AN INVESTIGATION OF ALTERNATIVE MEANS FOR DEMONSTRATING SEWAGE SLUDGE INCINERATOR COMPLIANCE WITH TOTAL HYDROCARBON EMISSION STANDARDS

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SECTION 1

INTRODUCTION

BACKGROUND

On February 19, 1993, the United States Environmental Protection Agency (EPA) published the Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503 in the Federal Register. This regulation contains the requirements that have to be met when sewage sludge is applied to the land; placed onto a surface disposal site; placed into a municipal solid waste landfill unit; or fired in a sewage sludge incinerator.

One of the Part 503 requirements for incineration of sewage sludge is that the monthly average concentration of total hydrocarbons (THC) in the exit gas from a sewage sludge incinerator stack shall not exceed 100 parts per million (ppm) when corrected to zero percent moisture and to seven percent oxygen. In addition, Part 503 requires the use of a continuous emission monitor (CEM) to continuously record the concentration of THC in the stack exit gas.

The requirement to install a CEM for THC was the subject of a petition by the State of New Jersey and by several publicly owned treatment works (POTWs) in the State of New Jersey. The petitioners argued that the Part 503 requirement to install, calibrate, and operate a CEM for THC should be changed. The State of New Jersey currently requires that the concentration of carbon monoxide (CO) in the exit gas from a sewage sludge incinerator not exceed 100 ppm when corrected to zero percent moisture and to seven percent oxygen. The State also requires that the CO concentration in the exit gas be monitored continuously using a CEM.

The petitioners argued, based on information they have gathered, that when the CO concentration in the exit gas is 100 ppm or less, the THC concentration in the exit gas also is 100 ppm or less. For this reason, there is no need to monitor both CO and THC continuously. The petitioners wanted to monitor the exit gas continuously for only CO.

EPA concluded, after reviewing the information submitted by the petitioners, that if CO is monitored continuously in the exit gas, and that if the monthly average exit gas concentration is 100 ppm, or less, that the monthly average THC concentration in the exit gas should be 100 ppm, or less. For this reason, continuously monitoring of the exit gas for THC is not necessary to demonstrate compliance with the 100 ppm THC operational standard in Part 503. On February 25, 1994, EPA amended the Part

503 regulation to allow the incinerator exit gas to be monitored continuously for CO in lieu of monitoring the exit gas continuously for THC (59 FR 9095, February 25, 1994). Note that this amendment did not change the 100 ppm operational standard for THC in Part 503 (see 503.44).

In the February 25, 1994, Part 503 amendment, EPA committed to study further the relationship between CO and THC in the stack exit gas from sewage sludge incinerators. At the completion of the study, the Agency will decide whether another amendment is needed concerning monitoring of CO to demonstrate compliance with the THC operational standard. This report presents the results of a study of the relationship between CO and THC in the exit gases from sewage sludge incinerators.

Subsequent to publication of the Part 503 regulation, EPA decided to investigate whether there should be a different THC operational standard for each type of sewage sludge incinerator. This study included collection of THC concentration data in the exit gas from different types of sewage sludge incinerators. These data are presented in this report.

Currently, EPA is reassessing the impacts of polychlorinated dibenzo-dioxins and -furans (dioxin/furan) that may be emitted from many combustion processes, including sewage sludge incinerators. This study presents the data on the concentrations of dioxin/furan in the exit gas from sewage sludge incinerators that were collected during this effort.

Many persons have proposed that the temperature of the exit gas from sewage sludge incinerators can be used as a surrogate for measurement of total hydrocarbons. The temperature of the exit gas is a routinely measured process parameter. If a reliable relationship between exit gas temperature and exit gas THC concentration can be found, then the cost of monitoring could be reduced by elimination of the need for a THC monitor. EPA agreed to study possible relationships between temperature and THC concentration. Some of the data necessary to pursue this objective were collected during the testing done for this study, other data were provided by several organizations.

PURPOSE

The purposes of this study were:

(1) To determine if there is a relationship between the concentrations of carbon monoxide (CO) and unburned organic matter (THC) in the exit gas from sewage sludge incinerators.

(2) To measure the concentration of THC in the exit gas from "well operated" sewage sludge incinerators.

(3) To measure the concentrations of polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) in the exit gas from sewage sludge incinerators.

(4) To study the relationship between incinerator operating conditions (including final hearth temperature) and exit THC concentrations.

SECTION 2

INCINERATOR DESCRIPTIONS

There are three types of sewage sludge incinerators in use in this country at this time. These are:

- Fluidized Bed Incinerator (FBI)
- Multiple Hearth Furnace (MHF)
- Radiant Electric Incinerator (REI)

Only the first two types are common. Statistics developed during the initial development of Part 503 Regulations indicated that there were approximately 49 FBI and 156 MHF in use at that time. Only three of the radiant electric incinerators were constructed, only two of those three were in operation in 1996.

CURRENT FURNACE TECHNOLOGY

There are approximately 207 sewage sludge incinerators in the United States, located at an estimated 150 publicly owned treatment works (POTWs). The furnace technologies currently used in those incinerators are listed below.

156 multiple-hearth furnaces (75 percent of the incinerators firing sewage sludge)

49 fluidized-bed furnaces (24 percent of the incinerators firing sewage sludge)

2 electric infrared furnaces (1 percent of the incinerators firing sewage sludge)

Although three-quarters of the operating sewage sludge incinerators are multiple-hearths, newly installed sewage sludge incinerators are expected to be divided evenly between the fluidized-bed and multiple-hearth furnaces.

The water content of the sewage sludge is a main factor controlling incinerator combustion efficiency. All sewage sludge incinerators, regardless of design, are affected by the water content of the sewage sludge. Treatment works remove enough water from the sewage sludge to bring its solids content to at least 25 to 35 percent to increase the efficiency of combustion. Dewatering is done mechanically by filtration or centrifugation systems. Most treatment works also add a chemical conditioner to the sewage sludge to enhance dewatering. Ferric chloride and lime have been used most often in the past to condition sewage sludge, but organic polymers are better conditioning agents in many cases and their use is increasing.

Dewatering increases the heating value of the sewage sludge, which decreases the need for auxiliary fuel (or electric power in the case of electric infrared furnaces) and reduces operating costs. Theoretically, combustion can become self-sustaining (or "autogenous") so that no auxiliary fuel is needed. This can occur when the solids content of the sewage sludge is above 30 percent and the volatile solids fraction is at least 60 to 65 percent of the total solids. In practice, however, few MHFs operate autogenously. Most of these units require auxiliary fuel. Autogenous combustion can be reached at a lower solids content in modern fluidized-bed furnaces.

Multiple-Hearth Furnaces

Multiple-hearth furnaces (MHFs) were initially designed nearly a century ago for baking mineral ores in the metal extraction industry. Since the 1930s, an air cooled variant of the original Herreshoff design has been used to burn sewage sludge.

