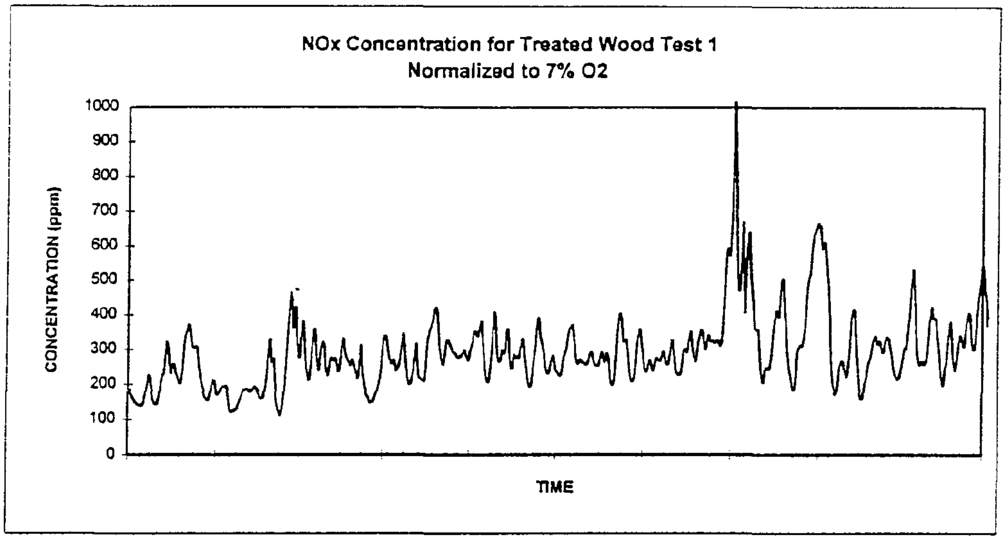

CO2 Concentration for Treated Wood Test 2
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

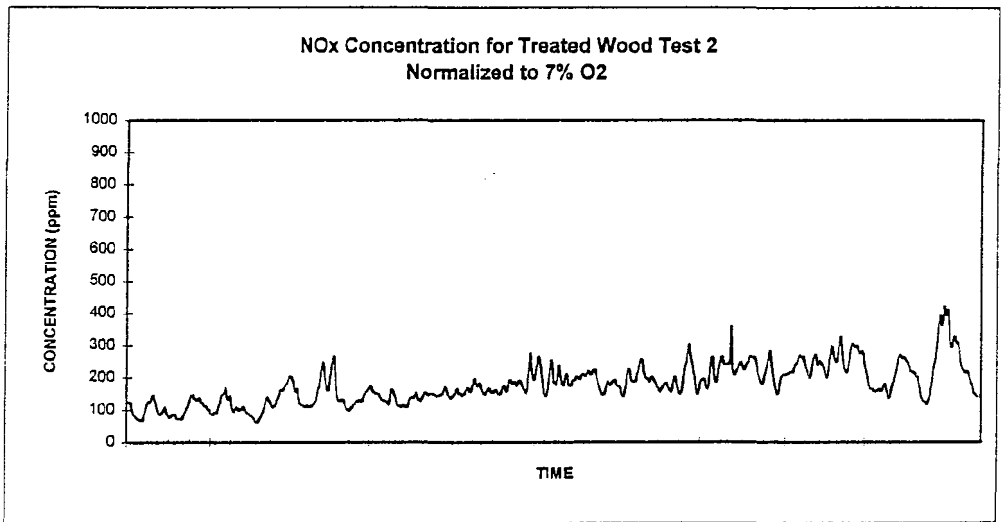

CO2 Concentration for Treated Wood Test 3
CONCENTRATION (%)
20
18
16
14
12
10
8
6
4
2
0
TIME

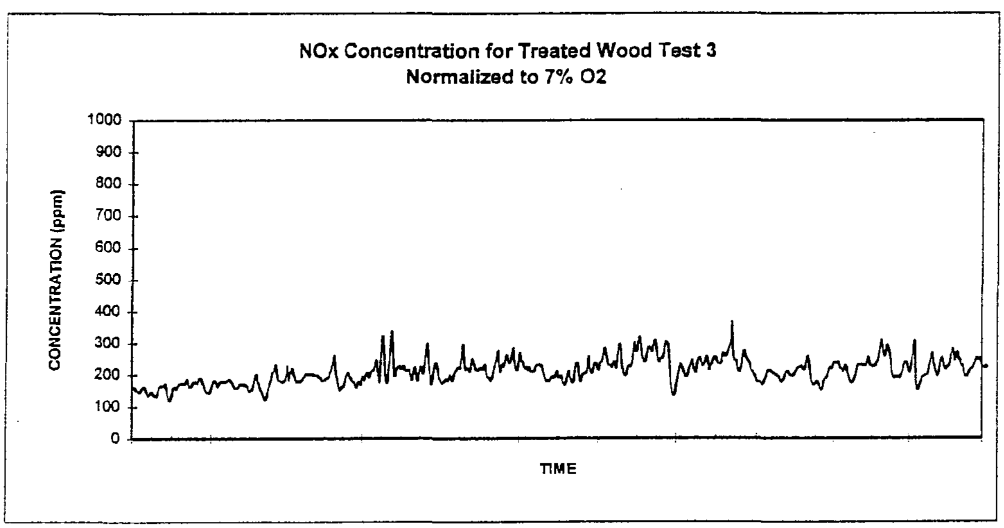

CO Concentration for Treated Wood Test 1
Normalized to 7% O2
CONCENTRATION (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
TIME

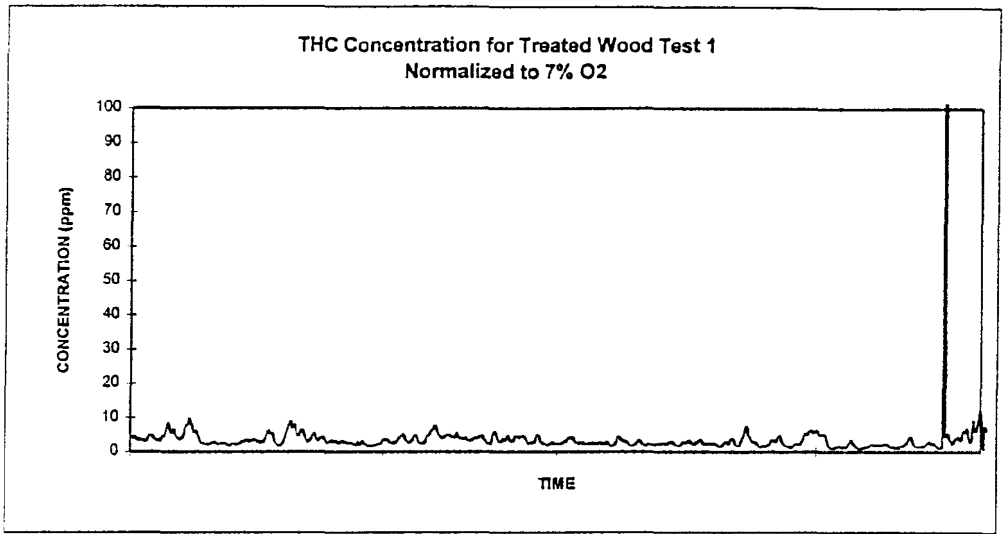

CO Concentration for Treated Wood Test 2
Normalized to 7% O2
CONCENTRATION (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
TIME

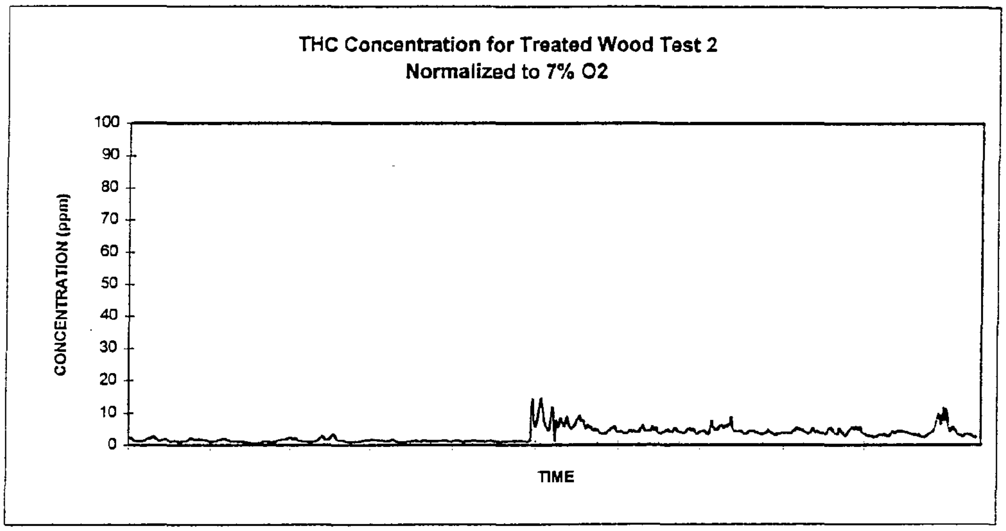

CO Concentration for Treated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
TIME

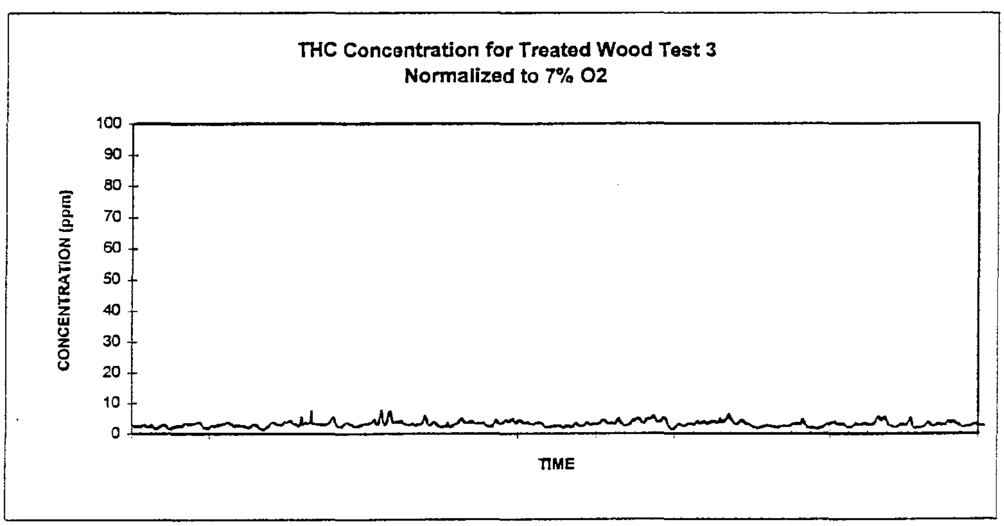

NOx Concentration for Treated Wood Test 1
Normalized to 7% O2
CONCENTRATION (ppm)
1000
900
800
700
600
500
400
300
200
100
0
TIME

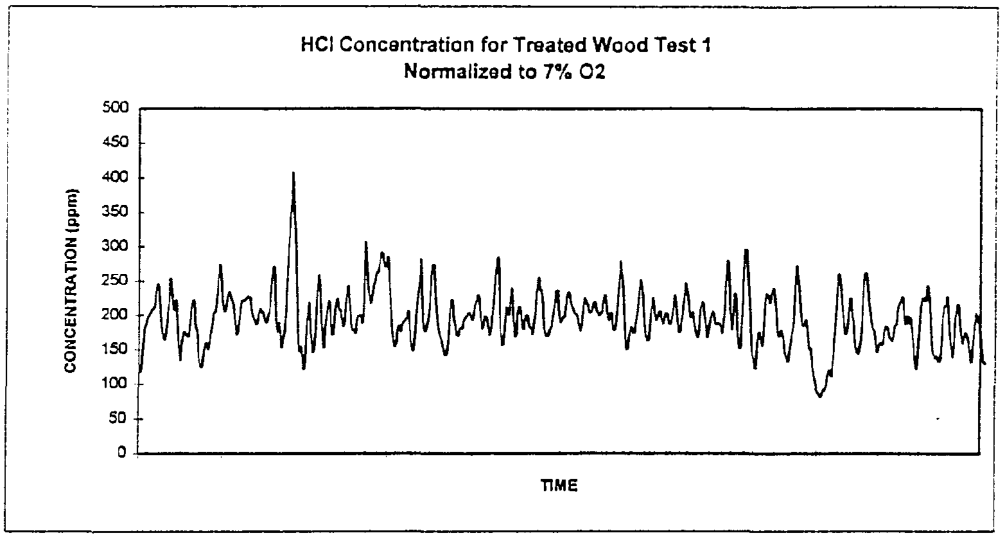

NOx Concentration for Treated Wood Test 2
Normalized to 7% O2
CONCENTRATION (ppm)
1000
900
800
700
600
500
400
300
200
100
0
TIME

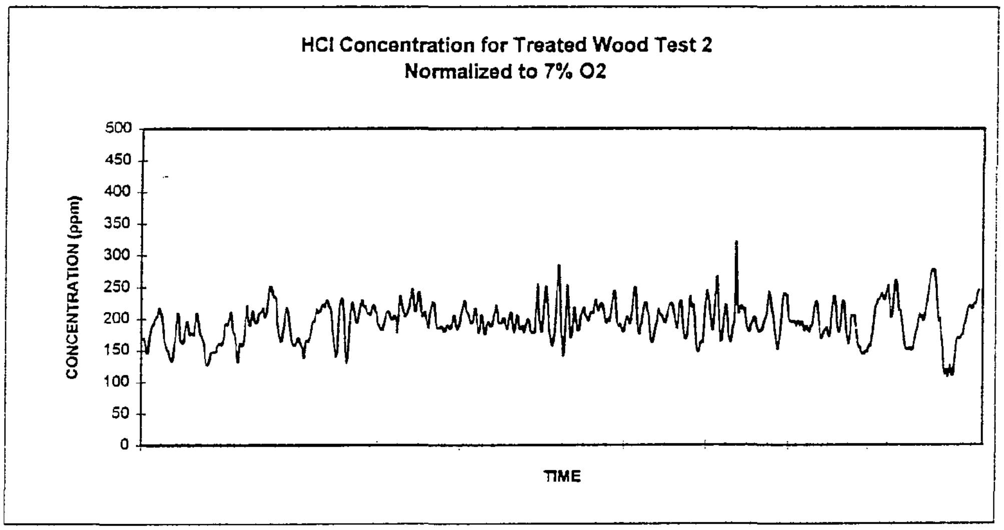

NOx Concentration for Treated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
1000
900
800
700
600
500
400
300
200
100
0
TIME

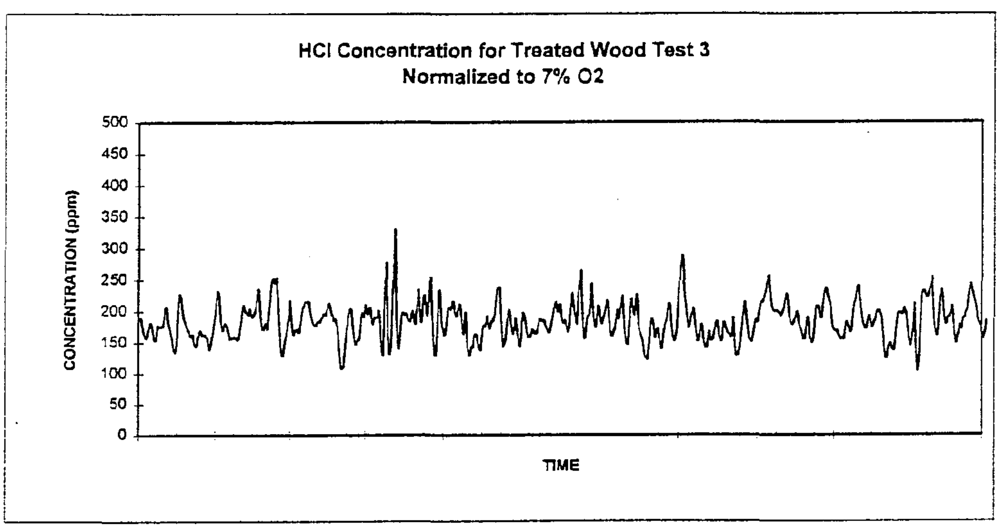

THC Concentration for Treated Wood Test 1
Normalized to 7% O2
CONCENTRATION (ppm)
100
90
80
70
60
50
40
30
20
10
0
TIME

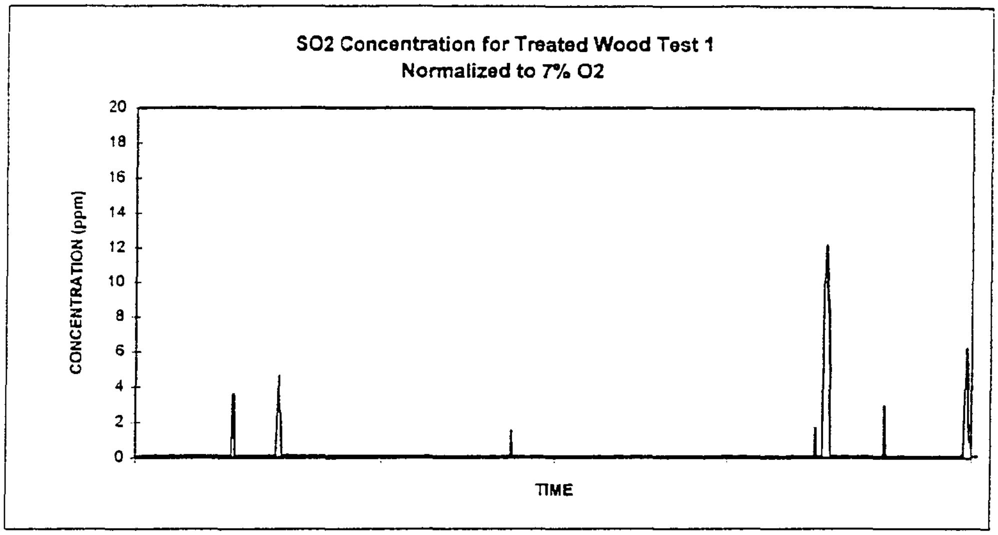

THC Concentration for Treated Wood Test 2
Normalized to 7% O2
CONCENTRATION (ppm)
100
90
80
70
60
50
40
30
20
10
0
TIME

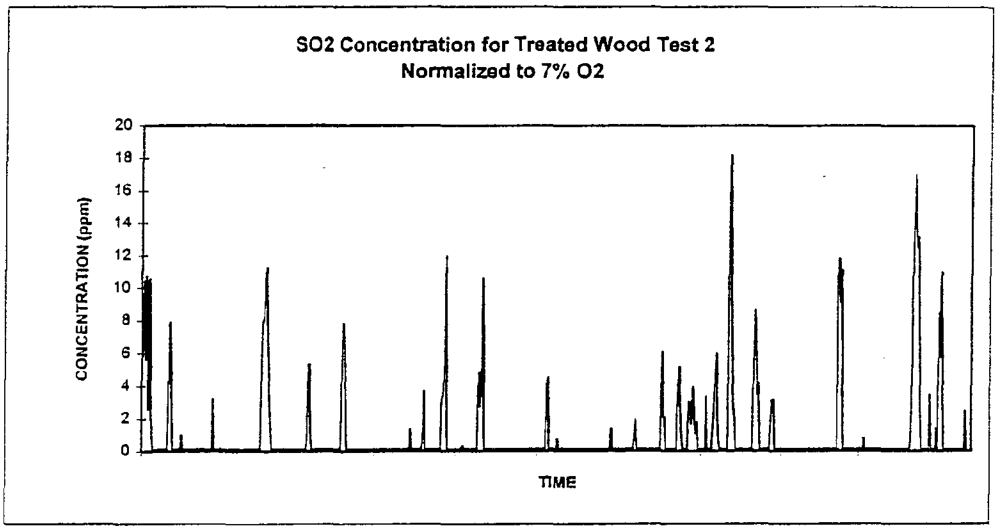

THC Concentration for Treated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
100
90
80
70
60
50
40
30
20
10
0
TIME

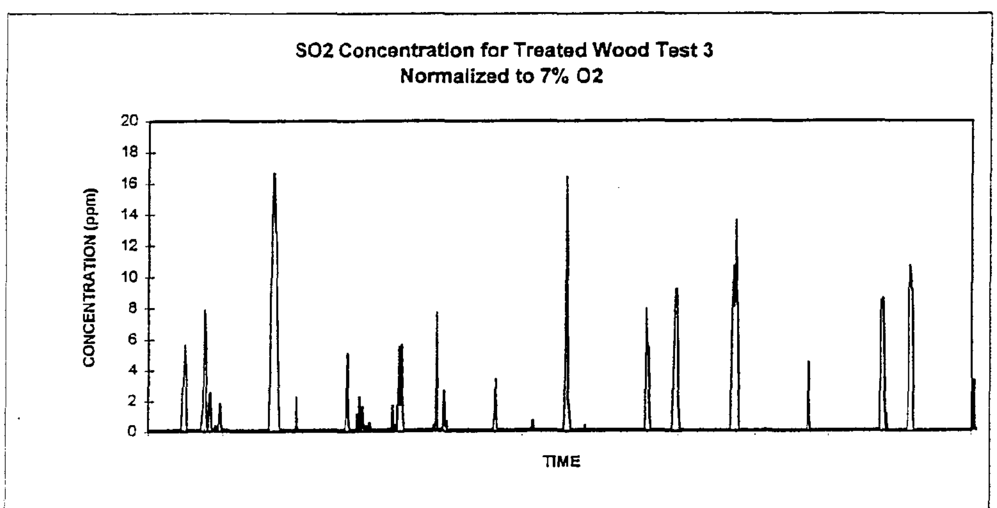

HCl Concentration for Treated Wood Test 1
Normalized to 7% O2
CONCENTRATION (ppm)
500
450
400
350
300
250
200
150
100
50
0
TIME


HCl Concentration for Treated Wood Test 2
Normalized to 7% O2
CONCENTRATION (ppm)
500
450
400
350
300
250
200
150
100
50
0
TIME

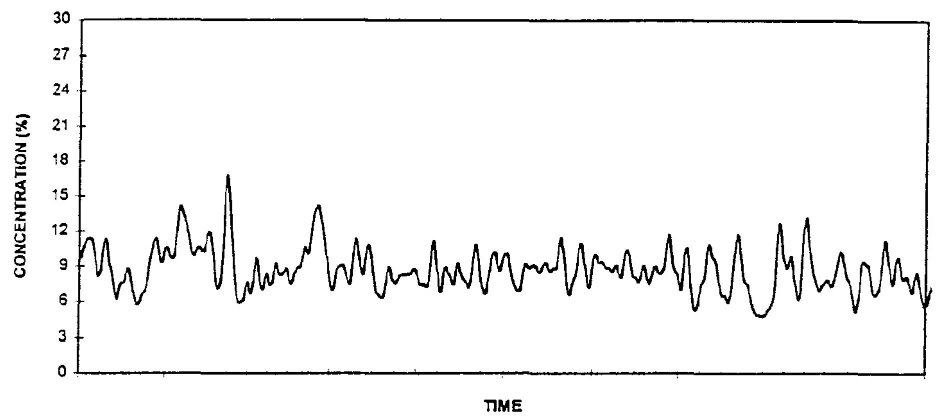

HCl Concentration for Treated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
500
450
400
350
300
250
200
150
100
50
0
TIME