Design Characteristics

MHFs are cylindrical and oriented vertically. Those used to fire sewage sludge range in size from an outer diameter of approximately 6 feet with a total effective hearth area of 85 square feet (ft^2) for 6-hearth furnaces to 22 feet in diameter with hearth areas of over 3000 ft^2 for 12-hearth furnaces. Hearth loading rates range from 7 to 15 lb/hr of wet sewage sludge per ft^2 of total hearth (all hearths) area. This amount corresponds to furnace capacities of 0.3 tons/hr up to 22 tons/hr of wet sewage sludge.

Figure 2.1 illustrates the design of a typical MHF. The outer shell is constructed of steel and surrounds a series of horizontal refractory hearths. A hollow cast-iron rotating shaft runs through the center of the hearths. The rabble arms are attached to the central shaft and extend above the hearths. A fan located at the base of the shaft introduces cool air into the shaft and rabble arms to keep the metal from deforming under the high temperatures.

Attached to the rabble arms are angled plows less than 3 feet in length that rake the sewage sludge in a spiral motion. The plows alternate the radial direction of sewage sludge movement between hearths. The plows in one hearth are angled to move the material from the outside in -- these are called "in-hearths". The plows on the next hearth are then angled to move it from the inside out -these are called "out--hearths. Fuel burners that provide auxiliary heat are located in the side walls of the hearths.

Operating Conditions

In MHFs, de-watered sewage sludge (17 to 28 percent solids) is fed into the periphery of the top hearth. As they rotate, the rabble arms rake the sewage sludge

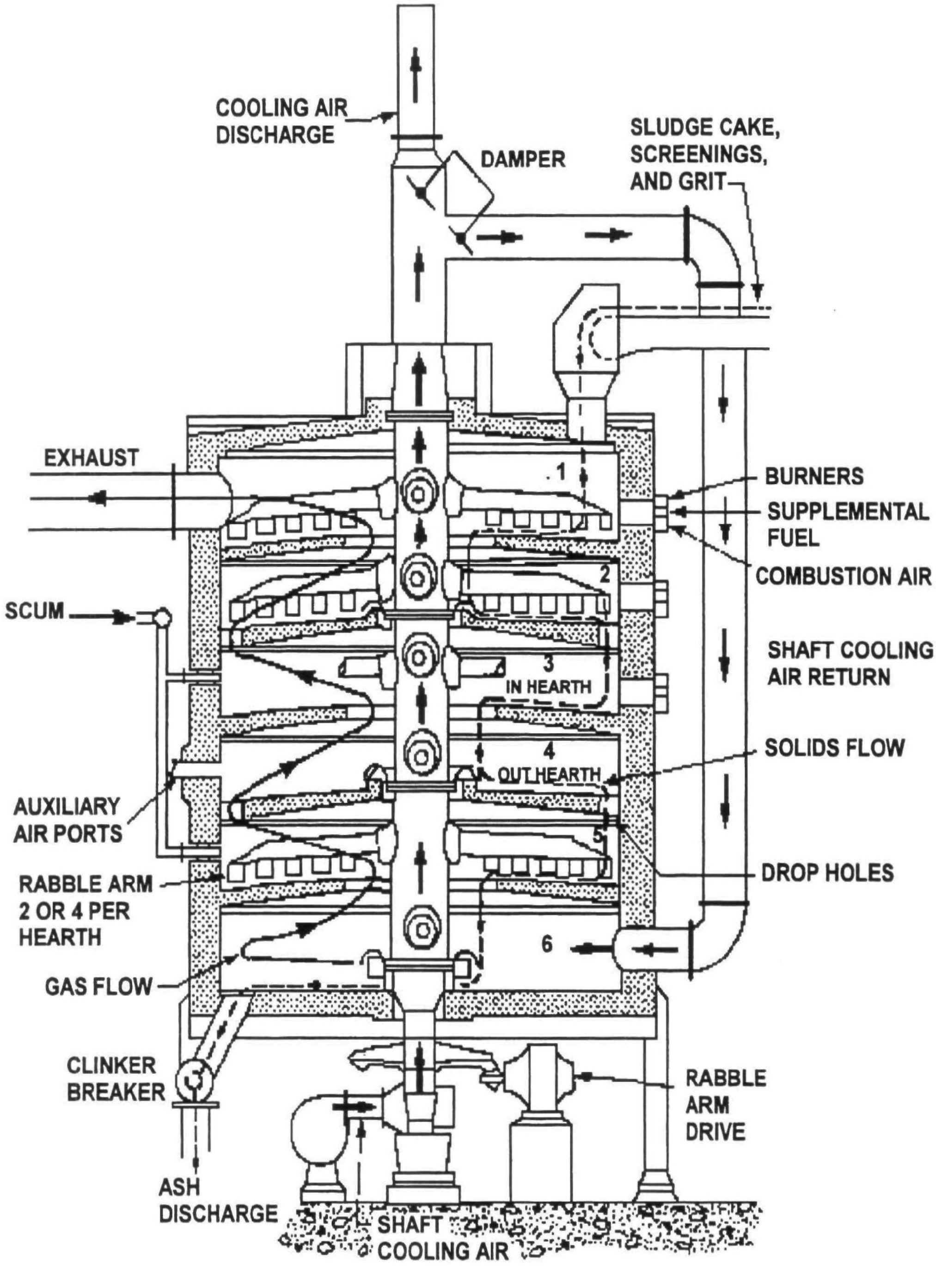

Figure 2.1 Schematic Diagram of a Typical Multiple Hearth Furnace

towards the center shaft and break up the sewage sludge so that a larger surface area of the solids comes in contact with heat and oxygen. The dried sewage sludge then drops through holes (drop holes) located near the edge of the shaft onto the second hearth, where it is raked in the opposite direction. This process is repeated in all subsequent hearths as the sewage is dried and burned. The remaining dry ash is discharged through a hole at the periphery of the bottom hearth, where it is collected for disposal.

Ambient air is blown through the central shaft at its base and rises into the rabble arms, cooling the shaft and the rabble arms. A portion, or all, of this air is then recirculated from the top of the shaft back into the bottom hearth as preheated combustion air. Air that is not recirculated is discharged through the top of the shaft into the stack, downstream of any air pollution control device (APCD). Additional ambient air is injected directly into one of the middle hearths. The combustion air flows upward through the drop holes in the hearths, counter-current to the flow of the sewage sludge solids.

The overall sewage sludge incineration process occurs within three basic zones in an MHF. The upper hearth and part of the second hearth constitute the drying zone, where most of the moisture (and some of the more volatile organic compounds) in the sewage sludge is evaporated. The furnace gas temperature above the drying sewage sludge is from 600°F to 1,200°F. Combustion of volatile organic material occurs on the next two hearths, where the temperature is increased to about 1,500°F to 1,700°F. The combustion of carbon should occur on the next 1 to 1.5 hearths. A fourth zone, comprising the lower-most hearth(s), is the ash cooling zone. No combustion occurs in this zone. The ash is cooled as its heat is transferred to the incoming combustion air.