SO2 Concentration for Treated Wood Test 1
Normalized to 7% O2
CONCENTRATION (ppm)
20
18
16
14
12
10
8
6
4
2
0
TIME

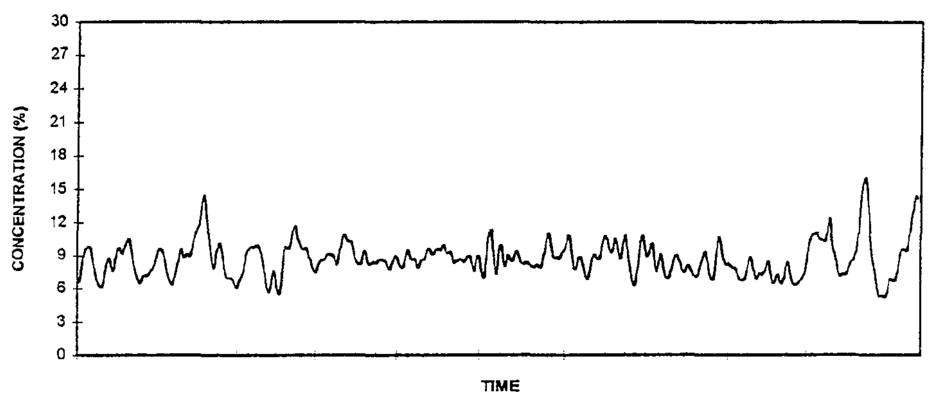

SO2 Concentration for Treated Wood Test 2
Normalized to 7% O2
CONCENTRATION (ppm)
20
18
16
14
12
10
8
6
4
2
0
TIME


SO2 Concentration for Treated Wood Test 3
Normalized to 7% O2
CONCENTRATION (ppm)
20
18
16
14
12
10
8
6
4
2
0
TIME

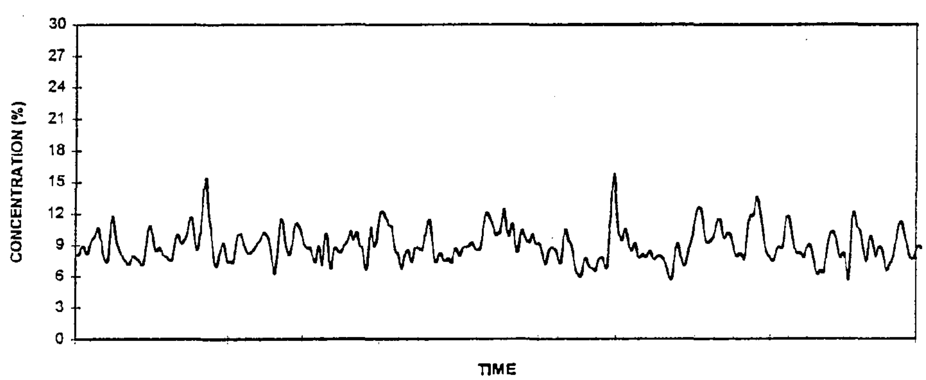
H2O Concentration for Treated Wood Test 1

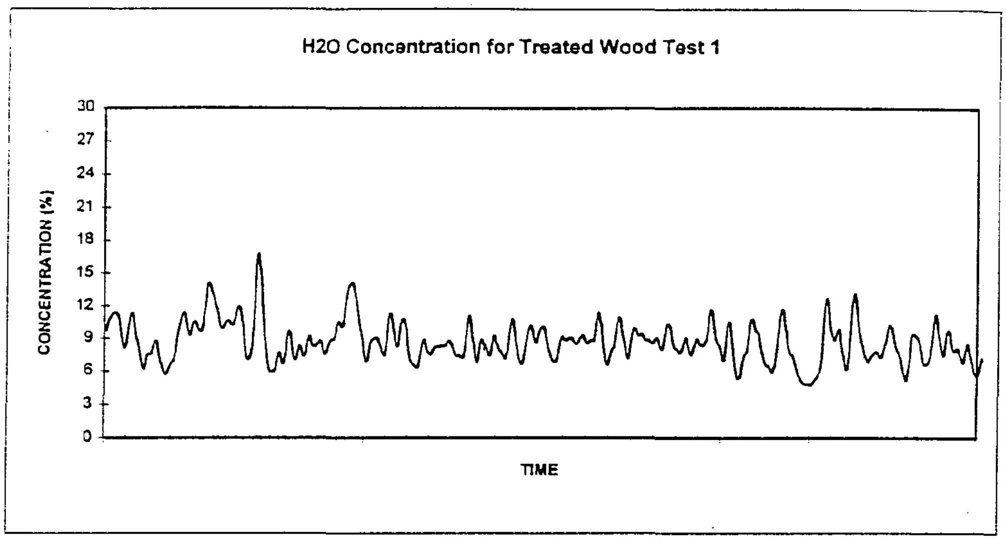


H2O Concentration for Treated Wood Test 2

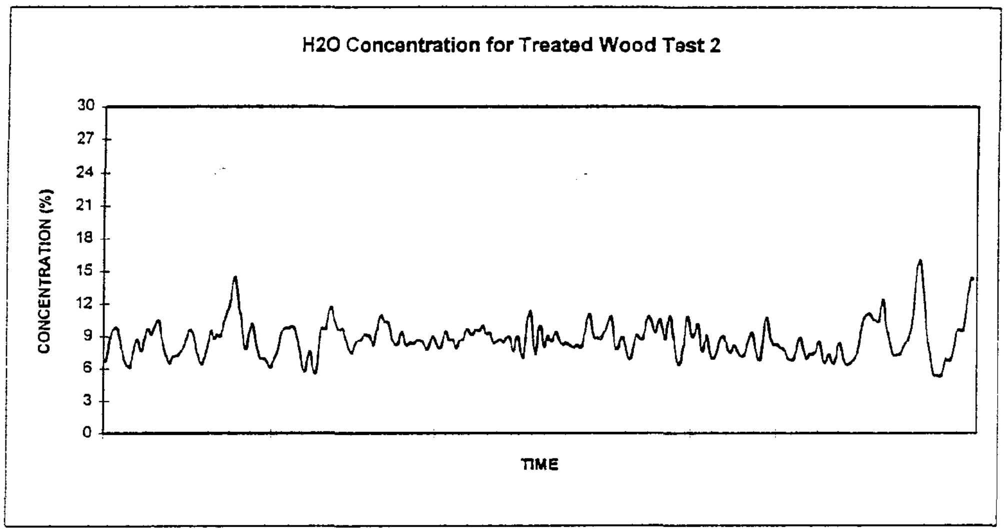


H2O Concentration for Treated Wood Test 3

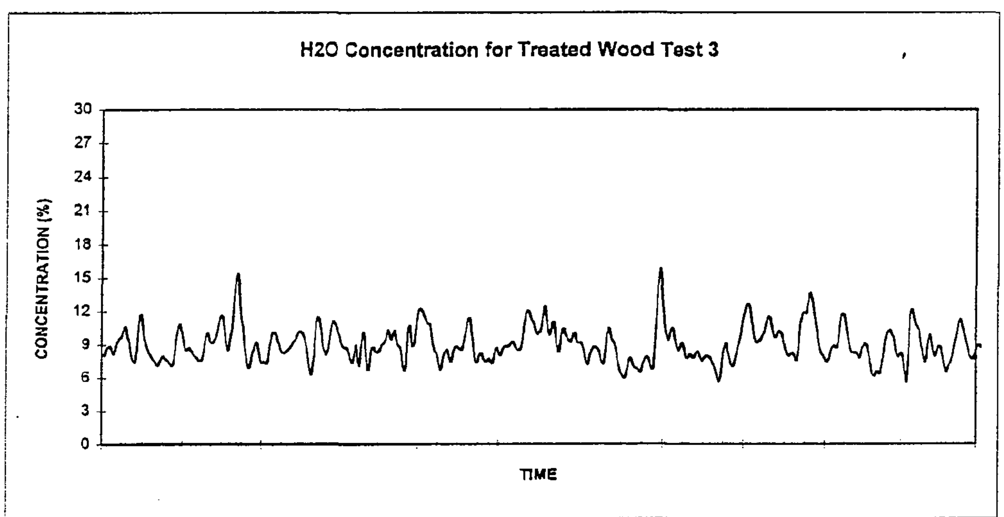




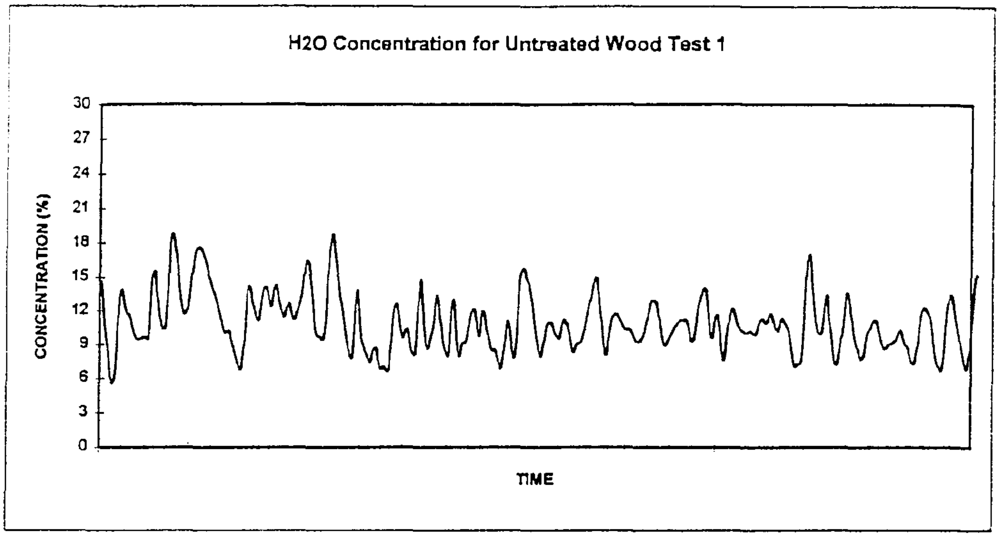
H2O Concentration for Treated Wood Test 1
CONCENTRATION (%)
30
27
24
21
18
15
12
9
6
3
0
TIME

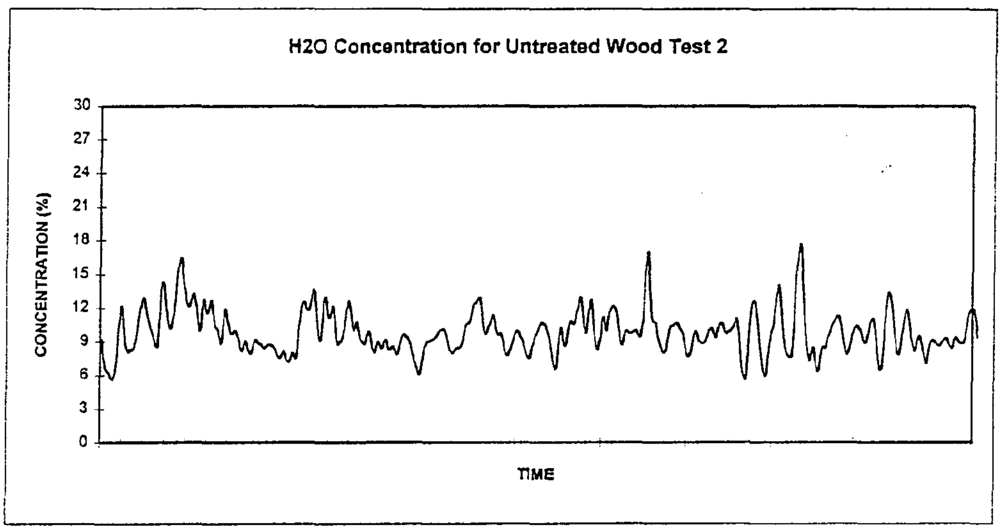


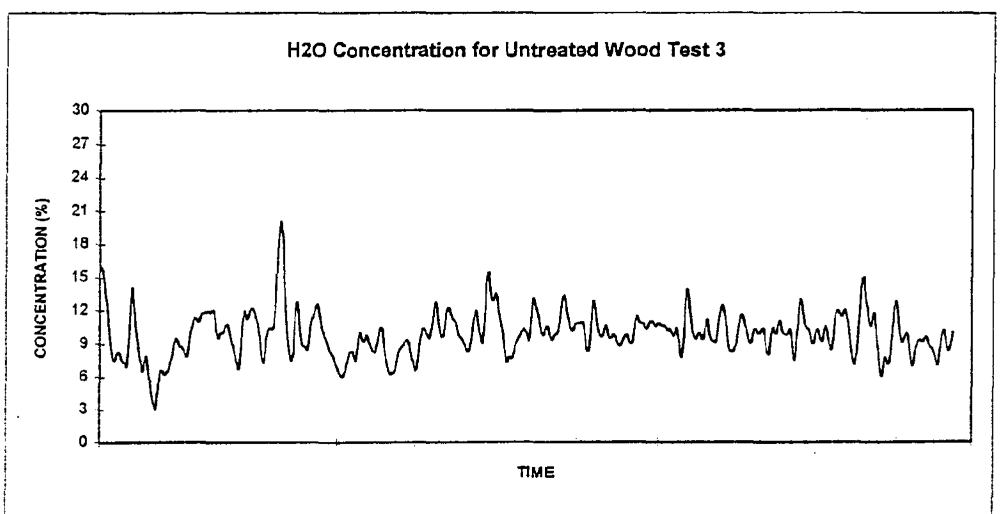
H2O Concentration for Treated Wood Test 2
CONCENTRATION (%)
30
27
24
21
18
15
12
9
6
3
0
TIME



H2O Concentration for Treated Wood Test 3
CONCENTRATION (%)
30
27
24
21
18
15
12
9
6
3
0
TIME


H2O Concentration for Untreated Wood Test 1
CONCENTRATION (%)
30
27
24
21
18
15
12
9
6
3
0
TIME


H2O Concentration for Untreated Wood Test 2
CONCENTRATION (%)
30
27
24
21
18
15
12
9
6
3
0
TIME


H2O Concentration for Untreated Wood Test 3
CONCENTRATION (%)
30
27
24
21
18
15
12
9
6
3
0
TIME

APPENDIX II VOC SAMPLE ANALYSIS RESULTS

Triangle Laboratories of RTP

Project Summary for Project 38560

Client ID:	WWC-VOST-1 -1 TC 9/13/96 UNTREATED	WWC-VOST-1 -2 T/TC 9/13 UNTREATED	WWC-VOST-2 -1 T/TC 9/14 UNTREATED	WWC-VOST-2 -2 T/TC 9/14 UNTREATED	WWC-VOST-3 -1 T/TC 9/15 UNTREATED
Filename :	FT098 #1	FT099 #1	FT100 #2	FT101 #2	FT102 #3
TLI Id :	135-84-1	135-84-2A,B	135-84-3A,B	135-84-4A,B	135-84-6A,B
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
Chloromethane	0.234	0.612	0.382	0.288	0.158
Vinyl Chloride	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,3-Butadiene	(0.001)	0.007	(0.001)	0.004	0.027
Bromomethane	0.013	0.020	0.020	0.014	0.013
Chloroethane	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Vinyl bromide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Trichlorofluoromethane	0.006	0.012	0.010	0.008	0.063
1,1-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Iodomethane	0.012	0.009	0.042	0.015	0.005
Carbon disulfide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Acetone	(0.002)	0.133	0.077	0.089	0.081
Allyl chloride	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Methylene chloride	0.035	0.053	0.121	0.069	0.557
trans-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
tert-Butyl methyl ether	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Acrylonitrile	(0.004)	0.012	(0.004)	(0.004)	0.023
n-Hexane	(0.001)	0.029	0.012	0.005	(0.001)
1,1-Dichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Epoxybutane	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
cis-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Chloroform	(0.001)	0.010	0.003	0.003	0.002
1,2-Dichloroethane	(0.001)	0.015	0.101	0.024	(0.001)
Isooctane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Vinyl acetate	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
2-Butanone	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
1,1,1-Trichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Carbon tetrachloride	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Benzene	0.010	0.292	0.126	0.247	0.591
Trichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Dichloropropane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ethyl acrylate	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Methyl methacrylate	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Bromodichloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
cis-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
trans-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

( )-Estimated Detection Limit

Triangle Laboratories of RTP, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Project Summary for Project 38560

	8/13	8/13	8/14	8/14	8/15
Client ID:	WWC-VOST-1 -1 TC UNTREATED	WWC-VOST-1 -2 T/TC UNTREATED	WWC-VOST-2 -1 T/TC UNTREATED	WWC-VOST-2 -2 T/TC UNTREATED	WWC-VOST-3 -1 T/TC UNTREATED
Filename :	FT098 #1	FT099 #1	FT100 #2	FT101 #2	FT102 #3
TLI Id :	135-84-1	135-84-2A,B	135-84-3A,B	135-84-4A,B	135-84-6A,B
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
1,1,2-Trichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Dibromochloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ethylene dibromide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bromoform	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
4-Methyl-2-pentanone	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Toluene	0.009	0.027	0.018	0.021	0.056
Tetrachloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
2-Hexanone	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Chlorobenzene	(0.001)	0.008	0.004	0.002	0.002
Ethylbenzene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
m-/p-Xylene	(0.001)	0.005	0.008	0.005	0.004
o-Xylene	(0.001)	0.002	0.003	0.002	0.001
Styrene	(0.001)	0.003	0.004	0.004	0.007
1,1,2,2-Tetrachloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cumene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

( )-Estimated Detection Limit

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Client ID:	8/15 WWC-VOST-3 -2 T/TC UNTREATED	8/20 WWC-VOST-4 -1 T/TC TREATED	8/20 WWC-VOST-4 -2 T/TC TREATED	8/21 WWC-VOST-5 -1 T/TC TREATED	8/21 WWC-VOST-5 -2 T/TC TREATED
Filename :	FT103 #3	FT104 #1	FT105 #1	FT106 #2	FT107 #2
TLI Id :	135-84-7A,B	135-84-8A,B	135-84-9A,B	135-84-10A,B	135-84-11A,B
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
Chloromethane	0.244	0.525	0.728	1.145	0.904
Vinyl Chloride	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
1,3-Butadiene	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Bromomethane	0.038	0.094	0.252	0.577	0.144
Chloroethane	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Vinyl bromide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Trichlorofluoromethane	0.039	0.046	0.072	0.050	0.005
1,1-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Iodomethane	0.132	0.007	0.031	0.092	0.016
Carbon disulfide	0.008	(0.001)	0.007	0.004	(0.001)
Acetone	0.097	(0.002)	0.099	0.100	0.148
Allyl chloride	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Methylene chloride	0.396	0.062	0.318	0.206	0.111
trans-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
tert-Butyl methyl ether	(0.001)	(0.001)	(0.001)	0.001	(0.001)
Acrylonitrile	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
n-Hexane	0.015	0.005	0.013	0.017	0.010
1,1-Dichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Epoxybutane	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
cis-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Chloroform	0.004	0.037	0.021	0.019	0.020
1,2-Dichloroethane	(0.001)	0.018	0.017	0.003	0.011
Isooctane	(0.001)	(0.001)	0.001	0.003	(0.001)
Vinyl acetate	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
2-Butanone	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
1,1,1-Trichloroethane	(0.001)	(0.001)	(0.001)	0.005	(0.001)
Carbon tetrachloride	(0.001)	0.012	0.010	0.009	0.005
Benzene	0.057	0.015	0.033	0.030	0.026
Trichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Dichloropropane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ethyl acrylate	0.008	(0.001)	(0.001)	0.003	(0.001)
Methyl methacrylate	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Bromodichloromethane	(0.001)	0.004	0.004	(0.001)	(0.001)
cis-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
trans-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

( )-Estimated Detection Limit

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Project Summary for Project 38560

Client ID:	8/15 WWC-VOST-3 -2 T/TC UNTREATED	8/20 WWC-VOST-4 -1 T/TC TREATED	8/20 WWC-VOST-4 -2 T/TC TREATED	8/21 WWC-VOST-5 -1 T/TC TREATED	8/21 WWC-VOST-5 -2 T/TC TREATED
Filename :	FT103 #3	FT104 #1	FT105 #1	FT106 #2	FT107 #2
TLI Id :	135-84-7A,B	135-84-8A,B	135-84-9A,B	135-84-10A,B	135-84-11A,B
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
1,1,2-Trichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Dibromochloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ethylene dibromide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bromoform	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
4-Methyl-2-pentanone	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Toluene	0.038	0.006	0.039	0.037	0.016
Tetrachloroethene	(0.001)	0.001	0.003	0.006	(0.001)
2-Hexanone	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Chlorobenzene	0.001	0.003	0.002	0.002	0.003
Ethylbenzene	0.005	(0.001)	0.001	0.004	(0.001)
m-/p-Xylene	0.031	0.002	0.006	0.018	0.007
o-Xylene	0.009	(0.001)	0.003	0.011	0.003
Styrene	0.005	(0.001)	0.002	0.003	0.002
1,1,2,2-Tetrachloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cumene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

( )-Estimated Detection Limit

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	8/22	8/22	8/14	8/22	
Client ID:	WWC-VOST-6 -1 T/TC	WWC-VOST-6 -2 T/TC	WWC-VOST-2 -FB T/TC	WWC-VOST-6 -FB T/TC	VOSTBLK 08 2796
	TREATED	TREATED	UNTREATED	TREATED	BLK
Filename :	FT108 #3	FT109 #3	FT096	FT097	FT095
TLI Id :	135-84-12A,B	135-84-13A,B	135-84-5A,B	135-84-14A,B	VOSTBLK 0827
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
Chloromethane	1.938	0.874	0.350	(0.002)	(0.002)
Vinyl Chloride	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,3-Butadiene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bromomethane	1.146	0.268	0.022	0.007	(0.002)
Chloroethane	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Vinyl bromide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Trichlorofluoromethane	0.024	0.010	0.018	0.025	(0.001)
1,1-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Iodomethane	0.291	0.197	0.013	0.016	(0.001)
Carbon disulfide	0.003	0.004	(0.001)	(0.001)	(0.001)
Acetone	0.115	0.178	(0.002)	(0.002)	(0.002)
Allyl chloride	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Methylene chloride	0.382	0.114	0.099	0.280	0.003
trans-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
tert-Butyl methyl ether	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Acrylonitrile	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
n-Hexane	0.012	0.006	0.019	0.005	(0.001)
1,1-Dichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Epoxybutane	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
cis-1,2-Dichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Chloroform	0.037	0.042	(0.001)	0.005	(0.001)
1,2-Dichloroethane	0.043	0.015	(0.001)	(0.001)	(0.001)
Isooctane	0.001	0.001	(0.001)	(0.001)	(0.001)
Vinyl acetate	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
2-Butanone	(0.006)	(0.006)	(0.007)	(0.007)	(0.009)
1,1,1-Trichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Carbon tetrachloride	0.014	0.012	(0.001)	(0.001)	(0.001)
Benzene	0.026	0.036	0.005	0.005	(0.001)
Trichloroethene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1,2-Dichloropropane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ethyl acrylate	(0.001)	0.008	(0.001)	(0.001)	(0.001)
Methyl methacrylate	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Bromodichloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
cis-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
trans-1,3-Dichloropropene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

( )-Estimated Detection Limit

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Triangle Laboratories of RTP

Project Summary for Project 38560

Client ID:	8/22 WWC-VOST-6 -1 T/TC TREATED	8/22 WWC-VOST-6 -2 T/TC TREATED	8/14 WWC-VOST-2 -FB T/TC UNTREATED	8/22 WWC-VOST-6 -FB T/TC TREATED	VOSTBLK 08 2796 BLK
Filename :	FT108 #3	FT109 #3	FT096	FT097	FT095
TLI Id :	135-84-12A,B	135-84-13A,B	135-84-5A,B	135-84-14A,B	VOSTBLK 0827
Matrix :	VOST	VOST	VOST	VOST	VOST
Units :	ug	ug	ug	ug	ug
1,1,2-Trichloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Dibromochloromethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ethylene dibromide	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bromoform	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
4-Methyl-2-pentanone	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Toluene	0.027	0.021	0.018	0.022	(0.001)
Tetrachloroethene	0.001	0.001	(0.001)	(0.001)	(0.001)
2-Hexanone	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Chlorobenzene	0.003	0.004	(0.001)	(0.001)	(0.001)
Ethylbenzene	0.001	0.005	(0.001)	(0.001)	(0.001)
m-/p-Xylene	0.008	0.037	0.001	(0.001)	(0.001)
o-Xylene	0.005	0.011	(0.001)	(0.001)	(0.001)
Styrene	0.002	0.003	(0.001)	(0.001)	(0.001)
1,1,2,2-Tetrachloroethane	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cumene	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

( )-Estimated Detection Limit

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Client ID:	VOSTBLK 08 2696
Filename :	FT089
TLI Id :	VOSTBLK 0826
Matrix :	VOST
Units :	ug

Chloromethane	(0.001)
Vinyl Chloride	(0.001)
1,3-Butadiene	(0.001)
Bromomethane	(0.001)
Chloroethane	(0.002)
Vinyl bromide	(0.001)
Trichlorofluoromethane	(0.001)
1,1-Dichloroethene	(0.001)
Iodomethane	(0.001)
Carbon disulfide	(0.001)
Acetone	(0.002)
Allyl chloride	(0.002)
Methylene chloride	(0.001)
trans-1,2-Dichloroethene	(0.001)
tert-Butyl methyl ether	(0.001)
Acrylonitrile	(0.004)
n-Hexane	(0.001)
1,1-Dichloroethane	(0.001)
1,2-Epoxybutane	(0.004)
cis-1,2-Dichloroethene	(0.001)
Chloroform	(0.001)
1,2-Dichloroethane	(0.001)
Isooctane	(0.001)
Vinyl acetate	(0.001)
2-Butanone	(0.006)
1,1,1-Trichloroethane	(0.001)
Carbon tetrachloride	(0.001)
Benzene	(0.001)
Trichloroethene	(0.001)
1,2-Dichloropropane	(0.001)
Ethyl acrylate	(0.001)
Methyl methacrylate	(0.001)
Bromodichloromethane	(0.001)
cis-1,3-Dichloropropene	(0.001)
trans-1,3-Dichloropropene	(0.001)

( )-Estimated Detection Limit

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Client ID:	VOSTBLK 08 2696
Filename :	FT089
TLI Id :	VOSTBLK 0826
Matrix :	VOST
Units :	ug

1,1,2-Trichloroethane	(0.001)
Dibromochloromethane	(0.001)
Ethylene dibromide	(0.001)
Bromoform	(0.001)
4-Methyl-2-pentanone	(0.001)
Toluene	0.003
Tetrachloroethene	(0.001)
2-Hexanone	(0.001)
Chlorobenzene	(0.001)
Ethylbenzene	(0.001)
m-/p-Xylene	(0.001)
o-Xylene	(0.001)
Styrene	0.001
1,1,2,2-Tetrachloroethane	(0.001)
Cumene	0.001

( )-Estimated Detection Limit

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VOST Analyte Summary Sheet

Sample #	Date	Gas Sample Volume (dscm)	Stack Flow Rate (dscfm)	Flue Gas O2 (%)	Analytes	Analytes (Total ug)	Analytes (ug/dscm)	Analytes (ug/dscm @7% O2)	Semivolatiles Emission Rate (ug/hr)	Semivolatiles Emission Rate (ug/hr @ 7% O2)
Untreated Waste Wood Test # 1										
WWC-VOST-1-1T	8-13-96	0.024	684.862	12.5	Chloromethane	Tubes Broken	N/A	N/A	N/A	N/A
					1,3-Butadiene	Tubes Broken	N/A	N/A	N/A	N/A
					Bromomethane	Tubes Broken	N/A	N/A	N/A	N/A
					Trichlorofluromethane	Tubes Broken	N/A	N/A	N/A	N/A
					Iodomethane	Tubes Broken	N/A	N/A	N/A	N/A
					Carbon disulfide	Tubes Broken	N/A	N/A	N/A	N/A
					Acetone	Tubes Broken	N/A	N/A	N/A	N/A
					Methylene Chloride	Tubes Broken	N/A	N/A	N/A	N/A
					tert-Butyl methyl ether	Tubes Broken	N/A	N/A	N/A	N/A
					Acrylonitrile	Tubes Broken	N/A	N/A	N/A	N/A
					n-Hexane	Tubes Broken	N/A	N/A	N/A	N/A
					Chloroform	Tubes Broken	N/A	N/A	N/A	N/A
					1,2-Dichloroethane	Tubes Broken	N/A	N/A	N/A	N/A
					Isooctane	Tubes Broken	N/A	N/A	N/A	N/A
					1,1,1 - Trichloroethane	Tubes Broken	N/A	N/A	N/A	N/A
					Carbon tetrachloride	Tubes Broken	N/A	N/A	N/A	N/A
					Benzene	Tubes Broken	N/A	N/A	N/A	N/A
					Ethyl Acryate	Tubes Broken	N/A	N/A	N/A	N/A
					Bromodichloromethane	Tubes Broken	N/A	N/A	N/A	N/A
					Toluene	Tubes Broken	N/A	N/A	N/A	N/A
					Tetrachloroethene	Tubes Broken	N/A	N/A	N/A	N/A
					Chlorobenzene	Tubes Broken	N/A	N/A	N/A	N/A
					Ethylbenzene	Tubes Broken	N/A	N/A	N/A	N/A
					m-/p-Xylene	Tubes Broken	N/A	N/A	N/A	N/A
					o-Xylene	Tubes Broken	N/A	N/A	N/A	N/A
					Styrene	Tubes Broken	N/A	N/A	N/A	N/A
Untreated Waste Wood Test # 1										
WWC-VOST-1-2T	8-13-96	0.019	684.862	12.5	Chloromethane	0.612	32.211	53.303	37483.953	62030.183
					1,3-Butadiene	0.007	0.368	0.610	428.738-	709.496
					Bromomethane	0.020	1.053	1.742	1224.966	2027.130
					Trichlorofluromethane	0.012	0.632	1.045	734.979	1216.278
					Iodomethane	0.009	0.474	0.784	551.235	912.209
					Carbon disulfide	0.001	0.053	0.087	61.248	101.357
					Acetone	0.133	7.000	11.584	8148.023	13480.416
					Methylene Chloride	0.053	2.789	4.616	3248.159	5371.895
					tert-Butyl methyl ether	0.001	0.053	0.087	61.248	101.357
					Acrylonitrile	0.012	0.632	1.045	734.979	1216.278
					n-Hexane	0.029	1.526	2.526	1778.200	2939.339
					Chloroform	0.010	0.526	0.871	612.483	1013.565
					1,2-Dichloroethane	0.015	0.789	1.306	918.724	1520.348
					Isooctane	0.001	0.053	0.087	61.248	101.357
					1,1,1 - Trichloroethane	0.001	0.053	0.087	61.248	101.357
					Carbon tetrachloride	0.001	0.053	0.087	61.248	101.357
					Benzene	0.292	15.368	25.432	17884.501	29596.100
					Ethyl Acryate	0.001	0.053	0.087	61.248	101.357
					Bromodichloromethane	0.001	0.053	0.087	61.248	101.357
					Toluene	0.027	1.421	2.352	1653.704	2736.626
					Tetrachloroethene	0.001	0.053	0.087	61.248	101.357
					Chlorobenzene	0.008	0.421	0.697	489.986	810.852
					Ethylbenzene	0.001	0.053	0.087	61.248	101.357
					m-/p-Xylene	0.005	0.263	0.435	306.241	506.783
					o-Xylene	0.002	0.105	0.174	122.497	202.713
					Styrene	0.003	0.158	0.261	183.745	304.070
Untreated Waste Wood Test # 2										
WWC-VOST-2-1T	8-14-96	0.022	587.093	13.2	Chloromethane	0.382	17.364	31.126	17321.763	31050.5
					1,3-Butadiene	0.001	0.045	0.081	45.345	81.3
					Bromomethane	0.020	0.909	1.630	906.899	1625.7
					Trichlorofluromethane	0.010	0.455	0.815	453.449	812.8
					Iodomethane	0.042	1.909	3.422	1904.487	3413.9
					Carbon disulfide	0.001	0.045	0.081	45.345	81.3
					Acetone	0.077	3.500	6.274	3491.558	6258.9
					Methylene Chloride	0.121	5.500	9.859	5486.736	9835.4
					tert-Butyl methyl ether	0.001	0.045	0.081	45.345	81.3
					Acrylonitrile	0.004	0.182	0.326	181.380	325.1
					n-Hexane	0.012	0.545	0.978	544.139	975.4
					Chloroform	0.003	0.136	0.244	136.035	243.9
					1,2-Dichloroethane	0.101	4.591	8.230	4579.838	8209.7
					Isooctane	0.001	0.045	0.081	45.345	81.3
					1,1,1 - Trichloroethane	0.001	0.045	0.081	45.345	81.3
					Carbon tetrachloride	0.001	0.045	0.081	45.345	81.3
					Benzene	0.126	5.727	10.267	5713.461	10241.8
					Ethyl acryate	0.001	0.045	0.081	45.345	81.3
					Bromodichloromethane	0.001	0.045	0.081	45.345	81.3
					Toluene	0.018	0.818	1.467	816.209	1463.1
					Tetrachloroethene	0.001	0.045	0.081	45.345	81.3
					Chlorobenzene	0.004	0.182	0.326	181.380	325.1
					Ethylbenzene	0.001	0.045	0.081	45.345	81.3
					m-/p-Xylene	0.008	0.364	0.652	362.759	650.3
					o-Xylene	0.003	0.136	0.244	136.035	243.9
					Styrene	0.004	0.182	0.326	181.380	325.1
Untreated Waste Wood Test # 2										
WWC-VOST-2-2T	8-14-96	0.020	587.093	13.2	Chloromethane	0.288	14.400	25.813	14365.273	25750.8
					1,3-Butadiene	0.004	0.200	0.359	199.518	357.7
					Bromomethane	0.014	0.700	1.255	698.312	.1251.8
					Trichlorofluromethane	0.008	0.400	0.717	399.035	715.3
					Iodomethane	0.015	0.750	1.344	748.191	1341.2
					Carbon disulfide	0.001	0.050	0.090	49.879	89.4
					Acetone	0.089	4.450	7.977	4439.268	7957.7
					Methylene Chloride	0.069	3.450	6.184	3441.680	6169.5
					tert-Butyl methyl ether	0.001	0.050	0.090	49.879	89.4
					Acrylonitrile	0.004	0.200	0.359	199.518	357.7
					n-Hexane	0.005	0.250	0.448	249.397	447.1

					Chloroform	0.003	0.150	0.269	149.638	268.2
					1,2-Dichloroethane	0.024	1.200	2.151	1197.106	2145.9
					Isooctane	0.001	0.050	0.090	49.879	89.4
					1,1,1 - Trichloroethane	0.001	0.050	0.090	49.879	89.4
					Carbon tetrachloride	0.001	0.050	0.090	49.879	89.4
					Benzene	0.247	12.350	22.138	12320.217	22084.9
					Ethyl acryate	0.001	0.050	0.090	49.879	89.4
					Bromodichloromethane	0.001	0.050	0.090	49.879	89.4
					Toluene	0.021	1.050	1.882	1047.468	1877.7
					Tetrachloroethene	0.001	0.050	0.090	49.879	89.4
					Chlorobenzene	0.002	0.100	0.179	99.759	178.8
					Ethylbenzene	0.001	0.050	0.090	49.879	89.4
					m-/p-Xylene	0.005	0.250	0.448	249.397	447.1
					o-Xylene	0.002	0.100	0.179	99.759	178.8
					Styrene	0.004	0.200	0.359	199.518	357.7
Untreated Waste Wood Test # 3 WWC-VOST-3-1T	8-15-96	0.020	631.546	12.9	Chloromethane	0.158	7.900	13.654	8477.671	14652.8
					1,3-Butadiene	0.027	1.350	2.333	1448.716	2504.0
					Bromomethane	0.013	0.650	1.123	697.530	1205.6
					Trichlorofluromethane	0.063	3.150	5.444	3380.337	5842.6
					Iodomethane	0.005	0.250	0.432	268.281	463.7
					Carbon disulfide	0.001	0.050	0.086	53.656	92.7
					Acetone	0.081	4.050	7.000	4346.148	7511.9
					Methylene Chloride	0.557	27.850	48.136	29886.475	51655.6
					tert-Butyl methyl ether	0.001	0.050	0.086	53.656	92.7
					Acrylonitrile	0.023	1.150	1.988	1234.091	2133.0
					n-Hexane	0.001	0.050	0.086	53.656	92.7
					Chloroform	0.002	0.100	0.173	107.312	185.5
					1,2-Dichloroethane	0.001	0.050	0.086	53.656	92.7
					isooctane	0.001	0.050	0.086	53.656	92.7
					1,1,1 - Trichloroethane	0.001	0.050	0.086	53.656	92.7
					Carbon tetrachloride	0.001	0.050	0.086	53.656	92.7
					Benzene	0.591	29.550	51.074	31710.784	54808.8
					Ethyl acryate	0.001	0.050	0.086	53.656	92.7
					Bromodichloromethane	0.001	0.050	0.086	53.656	92.7
					Toluene	0.056	2.800	4.840	3004.744	5193.4
					Tetrachloroethene	0.001	0.050	0.086	53.656	92.7
					Chlorobenzene	0.002	0.100	0.173	107.312	185.5
					Ethylbenzene	0.001	0.050	0.086	53.656	92.7
					m-/p-Xylene	0.004	0.200	0.346	214.625	371.0
					o-Xylene	0.001	0.050	0.086	53.656	92.7
					Styrene	0.007	0.350	0.605	375.593	649.2
Untreated Waste Wood Test # 3 WWC-VOST-3-2T	8-15-96	0.021	631.546	12.9	Chloromethane	0.244	11.619	20.082	12468.667	21550.8
					1,3-Butadiene	0.001	0.048	0.082	51.101	88.3
					Bromomethane	0.038	1.810	3.128	1941.842	3356.3
					Trichlorofluromethane	0.039	1.857	3.210	1992.943	3444.6
					Iodomethane	0.132	6.286	10.864	6745.344	11658.6
					Carbon disulfide	0.008	0.381	0.658	408.809	706.6
					Acetone	0.097	4.619	7.984	4956.806	8567.3
					Methylene Chloride	0.396	18.857	32.593	20236.033	34975.9
					tert-Butyl methyl ether	0.001	0.048	0.082	51.101	88.3
					Acrylonitrile	0.004	0.190	0.329	204.404	353.3
					n-Hexane	0.015	0.714	1.235	766.516	1324.8
					Chloroform	0.004	0.190	0.329	204.404	353.3
					1,2-Dichloroethane	0.001	0.048	0.082	51.101	88.3
					isooctane	0.001	0.048	0.082	51.101	88.3
					1,1,1 - Trichloroethane	0.001	0.048	0.082	51.101	88.3
					Carbon tetrachloride	0.001	0.048	0.082	51.101	88.3
					Benzene	0.057	2.714	4.691	2912.762	5034.4
					Ethyl acryate	0.008	0.381	0.658	408.809	706.6
					Bromodichloromethane	0.001	0.048	0.082	51.101	88.3
					Toluene	0.038	1.810	3.128	1941.842	3356.3
					Tetrachloroethene	0.001	0.048	0.082	51.101	88.3
					Chlorobenzene	0.001	0.048	0.082	51.101	88.3
					Ethylbenzene	0.005	0.238	0.412	255.505	441.6
					m-/p-Xylene	0.031	1.476	2.551	1584.134	2738.0
					o-Xylene	0.009	0.429	0.741	459.910	794.9
					Styrene	0.005	0.238	0.412	255.505	441.6
Treated Waste Wood Test # 1 WWC-VOST-4-1T	8-20-96	0.020	884.52	13.1	Chloromethane	0.525	26.250	46.756	39453.219	70272.9
					1,3-Butadiene	0.002	0.100	0.178	150.298	267.7
					Bromomethane	0.094	4.700	8.372	7064.005	12582.2
					Trichlorofluromethane	0.046	2.300	4.097	3456.853	6157.2
					Iodomethane	0.007	0.350	0.623	526.043	937.0
					Carbon disulfide	0.001	0.050	0.089	75.149	133.9
					Acetone	0.002	0.100	0.178	150.298	267.7
					Methylene Chloride	0.062	3.100	5.522	4659.237	8298.9
					tert-Butyl methyl ether	0.001	0.050	0.089	75.149	133.9
					Acrylonitrile	0.005	0.250	0.445	375.745	669.3
					n-Hexane	0.005	0.250	0.445	375.745	669.3
					Chloroform	0.037	1.850	3.295	2780.513	4952.6
					1,2-Dichloroethane	0.018	0.900	1.603	1352.682	2409.4
					isooctane	0.001	0.050	0.089	75.149	133.9
					1,1,1 - Trichloroethane	0.001	0.050	0.089	75.149	133.9
					Carbon tetrachloride	0.012	0.600	1.069	901.788	1606.2
					Benzene	0.015	0.750	1.336	1127.235	2007.8
					Ethyl acryate	0.001	0.050	0.089	75.149	133.9
					Bromodichloromethane	0.004	0.200	0.356	300.596	535.4
					Toluene	0.006	0.300	0.534	450.894	803.1
					Tetrachloroethene	0.001	0.050	0.089	75.149	133.9
					Chlorobenzene	0.003	0.150	0.267	225.447	401.6
					Ethylbenzene	0.001	0.050	0.089	75.149	133.9
					m-/p-Xylene	0.002	0.100	0.178	150.298	267.7
					o-Xylene	0.001	0.050	0.089	75.149	133.9
					Styrene	0.001	0.050	0.089	75.149	133.9
Treated Waste Wood Test # 1 WWC-VOST-4-2T	8-20-96	0.020	884.52	13.1	Chloromethane	0.728	36.400	64.835	54708.464	97445.1
					1,3-Butadiene	0.001	0.050	0.089	75.149	133.9
					Bromomethane	0.252	12.600	22.443	18937.545	33731.0
					Trichlorofluromethane	0.072	3.600	6.412	5410.727	9637.4