The theoretical amount of oxygen required for complete combustion is known as the stoichiometric oxygen. Specific stoichiometric oxygen requirements are determined by the nature and quantity of the combustible material to be burned. Combustion oxygen usually is obtained from atmospheric air. The additional oxygen (or air) available for combustion over and above stoichiometric amount is called excess air. Adding excess air enhances contact between the fuel and oxygen in the furnace and compensates for normal variations in both the organic characteristics of the sewage sludge and the feed rate at which the sewage sludge enters the incinerator. The 18 MHFs for which data were collected during this study show an average of approximately 180 percent excess air. This means that the units were using 2.8 times the amount of air that was needed to oxidize the organic matter in the sewage sludge and in the fossil fuel.

When the amount of oxygen (or air) is less than the stoichiometric amount, it is called starved air, or substoichiometric air. Under starved-air conditions, incomplete combustion occurs, which results in the production of carbon monoxide (CO) and products of incomplete combustion (PICs). The formation of these combustion products is characterized by the release of smoky emissions containing unburned hydrocarbons and volatile organic material. Too much excess air results in lower combustion temperatures, consumption of more auxiliary fuel, more entrainment of particles, and lower combustion efficiency.

The rate at which the sewage sludge is fed into the MHF and the sewage sludge moisture content also can affect the performance of multiple-hearth sewage sludge incinerators. A sharp increase in the feed rate generally causes the middle combustion zone to drop to lower hearths, a change that can lead to a decrease in temperature within the combustion zone and high auxiliary fuel usage. A sharp increase in moisture content can lead to reduced hearth temperatures, while material that is too dry may cause excessively high temperatures.

One problem resulting from excessively high temperatures in the combustion zone is the formation of clinker, or clumps of ash, that can break teeth and rabble arms and increase maintenance requirements. Organic polymer conditioners contribute less to clinker formation than do ferric chloride and lime conditioners.

Fluidized-Bed Incinerators

Air and sewage sludge are introduced at different locations near the base of a bed of sand in fluidized-bed incinerators. The mixture of air, sewage sludge, and sand acts as a fluid in the furnace. Fluidizing the sewage sludge has a number of advantages that help to improve the burning atmosphere within the incinerator. First, the turbulence in the bed facilitates the transfer of heat from the hot sand particles to the sewage sludge. Second, the greatly increased surface area and turbulence that are contributed by the sand particles improves the mixing of the sewage sludge and the combustion air. Third, the sand provides a large thermal inertia that minimizes the effects of sewage sludge feed rate and moisture content fluctuations.

Fluidized-bed incineration has been applied to a wide range of industrial processes since its initial development in the oil-refining industry. Coal drying and calcining operations in the phosphate industry are two other examples of industrial applications of fluidized bed technology. The first FBI designed specifically for burning sewage sludge was installed in 1961 in Lynwood, Washington.

Design Characteristics

Figure 2.2 depicts a cross section of a typical FBI. Like multiple-hearth furnaces, FBIs are cylindrical and vertically oriented. The outer shell is constructed of steel and is lined with a refractory material. Tuyere nozzles, which blast air into the furnace, are located at the base of the furnace within a refractory-lined arch.

There are two general FBI configurations, each based on the method used to inject the fluidizing air into the furnace. In the hot-wind box design (shown in Figure 2.2), air is first passed through a heat exchanger, where heat is recovered from the hot

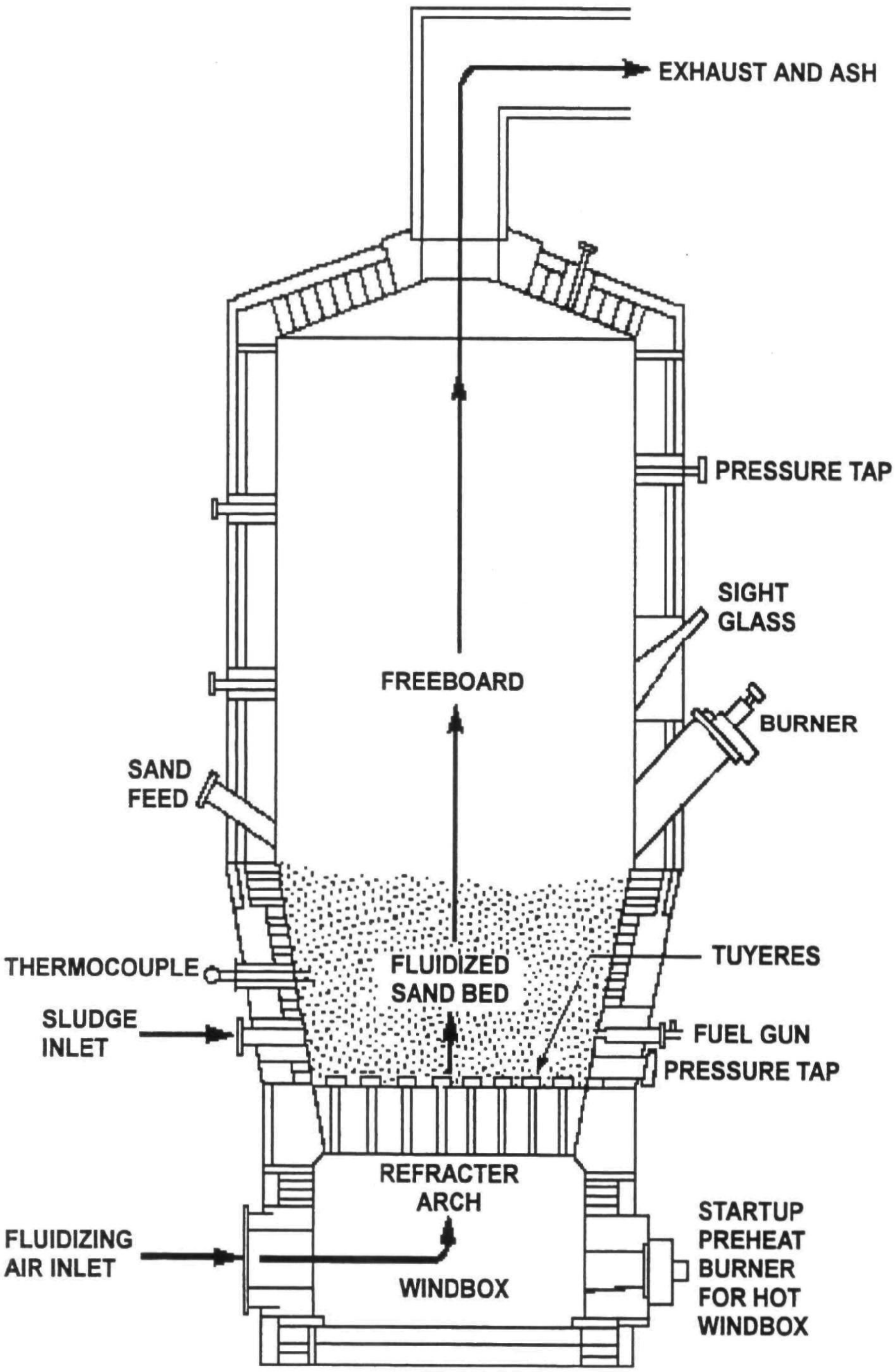

Figure 2.2 Schematic Diagram of a Typical Fluidized Bed Incinerator

flue gases. Alternatively, in the "cold-wind box" design, ambient temperature air is injected directly into the furnace.