					Iodomethane	0.031	1.550	2.761	2329.619	4149.4
					Carbon disulfide	0.007	0.350	0.623	526.043	937.0
					Acetone	0.099	4.950	8.817	7439.750	13251.5
					Methylene Chloride	0.318	15.900	28.321	23897.379	42565.3
					tert-Butyl methyl ether	0.001	0.050	0.089	75.149	133.9
					Acrylonitrile	0.004	0.200	0.356	300.596	535.4
					n-Hexane	0.013	0.650	1.158	976.937	1740.1
					Chloroform	0.021	1.050	1.870	1578.129	2810.9
					1,2-Dichloroethane	0.017	0.850	1.514	1277.533	2275.5
					isooctane	0.001	0.050	0.089	75.149	133.9
					1,1,1 - Trichloroethane	0.001	0.050	0.089	75.149	133.9
					Carbon tetrachloride	0.010	0.500	0.891	751.490	1338.5
					Benzene	0.033	1.650	2.939	2479.917	4417.2
					Ethyl acryate	0.001	0.050	0.089	75.149	133.9
					Bromodichloromethane	0.004	0.200	0.356	300.596	535.4
					Toluene	0.039	1.950	3.473	2930.811	5220.3
					Tetrachloroethene	0.003	0.150	0.267	225.447	401.8
					Chlorobenzene	0.002	0.100	0.178	150.298	267.7
					Ethylbenzene	0.001	0.050	0.089	75.149	133.9
					m-/p-Xylene	0.006	0.300	0.534	450.894	803.1
					o-Xylene	0.003	0.150	0.267	225.447	401.8
					Styrene	0.002	0.100	0.178	150.298	267.7
Treated Waste Wood Test # 2 WWC-VOST-5-1T	8-21-96	0.019	742.778	13.3	Chloromethane	1.145	60.263	107.339	76059.842	137575.9
					1,3-Butadiene	0.001	0.053	0.094	66.428	120.2
					Bromomethane	0.577	30.368	54.091	38328.848	69328.7
					Trichlorofluromethane	0.050	2.632	4.687	3321.390	6007.7
					Iodomethane	0.092	4.842	8.625	6111.358	11054.1
					Carbon disulfide	0.004	0.211	0.375	265.711	480.6
					Acetone	0.100	5.263	9.375	6642.781	12015.4
					Methylene Chloride	0.206	10.842	19.312	13684.129	24751.7
					tert-Butyl methyl ether	0.001	0.053	0.094	66.428	120.2
					Acrylonitrile	0.004	0.211	0.375	265.711	480.6
					n-Hexane	0.017	0.895	1.594	1129.273	2042.6
					Chloroform	0.019	1.000	1.781	1262.128	2282.9
					1,2-Dichloroethane	0.003	0.158	0.281	199.283	360.5
					Isooctane	0.003	0.158	0.281	199.283	360.5
					1,1,1-Trichloroethane	0.005	0.263	0.469	332.139	600.8
					Carbon tetrachloride	0.009	0.474	0.844	597.850	1081.4
					Benzene	0.030	1.579	2.812	1992.834	3604.6
					Ethyl acryate	0.003	0.158	0.281	199.283	360.5
					Bromodichloromethane	0.001	0.053	0.094	66.428	120.2
					Toluene	0.037	1.947	3.469	2457.829	4445.7
					Tetrachloroethene	0.006	0.316	0.562	398.567	720.9
					Chlorobenzene	0.002	0.105	0.187	132.856	240.3
					Ethylbenzene	0.004	0.211	0.375	265.711	480.6
					m-/p-Xylene	0.018	0.947	1.687	1195.701	2162.8
					o-Xylene	0.011	0.579	1.031	730.706	1321.7
					Styrene	0.003	0.158	0.281	199.283	360.5
Treated Waste Wood Test # 2 WWC-VOST-5-2T	8-21-96	0.019	742.778	13.3	Chloromethane	0.904	47.579	86.060	60050.740	108618.9
					1,3-Butadiene	0.001	0.053	0.095	66.428	120.2
					Bromomethane	0.144	7.579	13.709	9565.805	17302.1
					Trichlorofluromethane	0.005	0.263	0.476	332.139	600.8
					Iodomethane	0.016	0.842	1.523	1062.845	1922.5
					Carbon disulfide	0.001	0.053	0.095	66.428	120.2
					Acetone	0.148	7.789	14.089	9831.316	17782.7
					Methylene Chloride	0.111	5.842	10.567	7373.487	13337.1
					tert-Butyl methyl ether	0.001	0.053	0.095	66.428	120.2
					Acrylonitrile	0.004	0.211	0.381	265.711	480.6
					n-Hexane	0.010	0.526	0.952	664.278	1201.5
					Chloroform	0.020	1.053	1.904	1328.556	2403.1
					1,2-Dichloroethane	0.011	0.579	1.047	730.706	1321.7
					Isooctane	0.001	0.053	0.095	66.428	120.2
					1,1,1-Trichloroethane	0.001	0.053	0.095	66.428	120.2
					Carbon tetrachloride	0.005	0.263	0.476	332.139	600.8
					Benzene	0.026	1.368	2.475	1727.123	3124.0
					Ethyl acryate	0.001	0.053	0.095	66.428	120.2
					Bromodichloromethane	0.001	0.053	0.095	66.428	120.2
					Toluene	0.016	0.842	1.523	1062.845	1922.5
					Tetrachloroethene	0.001	0.053	0.095	66.428	120.2
					Chlorobenzene	0.003	0.158	0.286	199.283	360.5
					Ethylbenzene	0.001	0.053	0.095	66.428	120.2
					m-/p-Xylene	0.007	0.368	0.666	464.995	841.1
					o-Xylene	0.003	0.158	0.286	199.283	360.5
					Styrene	0.002	0.105	0.190	132.856	240.3
Treated Waste Wood Test # 3 WWC-VOST-6-1T	8-22-96	0.018	911.610	13.3	Chloromethane	0.194	10.767	19.525	16677.650	30244.4
					1,3-Butadiene	0.001	0.056	0.101	86.056	156.1
					Bromomethane	1.146	63.667	115.458	98620.158	178844.8
					Trichlorofluromethane	0.024	1.333	2.418	2065.344	3745.4
					Iodomethane	0.291	16.167	29.318	25042.291	45413.5
					Carbon disulfide	0.003	0.167	0.302	258.168	468.2
					Acetone	0.115	6.389	11.586	9896.438	17946.9
					Methylene Chloride	0.382	21.222	38.486	32873.386	59614.9
					tert-Butyl methyl ether	0.001	0.056	0.101	86.056	156.1
					Acrylonitrile	0.004	0.222	0.403	344.224	624.2
					n-Hexane	0.012	0.667	1.209	1032.672	1872.7
					Chloroform	0.037	2.056	3.728	3184.071	5774.2
					1,2-Dichloroethane	0.043	2.389	4.332	3700.407	6710.6
					Isooctane	0.001	0.056	0.101	86.056	156.1
					1,1,1-Trichloroethane	0.001	0.056	0.101	86.056	156.1
					Carbon tetrachloride	0.014	0.778	1.410	1204.784	2184.8
					Benzene	0.026	1.444	2.619	2237.456	4057.6
					Ethyl acryate	0.001	0.056	0.101	86.056	156.1
					Bromodichloromethane	0.001	0.056	0.101	86.056	156.1
					Toluene	0.027	1.500	2.720	2323.512	4213.6
					Tetrachloroethene	0.001	0.056	0.101	86.056	156.1
					Chlorobenzene	0.003	0.167	0.302	258.168	468.2
					Ethylbenzene	0.001	0.056	0.101	86.056	156.1

					m-/p-Xylene	0.008	0.444	0.806	688.448	1248.5
					o-Xylene	0.003	0.167	0.302	258.168	468.2
					Styrene	0.002	0.111	0.201	172.112	312.1
Treated Waste Wood Test # 3										
WWC-VOST-8-2T	8-22-96	0.019	911.610	13.3	Chloromethane	0.874	46.000	83.420	71254.355	129217.7
					1,3-Butadiene	0.001	0.053	0.095	81.527	147.8
					Bromomethane	0.268	14.105	25.579	21849.161	39622.8
					Trichlorofluromethane	0.010	0.526	0.954	815.267	1478.5
					Iodomethane	0.197	10.368	18.803	16060.764	29125.7
					Carbon disulfide	0.004	0.211	0.382	326.107	591.4
					Acetone	0.178	9.368	16.989	14511.756	26316.7
					Methylene Chloride	0.114	6.000	10.881	9294.046	16854.5
					tert-Butyl methyl ether	0.001	0.053	0.095	81.527	147.8
					Acrylonitrile	0.004	0.211	0.382	326.107	591.4
					n-Hexane	0.006	0.316	0.573	489.160	887.1
					Chloroform	0.042	2.211	4.009	3424.122	6209.5
					1,2-Dichloroethane	0.015	0.789	1.432	1222.901	2217.7
					Isooctane	0.001	0.053	0.095	81.527	147.8
					1,1,1-Trichloroethane	0.001	0.053	0.095	81.527	147.8
					Carbon tetrachloride	0.012	0.632	1.145	978.321	1774.2
					Benzene	0.036	1.895	3.436	2934.962	5322.5
					Ethyl acryate	0.008	0.421	0.764	652.214	1182.8
					Bromodichloromethane	0.001	0.053	0.095	81.527	147.8
					Toluene	0.021	1.105	2.004	1712.081	3104.8
					Tetrachloroethene	0.001	0.053	0.095	81.527	147.8
					Chlorobenzene	0.004	0.211	0.382	326.107	591.4
					Ethylbenzene	0.005	0.263	0.477	407.634	739.2
					m-/p-Xylene	0.037	1.947	3.531	3016.489	5470.3
					o-Xylene	0.011	0.579	1.050	896.794	1626.3
					Styrene	0.003	0.158	0.286	244.580	443.5

APPENDIX III SVOC SAMPLE ANALYSIS RESULTS

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608025	Date Sampled:	8/23/96
Sample Name:	WWC-MM5-FB	Date Extracted:	8/27/96
MS Data File:	S9608025	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Field Blank.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	82.9
d4-1,2 Dichlorobenzenze	79.1
d10-Anthracene	86.2

Post Sampling Surrogates	% Recovery
2-Fluorophenol	84.5
d5-Phenol	94.8
d5-Nitrobenzene	80.9
2-Fluorobiphenyl	89.1
2,4,6-Tribromophenol	72.9
d14-Terphenyl	114.9

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	ND
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion		Date Acquired:	9/23/96
Sample Id:	9608025		Date Sampled:	8/23/96

Target Analytes	**Total μg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	ND
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2,4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	ND
2-Nitrophenol	ND
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	ND
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608025	Date Sampled:	8/23/96

Target Analytes	**Total µg**
Acenapthylene	ND
1,4-Napthoquinone	ND
Dimethyl phthalate	ND
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	ND
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	1.4J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	ND
Anthracene	ND
Di-n-butyl phthalate	2.1J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	41.4

Project:	Wastewood Combustion		Date Acquired:	9/23/96
Sample Id:	9608025		Date Sampled:	8/23/96

Target Analytes	Total µg
3,3'-Dichlorobenzidine	ND
Benzo (a) anthracene	ND
Chrysene	ND
di-n-octyl phthalate	ND
Benzo (b) fluoranthene	ND
7,12-Dimethylbenz (a) anthracene	ND
Benzo (k) fluoranthene	ND
Benzo (a) pyrene	ND
3-Methylcholanthrene	ND
Indeno (1,2,3-cd) pyrene	ND
Dibenz (a,h) anthracene	ND
Benzo (ghi) perylene	ND

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608018	Date Sampled:	8/13/96
Sample Name:	WWC-MM5-run # 1	Date Extracted:	8/26/96
MS Data File:	S9608018	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Run #1.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	77.2
d4-1,2 Dichlorobenzenze	83.1
d10-Anthracene	76.1

Post Sampling Surrogates	% Recovery
2-Fluorophenol	97.0
d5-Phenol	109.3
d5-Nitrobenzene	95.2
2-Fluorobiphenyl	99.5
2,4,6-Tribromophenol	92.7
d14-Terphenyl	112.3

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	7.0J
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608018	Date Sampled:	8/13/96

Target Analytes	**Total µg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	7.9J
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2,4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	2.6J
2-Nitrophenol	2.2J
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	ND
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608018	Date Sampled:	8/13/96

Target Analytes	**Total µg**
Acenapthylene	ND
1,4-Napthoquinone	ND
Dimethyl phthalate	ND
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	ND
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	3.5J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	1.4J
Anthracene	ND
Di-n-butyl phthalate	2.3J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	2.5J

Project:	Wastewood Combustion		Date Acquired:	9/23/96
Sample Id:	9608018		Date Sampled:	8/13/96
Target Analytes		**Total µg**		
3,3'-Dichlorobenzidine		ND		
Benzo (a) anthracene		ND		
Chrysene		ND		
di-n-octyl phthalate		ND		
Benzo (b) fluoranthene		ND		
7,12-Dimethylbenz (a) anthracene		ND		
Benzo (k) fluoranthene		ND		
Benzo (a) pyrene		ND		
3-Methylcholanthrene		ND		
Indeno (1,2,3-cd) pyrene		ND		
Dibenz (a,h) anthracene		ND		
Benzo (ghi) perylene		ND		

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608019	Date Sampled:	8/14/96
Sample Name:	WWC-MM5-run # 2	Date Extracted:	8/26/96
MS Data File:	S9608019	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Run #2.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	57.9
d4-1,2 Dichlorobenzenze	48.1
d10-Anthracene	87.3

Post Sampling Surrogates	% Recovery
2-Fluorophenol	57.1
d5-Phenol	85.7
d5-Nitrobenzene	61.5
2-Fluorobiphenyl	87.9
2,4,6-Tribromophenol	93.3
d14-Terphenyl	121.9

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	2.0J
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608019	Date Sampled:	8/14/96

Target Analytes	**Total µg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	2.3J
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2,4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	2.2J
2-Nitrophenol	ND
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	ND
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608019	Date Sampled:	8/14/96

Target Analytes	Total µg
Acenapthylene	ND
1,4-Napthoquinone	ND
Dimethyl phthalate	1.8J
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	1.2J
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	4.5J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	ND
Anthracene	ND
Di-n-butyl phthalate	2.4J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	2.8J

Project:	Wastewood Combustion	Date Acquired:	9/23/96
Sample Id:	9608019	Date Sampled:	8/14/96

Target Analytes	Total µg
3,3'-Dichlorobenzidine	ND
Benzo (a) anthracene	ND
Chrysene	ND
di-n-octyl phthalate	ND
Benzo (b) fluoranthene	ND
7,12-Dimethylbenz (a) anthracene	ND
Benzo (k) fluoranthene	ND
Benzo (a) pyrene	ND
3-Methylcholanthrene	ND
Indeno (1,2,3-cd) pyrene	ND
Dibenz (a,h) anthracene	ND
Benzo (ghi) perylene	ND

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608020	Date Sampled:	8/19/96
Sample Name:	WWC-MM5-run # 3	Date Extracted:	8/26/96
MS Data File:	S9608020	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Run #3.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	82.3
d4-1,2 Dichlorobenzenze	82.7
d10-Anthracene	82.0

Post Sampling Surrogates	% Recovery
2-Fluorophenol	31.6
d5-Phenol	107.8
d5-Nitrobenzene	99.2
2-Fluorobiphenyl	98.7
2,4,6-Tribromophenol	95.7
d14-Terphenyl	130.8

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	2.1J
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608020		Date Sampled:	8/19/96

Target Analytes	**Total µg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	3.1J
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2,4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	8.9J
2-Nitrophenol	ND
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	ND
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608020	Date Sampled:	8/19/96

Target Analytes	**Total µg**
Acenapthylene	ND
1,4-Napthoquinone	1.4J
Dimethyl phthalate	ND
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	4.3J
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	1.5J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	1.7J
Anthracene	ND
Di-n-butyl phthalate	1.5J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	18.4

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608020		Date Sampled:	8/19/96
Target Analytes		**Total µg**		
3,3'-Dichlorobenzidine		ND		
Benzo (a) anthracene		ND		
Chrysene		ND		
di-n-octyl phthalate		ND		
Benzo (b) fluoranthene		ND		
7,12-Dimethylbenz (a) anthracene		ND		
Benzo (k) fluoranthene		ND		
Benzo (a) pyrene		ND		
3-Methylcholanthrene		ND		
Indeno (1,2,3-cd) pyrene		ND		
Dibenz (a,h) anthracene		ND		
Benzo (ghi) perylene		ND		

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608022	Date Sampled:	8/19/96
Sample Name:	WWC-MM5-run # 4	Date Extracted:	8/27/96
MS Data File:	S9608022	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Run #4- Some sample was spilled during transfer to sample vial.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	65.3
d4-1,2 Dichlorobenzenze	72.1
d10-Anthracene	62.4

Post Sampling Surrogates	% Recovery
2-Fluorophenol	100.1
d5-Phenol	108.4
d5-Nitrobenzene	94.2
2-Fluorobiphenyl	95.8
2,4,6-Tribromophenol	99.9
d14-Terphenyl	109.3

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	5.6J
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608022		Date Sampled:	8/19/96

Target Analytes	**Total µg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	6.0J
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2,4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	1.9J
2-Nitrophenol	1.1J
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	1.7J
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608022	Date Sampled:	8/19/96

Target Analytes	**Total µg**
Acenapthylene	ND
1,4-Napthoquinone	ND
Dimethyl phthalate	ND
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	ND
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	1.3J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	ND
Anthracene	ND
Di-n-butyl phthalate	1.4J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	29.5

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608022		Date Sampled:	8/19/96
Target Analytes		**Total µg**		
3,3'-Dichlorobenzidine		ND		
Benzo (a) anthracene		ND		
Chrysene		ND		
di-n-octyl phthalate		ND		
Benzo (b) fluoranthene		ND		
7,12-Dimethylbenz (a) anthracene		ND		
Benzo (k) fluoranthene		ND		
Benzo (a) pyrene		ND		
3-Methylcholanthrene		ND		
Indeno (1,2,3-cd) pyrene		ND		
Dibenz (a,h) anthracene		ND		
Benzo (ghi) perylene		ND		

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608023	Date Sampled:	8/23/96
Sample Name:	WWC-MM5-run #5	Date Extracted:	8/27/96
MS Data File:	S9608023	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Run #5.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	72.4
d4-1,2 Dichlorobenzenze	73.5
d10-Anthracene	77.5

Post Sampling Surrogates	% Recovery
2-Fluorophenol	103.1
d5-Phenol	110.9
d5-Nitrobenzene	95.1
2-Fluorobiphenyl	98.1
2,4,6-Tribromophenol	101.3
d14-Terphenyl	97.3

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	6.1J
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608023		Date Sampled:	8/23/96

Target Analytes	**Total µg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	6.9J
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2,4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	1.5J
2-Nitrophenol	ND
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	1.6J
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608023	Date Sampled:	8/23/96

Target Analytes	Total µg
Acenapthylene	ND
1,4-Napthoquinone	ND
Dimethyl phthalate	ND
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	ND
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	3.9J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	ND
Anthracene	ND
Di-n-butyl phthalate	3.0J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	53.8

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608023		Date Sampled:	8/23/96

Target Analytes	**Total µg**
3,3'-Dichlorobenzidine	ND
Benzo (a) anthracene	ND
Chrysene	ND
di-n-octyl phthalate	ND
Benzo (b) fluoranthene	ND
7,12-Dimethylbenz (a) anthracene	ND
Benzo (k) fluoranthene	ND
Benzo (a) pyrene	ND
3-Methylcholanthrene	ND
Indeno (1,2,3-cd) pyrene	ND
Dibenz (a,h) anthracene	ND
Benzo (ghi) perylene	ND

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

APPCD Organic Support Laboratory
Wastewood Combustion-Semivolatile Analysis

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608024	Date Sampled:	8/23/96
Sample Name:	WWC-MM5-run #6	Date Extracted:	8/27/96
MS Data File:	S9608024	Dilution factor:	none
Method:	SW846-Method 8270	Analyst:	Billl Preston
		QC reviewer:	Dennis Tabor

Comment:
Run #6. Internal standard indicated only a partial injection.
This sample was rerun confirming that the target analyte values did not change appreciably.

Presampling Surrogates	% Recovery
d4-2-Chlorophenol	64.0
d4-1,2 Dichlorobenzenze	75.3
d10-Anthracene	58.1

Post Sampling Surrogates	% Recovery
2-Fluorophenol	86.3
d5-Phenol	96.4
d5-Nitrobenzene	86.8
2-Fluorobiphenyl	98.6
2,4,6-Tribromophenol	95.4
d14-Terphenyl	106.5

Target Analytes	Total µg
n-Nitrosomethylethylamine	ND
Methyl Methanesulfonate	ND
n-Nitrosodiethylamine	ND
Bis-(2-Chloroethyl) ether	ND
Ethyl Methanesulfonate	ND
Aniline	ND
Phenol	6.5J
2-Chlorophenol	ND
1,3-Dichlorobenzene	ND

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608024	Date Sampled:	8/23/96

Target Analytes	**Total µg**
1,4-Dichlorobenzene	ND
1,2-Dichlorobenzene	ND
Benzyl Alcohol	ND
Bis (2-Chloroisopropyl) ether	ND
2-Methylphenol	ND
n-Nitrosopyrrolidine	ND
Acetophenone	5.7J
Hexachloroethane	ND
4-Methylphenol	ND
n-Nitrosodi-n-propylamine	ND
Nitrobenzene	ND
1-Nitrosopiperidine	ND
Isophorone	ND
2,4-Dimethylphenol	ND
Bis (2-chloroethoxy) methane	ND
2;4_Dichlorophenol	ND
1,2,4-Trichlorobenzene	ND
Napthalene	1.9J
2-Nitrophenol	ND
2,6-Dichlorophenol	ND
Hexachloropropene	ND
4-Chloroaniline	ND
Hexachlorobutadiene	ND
n-Nitrosodi-n-butylamine	ND
4-Chloro-3-methyl-phenol	ND
2-Methylnapthalene	ND
Isosafrole	ND
1,2,4,5 Tetrachlorobenzene	ND
Hexachlorocyclopentadiene	ND
2,4,6-Trichlorophenol	ND
2,4,5-Trichlorophenol	ND
2-Choronapthalene	ND
1,3 Dinitrobenzene	ND
2-Nitroaniline	ND
3-Nitroaniline	ND
Safrole	ND

Project:	Wastewood Combustion	Date Acquired:	9/24/96
Sample Id:	9608024	Date Sampled:	8/23/96

Target Analytes	Total µg
Acenapthylene	ND
1,4-Napthoquinone	ND
Dimethyl phthalate	ND
2,6-Dinitrotoluene	ND
Acenapthene	ND
1-Napthylamine	ND
2-Napthylamine	ND
4-Nitroaniline	ND
2,4-Dinitrophenol	ND
Dibenzofuran	ND
Pentachlorobenzene	ND
2,4-Dinitrophenol	ND
2,3,4,6-Tetrachlorophenol	ND
4-Nitrophenol	ND
Fluorene	ND
Diethyl phthalate	4.4J
4-Chlorophenyl phenyl ether	ND
2-Methyl-4,6-dinitrophenol	ND
5-Nitro-o-toluidine	ND
Diphenylamine	ND
Diallate	ND
1,3,5-Trinitrobenzene	ND
4-Bronophenyl phenyl ether	ND
Phenacetin	ND
Hexachlorobenzene	ND
4-Aminobiphenyl	ND
Dinoseb	ND
Pentachlorophenol	ND
Pentachloronitrobenzene	ND
Phenanthrene	ND
Anthracene	ND
Di-n-butyl phthalate	4.1J
Isodrin	ND
Fluoranthene	ND
3,3'-Dimethylbenzidine	ND
Pyrene	ND
Chlorobenzilate	ND
p-Dimethylaminoazobenzene	ND
2-Acetylaminofluorene	ND
Benzyl butyl phthalate	91.3

Project:	Wastewood Combustion		Date Acquired:	9/24/96
Sample Id:	9608024		Date Sampled:	8/23/96

Target Analytes	**Total μg**
3,3'-Dichlorobenzidine	ND
Benzo (a) anthracene	ND
Chrysene	ND
di-n-octyl phthalate	ND
Benzo (b) fluoranthene	ND
7,12-Dimethylbenz (a) anthracene	ND
Benzo (k) fluoranthene	ND
Benzo (a) pyrene	ND
3-Methylcholanthrene	ND
Indeno (1,2,3-cd) pyrene	ND
Dibenz (a,h) anthracene	ND
Benzo (ghi) perylene	ND

ND = not detected
NS = not spiked
J = present but lower than lowest calibration standard level
E = exceed calibration range

Waste Wood Combustion -Semivolitile Analysis Modified Method 5 August,1996
Revised 10/30/96

Sample #	Date	Gas Sample Volume (dscm)	Stack Flow Rate (dscfm)	Flue Gas O2 (%)	Compound	Semivolatiles (Total micro gram)		Semivolatiles (micro grams/dscm)	Semivolatiles (micro grams/dscm @7% O2)	Semivolatiles Emission Rate (micrograms/hr)	Semivolatiles Emission Rate (micrograms/hr @ 7% O2)
Untreated Waste Wood Test # 1											
9608018	8/13/96	3.4672	684.657	12.5	Phenol	7	J	2.0	3.3	2348.7	3886.8
WWC-MM5-1					Acetophenone	7.9	J	2.3	3.8	2650.7	4386.6
					Hexachlorethane	N/D					
					Napthalene	2.6	J	0.7	1.2	872.4	1443.7
					2-Nitrophenol	2.2	J	0.6	1.1	738.2	1221.6
					2,4,6 - Trichlorophenol	N/D					
					1,4-Napthoquinone	N/D					
					Dimethyl phthalate	N/D					
					Diethyl phthalate	3.5	J	1.0	1.7	1174.4	1943.4
					Dibenzofuran	N/D					
					Phenanthrene	1.4	J	0.4	0.7	469.7	777.4
					Di-n-butyl phthalate	2.3	J	0.7	1.1	771.7	1277.1
					Benzyl butyl phthalate	2.5	J	0.7	1.2	838.8	1388.1
Untreated Waste Wood Test # 2											
9608019	8/14/96	2.7916	586.901	13.2	Phenol	2	J	0.7	1.3	714.5	1280.7
WWC-MM5-2					Acetophenone	2.3	J	0.8	1.5	821.6	1472.9
					Hexachlorethane	N/D					
					Napthalene	2.2	J	0.8	1.4	785.9	1408.8
					2-Nitrophenol	10	J	3.6	6.4	3572.4	6403.7
					2,4,6 - Trichlorophenol	N/D					
					1,4-Napthoquinone	N/D					
					Dimethyl phthalate	1.8	J	0.6	1.2	643.0	1152.7
					Diethyl phthalate	4.5	J	1.6	2.9	1607.6	2881.7
					Dibenzofuran	1.2	J	0.4	0.8	428.7	768.4
					Phenanthrene	N/D					
					Di-n-butyl phthalate	2.4	J	0.9	1.5	857.4	1536.9
					Benzyl butyl phthalate	2.8	J	1.0	1.8	1000.3	1793.0
Untreated Waste Wood Test # 3											
9608020	8/15/96	2.9538	631.904	12.9	Phenol	2.1	J	0.7	1.2	763.4	1319.4
WWC-MM5-3					Acetophenone	3.1	J	1.0	1.8	1126.9	1947.7
					Hexachlorethane	N/D					
					Napthalene	8.9	J	3.0	5.2	3235.2	5591.7
					2-Nitrophenol	N/D					
					2,4,6 - Trichlorophenol	N/D					
					1,4-Napthoquinone	1.4	J	0.5	0.8	508.9	879.6
					Dimethyl phthalate	N/D					
					Diethyl phthalate	1.5	J	0.5	0.9	545.3	942.4
					Dibenzofuran	4.3	J	1.5	2.5	1563.1	2701.6
					Phenanthrene	1.7	J	0.6	1.0	618.0	1068.1
					Di-n-butyl phthalate	1.5	J	0.5	0.9	545.3	942.4
					Benzyl butyl phthalate	18.4	J	6.2	10.8	6688.6	11560.5

Waste Wood Combustion -Semivoltile Analysis Modified Method 5 August, 1996
Revised 10/30/96

Sample #	Date	Gas Sample Volume (dscm)	Stack Flow Rate (dscfm)	Flue Gas O2 (%)	Compound	Semivolatiles (Total micro gram)		Semivolatiles (micro grams/dscm)	Semivolatiles (micro grams/dscm @7% O2)	Semivolatiles Emission Rate (micrograms/hr)	Semivolatiles Emission Rate (micrograms/hr @ 7% O2)
Treated Waste Wood Test # 1											
9608022	8/20/96	4.1241	884.522	13.1	Phenol	5.6	J	1.4	2.4	2040.9	3635.1
WWC-MM5-4					Acetophenone	6	J	1.5	2.6	2186.6	3894.8
					Hexachlorethane	N/D					
					Napthalene	1.9	J	0.5	0.8	692.4	1233.3
					2-Nitrophenol	1.1	J	0.3	0.5	400.9	714.0
					2,4,6-Trichlorophenol	1.7	J	0.4	0.7	619.5	1103.5
					1,4-Napthoquinone	N/D					
					Dimethyl phthalate	N/D					
					Diethyl phthalate	1.3	J	0.3	0.6	473.8	843.9
					Dibenzofuran	N/D					
					Phenanthrene	N/D					
					Di-n-butyl phthalate	1.4	J	0.3	0.6	510.2	908.8
					Benzyl butyl phthalate	29.5	J	7.2	12.7	10750.9	19149.2
Treated Waste Wood Test # 2											
9608023	8/21/96	3.7424	742.778	13.1	Phenol	6.1	J	1.6	2.9	2057.2	3664.3
WWC-MM5-5					Acetophenone	6.9	J	1.8	3.3	2327.0	4144.8
					Hexachlorethane	N/D					
					Napthalene	1.5	J	0.4	0.7	505.9	901.1
					2-Nitrophenol	N/D					
					2,4,6-Trichlorophenol	1.6	J	0.4	0.8	539.6	961.1
					1,4-Napthoquinone	N/D					
					Dimethyl phthalate	N/D					
					Diethyl phthalate	3.9	J	1.0	1.9	1315.3	2342.7
					Dibenzofuran	N/D					
					Phenanthrene	N/D					
					Di-n-butyl phthalate	3	J	0.8	1.4	1011.8	1802.1
					Benzyl butyl phthalate	53.8		14.4	25.6	18144.1	32317.7
Treated Waste Wood Test # 3											
9608024	8/22/96	4.3594	911.610	13.3	Phenol	6.5	J	1.5	2.7	2309.6	4188.4
WWC-MM5-6					Acetophenone	5.7	J	1.3	2.4	2025.4	3672.9
					Hexachlorethane	N/D					0.0
					Napthalene	1.9	J	0.4	0.8	675.1	1224.3
					2-Nitrophenol	N/D					
					2,4,6-Trichlorophenol	N/D					
					1,4-Napthoquinone	N/D					
					Dimethyl phthalate	N/D					
					Diethyl phthalate	4.4	J	1.0	1.8	1563.4	2835.2
					Dibenzofuran	N/D					
					Phenanthrene	N/D					
					Di-n-butyl phthalate	4.1	J	0.9	1.7	1456.8	2641.9
					Benzyl butyl phthalate	91.3		20.9	38.0	32441.3	58831.3
Performance Evaluation Audit											
9608033	Spiked 8/28/96	NA	NA	NA	Acetophenone	1	J				
WWC-PEA#1					Napthalene	36.7					
					Acenapthylene	34.6					
					Acenapthene	39.3					
					Fluorene	42.3					
					Diethyl phthalate	1.1	J				
					Phenanthrene	45.7					
					Anthracene	45.4					
					Di-n-butyl phthalate	41.7					
					Fluoranthene	40.3					
					Pyrene	49.7					
					Benzo(a)anthracene	41.9					
					Chrysene	42.1					
					Benzo(b)fluorathene	42.3					
					Benzo(k)fluorathene	49					
					Benzo(a)pyrene	44.9					
					Ideno(1,2,3-cd)pyrene	42.5					
					Dibenz(a,h)anthracene	37.6					
					Benzo(ghi)perylene	45.3					
Field Blank											
9608025	8-23-96	NA	NA	NA	Diethyl phthalate	1.4	J				
WWC-MM5-FB					Di-n-butyl phthalate	2.1	J				
					Benzyl butyl phthalate	41.4					

*** J - Present but lower than the lowest calibrated standard level
***ND - None Detect

APPENDIX IV PCDD/PCDF ANALYSIS RESULTS

TCDD SUMMARY, nanograms/dscm
@ 7% Oxygen

TEST NO.	Front Half Total	Front Half TEQ	Back Half Total	Back Half TEQ	Combined Total	Combined TEQ
untreated 1	1.19	0.043	7.19	0.091	8.43	0.136
untreated 2	0.80	0.035	1.85	0.032	2.63	0.066
untreated 3	0.21	0.026	0.74	0.027	0.95	0.053
treated 1	11.60	0.301	3.78	0.105	15.03	0.397
treated 2	13.82	0.354	7.67	0.165	20.88	0.503
treated 3	11.91	0.323	7.37	0.167	18.72	0.475

TCDF SUMMARY, nanograms/dscm @ 7% Oxygen

TEST NO.	Front Half Total	Front Half TEQ	Back Half Total	Back Half TEQ	Combined Total	Combined TEQ
untreated 1	3.30	0.090	18.85	0.279	22.29	0.373
untreated 2	2.23	0.057	15.0	0.087	17.15	0.142
untreated 3	0.55	0.018	10.57	0.036	11.12	0.054
treated 1	28.90	0.575	14.14	0.349	42.19	0.907
treated 2	20.90	0.424	36.50	0.309	56.47	0.714
treated 3	18.05	0.344	27.84	0.248	45.04	0.576

Data File	W103702	W103703	W103704	W103705
Sample ID	TLI Front Half Blank	WWC-M23-1-1,2,3	WWC-M23-2-1,2,3	WWC-M23-3-1,2,3
Units	ng	ng	ng	ng
Analytes				
2378-TCDD	(0.01)	(0.03)	(0.02)	(0.02)
12378-PeCDD	(0.02)	(0.07)	(0.04)	(0.03)
123478-HxCDD	(0.02)	0.04	(0.03)	(0.02)
123678-HxCDD	(0.02)	0.06	0.03	(0.02)
123789-HxCDD	(0.02)	0.10	0.05	(0.02)
1234678-HpCDD	(0.02)	0.30	0.15	0.11
OCDD	(0.03)	1.2	0.61	1.3
2378-TCDF	(0.009)	0.35	0.18	0.06
12378-PeCDF	(0.01)	{0.05}	{0.03}	(0.02)
23478-PeCDF	(0.01)	0.18	0.08	{0.02}
123478-HxCDF	(0.01)	0.25	0.12	0.05
123678-HxCDF	(0.01)	0.10	0.05	0.02
234678-HxCDF	(0.01)	0.15	{0.06}	0.03
123789-HxCDF	(0.01)	(0.04)	(0.02)	(0.02)
1234678-HpCDF	(0.01)	0.25	0.13	0.06
1234789-HpCDF	(0.02)	{0.04}	0.03	(0.02)
OCDF	(0.03)	0.15	0.10	{0.07}
Total MCDD	(0.008)	(0.02)	(0.01)	(0.01)
Total DCDD	(0.01)	(0.03)	(0.02)	(0.01)
Total TriCDD	(0.02)	0.11	0.05	(0.03)
TOTAL TCDD	(0.01)	0.31	0.24	{0.03}
TOTAL PeCDD	(0.02)	0.34	0.34	0.06
TOTAL HxCDD	(0.02)	0.99	0.25	{0.10}
TOTAL HpCDD	(0.02)	0.65	0.31	0.11
Total MCDF	0.07	0.66	1.1	{0.20}
Total DCDF	(0.02)	(0.05)	(0.03)	(0.02)
Total TriCDF	(0.01)	1.3	0.25	0.15
TOTAL TCDF	(0.009)	1.9	0.77	0.14
TOTAL PeCDF	(0.01)	1.4	0.54	0.07
TOTAL HxCDF	(0.01)	1.0	0.34	0.14
TOTAL HpCDF	(0.01)	0.34	0.25	0.13
Other Standards Percent Recovery Summary (% Rec)				
37Cl-TCDD	104	116	120	104
13C12-PeCDF 234	104	107	118	104
13C12-HxCDF 478	95.3	108	113	102
13C12-HxCDD 478	83.6	106	104	94.4
13C12-HpCDF 789	95.4	107	105	98.9
Other Standards Percent Recovery Summary (% Rec)				
13C12-HxCDF 789	80.7	59.7	95.5	72.5
13C12-HxCDF 234	90.8	60.3	106	77.1
Internal Standards Percent Recovery Summary (% Rec)				
13C12-2378-TCDF	70.7	48.2	65.9	63.5
13C12-2378-TCDD	66.9	43.2	62.5	58.2
13C12-PeCDF 123	72.2	49.0	67.7	60.9

Data File	W103702	W103703	W103704	W103705
Sample ID	TLI Front Half Blank	WWC-M23-1-1,2,3	WWC-M23-2-1,2,3	WWC-M23-3-1,2,3
Units	ng	ng	ng	ng
Internal Standards Percent Recovery Summary (% Rec)				
13C12-PeCDD 123	69.1	41.4	62.5	52.8
13C12-HxCDF 678	75.7	51.1	74.4	62.8
13C12-HxCDD 678	94.8	55.1	84.8	69.9
13C12-HpCDF 678	68.8	47.1	74.2	60.6
13C12-HpCDD 678	86.0	57.9	87.1	72.2
13C12-OCDD	69.2	44.5	67.6	53.6

Data File	W103706	W103707	W103708	W103709
Sample ID	WWC-M23-4-1,2,3	WWC-M23-5-1,2,3	WWC-M23-6-1,2,3	WWC-M23-FB-1,2, 3
Units	ng	ng	ng	ng
Analytes				
2378-TCDD	0.12	0.15	0.15	(0.01)
12378-PeCDD	0.59	0.58	0.66	(0.02)
123478-HxCDD	0.56	0.44	0.45	(0.01)
123678-HxCDD	0.72	0.61	0.62	(0.01)
123789-HxCDD	1.3	1.1	1.2	(0.01)
1234678-HpCDD	5.2	4.2	4.1	(0.03)
OCDD	10.2	12.9	12.3	0.08
2378-TCDF	1.7	1.1	1.1	(0.007)
12378-PeCDF	0.77	0.54	0.56	- (0.01)
23478-PeCDF	1.1	0.72	0.70	(0.01)
123478-HxCDF	2.5	1.5	1.3	(0.008)
123678-HxCDF	1.3	0.74	0.67	(0.006)
234678-HxCDF	1.7	0.84	0.80	(0.02)
123789-HxCDF	0.19	(0.09)	0.08	(0.01)
1234678-HpCDF	4.7	2.3	2.2	(0.007)
1234789-HpCDF	2.0	0.79	0.68	(0.01)
OCDF	9.6	4.2	3.7	(0.02)
Total MCDD	(0.04)	(0.06)	(0.06)	(0.007)
Total DCDD	0.11	0.40	0.39	(0.01)
Total TriCDD	0.58	0.74	0.79	(0.02)
TOTAL TCDD	3.1	3.8	4.0	0.12
TOTAL PeCDD	5.8	6.3	6.9	(0.14)
TOTAL HxCDD	9.0	8.6	8.3	0.12
TOTAL HpCDD	9.7	7.8	7.6	(0.05)
Total MCDF	4.0	4.2	4.8	0.12
Total DCDF	3.4	2.2	3.1	(0.01)
Total TriCDF	3.7	3.0	3.0	0.03
TOTAL TCDF	9.6	6.8	7.5	(0.007)
TOTAL PeCDF	12.6	8.2	8.2	(0.01)
TOTAL HxCDF	14.7	7.8	7.1	(0.02)
TOTAL HpCDF	13.0	5.5	5.1	(0.008)
Other Standards Percent Recovery Summary (% Rec)				
37Cl-TCDD	111	109	149	111
13C12-PeCDF 234	111	104	146	110
13C12-HxCDF 478	102	106	133	105
13C12-HxCDD 478	99.8	94.0	125	101
13C12-HpCDF 789	103	99.8	137	105
Other Standards Percent Recovery Summary (% Rec)				
13C12-HxCDF 789	105	87.2	113	99.8
13C12-HxCDF 234	112	92.1	118	106
Internal Standards Percent Recovery Summary (% Rec)				
13C12-2378-TCDF	89.8	80.5	72.0	92.9
13C12-2378-TCDD	80.9	67.5	63.0	79.5
13C12-PeCDF 123	91.7	73.1	69.6	88.0

Data File	W103706	W103707	W103708	W103709
Sample ID	WWC-M23-4-1,2,3	WWC-M23-5-1,2,3	WWC-M23-6-1,2,3	WWC-M23-FB-1,2,3
Units	ng	ng	ng	ng
Internal Standards Percent Recovery Summary (% Rec)				
13C12-PeCDD 123	84.2	61.1	59.3	73.0
13C12-HxCDF 678	90.9	74.9	72.4	82.8
13C12-HxCDD 678	99.3	81.6	79.6	88.8
13C12-HpCDF 678	93.6	75.9	69.5	83.7
13C12-HpCDD 678	107	90.8	87.1	108
13C12-OCDD	91.5	68.0	63.5	76.6

{Estimated Maximum Possible Concentration}, (Detection Limit).

TRIANGLE LABORATORIES, INC.
Sample Result Summary for Project 38672A
Method 23X (DB-225)

Data File	P963050	P963051	P963052	P963055
Sample ID	WWC-M23-1-1,2,3	WWC-M23-2-1,2,3	WWC-M23-3-1,2,3	WWC-M23-4-1,2,3
Units	ng	ng	ng	ng
Analytes				
2378-TCDF	0.08	0.04	{0.02}	0.38
Internal Standards Percent Recovery Summary (% Rec)				
13C12-2378-TCDF	63.9	90.3	80.3	101

Data File	P963056	P963057
Sample ID	WWC-M23-5-1,2,3	WWC-M23-6-1,2,3
Units	ng	ng
Analytes		
2378-TCDF	0.28	0.29
Internal Standards Percent Recovery Summary (% Rec)		
13C12-2378-TCDF	93.6	85.9

{Estimated Maximum Possible Concentration}.

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TRIANGLE LABORATORIES, INC.
Sample Result Summary for Project 386723
Method 8290X Full Screen Analyses (DB-5)

Data File	W103712	W103713	W103714	W103715
Sample ID	TLI Back Half B lank	WWC-M23-1-6	WWC-M23-2-6	WWC-M23-3-6
Units	ng	ng	ng	ng
Analytes				
2378-TCDD	(0.01)	0.05	0.02	(0.02)
12378-PeCDD	(0.02)	0.15	0.04	(0.04)
123478-HxCDD	(0.01)	0.10	{0.02}	(0.02)
123678-HxCDD	(0.01)	0.15	{0.03}	(0.01)
123789-HxCDD	(0.01)	0.23	{0.04}	(0.01)
1234678-HpCDD	(0.01)	0.49	{0.10}	0.04
OCDD	(0.02)	1.3	0.24	0.31
2378-TCDF	(0.006)	1.5	0.40	0.24
12378-PeCDF	(0.01)	0.24	0.07	0.04
23478-PeCDF	(0.01)	0.53	0.13	{0.04}
123478-HxCDF	(0.007)	0.59	0.13	0.06
123678-HxCDF	(0.006)	0.25	0.06	0.02
234678-HxCDF	(0.007)	0.32	0.07	0.03
123789-HxCDF	(0.008)	0.02	(0.01)	(0.02)
1234678-HpCDF	(0.006)	0.46	0.09	0.04
1234789-HpCDF	(0.01)	0.08	{0.01}	(0.02)
OCDF	(0.02)	0.22	0.04	0.02
Total MCDD	(0.007)	0.57	0.44	0.28
Total DCDD	(0.009)	0.82	0.39	0.22
Total TriCDD	(0.02)	0.88	0.23	{0.11}
TOTAL TCDD	(0.01)	4.5	0.94	0.35
TOTAL PeCDD	(0.02)	3.6	0.43	0.12
TOTAL HxCDD	(0.01)	2.8	0.38	0.07
TOTAL HpCDD	(0.01)	1.0	0.10	0.08
Total MCDF	0.14	{0.29}	12.5	10.4
Total DCDF	(0.01)	12.5	4.9	3.7
Total TriCDF	{0.02}	6.0	1.9	1.1
TOTAL TCDF	(0.006)	9.1	2.5	1.6
TOTAL PeCDF	(0.01)	5.4	1.1	0.44
TOTAL HxCDF	{0.008}	2.8	0.53	0.25
TOTAL HpCDF	(0.008)	0.85	0.13	0.05
Other Standards Percent Recovery Summary (% Rec)				
37Cl-TCDD	102	99.6	105	103
13C12-PeCDF 234	97.0	96.7	97.0	96.9
13C12-HxCDF 478	92.1	93.6	93.9	94.0
13C12-HxCDD 478	86.0	84.0	80.5	55.7 V
13C12-HpCDF 789	96.4	90.3	97.8	94.9
Other Standards Percent Recovery Summary (% Rec)				
13C12-HxCDF 789	99.8	73.3	91.5	97.4
13C12-HxCDF 234	104	79.0	92.7	91.8
Internal Standards Percent Recovery Summary (% Rec)				
13C12-2378-TCDF	95.8	75.2	82.2	91.1
13C12-2378-TCDD	81.2	64.8	67.5	77.8
13C12-PeCDF 123	86.9	69.3	70.0	77.2

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Data File	W103712	W103713	W103714	W103715
Sample ID	TLI Back Half Blank	WWC-M23-1-6	WWC-M23-2-6	WWC-M23-3-6
Units	ng	ng	ng	ng
Internal Standards Percent Recovery Summary (% Rec)				
13C12-PeCDD 123	70.1	54.7	55.4	67.6
13C12-HxCDF 678	85.1	65.6	78.5	79.9
13C12-HxCDD 678	88.9	68.8	85.8	133
13C12-HpCDF 678	85.0	67.8	78.8	85.4
13C12-HpCDD 678	100	79.3	91.9	100.0
13C12-OCDD	77.9	58.8	68.7	79.4

Data File	W103716	W103717	W103718	W104401
Sample ID	WWC-M23-4-6	WWC-M23-5-6	WWC-M23-6-6	WWC-M23-FB-6
Units	ng	ng	ng	ng
Analytes				
2378-TCDD	{0.09}	0.12	0.13	(0.04)
12378-PeCDD	0.24	0.30	0.39	(0.08)
123478-HxCDD	0.13	0.13	0.19	(0.08)
123678-HxCDD	0.16	0.23	0.21	(0.06)
123789-HxCDD	0.22	0.32	0.37	(0.07)
1234678-HpCDD	0.28	0.68	0.80	(0.08)
OCDD	{0.07}	1.4	2.1	(0.2)
2378-TCDF	2.0	1.5	1.4	(0.03)
12378-PeCDF	0.59	-0.54	0.51	(0.05)
23478-PeCDF	0.84	0.59	0.56	(0.05)
123478-HxCDF	1.1	0.83	0.79	(0.04)
123678-HxCDF	0.52	0.41	0.40	(0.04)
234678-HxCDF	0.51	0.38	0.33	(0.05)
123789-HxCDF	0.06	0.04	0.04	(0.05)
1234678-HpCDF	0.72	0.79	0.79	(0.04)
1234789-HpCDF	0.24	0.22	{0.15}	(0.06)
OCDF	{0.21}	0.76	0.66	(0.1)
Total MCDD	(0.02)	0.90	0.81	(0.0)
Total DCDD	(0.02)	1.0	1.5	(0.0)
Total TriCDD	(0.04)	1.5	1.4	(0.0)
TOTAL TCDD	3.5	5.1	5.3	(0.04)
TOTAL PeCDD	3.3	3.3	4.4	(0.08)
TOTAL HxCDD	2.1	2.9	3.2	(0.07)
TOTAL HpCDD	0.53	1.4	1.6	(0.08)
Total MCDF	(0.01)	28.9	25.3	(0.0)
Total DCDF	(0.03)	13.9	12.0	(0.0)
Total TriCDF	{0.05}	6.1	5.6	(0.0)
TOTAL TCDF	15.6	12.2	11.5	(0.03)
TOTAL PeCDF	11.2	8.0	8.0	(0.05)
TOTAL HxCDF	7.0	4.8	4.2	(0.04)
TOTAL HpCDF	1.5	1.9	1.5	(0.05)
Other Standards Percent Recovery Summary (% Rec)				
37Cl-TCDD	103	103	106	104
13C12-PeCDF 234	102	96.9	96.2	95.0
13C12-HxCDF 478	97.0	97.0	96.5	98.1
13C12-HxCDD 478	83.3	84.1	84.5	97.6
13C12-HpCDF 789	94.7	97.4	95.7	94.8
Other Standards Percent Recovery Summary (% Rec)				
13C12-HxCDF 789	95.6	77.6	70.3	88.9
13C12-HxCDF 234	99.9	76.7	72.9	91.6
Internal Standards Percent Recovery Summary (% Rec)				
13C12-2378-TCDF	87.7	71.7	72.0	79.0
13C12-2378-TCDD	71.6	59.3	58.1	72.3
13C12-PeCDF 123	72.1	58.3	58.6	75.8

Data File	W103716	W103717	W103718	W104401
Sample ID	WWC-M23-4-6	WWC-M23-5-6	WWC-M23-6-6	WWC-M23-FB-6
Units	ng	ng	ng	ng
Internal Standards Percent Recovery Summary (% Rec)				
13C12-PeCDD 123	58.6	45.6	44.2	68.7
13C12-HxCDF 678	80.9	65.8	61.9	72.5
13C12-HxCDD 678	86.2	68.4	64.6	78.7
13C12-HpCDF 678	85.0	65.4	61.1	69.1
13C12-HpCDD 678	97.9	77.8	75.7	80.4
13C12-OCDD	73.2	51.5	52.3	54.1

Data File	W104402	W104403
Sample ID	TLI LCS	TLI LCSD
Units	ng	ng
Analytes		
2378-TCDD	0.40	0.42
12378-PeCDD	2.1	2.1
123478-HxCDD	1.9	1.8
123678-HxCDD	2.0	1.9
123789-HxCDD	2.1	1.8
1234678-HpCDD	1.9	1.8
OCDD	4.3	3.9
2378-TCDF	0.38	0.38
12378-PeCDF	2.0	1.8
23478-PeCDF	1.9	2.2
123478-HxCDF	1.9	1.8
123678-HxCDF	2.0	2.0
234678-HxCDF	2.2	2.1
123789-HxCDF	2.2	2.1
1234678-HpCDF	1.9	1.9
1234789-HpCDF	2.0	1.7
OCDF	3.9	3.8
Other Standards Percent Recovery Summary (% Rec)		
37C1-TCDD	108	109
13C12-PeCDF 234	104	114
13C12-HxCDF 478	104	103
13C12-HxCDD 478	95.6	92.0
13C12-HpCDF 789	103	100
Other Standards Percent Recovery Summary (% Rec)		
13C12-HxCDF 789	74.3	91.9
13C12-HxCDF 234	69.1	92.0
Internal Standards Percent Recovery Summary (% Rec)		
13C12-2378-TCDF	64.4	78.4
13C12-2378-TCDD	62.2	71.2
13C12-PeCDF 123	66.7	67.4
13C12-PeCDD 123	67.3	73.6
13C12-HxCDF 678	53.5	70.5
13C12-HxCDD 678	65.8	90.5
13C12-HpCDF 678	58.0	73.5
13C12-HpCDD 678	71.0	83.5
13C12-OCDD	53.5	66.5

{Estimated Maximum Possible Concentration}, (Detection Limit).