The diameter of FBI units is comparable to that of MHFs, ranging from 6 to 25 feet. FBIs have sewage sludge loading rates ranging from 30 to 60 lb/hr of wet sewage sludge per ft^2 of bed and burning capacity ranging from 0.5 to 15 tons/hr of wet sewage sludge.

Operating Conditions

De-watered sewage sludge (17% to 28% solids) is fed into a bed of hot sand in the lower portion of the furnace. The sand and incoming sewage sludge are simultaneously fluidized by air injected through the Tuyere nozzles at pressure ranging from 3 to 5 pounds per square inch (lb/in^2) Temperatures of 1,250°F to 1,600°F are maintained in the bed. Gas residence times in the freeboard range from 2 to 5 seconds. As the sewage sludge is fired, fine ash particles and minor amounts of sand are carried out through the top of the furnace, where they are captured by an inertial separator and a wet scrubbing system. The larger sand particles that are collected by the inertial separator system are returned to the bed.

The overall combustion process in an FBI occurs in two zones. The first zone is within the fluidized bed itself. Here, water evaporation and pyrolysis of organic materials occur almost simultaneously, as the temperature of the sewage sludge is rapidly increased. The free board area (see Figure 2.2) is similar to a secondary combustion chamber, in which the remaining free carbon and combustible gases are burned.

The most noticeable impact of the improved combustion provided by an FBI, as compared to the multiple hearth furnace is the decrease in the amount of excess air required for complete combustion of the sewage sludge. FBIs can achieve complete combustion of sewage sludge with 40 to 60 percent excess air. This is 1.4 to 1.6 times the amount of air required to effect complete combustion of all of the sewage sludge organic material and the fossil fuel. The MHF studied used, on the average 2.8 times the amount of air required. FBI units use 50 percent to 60 percent of the air that an MHF would use to burn the same sewage sludge. The reduced air flow reduces the auxiliary fuel requirements of FBIs compared to MHFs.

The most critical operating variable of FBI units is the rate at which the sewage sludge is fed to the incinerator. The optimal rate of heat transfer achievable for a given amount of sand is reached when the sewage sludge feed rate is equal to the burning capacity of the sand bed. If the burning capacity is exceeded because of a sewage sludge feed rate that is too high, combustion will not be complete. A rapid increase in either the rate of feed of sewage sludge to the furnace or the moisture content of the sewage sludge will cause the sewage sludge to coagulate into heavy masses. Coagulation eliminates the fluidized nature of the bed and halts combustion. It is important to ensure that an adequate residence time of sewage sludge solids in the bed is maintained so that the sewage sludge burns completely. .

Because of excellent mixing characteristics, as well as short sewage sludge residence times, fluidized-bed furnaces are less vulnerable than are MHFs to fluctuations in the sewage sludge feed rate and the total moisture content. Moreover, any disruption of combustion happens almost immediately in FBIs and, therefore, can be more easily detected and corrected by the furnace operators.

Electric Infrared Furnaces

The electric furnace uses infrared radiation as a partial heat source. The radiant electric heat dries the sewage sludge and initiates combustion. Once ignition occurs the heat released by the burning sewage sludge solids provides most of the energy necessary to dry and burn the sewage sludge. This represents a relatively new technological approach to sewage sludge incineration. The first such unit was put into operation in Richardson, Texas, in 1975. Two others were put into service in Wrangell and Petersburg, Alaska. The unit that was installed in Petersburg has since been decommissioned and shipped to Wrangell for use as spare parts.

Design Characteristics

Electric furnaces, unlike the other two types of furnaces designs, are oriented horizontally. They consist of insulated enclosures through which sewage sludge is transported on a continuous, woven, wire-mesh conveyor belt (see Figure 2.3). The belt is made of steel alloy and can withstand the temperature encountered in the furnaces. The refractory lining in the furnace is composed of ceramic felt, not brick. The refractory has a low heat capacity, so it does not take a lot of heat energy to heat the refractory. Further, the woven refractory is not subject to fracture by thermal expansion. Because of these attributes radiant electric furnaces can be started from a cold condition and shut down relatively quickly.

Operating Conditions

De-watered sewage sludge (17% to 28% solids) is first fed into a holding tank, then into the incinerator through a feed hopper and dropped onto the conveyor belt. Here, it is leveled by an internal roller into a layer approximately one inch thick, spanning the width of the belt. The sewage sludge layer then moves under infrared heating elements, which sustain the drying and combustion processes. The resulting ash is discharged from the end of the furnace into the ash-handling system.

Combustion air (often preheated by an external, recuperative-exit heat exchanger) is introduced at the hot, solids discharge end of the belt. The air also picks up heat from the hot burning sewage sludge as the sewage sludge and air travel counter-current to one another.

Because the primary heat-transfer mechanism used in the infrared furnace is radiant transfer, satisfactory combustion rates can be achieved without rabbling or

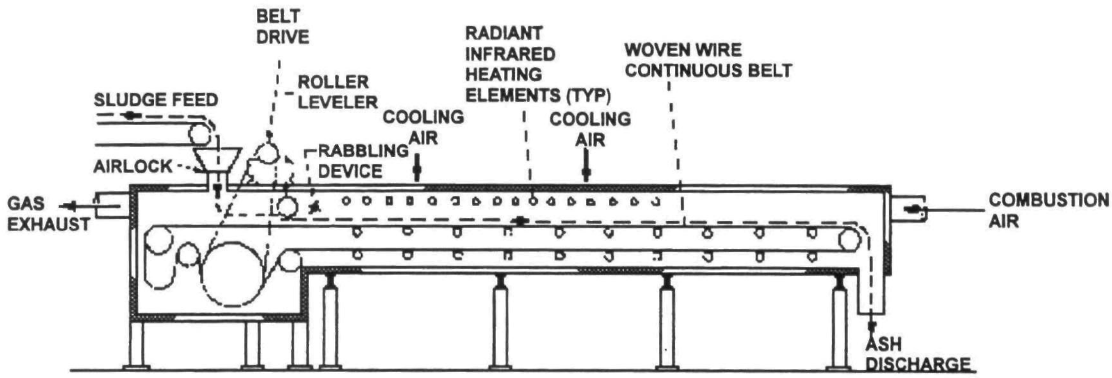

Figure 2.3 Schematic Diagram of a Typical Radiant Electric Furnace

plowing the sewage sludge layer. Because there is no mechanical agitation of the sewage sludge solids or ash, radiant electric incinerators produce less fly ash than do MHFs and FBIs.

Complete combustion can be achieved in the electric infrared furnace with excess air levels as low as 10 to 20 percent. This process efficiency is attributed to several factors. First, the furnace is designed so that uncontrolled sources of excess air are eliminated. Second, the flow of combustion air is regulated closely and directed down the channel formed inside the primary combustion chamber between the belt and the heating elements overhead. Third, the addition of supplemental heat does not require auxiliary fuel burners that generate any gaseous by-products. The products of combustion and excess air from these burners dilute the sewage sludge combustion products in MHF and FBI. This ability to operate at low excess air levels contributes to a reduction in the size, complexity, and energy requirements of the exit gas scrubbing equipment. Yet, because electric energy costs from 2 to 3 times as much as other energy sources (e.g., natural gas), the total energy cost of the electric furnace is likely to be higher than the total energy cost for other types of furnaces.

The electric furnace is divided into several temperature control zones. These zones are maintained at predetermined temperatures with set points. The input power to the infrared heating elements is then adjusted upward or downward, accordingly. Control temperatures range from 1,400°F in the drying zones to 1700°F in the combustion zones.

A feedback-loop process also controls the flow of air for sewage sludge combustion. The controller continuously senses the residual oxygen content in the exit stream and compares it with a set point value and adjusts the air flow rate to maintain the oxygen at the set point. In the event that a high-energy sewage sludge is being processed, the controller adds additional excess air to limit exit temperature. The throughput of the system can be controlled by adjusting the speed of the internal conveyor belt. This allows the electric furnace to accommodate different sewage sludge feeds (i.e., sewage sludge with different moisture contents or volatile solid contents). The operator accomplishes this adjustment, which also adjusts sewage sludge retention time, from the control panel.

To date, infrared furnaces have been used in smaller applications, for which greater operating flexibility of this type of furnace provides an advantage over traditionally larger multiple-hearth and fluidized-bed furnaces. Because of its ceramic-fiber blanket insulation system, the infrared furnace is well suited for intermittent operation. This insulation system is not subject to thermal fracturing and does not require the slow warm-up and cool-down cycles required by solid refractory materials. Start-up times of 1 to 1-1 ½ hours are normal, and shutdown is accomplished by pressing a single, stop button.

SECTION 3

DEFINITIONS OF "WELL-OPERATED"

This section contains definitions of "well-operated" sewage sludge incinerators. These definitions are in terms of operating parameters that are easily observable and easily measurable. Insight from experts in the design and operation of sewage sludge incinerators about the items that they would consider to be important in the design and operation of sewage sludge incinerators was solicited. The purpose of these definitions is to provide guidance in the selection of sewage sludge incinerators to be sampled. This eliminates unwanted influence on the study's conclusions by poorly operated sewage sludge incinerators. The definitions are not intended to be operating manuals. They are merely to provide a relatively simple means to identify sewage sludge incinerators that are operated up to their potential.

INTENT OF DEFINITIONS

The object of this study was to monitor the emissions from sewage sludge incinerators. This was done by sampling and analysis of the exit gases from well operated sewage sludge incinerators. This section discusses the definitions of "well-operated" sewage sludge incinerators and the intended use of those definitions.

Definitions of "well-operated" sewage sludge incinerators were needed to ensure that the sewage sludge incinerators that were sampled were operated to their potential. The basis for development of technology-based requirements is the assessment of the capability of existing technology. Once this determination is made the regulations merely specify that everyone meet the requirement attainable by existing technology. The conclusions would have been biased if the sampled population included units that were not operated in accord with good operating practice and the specifications of their manufacturers. It was beyond the scope of this project to perform an engineering evaluation of each sewage sludge incinerator in the sampling program. Easily observed operating parameters that could be used to show good operating practice were sought. These parameters were used to develop definitions of "well-operated" sewage sludge incinerators.

Please note, these definitions describe smooth (steady state) and productive (sewage sludge combustion rates at or near design capacity) operation of sewage sludge incinerators. They do not describe operational techniques that reduce emissions of air pollutants.

The definitions that follow describe generic operating conditions. These conditions can be achieved in different ways for particular incinerators. There can be many reasons why a particular treatment works operates its sewage sludge incinerator in variance with these relatively simple guidelines. There may be special requirements of the particular sewage sludge, or peculiarities in the operation of a particular sewage sludge incinerator that dictate alternative conditions. It was beyond the scope of this project to investigate individual circumstances that lead to unusual operating conditions. The fact of operation outside the following, simple and broad definitions infers that the operation was not typical and representative of commonly encountered conditions. Although such sewage sludge incinerators may be effective in particular circumstances, they were considered to be outside the envelope of typical conditions and were not selected for sampling as part of this study.

Multiple Hearth Furnaces

Optimum operation of a MHF consists of maintaining the active volatiles combustion zone in a specific area of the furnace on a consistent basis. Combustion of volatiles begins when the solids content of the sewage sludge increases to approximately 50%. This usually occurs toward the top of the furnace. Furthermore, the onset of active combustion should start near the outer edge of an in-hearth, but not directly under the drop-holes of the out-hearth above. The solids on an in-hearth are migrating toward the shaft. Active combustion should be complete by the time the solids reach the center of the out-hearth just below. This burning pattern provides the maximum turbulence, uniform draft conditions, maximum oxygen availability and minimum heat loss. This mode of operation also exposes all gases released from the lower hearths to the active flame. Destruction of organic materials is most efficient in an active flame zone.

Conditions that increase the feed rate of heat to the MHF such as: an increase in the rate of feed of a dry sewage sludge; a decreased moisture content of the sewage sludge; or a rapid increase in the heat content of the sewage sludge can cause the zone of active combustion to move upward in the furnace. This condition, called a "flare-up" or a "burn-out," is characterized by the active combustion occupying the outer edge of the in-hearth that is just below the feed hearth. When the fire is directly under the drop-holes, burning becomes erratic, unsteady and smoky due to the restriction of the combustion space, increased heat losses to the surroundings, and a lack of air. The most critical parameters to the operation of a MHF are the consistency of the rate of feed, the percentage moisture and the heating value of the sewage sludge. These parameters, combined with the location of the active combustion zone, constitute a well-operated MHF. A well-operated MHF should have no more than one burn-out per week.

Each furnace operates with its own temperature profile. Sewage sludge moisture content, heat content, feed rate, and the design of the furnace all affect the temperature profile within the furnace. These variations make it difficult to include hearth temperatures in the definitions of a well-operated MHF. It is possible, however, to provide some guidance about the temperatures in the various hearths of the furnace. The temperatures in the various hearths also indicate the location of the active combustion zone.