TRIANGLE LABORATORIES, INC.
Sample Result Summary for Project 38672B
Method 8290X (DB-225)

Data File	X963481	X963482	X963483	X963484
Sample ID	WWC-M23-1-6	WWC-M23-2-6	WWC-M23-3-6	WWC-M23-4-6
Units	ng	ng	ng	ng
Analytes				
2378-TCDF	0.23	0.06	0.05	0.34
Internal Standards Percent Recovery Summary (% Rec)				
13C12-2378-TCDF	66.6	70.1	80.0	71.1

Data File	X963485	X963486
Sample ID	WWC-M23-5-6	WWC-M23-6-6
Units	ng	ng
Analytes		
2378-TCDF	0.26	0.26
Internal Standards Percent Recovery Summary (% Rec)		
13C12-2378-TCDF	62.5	60.2

Dioxin Toxicity Equivalency Value Calculations for sample WWC-M23-1
Untreated Waste Wood Test #1
Date 8/13/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.03	0.03	0.05	0.05	0.08	0.08
1,2,3,7,8-PeCDD	0.5	0.07	0.035	0.15	0.075	0.22	0.11
1,2,3,4,7,8-HxCDD	0.1	0.04	0.004	0.1	0.01	0.14	0.014
1,2,3,6,7,8-HxCDD	0.1	0.06	0.006	0.15	0.015	0.21	0.021
1,2,3,7,8,9-HxCDD	0.1	0.1	0.01	0.23	0.023	0.33	0.033
1,2,3,4,6,7,8-HpCDD	0.01	0.3	0.003	0.49	0.0049	0.79	0.0079
OCDD	0.001	1.2	0.0012	1.3	0.0013	2.5	0.0025
Total MCDD	N/A	0.02	N/A	0.57	N/A	0.59	0
Total DCDD	N/A	0.03	N/A	0.82	N/A	0.85	0
Total TriCDD	N/A	0.11	N/A	0.88	N/A	0.99	0
Total TCDD	N/A	0.31	N/A	4.5	N/A	4.81	0
Total PeCDD	N/A	0.34	N/A	3.6	N/A	3.94	0
Total HxCDD	N/A	0.99	N/A	2.8	N/A	3.79	0
Total HpCDD	N/A	0.65	N/A	1	N/A	1.65	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	2.45	0.0892	14.17	0.1792	16.62	0.2684
Volume of flue gas collected (dscm)		3.4081		3.4081		3.41
Total Dioxin (nanograms/dscm)		0.72		4.16		4.88
Total Dioxin @ 7% O2 (nanograms/dscm)		1.19		7.19		8.43
TEV Dioxin (nanograms/dscm)		0.026		0.053		0.079
TEV Dioxin @ 7% O2 (nanograms/dscm)		0.043		0.091		0.136

Dioxin Toxicity Equivalency Value Calculations for sample WWC-M23-2
Untreated Waste Wood Test # 2
Date 8/14/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.02	0.02	0.02	0.02	0.04	0.04
1,2,3,7,8-PeCDD	0.5	0.04	0.02	0.04	0.02	0.08	0.04
1,2,3,4,7,8-HxCDD	0.1	0.03	0.003	0.02	0.002	0.05	0.005
1,2,3,6,7,8-HxCDD	0.1	0.03	0.003	0.03	0.003	0.06	0.006
1,2,3,7,8,9-HxCDD	0.1	0.05	0.005	0.04	0.004	0.09	0.009
1,2,3,4,6,7,8-HpCDD	0.01	0.15	0.0015	0.1	0.001	0.25	0.0025
OCDD	0.001	0.61	0.00061	0.24	0.00024	0.85	0.00085
Total MCDD	N/A	0.01	N/A	0.44	N/A	0.45	0
Total DCDD	N/A	0.02	N/A	0.39	N/A	0.41	0
Total TriCDD	N/A	0.05	N/A	0.23	N/A	0.28	0
Total TCDD	N/A	0.24	N/A	0.94	N/A	1.18	0
Total PeCDD	N/A	0.34	N/A	0.43	N/A	0.77	0
Total HxCDD	N/A	0.25	N/A	0.38	N/A	0.63	0
Total HpCDD	N/A	0.31	N/A	0.1	N/A	0.41	0

		Front half		Back half		Front half+Back half
Sum (nanograms)	1.22	0.05311	2.91	0.05024	4.13	0.10335
Volume of flue gas collected (dscm)		2.7186		2.7186		2.72
Total Dioxin (nanograms/dscm)		0.45		1.07		1.52
Total Dioxin @ 7% O2 (nanograms/dscm)		0.80		1.85		2.63
TEV Dioxin (nanograms/dscm)		0.020		0.018		0.038
TEV Dioxin @ 7% O2 (nanograms/dscm)		0.035		0.032		0.066

Dioxin Toxicity Equivalency Value Calculations for sample WWC-M23-3
Untreated Waste Wood Test # 3
Date 8/15/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.02	0.02	0.02	0.02	0.04	0.04
1,2,3,7,8-PeCDD	0.5	0.03	0.015	0.04	0.02	0.07	0.035
1,2,3,4,7,8-HxCDD	0.1	0.02	0.002	0.02	0.002	0.04	0.004
1,2,3,6,7,8-HxCDD	0.1	0.02	0.002	0.01	0.001	0.03	0.003
1,2,3,7,8,9-HxCDD	0.1	0.02	0.002	0.01	0.001	0.03	0.003
1,2,3,4,6,7,8-HpCDD	0.01	0.11	0.0011	0.04	0.0004	0.15	0.0015
OCDD	0.001	1.3	0.0013	0.31	0.00031	1.61	0.00161
Total MCDD	N/A	0.01	N/A	0.28	N/A	0.29	0
Total DCDD	N/A	0.01	N/A	0.22	N/A	0.23	0
Total TriCDD	N/A	0.03	N/A	0.11	N/A	0.14	0
Total TCDD	N/A	0.03	N/A	0.35	N/A	0.38	0
Total PeCDD	N/A	0.06	N/A	0.12	N/A	0.18	0
Total HxCDD	N/A	0.1	N/A	0.07	N/A	0.17	0
Total HpCDD	N/A	0.11	N/A	0.08	N/A	0.19	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	0.35	0.0434	1.23	0.04471	1.58	0.08811
Volume of flue gas collected (dscm)		2.872		2.872		2.87
Total Dioxin (nanograms/dscm)		0.12		0.43		0.55
Total Dioxin @ 7% O2 (nanograms/dscm)		0.21		0.74		0.95
TEV Dioxin (nanograms/dscm)		0.015		0.016		0.031
TEV Dioxin @ 7% O2 (nanograms/dscm)		0.026		0.027		0.053

Dioxin Toxicity Equivalency Value Calculations for sample WWC-M23-4
Treated Waste Wood Test # 1
Date 8/20/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.12	0.12	0.09	0.09	0.21	0.21
1,2,3,7,8-PeCDD	0.5	0.59	0.295	0.24	0.12	0.83	0.415
1,2,3,4,7,8-HxCDD	0.1	0.56	0.056	0.13	0.013	0.69	0.069
1,2,3,6,7,8-HxCDD	0.1	0.72	0.072	0.16	0.016	0.88	0.088
1,2,3,7,8,9-HxCDD	0.1	1.3	0.13	0.22	0.022	1.52	0.152
1,2,3,4,6,7,8-HpCDD	0.01	5.2	0.052	0.28	0.0028	5.48	0.0548
OCDD	0.001	10.2	0.0102	0.07	0.00007	10.27	0.01027
Total MCDD	N/A	0.04	N/A	0.02	N/A	0.06	0
Total DCDD	N/A	0.11	N/A	0.02	N/A	0.13	0
Total TriCDD	N/A	0.58	N/A	0.04	N/A	0.62	0
Total TCDD	N/A	3.1	N/A	3.5	N/A	6.6	0
Total PeCDD	N/A	5.8	N/A	3.3	N/A	9.1	0
Total HxCDD	N/A	9	N/A	2.1	N/A	11.1	0
Total HpCDD	N/A	9.7	N/A	0.53	N/A	10.23	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	28.33	0.7352	9.51	0.26387	37.84	0.99907
Volume of flue gas collected (dscm)		4.3505		4.3505		4.35
Total Dioxin (nanograms/dscm)		6.51		2.19		8.70
Total Dioxin @ 7% O2 (nanograms/dscm)		11.60		3.78		15.03
TEV Dioxin (nanograms/dscm)		0.169		0.061		0.230
TEV Dioxin @ 7% O2 (nanograms/dscm)		0.301		0.105		0.397

Dioxin Toxicity Equivalency Value Calculations for sample WWC-M23-5
Treated Waste Wood Test # 2
Date 8/21/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.15	0.15	0.12	0.12	0.27	0.27
1,2,3,7,8-PeCDD	0.5	0.58	0.29	0.3	0.15	0.88	0.44
1,2,3,4,7,8-HxCDD	0.1	0.44	0.044	0.13	0.013	0.57	0.057
1,2,3,6,7,8-HxCDD	0.1	0.61	0.061	0.23	0.023	0.84	0.084
1,2,3,7,8,9-HxCDD	0.1	1.1	0.11	0.32	0.032	1.42	0.142
1,2,3,4,6,7,8-HpCDD	0.01	4.2	0.042	0.68	0.0068	4.88	0.0488
OCDD	0.001	12.9	0.0129	1.4	0.0014	14.3	0.0143
Total MCDD	N/A	0.06	N/A	0.9	N/A	0.96	0
Total DCDD	N/A	0.4	N/A	1	N/A	1.4	0
Total TriCDD	N/A	0.74	N/A	1.5	N/A	2.24	0
Total TCDD	N/A	3.8	N/A	5.1	N/A	8.9	0
Total PeCDD	N/A	6.3	N/A	3.3	N/A	9.6	0
Total HxCDD	N/A	8.6	N/A	2.9	N/A	11.5	0
Total HpCDD	N/A	7.8	N/A	1.4	N/A	9.2	0

		Front half		Back half		Front half+Back half
Sum (nanograms)	27.7	0.7099	16.1	0.3462	43.8	1.0561
Volume of flue gas collected (dscm)		3.6258		3.6258		3.63
Total Dioxin (nanograms/dscm)		7.64		4.44		12.08
Total Dioxin @ 7% O2 (nanograms/dscm)		13.82		7.67		20.88
TEV Dioxin (nanograms/dscm)		0.196		0.095		0.291
TEV Dioxin @ 7% O2 (nanograms/dscm)		0.354		0.165		0.503

Dioxin Toxicity Equivalency Value Calculations for sample WWC-M23-6
Treated Waste Wood Test # 3
Date 8/22/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.15	0.15	0.13	0.13	0.28	0.28
1,2,3,7,8-PeCDD	0.5	0.66	0.33	0.39	0.195	1.05	0.525
1,2,3,4,7,8-HxCDD	0.1	0.45	0.045	0.19	0.019	0.64	0.064
1,2,3,6,7,8-HxCDD	0.1	0.62	0.062	0.21	0.021	0.83	0.083
1,2,3,7,8,9-HxCDD	0.1	1.2	0.12	0.37	0.037	1.57	0.157
1,2,3,4,6,7,8-HpCDD	0.01	4.1	0.041	0.8	0.008	4.9	0.049
OCDD	0.001	12.3	0.0123	2.1	0.0021	14.4	0.0144
Total MCDD	N/A	0.06	N/A	0.81	N/A	0.87	0
Total DCDD	N/A	0.39	N/A	1.5	N/A	1.89	0
Total TriCDD	N/A	0.79	N/A	1.4	N/A	2.19	0
Total TCDD	N/A	4	N/A	5.3	N/A	9.3	0
Total PeCDD	N/A	6.9	N/A	4.4	N/A	11.3	0
Total HxCDD	N/A	8.3	N/A	3.2	N/A	11.5	0
Total HpCDD	N/A	7.6	N/A	1.6	N/A	9.2	0
			Front half		Back half		Front half+Bac
Sum (nanograms)		28.04	0.7603	18.21	0.4121	46.25	1.1724
Volume of flue gas collected (dscm)			4.2691		4.2691		4.27
Total Dioxin (nanograms/dscm)			6.57		4.27		10.83
Total Dioxin @ 7% O2 (nanograms/dscm)			11.91		7.37		18.72
TEV Dioxin (nanograms/dscm)			0.178		0.097		0.275
TEV Dioxin @ 7% O2 (nanograms/dscm)			0.323		0.167		0.475

Furan Toxicity Equivalency Value Calculations for sample WWC-M23-1
Untreated Waste Wood Test #1
Date 8/13/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDF	0.1	0.35	0.035	1.5	0.15	1.85	0.185
1,2,3,7,8-PeCDF	0.05	0.05	0.0025	0.24	0.012	0.29	0.0145
2,3,4,7,8-PeCDF	0.5	0.18	0.09	0.53	0.265	0.71	0.355
1,2,3,4,7,8-HxCDF	0.1	0.25	0.025	0.59	0.059	0.84	0.084
1,2,3,6,7,8-HxCDF	0.1	0.1	0.01	0.25	0.025	0.35	0.035
2,3,4,6,7,8-HxCDF	0.1	0.15	0.015	0.32	0.032	0.47	0.047
1,2,3,7,8,9-HxCDF	0.1	0.04	0.004	0.02	0.002	0.06	0.006
1,2,3,4,6,7,8-HpCDF	0.01	0.25	0.0025	0.46	0.0046	0.71	0.0071
1,2,3,4,7,8,9-HpCDF	0.01	0.04	0.0004	0.08	0.0008	0.12	0.0012
OCDF	0.001	0.15	0.00015	0.22	0.00022	0.37	0.00037
Total MCDF	N/A	0.66	N/A	0.29	N/A	0.95	0
Total DCDF	N/A	0.05	N/A	12.5	N/A	12.55	0
Total TriCDF	N/A	1.3	N/A	6	N/A	7.3	0
Total TCDF	N/A	1.9	N/A	9.1	N/A	11	0
Total PeCDF	N/A	1.4	N/A	5.4	N/A	6.8	0
Total HxCDF	N/A	1	N/A	2.8	N/A	3.8	0
Total HpCDF	N/A	0.34	N/A	0.85	N/A	1.19	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	6.8	0.18455	37.16	0.55062	43.96	0.73517
Volume of flue gas collected (dscm)		3.4081		3.4081		3.41
Total Furan (nanograms/dscm)		2.00		10.90		12.90
Total Furan @ 7% O2 (nanograms/dscm)		3.30		18.85		22.29
TEV Furan (nanograms/dscm)		0.054		0.162		0.216
TEV Furan @ 7% O2 (nanograms/dscm)		0.090		0.279		0.373

Furan Toxicity Equivalency Value Calculations for sample WWC-M23-2
Untreated Waste Wood Test # 2
Date 8/14/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDF	0.1	0.18	0.018	0.4	0.04	0.58	0.058
1,2,3,7,8-PeCDF	0.05	0.03	0.0015	0.07	0.0035	0.1	0.005
2,3,4,7,8-PeCDF	0.5	0.08	0.04	0.13	0.065	0.21	0.105
1,2,3,4,7,8-HxCDF	0.1	0.12	0.012	0.13	0.013	0.25	0.025
1,2,3,6,7,8-HxCDF	0.1	0.05	0.005	0.06	0.006	0.11	0.011
2,3,4,6,7,8-HxCDF	0.1	0.06	0.006	0.07	0.007	0.13	0.013
1,2,3,7,8,9-HxCDF	0.1	0.02	0.002	0.01	0.001	0.03	0.003
1,2,3,4,6,7,8-HpCDF	0.01	0.13	0.0013	0.09	0.0009	0.22	0.0022
1,2,3,4,7,8,9-HpCDF	0.01	0.03	0.0003	0.01	0.0001	0.04	0.0004
OCDF	0.001	0.1	0.0001	0.04	0.00004	0.14	0.00014
Total MCDF	N/A	1.1	N/A	12.5	N/A	13.6	0
Total DCDF	N/A	0.03	N/A	4.9	N/A	4.93	0
Total TriCDF	N/A	0.25	N/A	1.9	N/A	2.15	0
Total TCDF	N/A	0.77	N/A	2.5	N/A	3.27	0
Total PeCDF	N/A	0.54	N/A	1.1	N/A	1.64	0
Total HxCDF	N/A	0.34	N/A	0.53	N/A	0.87	0
Total HpCDF	N/A	0.25	N/A	0.13	N/A	0.38	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	3.38	0.0862	23.6	0.13654	26.98	0.22274
Volume of flue gas collected (dscm)		2.7186		2.7186		2.72
Total Furan (nanograms/dscm)		1.24		8.68		9.92
Total Furan @ 7% O2 (nanograms/dscm)		2.23		15.00		17.15
TEV Furan (nanograms/dscm)		0.032		0.050		0.082
TEV Furan @ 7% O2 (nanograms/dscm)		0.057		0.087		0.142

Furan Toxicity Equivalency Value Calculations for sample WWC-M23-3
Untreated Waste Wood Test # 3
Date 8/15/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDF	0.1	0.06	0.006	0.24	0.024	0.3	0.03
1,2,3,7,8-PeCDF	0.05	0.02	0.001	0.04	0.002	0.06	0.003
2,3,4,7,8-PeCDF	0.5	0.02	0.01	0.04	0.02	0.06	0.03
1,2,3,4,7,8-HxCDF	0.1	0.05	0.005	0.06	0.006	0.11	0.011
1,2,3,6,7,8-HxCDF	0.1	0.02	0.002	0.02	0.002	0.04	0.004
2,3,4,6,7,8-HxCDF	0.1	0.03	0.003	0.03	0.003	0.06	0.006
1,2,3,7,8,9-HxCDF	0.1	0.02	0.002	0.02	0.002	0.04	0.004
1,2,3,4,6,7,8-HpCDF	0.01	0.06	0.0006	0.04	0.0004	0.1	0.001
1,2,3,4,7,8,9-HpCDF	0.01	0.02	0.0002	0.02	0.0002	0.04	0.0004
OCDF	0.001	0.07	0.00007	0.02	0.00002	0.09	0.00009
Total MCDF	N/A	0.2	N/A	10.4	N/A	10.6	0
Total DCDF	N/A	0.02	N/A	3.7	N/A	3.72	0
Total TriCDF	N/A	0.15	N/A	1.1	N/A	1.25	0
Total TCDF	N/A	0.14	N/A	1.6	N/A	1.74	0
Total PeCDF	N/A	0.07	N/A	0.44	N/A	0.51	0
Total HxCDF	N/A	0.14	N/A	0.25	N/A	0.39	0
Total HpCDF	N/A	0.13	N/A	0.05	N/A	0.18	0
			Front half		Back half		Front half+Back half
Sum (nanograms)		0.92	0.02987	17.56	0.05962	18.48	0.08949
Volume of flue gas collected (dscm)			2.872		2.872		2.87
Total Furan (nanograms/dscm)			0.32		6.11		6.43
Total Furan @ 7% O2 (nanograms/dscm)			0.55		10.57		11.12
TEV Furan (nanograms/dscm)			0.010		0.021		0.031
TEV Furan @ 7% O2 (nanograms/dscm)			0.018		0.036		0.054