The ideal temperature of the drying hearth depends on whether the furnace is equipped with a secondary combustion chamber or Zero Hearth afterburner. In the absence of either of these devices the gas phase of the drying zone must be kept relatively hot (1,000°F to 1,400°F) to burn the volatile organic material that evaporates with the moisture. The presence of a back-up combustion chamber allows the the drying zone temperature to be reduced to 600°F to 1,000°F, because the evaporated volatiles are destroyed in the back-up combustion chamber. A back-up combustion chamber may be either an on-hearth afterburner (On-HRTH) or a detached afterburner. On-hearth afterburners are sometimes added above the sewage sludge feed hearth and are called zero-hearth afterburners. They are sometimes located on the first or second hearth. In all cases they are located above the hearth onto which the sewage sludge is fed. The term On-Hearth is used to cover all options. A detached afterburner is a device that is added to the system downstream and distinct from the MHF and is called a secondary combustion chamber (SCC) in this document.

The sludge drying zone is the feed hearth and sometimes the hearth immediately below it. The gas phase temperature in this zone will be between 600°F and 1,400°F.

The gas phase temperature in the zone where the volatile organic constituents of the sewage sludge are combusted (called the volatiles burning zone) should be between 1,400°F and 1,700°F. Higher temperatures in this zone usually equate to more efficient combustion.

The carbon burning zone is the zone immediately below the volatiles burning zone. The critical temperature in the carbon burning zone is the temperature of the solids on the hearth. Formation of clinker (slag) begins if the temperature of the solids approaches 2,000°F. Approximately 300 F° of temperature difference between the gas and solid phases is necessary to allow effective heat transfer from the burning solids to the gas. The gas phase temperature should not be more than 1,700°F.

The lower hearths are the ash cooling zone. Heat from the burned out ash is transferred to the in-coming combustion air and the ash is cooled for disposal. The temperature in the ash cooling zone is normally between 400°F and 600°F.

These temperature guidelines are summarized in Table 3.1.

TABLE 3.1

HEARTH TEMPERATURES

Hearth Function	Hearth Temperature (°F)
On-Hearth Afterburner	1,000 -- 1,700
Sewage Sludge Drying	600 -- 1,400
Volatiles Burning	1,400 -- 1,700
Carbon Burning	1,200 -- 1,400
Ash Cooling	400 -- 600

The concentration of oxygen in the furnace exit gas should not be less than 8 percent (dry basis). Less oxygen in the furnace may cause inefficient combustion of the sewage sludge. This oxygen concentration corresponds to 60% excess air. The concentration of oxygen in the stack exit gas usually does not accurately represent the concentration of oxygen in the furnace exit gas. This is because there often are points of significant air in-leakage between the furnace exit and the inlet to the stack. Also, most MHFs use only part of the shaft cooling air as preheated combustion air. The residual shaft cooling air is usually re-injected into the stack gas downstream of the scrubber as a means of reducing the plume of condensed water. This too is a source of dilution of the furnace exit gas. Thus, the percentage oxygen in the stack gas is much higher than the percentage oxygen in the furnace exit gas.

Maintenance of a consistent rate of feed of heat in the form of sewage sludge into the MHF is critical to maintenance of stable combustion conditions. The rate of net heat fed in the sewage sludge is dependent on the percent solids in the sewage sludge and the heating value of those solids. The rate of feed of sewage sludge at any particular time should be no more than 5 percent different (higher or lower) from the long term average feed rate, assuming that the moisture and heat content of the sewage sludge solids are constant. If the feed rate of an autogenous sewage sludge increases, then the furnace will overheat and the location of the fire will move upward in the furnace. The result will be poor combustion. If the sewage sludge will not support combustion, an increase in the feed rate may exceed the capacity of the auxiliary fuel burners to make up the heat deficit, causing the fire to move downward in the furnace, which also causes poor combustion.

Increases or decreases in the moisture content or the heating value of the sewage sludge solids have the same effects as changes in the rate of sewage sludge feed. Thus, upset conditions in the sewage sludge dewatering equipment or changes in the nature of the wastewater being treated can change the moisture content of the sewage sludge and thereby change the rate of feed of heat to the furnace even though the pounds per hour of wet sewage sludge being fed remains constant. For these reasons it is not possible to specify, with precision, the desired rate of sewage sludge feed to a MHF.

Table 3.2 provides some values for several parameters. There must be balance among them. For example, a sewage sludge that has a heat content near the top of the range may have a higher moisture or a lower feed rate. The values given in the table are typical values. A MHF that combusts a sewage sludge that is outside of the ranges of values given will be considered to be atypical for the purposes of this study.

TABLE 3.2

MULTIPLE HEARTH FURNACES

Parameter	Value
Sewage sludge percentage solids (%)	17% -- 28%
Sewage sludge heating value (Btu/lb)	8,000 --12,000
Sewage sludge feed rate (lb/ft^2/hr)	5 --12
Furnace exit gas oxygen (%)	8 -- 12

Fluidized Bed Incinerators

The fluidized bed incinerator is a single concurrent device in which the sewage sludge burns in a hot fluidized sand bed. Fluidized bed incinerators are much easier to control than are MHFs. They are far less sensitive to fluctuations in sewage sludge characteristics and feed rates because of the huge thermal inertia provided by the sand bed. The mass of sand in the bed is approximately 20 times the mass of wet sewage sludge that is fed to the unit in an hour. The large reservoir of heat held by the sand dampens variations in the feed material providing stability to the process.

The temperature of the bed should be between 1,250°F and 1,600°F. The temperature of the gas in the freeboard should be 100 F°to 200 F° higher than the bed temperature.

The concentration of oxygen in the incinerator exit gas should be between 6% and 8% (dry basis).

Values for the pertinent operating parameters are summarized in Table 3.3.

TABLE 3.3

OPERATING PARAMETER SUMMARY
FLUIDIZED BED INCINERATORS

Operating Parameter	Value
Sewage sludge percentage solids (%)	17% -- 28%
Sewage sludge heat value (Btu/lb)	8,000 -- 12,000
Sewage sludge feed rate ($lb/ft^2/hr$)	30 -- 60
Furnace exit gas oxygen (%)	6 -- 8
Fluidized bed temperature (°F)	1,250 -- 1,600
Freeboard temperature (°F)	1,400 -- 1,750

SECTION 4

DESCRIPTION OF THE SAMPLING PROGRAM

One of the purposes of the study was to design and conduct a field testing program to measure the emissions from "well-operated" sewage sludge incinerators. Before proceeding with the design of the testing program it was necessary to analyze data from previously conducted tests to discern which correlations and which models might be supported by kinetic theory. The object of this effort was to obtain information to guide the selection of the types of tests and numbers of tests to perform. One study[1], supported by the Water Environment Research Foundation, was extremely useful in this regard. These researchers developed and tested a first order kinetic model with the reaction rate constant defined by an abbreviated Arrhenius equation. The researchers tested three MHF so they were unable to sample both the inlet and the outlet of the combustion zone. There is no practicable way to sample the gases between hearths in a MHF. They were able to demonstrate that the equation does describe the combustion of THC. Tests of the model, using data generated at other sewage sludge incinerators, indicated that the model was probably widely applicable. Thus it was decided to use this model as the basis for the experimental design of this study.

The proposal to test the kinetic model during the field tests was made because, if the model could be validated, there would be a means to extend the test results to other sewage sludge incinerators. This decision also led to further categorization of the population of sewage sludge incinerators. This categorization was necessary because in only one configuration - a sewage sludge incinerator with a secondary combustion chamber - would it be possible to measure both inlet and outlet THC concentrations. Sewage sludge incinerators were divided into the following categories:

(1) Multiple Hearth Furnace -- No Afterburner (MHF)

(2) Multiple Hearth Furnace -- On-Hearth Afterburner (MHF/OH)

(3) Multiple Hearth Furnace -- Secondary Combustion Chamber (MHF/SCC)

(4) Fluid Bed Incinerator (FBI)

(5) Fluid Bed Incinerator -- Secondary Combustion Chamber (FBI/SCC)

(6) Radiant Electric Incinerator (REI)

We believed that once we determined the basic rate equation parameters, we would be able to calculate rate equation parameters for all sewage sludge incinerators. We expected that the chemical composition of the THC generated by sewage sludge incinerators would not vary greatly and that the reaction rate parameters would span a small range. This would make it possible to make site-specific correlations between final hearth temperature (or afterburner temperature) and the concentration of THC in the incinerator exhaust gas.

We also intended to develop correlations between operating conditions and the concentration of THC in the furnace exhaust. THC/CO correlations and correlations between THC and final combustion stage temperature had been studied in the past and appeared to hold the most promise for development into useful tools. Thus, the plan developed was to measure the exit gas temperatures and concentrations of THC and CO in the exhaust gas from "well-operated" examples of the various types of sewage sludge incinerators. We anticipated that use of these parameters would make it possible to develop site-specific correlations between both furnace exhaust gas CO concentration and final combustion zone temperature and the concentration of THC in the furnace exhaust gas.

The sampling and analysis portion of this program had four primary objectives. These were:

(1) To determine the concentration of THC in the exit gas from "well-operated" sewage sludge incinerators.

(2) To determine if a reliable relationship exists between final hearth temperature and exit THC concentrations and to develop a means of using final combustion stage gas temperature as a surrogate for THC concentration.

(3) To determine the relationship between the concentrations of carbon monoxide (CO) and unburned organic matter (THC) in the exit gas from sewage sludge incinerators to determine if the kinetic model would support the measurement of CO as a surrogate for measurement of THC.

(4) To determine the concentrations of polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) from sewage sludge incinerators.

The appropriate sampling and analysis response to the objectives is relatively straightforward. One selects a sample of representative sewage sludge incinerators and measures the concentrations of the two pollutants and the final hearth temperatures. We selected EPA Method 25A for measurement of THC, EPA Method 10 for measurement of CO, EPA Method 3A for measurement of oxygen and carbon dioxide, EPA Method 4 for measurement of the moisture content of the gases being sampled, and EPA Method 2 for measurement of gas flow rates. EPA Method 23, which was developed specifically for measurement of PCDD and PCDF emissions from combustion sources was selected for measurement of the PCDD and PCDF concentrations. Section 5 of this report contains a discussion of the selection of the sites for the sampling and analysis.

Other data were collected during the sampling of each sewage sludge incinerator. The field test team obtained recordings of the temperatures of each hearth, the feed rate of sewage sludge, and the moisture content of the sewage sludge during the sampling periods. The plant operators also provided composite samples of the sewage sludge that was burned on each test day. The test contractor submitted these samples to an independent laboratory for determination of the moisture content and heat value of the sewage sludge.

INVESTIGATION OF RELATIONSHIP BETWEEN THC AND CO

The development of relationships between CO and THC deserves additional discussion. The model tested here is the first order decay reaction model, commonly encountered in chemical reactions. The premise of this model is that the fraction of the THC and CO that is burned in a given time period is constant for any given temperature. That is, the rate of destruction of both of these two pollutants can be expressed in the terms, percent per second. Further, the rate is dependent on the temperature and that the rate can be calculated for any measured temperature.

This model can only be strictly applied if the concentrations of other reactants (in this case, oxygen) are high relative to THC and CO and are therefore essentially unchanged during the reaction. If the concentration of oxygen changes significantly during the combustion of THC and CO, then a different rate model (a second order model) would be more appropriate The concentration of oxygen (O_2) in the combustion zone of sewage sludge incinerators and in the secondary combustion chambers of sewage sludge incinerators is typically between 8% and 14% (i.e., between 80,000 and 140,000 ppm). The concentrations of THC in the furnace exit gas of multiple hearth sewage sludge incinerators is typically on the order of several hundred to 2,000 ppm. Carbon monoxide concentrations are typically between several hundred ppm and 5,000 ppm. Even if both THC and CO are present at their highest observed concentrations, only 10% to 20% of the O_2 available would be consumed by complete combustion of the THC and CO. The ratio of O_2 to the sum of THC and CO is sufficiently high to support a first order reaction rate model.

The first order reaction rate model states that the ratio of the inlet concentration to the outlet concentration of a reactant is proportional to an exponential function of the reaction rate constant and the time allowed for the reaction to occur. That is:

$$C_o = C_i exp(-kt) \qquad \text{(Eq. 4.1)}$$

Where:

C_i	=	inlet concentration of the reactant (ppm)
C_o	=	outlet concentration of the reactant (ppm)
t	=	time (sec)
k	=	reaction rate constant (sec^{-1})

Note that if the concentration (of THC or CO) at the inlet and the concentration at the outlet of the final combustion stage (On-hearth or SCC) and the retention time in the final combustion stage are all known, then the value of k can be calculated by re-arranging Equation 4.1. Equation 4.2 can be used to calculate values of the reaction rate

$$-k = [ln(\frac{C_o}{C_i})]/t \qquad \text{(Eq.4.2)}$$

constant, k, for short, discrete time periods. The values of t, the retention time in the final combustion chamber can be calculated by measuring the exit gas flow rate in the stack and then back-calculating the flow rate in the final combustion chamber based on measurements of the temperature, and the oxygen and moisture concentrations at both locations. This technique can be applied only where it is possible to sample the THC and CO concentrations at both the inlet and the outlet of the final combustion stage. Because it is not possible to take a sample of the gas entering the On-Hearth stage of a MHF, we sought to find a MHF equipped with a secondary combustion chamber (SCC) where inlet and outlet measurements would be possible.

The reaction rate constant (*k*) is an exponential function of temperature.

$$k = B * exp(-a/T) \qquad \text{(Eq 4.3)}$$

where

T	=	absolute temperature (°R)
a and *B*	=	constants

Taking the natural logarithm of both sides of Equation 4.3 yields:

$$ln(k) = ln(B) + (-a/T) \qquad \text{(Eq. 4.4)}$$

A plot of the logarithm of the values of *k* calculated by Equation 4.2 versus the reciprocal of temperature (1/T) has a slope equal to the parameter a and an intercept equal to the logarithm of the parameter *B*.