Furan Toxicity Equivalency Value Calculations for sample WWC-M23-4
Treated Waste Wood Test # 1
Date 8/20/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDF	0.1	1.7	0.17	2	0.2	3.7	0.37
1,2,3,7,8-PeCDF	0.05	0.77	0.0385	0.59	0.0295	1.36	0.068
2,3,4,7,8-PeCDF	0.5	1.1	0.55	0.84	0.42	1.94	0.97
1,2,3,4,7,8-HxCDF	0.1	2.5	0.25	1.1	0.11	3.6	0.36
1,2,3,6,7,8-HxCDF	0.1	1.3	0.13	0.52	0.052	1.82	0.182
2,3,4,6,7,8-HxCDF	0.1	1.7	0.17	0.51	0.051	2.21	0.221
1,2,3,7,8,9-HxCDF	0.1	0.19	0.019	0.06	0.006	0.25	0.025
1,2,3,4,6,7,8-HpCDF	0.01	4.7	0.047	0.72	0.0072	5.42	0.0542
1,2,3,4,7,8,9-HpCDF	0.01	2	0.02	0.24	0.0024	2.24	0.0224
OCDF	0.001	9.6	0.0096	0.21	0.00021	9.81	0.00981
Total MCDF	N/A	4	N/A	0.01	N/A	4.01	0
Total DCDF	N/A	3.4	N/A	0.03	N/A	3.43	0
Total TriCDF	N/A	3.7	N/A	0.05	N/A	3.75	0
Total TCDF	N/A	9.6	N/A	15.6	N/A	25.2	0
Total PeCDF	N/A	12.6	N/A	11.2	N/A	23.8	0
Total HxCDF	N/A	14.7	N/A	7	N/A	21.7	0
Total HpCDF	N/A	13	N/A	1.5	N/A	14.5	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	70.6	1.4041	35.6	0.87831	106.2	2.28241
Volume of flue gas collected (dscm)		4.3505		4.3505		4.35
Total Furan (nanograms/dscm)		16.23		8.18		24.41
Total Furan @ 7% O2 (nanograms/dscm)		28.90		14.14		42.19
TEV Furan (nanograms/dscm)		0.323		0.202		0.525
TEV Furan @ 7% O2 (nanograms/dscm)		0.575		0.349		0.907

Furan Toxicity Equivalency Value Calculations for sample WWC-M23-5
Treated Waste Wood Test # 2
Date 8/21/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDF	0.1	1.1	0.11	1.5	0.15	2.6	0.26
1,2,3,7,8-PeCDF	0.05	0.54	0.027	0.54	0.027	1.08	0.054
2,3,4,7,8-PeCDF	0.5	0.72	0.36	0.59	0.295	1.31	0.655
1,2,3,4,7,8-HxCDF	0.1	1.5	0.15	0.83	0.083	2.33	0.233
1,2,3,6,7,8-HxCDF	0.1	0.74	0.074	0.41	0.041	1.15	0.115
2,3,4,6,7,8-HxCDF	0.1	0.84	0.084	0.38	0.038	1.22	0.122
1,2,3,7,8,9-HxCDF	0.1	0.09	0.009	0.04	0.004	0.13	0.013
1,2,3,4,6,7,8-HpCDF	0.01	2.3	0.023	0.79	0.0079	3.09	0.0309
1,2,3,4,7,8,9-HpCDF	0.01	0.79	0.0079	0.22	0.0022	1.01	0.0101
OCDF	0.001	4.2	0.0042	0.76	0.00076	4.96	0.00496
Total MCDF	N/A	4.2	N/A	28.9	N/A	33.1	0
Total DCDF	N/A	2.2	N/A	13.9	N/A	16.1	0
Total TriCDF	N/A	3	N/A	6.1	N/A	9.1	0
Total TCDF	N/A	6.8	N/A	12.2	N/A	19	0
Total PeCDF	N/A	8.2	N/A	8	N/A	16.2	0
Total HxCDF	N/A	7.8	N/A	4.8	N/A	12.6	0
Total HpCDF	N/A	5.5	N/A	1.9	N/A	7.4	0

	Front half		Back half		Front half+Back half	
Sum (nanograms)	41.9	0.8491	76.56	0.64886	118.46	1.49796
Volume of flue gas collected (dscm)		3.6258		3.6258		3.63
Total Furan (nanograms/dscm)		11.56		21.12		32.67
Total Furan @ 7% O2 (nanograms/dscm)		20.90		36.50		56.47
TEV Furan (nanograms/dscm)		0.234		0.179		0.413
TEV Furan @ 7% O2 (nanograms/dscm)		0.424		0.309		0.714

Furan Toxicity Equivalency Value Calculations for sample WWC-M23-6
Treated Waste Wood Test # 3
Date 8/22/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDF	0.1	1.1	0.11	1.4	0.14	2.5	0.25
1,2,3,7,8-PeCDF	0.05	0.65	0.0325	0.51	0.0255	1.16	0.058
2,3,4,7,8-PeCDF	0.5	0.7	0.35	0.56	0.28	1.26	0.63
1,2,3,4,7,8-HxCDF	0.1	1.3	0.13	0.79	0.079	2.09	0.209
1,2,3,6,7,8-HxCDF	0.1	0.67	0.067	0.4	0.04	1.07	0.107
2,3,4,6,7,8-HxCDF	0.1	0.8	0.08	0.33	0.033	1.13	0.113
1,2,3,7,8,9-HxCDF	0.1	0.08	0.008	0.04	0.004	0.12	0.012
1,2,3,4,6,7,8-HpCDF	0.01	2.2	0.022	0.79	0.0079	2.99	0.0299
1,2,3,4,7,8,9-HpCDF	0.01	0.68	0.0068	0.15	0.0015	0.83	0.0083
OCDF	0.001	3.7	0.0037	0.66	0.00066	4.36	0.00436
Total MCDF	N/A	4.8	N/A	25.3	N/A	30.1	0
Total DCDF	N/A	3.1	N/A	12	N/A	15.1	0
Total TriCDF	N/A	3	N/A	5.6	N/A	8.6	0
Total TCDF	N/A	7.5	N/A	11.5	N/A	19	0
Total PeCDF	N/A	8.2	N/A	8	N/A	16.2	0
Total HxCDF	N/A	7.1	N/A	4.2	N/A	11.3	0
Total HpCDF	N/A	5.1	N/A	1.5	N/A	6.6	0

		Front half		Back half		Front half+Bac
Sum (nanograms)	42.5	0.81	68.76	0.61156	111.26	1.42156
Volume of flue gas collected (dscm)		4.2691		4.2691		4.27
Total Furan (nanograms/dscm)		9.96		16.11		26.06
Total Furan @ 7% O2 (nanograms/dscm)		18.05		27.84		45.04
TEV Furan (nanograms/dscm)		0.190		0.143		0.333
TEV Furan @ 7% O2 (nanograms/dscm)		0.344		0.248		0.576

Toxicity Equivalency Value Dioxin and Furan Calculations for sample WWC-M23-1
Untreated Waste Wood Test #1
Date 8/13/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.03	0.03	0.05	0.05	0.08	0.08
1,2,3,7,8-PeCDD	0.5	0.07	0.035	0.15	0.075	0.22	0.11
1,2,3,4,7,8-HxCDD	0.1	0.04	0.004	0.1	0.01	0.14	0.014
1,2,3,6,7,8-HxCDD	0.1	0.06	0.006	0.15	0.015	0.21	0.021
1,2,3,7,8,9-HxCDD	0.1	0.1	0.01	0.23	0.023	0.33	0.033
1,2,3,4,6,7,8-HpCDD	0.01	0.3	0.003	0.49	0.0049	0.79	0.0079
OCDD	0.001	1.2	0.0012	1.3	0.0013	2.5	0.0025
2,3,7,8-TCDF	0.1	0.35	0.035	1.5	0.15	1.85	0.185
1,2,3,7,8-PeCDF	0.05	0.05	0.0025	0.24	0.012	0.29	0.0145
2,3,4,7,8-PeCDF	0.5	0.18	0.09	0.53	0.265	0.71	0.355
1,2,3,4,7,8-HxCDF	0.1	0.25	0.025	0.59	0.059	0.84	0.084
1,2,3,6,7,8-HxCDF	0.1	0.1	0.01	0.25	0.025	0.35	0.035
2,3,4,6,7,8-HxCDF	0.1	0.15	0.015	0.32	0.032	0.47	0.047
1,2,3,7,8,9-HxCDF	0.1	0.04	0.004	0.02	0.002	0.06	0.006
1,2,3,4,6,7,8-HpCDF	0.01	0.25	0.0025	0.46	0.0046	0.71	0.0071
1,2,3,4,7,8,9-HpCDF	0.01	0.04	0.0004	0.08	0.0008	0.12	0.0012
OCDF	0.001	0.15	0.00015	0.22	0.00022	0.37	0.00037
Total MCDD	N/A	0.02	N/A	0.57	N/A	0.59	0
Total DCDD	N/A	0.03	N/A	0.82	N/A	0.85	0
Total TriCDD	N/A	0.11	N/A	0.88	N/A	0.99	0
Total TCDD	N/A	0.31	N/A	4.5	N/A	4.81	0
Total PeCDD	N/A	0.34	N/A	3.6	N/A	3.94	0
Total HxCDD	N/A	0.99	N/A	2.8	N/A	3.79	0
Total HpCDD	N/A	0.65	N/A	1	N/A	1.65	0
Total MCDF	N/A	0.66	N/A	0.29	N/A	0.95	0
Total DCDF	N/A	0.05	N/A	12.5	N/A	12.55	0
Total TriCDF	N/A	1.3	N/A	6	N/A	7.3	0
Total TCDF	N/A	1.9	N/A	9.1	N/A	11	0
Total PeCDF	N/A	1.4	N/A	5.4	N/A	6.8	0
Total HxCDF	N/A	1	N/A	2.8	N/A	3.8	0
Total HpCDF	N/A	0.34	N/A	0.85	N/A	1.19	0
			Front half		Back half		Front half+Back half
Sum (nanograms)		9.25	0.27375	51.33	0.72982	60.58	1.00357
Volume of flue gas collected (dscm)			3.4081		3.4081		3.41
Total Dioxin and Furan (nanograms/dscm)			2.71		15.06		17.78
Total Dioxin and Furan @ 7% O2 (nanograms/dscm)			4.49		26.03		30.72
TEV Dioxin and Furan (nanograms/dscm)			0.080		0.214		0.294
TEV Dioxin and Furan @ 7% O2 (nanograms/dscm)			0.133		0.370		0.509

Toxicity Equivalency Value Dioxin and Furan Calculations for sample WWC-M23-2
Untreated Waste Wood Test # 2
Date 8/14/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.02	0.02	0.02	0.02	0.04	0.04
1,2,3,7,8-PeCDD	0.5	0.04	0.02	0.04	0.02	0.08	0.04
1,2,3,4,7,8-HxCDD	0.1	0.03	0.003	0.02	0.002	0.05	0.005
1,2,3,6,7,8-HxCDD	0.1	0.03	0.003	0.03	0.003	0.06	0.006
1,2,3,7,8,9-HxCDD	0.1	0.05	0.005	0.04	0.004	0.09	0.009
1,2,3,4,6,7,8-HpCDD	0.01	0.15	0.0015	0.1	0.001	0.25	0.0025
OCDD	0.001	0.61	0.00061	0.24	0.00024	0.85	0.00085
2,3,7,8-TCDF	0.1	0.18	0.018	0.4	0.04	0.58	0.058
1,2,3,7,8-PeCDF	0.05	0.03	0.0015	0.07	0.0035	0.1	0.005
2,3,4,7,8-PeCDF	0.5	0.08	0.04	0.13	0.065	0.21	0.105
1,2,3,4,7,8-HxCDF	0.1	0.12	0.012	0.13	0.013	0.25	0.025
1,2,3,6,7,8-HxCDF	0.1	0.05	0.005	0.06	0.006	0.11	0.011
2,3,4,6,7,8-HxCDF	0.1	0.06	0.006	0.07	0.007	0.13	0.013
1,2,3,7,8,9-HxCDF	0.1	0.02	0.002	0.01	0.001	0.03	0.003
1,2,3,4,6,7,8-HpCDF	0.01	0.13	0.0013	0.09	0.0009	0.22	0.0022
1,2,3,4,7,8,9-HpCDF	0.01	0.03	0.0003	0.01	0.0001	0.04	0.0004
OCDF	0.001	0.1	0.0001	0.04	0.00004	0.14	0.00014
Total MCDD	N/A	0.01	N/A	0.44	N/A	0.45	0
Total DCDD	N/A	0.02	N/A	0.39	N/A	0.41	0
Total TriCDD	N/A	0.05	N/A	0.23	N/A	0.28	0
Total TCDD	N/A	0.24	N/A	0.94	N/A	1.18	0
Total PeCDD	N/A	0.34	N/A	0.43	N/A	0.77	0
Total HxCDD	N/A	0.25	N/A	0.38	N/A	0.63	0
Total HpCDD	N/A	0.31	N/A	0.1	N/A	0.41	0
Total MCDF	N/A	1.1	N/A	12.5	N/A	13.6	0
Total DCDF	N/A	0.03	N/A	4.9	N/A	4.93	0
Total TriCDF	N/A	0.25	N/A	1.9	N/A	2.15	0
Total TCDF	N/A	0.77	N/A	2.5	N/A	3.27	0
Total PeCDF	N/A	0.54	N/A	1.1	N/A	1.64	0
Total HxCDF	N/A	0.34	N/A	0.53	N/A	0.87	0
Total HpCDF	N/A	0.25	N/A	0.13	N/A	0.38	0

		Front half		Back half		Front half+Back half
Sum (nanograms)	4.6	0.13931	26.51	0.18678	31.11	0.32609
Volume of flue gas collected (dscm)		2.7186		2.7186		2.72
Total Dioxin and Furan (nanograms/dscm)		1.69		9.75		11.44
Total Dioxin and Furan @ 7% O2 (nanograms/dscm)		3.03		16.85		19.78
TEV Dioxin and Furan (nanograms/dscm)		0.051		0.069		0.120
TEV Dioxin and Furan @ 7% O2 (nanograms/dscm)		0.092		0.119		0.207

Toxicity Equivalency Value Dioxin and Furan Calculations for sample WWC-M23-3
Untreated Waste Wood Test # 3
Date 8/15/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.02	0.02	0.02	0.02	0.04	0.04
1,2,3,7,8-PeCDD	0.5	0.03	0.015	0.04	0.02	0.07	0.035
1,2,3,4,7,8-HxCDD	0.1	0.02	0.002	0.02	0.002	0.04	0.004
1,2,3,6,7,8-HxCDD	0.1	0.02	0.002	0.01	0.001	0.03	0.003
1,2,3,7,8,9-HxCDD	0.1	0.02	0.002	0.01	0.001	0.03	0.003
1,2,3,4,6,7,8-HpCDD	0.01	0.11	0.0011	0.04	0.0004	0.15	0.0015
OCDD	0.001	1.3	0.0013	0.31	0.00031	1.61	0.00161
2,3,7,8-TCDF	0.1	0.06	0.006	0.24	0.024	0.3	0.03
1,2,3,7,8-PeCDF	0.05	0.02	0.001	0.04	0.002	0.06	0.003
2,3,4,7,8-PeCDF	0.5	0.02	0.01	0.04	0.02	0.06	0.03
1,2,3,4,7,8-HxCDF	0.1	0.05	0.005	0.06	0.006	0.11	0.011
1,2,3,6,7,8-HxCDF	0.1	0.02	0.002	0.02	0.002	0.04	0.004
2,3,4,6,7,8-HxCDF	0.1	0.03	0.003	0.03	0.003	0.06	0.006
1,2,3,7,8,9-HxCDF	0.1	0.02	0.002	0.02	0.002	0.04	0.004
1,2,3,4,6,7,8-HpCDF	0.01	0.06	0.0006	0.04	0.0004	0.1	0.001
1,2,3,4,7,8,9-HpCDF	0.01	0.02	0.0002	0.02	0.0002	0.04	0.0004
OCDF	0.001	0.07	0.00007	0.02	0.00002	0.09	0.00009
Total MCDD	N/A	0.01	N/A	0.28	N/A	0.29	0
Total DCDD	N/A	0.01	N/A	0.22	N/A	0.23	0
Total TriCDD	N/A	0.03	N/A	0.11	N/A	0.14	0
Total TCDD	N/A	0.03	N/A	0.35	N/A	0.38	0
Total PeCDD	N/A	0.06	N/A	0.12	N/A	0.18	0
Total HxCDD	N/A	0.1	N/A	0.07	N/A	0.17	0
Total HpCDD	N/A	0.11	N/A	0.08	N/A	0.19	0
Total MCDF	N/A	0.2	N/A	10.4	N/A	10.6	0
Total DCDF	N/A	0.02	N/A	3.7	N/A	3.72	0
Total TriCDF	N/A	0.15	N/A	1.1	N/A	1.25	0
Total TCDF	N/A	0.14	N/A	1.6	N/A	1.74	0
Total PeCDF	N/A	0.07	N/A	0.44	N/A	0.51	0
Total HxCDF	N/A	0.14	N/A	0.25	N/A	0.39	0
Total HpCDF	N/A	0.13	N/A	0.05	N/A	0.18	0
			Front half		Back half		Front half+Back half
Sum (nanograms)		1.27	0.07327	18.79	0.10433	20.06	0.1776
Volume of flue gas collected (dscm)			2.872		2.872		2.87
Total Dioxin and Furan (nanograms/dscm)			0.44		6.54		6.98
Total Dioxin and Furan @ 7% O2 (nanograms/dscm)			0.76		11.31		12.07
TEV Dioxin and Furan (nanograms/dscm)			0.026		0.036		0.062
TEV Dioxin and Furan @ 7% O2 (nanograms/dscm)			0.044		0.063		0.107

Toxicity Equivalency Value Dioxin and Furan Calculations for sample WWC-M23-4
Treated Waste Wood Test # 1
Date 8/20/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.12	0.12	0.09	0.09	0.21	0.21
1,2,3,7,8-PeCDD	0.5	0.59	0.295	0.24	0.12	0.83	0.415
1,2,3,4,7,8-HxCDD	0.1	0.56	0.056	0.13	0.013	0.69	0.069
1,2,3,6,7,8-HxCDD	0.1	0.72	0.072	0.16	0.016	0.88	0.088
1,2,3,7,8,9-HxCDD	0.1	1.3	0.13	0.22	0.022	1.52	0.152
1,2,3,4,6,7,8-HpCDD	0.01	5.2	0.052	0.28	0.0028	5.48	0.0548
OCDD	0.001	10.2	0.0102	0.07	0.00007	10.27	0.01027
2,3,7,8-TCDF	0.1	1.7	0.17	2	0.2	3.7	0.37
1,2,3,7,8-PeCDF	0.05	0.77	0.0385	0.59	0.0295	1.36	0.068
2,3,4,7,8-PeCDF	0.5	1.1	0.55	0.84	0.42	1.94	0.97
1,2,3,4,7,8-HxCDF	0.1	2.5	0.25	1.1	0.11	3.6	0.36
1,2,3,6,7,8-HxCDF	0.1	1.3	0.13	0.52	0.052	1.82	0.182
2,3,4,6,7,8-HxCDF	0.1	1.7	0.17	0.51	0.051	2.21	0.221
1,2,3,7,8,9-HxCDF	0.1	0.19	0.019	0.06	0.006	0.25	0.025
1,2,3,4,6,7,8-HpCDF	0.01	4.7	0.047	0.72	0.0072	5.42	0.0542
1,2,3,4,7,8,9-HpCDF	0.01	2	0.02	0.24	0.0024	2.24	0.0224
OCDF	0.001	9.6	0.0096	0.21	0.00021	9.81	0.00981
Total MCDD	N/A	0.04	N/A	0.02	N/A	0.06	0
Total DCDD	N/A	0.11	N/A	0.02	N/A	0.13	0
Total TriCDD	N/A	0.58	N/A	0.04	N/A	0.62	0
Total TCDD	N/A	3.1	N/A	3.5	N/A	6.6	0
Total PeCDD	N/A	5.8	N/A	3.3	N/A	9.1	0
Total HxCDD	N/A	9	N/A	2.1	N/A	11.1	0
Total HpCDD	N/A	9.7	N/A	0.53	N/A	10.23	0
Total MCDF	N/A	4	N/A	0.01	N/A	4.01	0
Total DCDF	N/A	3.4	N/A	0.03	N/A	3.43	0
Total TriCDF	N/A	3.7	N/A	0.05	N/A	3.75	0
Total TCDF	N/A	9.6	N/A	15.6	N/A	25.2	0
Total PeCDF	N/A	12.6	N/A	11.2	N/A	23.8	0
Total HxCDF	N/A	14.7	N/A	7	N/A	21.7	0
Total HpCDF	N/A	13	N/A	1.5	N/A	14.5	0

		Front half		Back half		Front half+Back half
Sum (nanograms)	98.93	2.1393	45.11	1.14218	144.04	3.28148
Volume of flue gas collected (dscm)		4.3505		4.3505		4.35
Total Dioxin and Furan (nanograms/dscm)		22.74		10.37		33.11
Total Dioxin and Furan @ 7% O2 (nanograms/dscm)		40.50		17.92		57.23
TEV Dioxin and Furan (nanograms/dscm)		0.492		0.263		0.754
TEV Dioxin and Furan @ 7% O2 (nanograms/dscm)		0.876		0.454		1.304

Toxicity Equivalency Value Dioxin and Furan Calculations for sample WWC-M23-5
Treated Waste Wood Test # 2
Date 8/21/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.15	0.15	0.12	0.12	0.27	0.27
1,2,3,7,8-PeCDD	0.5	0.58	0.29	0.3	0.15	0.88	0.44
1,2,3,4,7,8-HxCDD	0.1	0.44	0.044	0.13	0.013	0.57	0.057
1,2,3,6,7,8-HxCDD	0.1	0.61	0.061	0.23	0.023	0.84	0.084
1,2,3,7,8,9-HxCDD	0.1	1.1	0.11	0.32	0.032	1.42	0.142
1,2,3,4,6,7,8-HpCDD	0.01	4.2	0.042	0.68	0.0068	4.88	0.0488
OCDD	0.001	12.9	0.0129	1.4	0.0014	14.3	0.0143
2,3,7,8-TCDF	0.1	1.1	0.11	1.5	0.15	2.6	0.26
1,2,3,7,8-PeCDF	0.05	0.54	0.027	0.54	0.027	1.08	0.054
2,3,4,7,8-PeCDF	0.5	0.72	0.36	0.59	0.295	1.31	0.655
1,2,3,4,7,8-HxCDF	0.1	1.5	0.15	0.83	0.083	2.33	0.233
1,2,3,6,7,8-HxCDF	0.1	0.74	0.074	0.41	0.041	1.15	0.115
2,3,4,6,7,8-HxCDF	0.1	0.84	0.084	0.38	0.038	1.22	0.122
1,2,3,7,8,9-HxCDF	0.1	0.09	0.009	0.04	0.004	0.13	0.013
1,2,3,4,6,7,8-HpCDF	0.01	2.3	0.023	0.79	0.0079	3.09	0.0309
1,2,3,4,7,8,9-HpCDF	0.01	0.79	0.0079	0.22	0.0022	1.01	0.0101
OCDF	0.001	4.2	0.0042	0.76	0.00076	4.96	0.00496
Total MCDD	N/A	0.06	N/A	0.9	N/A	0.96	0
Total DCDD	N/A	0.4	N/A	1	N/A	1.4	0
Total TriCDD	N/A	0.74	N/A	1.5	N/A	2.24	0
Total TCDD	N/A	3.8	N/A	5.1	N/A	8.9	0
Total PeCDD	N/A	6.3	N/A	3.3	N/A	9.6	0
Total HxCDD	N/A	8.6	N/A	2.9	N/A	11.5	0
Total HpCDD	N/A	7.8	N/A	1.4	N/A	9.2	0
Total MCDF	N/A	4.2	N/A	28.9	N/A	33.1	0
Total DCDF	N/A	2.2	N/A	13.9	N/A	16.1	0
Total TriCDF	N/A	3	N/A	6.1	N/A	9.1	0
Total TCDF	N/A	6.8	N/A	12.2	N/A	19	0
Total PeCDF	N/A	8.2	N/A	8	N/A	16.2	0
Total HxCDF	N/A	7.8	N/A	4.8	N/A	12.6	0
Total HpCDF	N/A	5.5	N/A	1.9	N/A	7.4	0
			Front half		Back half		Front half+Back half
Sum (nanograms)		69.6	1.559	92.66	0.99506	162.26	2.55406
Volume of flue gas collected (dscm)			3.6258		3.6258		3.63
Total Dioxin and Furan (nanograms/dscm)			19.20		25.56		44.75
Total Dioxin and Furan @ 7% O2 (nanograms/dscm)			34.72		44.17		77.35
TEV Dioxin and Furan (nanograms/dscm)			0.430		0.274		0.704
TEV Dioxin and Furan @ 7% O2 (nanograms/dscm)			0.778		0.474		1.218

Toxicity Equivalency Value Dioxin and Furan Calculations for sample WWC-M23-6
Treated Waste Wood Test # 3
Date 8/22/96

	Toxicity Equivalency Factor	Front Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Back Half Totals (nanograms)	Toxicity Equivalency Value (nanograms)	Combined Totals (nanograms)	Toxicity Equivalency Value (nanograms)
2,3,7,8-TCDD	1	0.15	0.15	0.13	0.13	0.28	0.28
1,2,3,7,8-PeCDD	0.5	0.66	0.33	0.39	0.195	1.05	0.525
1,2,3,4,7,8-HxCDD	0.1	0.45	0.045	0.19	0.019	0.64	0.064
1,2,3,6,7,8-HxCDD	0.1	0.62	0.062	0.21	0.021	0.83	0.083
1,2,3,7,8,9-HxCDD	0.1	1.2	0.12	0.37	0.037	1.57	0.157
1,2,3,4,6,7,8-HpCDD	0.01	4.1	0.041	0.8	0.008	4.9	0.049
OCDD	0.001	12.3	0.0123	2.1	0.0021	14.4	0.0144
2,3,7,8-TCDF	0.1	1.1	0.11	1.4	0.14	2.5	0.25
1,2,3,7,8-PeCDF	0.05	0.65	0.0325	0.51	0.0255	1.16	0.058
2,3,4,7,8-PeCDF	0.5	0.7	0.35	0.56	0.28	1.26	0.63
1,2,3,4,7,8-HxCDF	0.1	1.3	0.13	0.79	0.079	2.09	0.209
1,2,3,6,7,8-HxCDF	0.1	0.67	0.067	0.4	0.04	1.07	0.107
2,3,4,6,7,8-HxCDF	0.1	0.8	0.08	0.33	0.033	1.13	0.113
1,2,3,7,8,9-HxCDF	0.1	0.08	0.008	0.04	0.004	0.12	0.012
1,2,3,4,6,7,8-HpCDF	0.01	2.2	0.022	0.79	0.0079	2.99	0.0299
1,2,3,4,7,8,9-HpCDF	0.01	0.68	0.0068	0.15	0.0015	0.83	0.0083
OCDF	0.001	3.7	0.0037	0.66	0.00066	4.36	0.00436
Total MCDD	N/A	0.06	N/A	0.81	N/A	0.87	0
Total DCDD	N/A	0.39	N/A	1.5	N/A	1.89	0
Total TriCDD	N/A	0.79	N/A	1.4	N/A	2.19	0
Total TCDD	N/A	4	N/A	5.3	N/A	9.3	0
Total PeCDD	N/A	6.9	N/A	4.4	N/A	11.3	0
Total HxCDD	N/A	8.3	N/A	3.2	N/A	11.5	0
Total HpCDD	N/A	7.6	N/A	1.6	N/A	9.2	0
Total MCDF	N/A	4.8	N/A	25.3	N/A	30.1	0
Total DCDF	N/A	3.1	N/A	12	N/A	15.1	0
Total TriCDF	N/A	3	N/A	5.6	N/A	8.6	0
Total TCDF	N/A	7.5	N/A	11.5	N/A	19	0
Total PeCDF	N/A	8.2	N/A	8	N/A	16.2	0
Total HxCDF	N/A	7.1	N/A	4.2	N/A	11.3	0
Total HpCDF	N/A	5.1	N/A	1.5	N/A	6.6	0
			Front half		Back half		Front half+Bac
Sum (nanograms)		70.54	1.5703	86.97	1.02366	157.51	2.59396
Volume of flue gas collected (dscm)			4.2691		4.2691		4.27
Total Dioxin and Furan (nanograms/dscm)			16.52		20.37		36.90
Total Dioxin and Furan @ 7% O2 (nanograms/dscm)			29.96		35.21		63.77
TEV Dioxin and Furan (nanograms/dscm)			0.368		0.240		0.608
TEV Dioxin and Furan @ 7% O2 (nanograms/dscm)			0.667		0.414		1.050

APPENDIX V PCB ANALYSIS RESULTS

TRIANGLE LABORATORIES OF RTP, INC.
Sample Result Summary for Project 38672C
Method PCBO Analysis (DB-5)

Data File	W108203		W108204		W108205		W108206	
Sample ID	TLI M23 Blank		WWC-M23-1-1,6,2,3		WWC-M23-2-1,6,2,3		WWC-M23-3-1,6,2,3	
Units	ng		ng		ng		ng	
Analytes								
2-Mo	0.13		3.2		1.3	B	1.5	B
44-Di	0.32		3.9	B	3.5	B	3.2	B
244-Tr	0.59	PR	3.2	PRB	3.4	PRB	4.1	PRB
2255-T	1.2		3.9	B	4.3	B	6.0	B
3344-T	{0.07}		0.88	B	0.40	B	0.35	B
23445-Pe	{0.09}	PR	0.24	PRB	{0.24}	PRB	{0.33}	PRB
23344-Pe	0.17		0.77	B	0.71	B	1.1	B
33445-Pe	(0.2)		0.27		{0.21}	PR	(0.2)	
233445-Hx	0.08		0.41	B	0.37	B	0.37	B
334455-Hx	(0.3)		{0.13}		(0.3)		(0.3)	
2234455-Hp	0.90		3.0	B	2.8	B	5.1	B
22334455-Octa	0.17		0.48	B	0.38	B	0.72	B
223344556-Nona	(0.5)		(0.6)		(0.4)		(0.5)	
Deca	(0.5)		(0.7)		(0.4)		(0.6)	
TOTAL MONO	0.24		12.6		5.0		4.8	
TOTAL DI	1.2		47.9		28.9		28.6	
TOTAL TRI	3.5		27.3		22.9		25.6	
TOTAL TETRA	6.6		21.6		26.5		32.0	
TOTAL PENTA	5.0		15.6		17.4		27.9	
TOTAL HEXA	6.1		22.3		24.1		36.9	
TOTAL HEPTA	2.8		13.0		12.4		22.3	
TOTAL OCTA	0.54		2.5		1.5		2.4	
TOTAL NONA	(0.5)		(0.6)		(0.4)		(0.5)	
Internal Standards Percent Recovery Summary (% Rec)								
13C6-4-Mo	53.2		63.2		48.1		54.8	
13C12-44-Di	81.9		93.8		70.4		79.2	
13C12-244-Tr	78.6		85.3		72.5		77.5	
13C12-3344-T	85.0		89.1		71.5		75.8	
13C12-33445-Pe	79.7		85.8		67.3		68.9	
13C12-334455-Hx	59.0		62.9		49.1		60.7	
13C12-(245)3-Hp	55.4		60.1		54.3		53.7	
13C12-(2345)-O	73.6		77.5		74.7		73.7	
13C12-D	57.7		57.3		56.2		52.0	
Other Standards Percent Recovery Summary (% Rec)								
13C12-224455-Hx	75.2		75.3		72.6		72.7	
Other Standards Percent Recovery Summary (% Rec)								
13C12-3355-T	95.8		96.5		88.7		75.4	
13C12-22455-Pe	83.0		82.7		76.7		63.5	
13C12-223445-Hx	71.4		70.8		68.8		58.7	
13C12-(2356)-O	52.3		49.7		49.4		42.3	

Data File	W108207		W108208		W108209		W108210	
Sample ID	WWC-M23-4-1,6,2,3		WWC-M23-5-1,6,2,3		WWC-M23-6-1,6,2,3		WWC-M23-FB-1,6,2,3	
Units	ng		ng		ng		ng	
Analytes								
2-Mo	3.2		4.7		4.5		0.25	B
44-Di	4.8	B	7.4		10.6		0.69	B
244-Tr	3.9	PRB	8.9	PRB	10.6	PRB	1.3	PRB
2255-T	5.6	B	9.9	B	19.4	B	1.5	B
3344-T	0.67	B	0.78	B	0.87	B	0.09	B
23445-Pe	0.31	PRB	0.33	PRB	1.1	PRB	{0.14}	PRB
23344-Pe	1.2	B	1.2	B	3.3	B	0.36	B
33445-Pe	0.26	PR	{0.37}		{0.45}		(0.1)	
233445-Hx	0.49	B	0.65	B	1.2	B	0.29	B
334455-Hx	(0.1)		{0.18}		(0.2)		(0.2)	
2234455-Hp	4.0	B	6.0	B	12.5	B	5.5	B
22334455-Octa	0.69	B	1.4	B	1.4	B	1.6	B
223344556-Nona	{0.76}		0.87		0.81		0.30	
Deca	{0.81}		1.2		0.93		(0.4)	
TOTAL MONO	13.6		15.3		13.6		0.59	
TOTAL DI	38.8		69.5		70.5		4.4	
TOTAL TRI	24.9		60.7		73.1		6.4	
TOTAL TETRA	34.8		49.3		101		8.9	
TOTAL PENTA	29.9		32.0		106		7.8	
TOTAL HEXA	31.2		38.9		111		13.0	
TOTAL HEPTA	19.3		26.0		56.4		16.1	
TOTAL OCTA	3.5		6.1		9.9		5.2	
TOTAL NONA	1.0		2.3		2.2		0.30	
Internal Standards Percent Recovery Summary (% Rec)								
13C6-4-Mo	43.9		51.9		58.9		49.7	
13C12-44-Di	75.3		75.7		98.8		77.1	
13C12-244-Tr	79.2		69.8		88.4		74.3	
13C12-3344-T	82.4		77.1		92.1		80.1	
13C12-33445-Pe	77.1		70.9		79.7		73.9	
13C12-334455-Hx	60.0		58.3		65.0		68.1	
13C12-(245)3-Hp	54.0		52.2		61.9		63.8	
13C12-(2345)-O	73.7		70.7		73.2		78.9	
13C12-D	56.1		56.1		55.7		63.5	
Other Standards Percent Recovery Summary (% Rec)								
13C12-224455-Hx	71.6		77.6		80.4		76.4	
Other Standards Percent Recovery Summary (% Rec)								
13C12-3355-T	94.3		87.4		99.3		82.3	
13C12-22455-Pe	76.7		73.6		87.4		70.0	
13C12-223445-Hx	66.1		68.3		78.0		74.1	
13C12-(2356)-O	50.1		51.5		56.3		57.2	

Data File	W108211		W108212	
Sample ID	TLI LCS		TLI LCSD	
Units	ng		ng	
Analytes				
2-Mo	10.5		10.0	
44-Di	9.5		9.7	
244-Tr	8.8	B	8.9	
2255-T	20.1	B	20.1	B
3344-T	18.7		19.6	
23445-Pe	21.9		21.9	
23344-Pe	20.8		21.2	
33445-Pe	18.6		18.5	
233445-Hx	22.6		21.3	
334455-Hx	19.0		19.3	
2234455-Hp	28.6		30.5	
22334455-Octa	28.6		29.4	
223344556-Nona	46.2		46.3	
Deca	46.1		47.3	
Internal Standards Percent Recovery Summary (% Rec)				
13C6-4-Mo	54.4		51.1	
13C12-44-Di	67.2		76.9	
13C12-244-Tr	64.8		71.1	
13C12-3344-T	63.4		72.7	
13C12-33445-Pe	54.2		63.0	
13C12-334455-Hx	58.3		68.9	
13C12-(245)3-Hp	60.2		63.9	
13C12-(2345)-O	74.2		83.3	
13C12-D	61.4		67.8	
Other Standards Percent Recovery Summary (% Rec)				
13C12-224455-Hx	76.8		84.9	
Other Standards Percent Recovery Summary (% Rec)				
13C12-3355-T	73.8		79.3	
13C12-22455-Pe	67.7		70.7	
13C12-223445-Hx	75.8		78.8	
13C12-(2356)-O	62.4		61.5	

{Estimated Maximum Possible Concentration}, (Detection Limit).

Waste Wood Combustion PCB Calculations

Sample #	Date	Gas Sample Volume (dscm)	Stack Flow Rate (dscfm)	Stack Flow Rate (dscmm)	Flue Gas O2 (%)	Analytes	Analytes (Total ng)	Analytes (ng/dscm)	Analytes (ng/dscm @ 7% O2)	Emission Rate (ug/hr @ 7% O2)
WWC-M23-1 Untreated Waste Wood # 1	8/13/96	3.4080	685.066	19.40107	12.5	2-Mo	3.20	0.939	1.554	1.809
						44-Di	3.90	1.144	1.894	2.204
						244-Tr	3.20	0.939	1.554	1.809
						2255-T	3.90	1.144	1.894	2.204
						3344-T	0.88	0.258	0.427	0.497
						23445-Pe	0.24	0.070	0.117	0.136
						23344-Pe	0.77	0.226	0.374	0.435
						33445-Pe	0.27	0.079	0.131	0.153
						233445-Hx	0.41	0.120	0.199	0.232
						334455-Hx	0.13	0.038	0.063	0.073
						2234455-Hp	3.00	0.880	1.457	1.696
						22334455-Octa	0.48	0.141	0.233	0.271
						223344556-Nona	0.60	0.176	0.291	0.339
						Deca	0.70	0.205	0.340	0.396
						Total MONO	12.60	3.697	6.118	7.122
						Total Di	47.90	14.055	23.259	27.075
						Total TRI	27.30	8.011	13.256	15.431
						Total TETRA	21.60	6.338	10.488	12.209
						Total PENTA	15.60	4.577	7.575	8.818
						Total HEXA	22.30	6.543	10.828	12.605
						Total HEPTA	13.00	3.815	6.313	7.348
						Total OCTA	2.50	0.734	1.214	1.413
						Total NONA	0.60	0.176	0.291	0.339
WWC-M23-2 Untreated Waste Wood # 2	8/14/96	2.7186	587.284	16.63188	13.2	2-Mo	1.30	0.478	0.857	0.855
						44-Di	3.50	1.287	2.308	2.303
						244-Tr	3.40	1.251	2.242	2.237
						2255-T	4.30	1.582	2.835	2.829
						3344-T	0.40	0.147	0.264	0.263
						23445-Pe	0.24	0.088	0.158	0.158
						23344-Pe	0.71	0.261	0.468	0.467
						33445-Pe	0.21	0.077	0.138	0.138
						233445-Hx	0.37	0.136	0.244	0.243
						334455-Hx	0.30	0.110	0.198	0.197
						2234455-Hp	2.80	1.030	1.846	1.842
						22334455-Octa	0.38	0.140	0.251	0.250
						223344556-Nona	0.40	0.147	0.264	0.263
						Deca	0.40	0.147	0.264	0.263
						Total MONO	5.00	1.839	3.297	3.290
						Total Di	28.90	10.630	19.056	19.016
						Total TRI	22.90	8.423	15.100	15.068
						Total TETRA	26.50	9.748	17.473	17.437
						Total PENTA	17.40	6.400	11.473	11.449
						Total HEXA	24.10	8.865	15.891	15.858
						Total HEPTA	12.40	4.561	8.176	8.159
						Total OCTA	1.50	0.552	0.989	0.987
						Total NONA	0.40	0.147	0.264	0.263
WWC-M23-3 Untreated Waste Wood # 3	8/15/96	2.8758	631.188	17.87524	12.9	2-Mo	1.50	0.522	0.902	0.967
						44-Di	3.20	1.113	1.923	2.063
						244-Tr	4.10	1.426	2.464	2.643
						2255-T	6.00	2.086	3.606	3.868
						3344-T	0.35	0.122	0.210	0.226
						23445-Pe	0.33	0.115	0.198	0.213
						23344-Pe	1.10	0.383	0.661	0.709
						33445-Pe	0.20	0.070	0.120	0.129
						233445-Hx	0.37	0.129	0.222	0.239
						334455-Hx	0.30	0.104	0.180	0.193
						2234455-Hp	5.10	1.773	3.065	3.287
						22334455-Octa	0.72	0.250	0.433	0.464
						223344556-Nona	0.50	0.174	0.301	0.322
						Deca	0.60	0.209	0.361	0.387
						Total MONO	4.80	1.669	2.885	3.094
						Total Di	28.60	9.945	17.189	18.435
						Total TRI	25.60	8.902	15.386	16.502
						Total TETRA	32.00	11.127	19.232	20.627
						Total PENTA	27.90	9.702	16.768	17.984
						Total HEXA	36.90	12.831	22.177	23.786
						Total HEPTA	22.30	7.754	13.403	14.374
						Total OCTA	2.40	0.835	1.442	1.547
						Total NONA	0.50	0.174	0.301	0.322
WWC-M23-4 Treated Waste Wood # 1	8/20/96	4.3505	884.522	25.04966	13.1	2-Mo	3.20	0.736	1.310	1.969
						44-Di	4.80	1.103	1.965	2.954
						244-Tr	3.90	0.896	1.597	2.400
						2255-T	5.60	1.287	2.293	3.446
						3344-T	0.67	0.154	0.274	0.412
						23445-Pe	0.31	0.071	0.127	0.191
						23344-Pe	1.20	0.276	0.491	0.738
						33445-Pe	0.26	0.060	0.106	0.160
						233445-Hx	0.49	0.113	0.201	0.302
						334455-Hx	0.10	0.023	0.041	0.062
						2234455-Hp	4.00	0.919	1.638	2.461
						22334455-Octa	0.69	0.159	0.282	0.425

						223344556-Nona	0.76	0.175	0.311	0.468
						Deca	0.81	0.186	0.332	0.498
						Total MONO	13.60	3.128	5.568	8.369
						Total Di	38.80	8.919	15.885	23.875
						Total TRI	24.90	5.723	10.194	15.322
						Total TETRA	34.80	7.999	14.248	21.414
						Total PENTA	29.90	6.873	12.242	18.399
						Total HEXA	31.20	7.172	12.774	19.199
						Total HEPTA	19.30	4.436	7.902	11.876
						Total OCTA	3.50	0.805	1.433	2.154
						Total NONA	1.00	0.230	0.409	0.615
WWC-M23-5 Treated Waste Wood #2	8/21/96	3.6273	742.778	21.03547	13.3	2-Mo	4.70	1.296	2.344	2.958
						44-Di	7.40	2.040	3.690	4.657
						244-Tr	8.90	2.454	4.438	5.601
						2255-T	9.90	2.729	4.937	6.231
						3344-T	0.78	0.215	0.389	0.491
						23445-Pe	0.33	0.091	0.165	0.208
						23344-Pe	1.20	0.331	0.598	0.755
						33445-Pe	0.37	0.102	0.185	0.233
						233445-Hx	0.65	0.179	0.324	0.409
						334455-Hx	0.18	0.050	0.090	0.113
						2234455-Hp	6.00	1.654	2.992	3.776
						22334455-Octa	1.40	0.386	0.698	0.881
						223344556-Nona	0.87	0.240	0.434	0.548
						Deca	1.20	0.331	0.598	0.755
						Total MONO	15.30	4.218	7.629	9.629
						Total Di	69.50	19.160	34.657	43.741
						Total TRI	60.70	16.734	30.269	38.203
						Total TETRA	49.30	13.591	24.584	31.028
						Total PENTA	32.00	8.822	15.957	20.140
						Total HEXA	38.90	10.724	19.398	24.483
						Total HEPTA	26.00	7.168	12.965	16.364
						Total OCTA	6.10	1.682	3.042	3.839
						Total NONA	2.30	0.634	1.147	1.448
WWC-M23-6 Treated Waste Wood #3	8/22/96	4.2626	911.610	25.81680	13.3	2-Mo	4.50	1.056	1.919	2.973
						44-Di	10.60	2.487	4.521	7.004
						244-Tr	10.60	2.487	4.521	7.004
						2255-T	19.40	4.551	8.275	12.818
						3344-T	0.87	0.204	0.371	0.575
						23445-Pe	1.10	0.258	0.469	0.727
						23344-Pe	3.30	0.774	1.408	2.180
						33445-Pe	0.45	0.106	0.192	0.297
						233445-Hx	1.20	0.282	0.512	0.793
						334455-Hx	0.20	0.047	0.085	0.132
						2234455-Hp	12.50	2.932	5.332	8.259
						22334455-Octa	1.40	0.328	0.597	0.925
						223344556-Nona	0.81	0.190	0.345	0.535
						Deca	0.93	0.218	0.397	0.614
						Total MONO	13.60	3.191	5.801	8.986
						Total Di	70.50	16.539	30.071	46.581
						Total TRI	73.10	17.149	31.180	48.299
						Total TETRA	101.00	23.694	43.081	66.733
						Total PENTA	106.00	24.867	45.214	70.036
						Total HEXA	111.00	26.040	47.346	73.340
						Total HEPTA	56.40	13.231	24.057	37.265
						Total OCTA	9.90	2.323	4.223	6.541
						Total NONA	2.20	0.516	0.938	1.454
WWC-M23-FB Field Blank	8/22/96	NA	NA	NA	NA	2-Mo	0.25			
						44-Di	0.69			
						244-Tr	1.30			
						2255-T	1.50			
						3344-T	0.09			
						23445-Pe	0.14			
						23344-Pe	0.36			
						33445-Pe	0.10			
						233445-Hx	0.29			
						334455-Hx	0.20			
						2234455-Hp	5.50			
						22334455-Octa	1.60			
						223344556-Nona	0.30			
						Deca	0.40			
						Total MONO	0.59			
						Total Di	4.40			
						Total TRI	6.40			
						Total TETRA	8.90			
						Total PENTA	7.80			
						Total HEXA	13.00			
						Total HEPTA	16.10			
						Total OCTA	5.20			
						Total NONA	0.30			