This same approach can be used for cases where it is not possible to measure the concentration of CO and THC at the inlet to the final combustion stage, only if the concentration of THC or CO at the inlet to the final combustion stage is constant.

Combining equations 4.1 and 4.3:

$$\left(\frac{C_o}{C_i}\right) = exp(-Bt * exp(-a/T)) \qquad \text{(Eq. 4.5)}$$

We now take the natural logarithm of both sides of the Equation 4.5 to obtain:

$$ln\left(\frac{C_o}{C_i}\right) = -Bt * exp(-a/T) \qquad \text{(Eq. 4.6)}$$

For simplicity we define:

$$A = Bt \qquad \text{(Eq. 4.7)}$$

Combining Equations 4.6 and 4.7 we obtain

$$ln\left(\frac{C_o}{C_i}\right) = -A * exp(-a/T) \qquad \text{(Eq. 4.8)}$$

The constant C_i is physically equal to the concentration of THC (or CO) in the inlet to the final combustion stage. If the sewage sludge incinerator were operating at steady state with a constant inlet concentration, then it would be possible to calculate that concentration using the model. In the case where the sewage sludge incinerator is not operating with a constant inlet concentration, the value C_i becomes a parameter in the equation of the model. If the inlet concentration to the final combustion zone is nearly constant then the model can accurately predict outlet THC concentrations based on the temperature of the final combustion zone.

We now take the natural logarithm of Equation 4.8 to obtain:

$$ln(ln(\frac{C_o}{C_i})) = ln(-A) + (-a/T) \qquad \text{(Eq. 4.9)}$$

The slope of a plot of the ln(ln(C_o)) versus the reciprocal of the absolute temperature (1/T) will have a slope equal to the parameter *a*.

We now re-arrange Equation 4.8 to yield:

$$ln(C_o) = ln(C_i) - A * exp(-a/T) \qquad \text{(Eq. 4.10)}$$

Therefore, the slope of a plot of ln(C_o) versus exp($-a/T$) should be linear and have a slope equal to the parameter $-A$. The intercept of this plot should be equal to the natural logarithm of the constant C_i.

Therefore, if the first order rate equation is appropriate, there should be a set of constants (*a*, *A* and C_i) for each of the two pollutants (THC and CO) that describes their combustion in a furnace. Carbon monoxide is a discrete chemical. The values of the two constants (*a* and *A*) for CO should be the same (assuming adequate turbulence) in every sewage sludge incinerator.

Throughout the preceding, THC has been assumed to be a chemical entity. THC is actually a mixture of products of evaporation and pyrolysis of sewage sludge. We anticipated that the THC evolved during the evaporation and pyrolysis of sewage sludge would be similar at all locations and times. The bulk of the organic composition of sewage sludge is composed of cellulose fiber and the residue of the microbes that perform the digestion of the organic material in sewage. It seemed not too optimistic to assume that if the starting materials and the processes are similar, then the products of the evaporation and pyrolysis would be similar.

Thus we proposed to test the validity of the model by calculating the values of the three parameters for CO at as many locations as we could obtain data. We also proposed to evaluate the values of the three parameters for THC at the same locations. A finding that the model works for CO would validate the model. A finding that the model also works for THC would validate our assumption that the composition of THC evolved during the evaporation and pyrolysis of the sewage sludge does not vary widely.

OBSERVED TOTAL HYDROCARBON/CARBON MONOXIDE RELATIONSHIPS

The data in Table 4.1, from the previously mentioned study by the Water Environment Research Foundation (WERF)[1], provided some support for this approach. Sites 1, 2, and 3 were sampled during the WERF study. WERF obtained the remaining data from the literature. All of the furnaces tested were MHF. One site (Site 2) was equipped with a secondary combustion chamber (SCC) but no sampling was done at the inlet of the SCC. The values of the constant a in Eq. 4.3 were found by plotting the ln(ln) of C_o against 1/T (Eq. 4.9). The slope of this line is equal to *a*. A plot of ln(C_o) versus 1/exp(-*a*/T) has a slope equal to the constant *A* and an intercept equal to the natural logarithm of the inlet concentration (C_i). The calculated values of *kt* in Table 4.1 were found by calculating value of the logarithm of C_o/C_i. By Equation 4.1, the natural logarithm of the ratio of C_o/C_i is equal to the product of the parameters -*k* and *t*. The values of *kt* calculated are approximate for the average temperature in the final combustion zone during the testing. They are comparable from site to site because the average, final combustion zone temperature did not vary widely from site to site.

The variation in the value of the product, -*kt*, from site to site is small, approximately a factor of 2.5. Part of the variation may be due to variation in the retention time of the furnace exit gases in the final combustion zone of the various sewage sludge incinerators. The values of -*kt* calculated were consistent enough to provide encouragement that a universal value for the parameter k might be found, and that this could be used to correlate the temperature in the final combustion zone to the exit gas concentration of THC.

Figures 4.1 and 4.2 demonstrate application of the technique to other data. They are plotted from data collected by Lewis, Boe and Boyer[2] at a MHF in Vancouver Washington. The value of the slopes of these two curves is equal to the value of the parameter *a*.

The question of correlation between THC and CO in the exit gas from sewage sludge incinerators is complex. A successful correlation must include a description of a plausible causal relationship. Serendipitous correlations occur, but unless there is some basis in theory why the correlation should occur, they are unreliable for prediction. In the case considered here, a correlation between THC and CO concentrations in the exit gas of the SCC of a sewage sludge incinerator would be supported by the

TABLE 4.1

WATER ENVIRONMENT RESEARCH FOUNDATION REPORT(1) KINETIC EVALUATION

Model Tested

$$\left(\frac{C_o}{C_i}\right) = exp(-A * exp(-a/T))$$

Site	Average THC_{in} (C_i ppm)(2) Calculated	*A* (Calculated)	Average THC_{out} (C_o)	*a* (sec^{-1})	Estimated Values of *kt* ($sec^{-1}*sec$)	After-burner Type
1	11,900	157	341	4,948	3.55	none
2	1,600	49	158	4,052	2	SCC
3	340	24	80	2,961	1.45	On-HRTH
AMSA(1)	590	40	60	4,013	2.29	Various
Detroit	1,970	59	140	4,225	2.64	none
St. Paul 1989	270	98	30	5,753	2.2	On-HRTH
St. Paul 1991	1,780	287	190	7,062	2.24	On-HRTH

(1) Note: These data include results from several sewage sludge incinerators.
(2) Concentration of total hydrocarbons in the gas entering the combustion chamber.
(3) Concentration of total hydrocarbons in the gas leaving the combustion chamber.

kinetic relationships described above, if there were a correlation between the concentrations of THC and CO in the inlet to the SCC.

The theory would hold that the relationship between reductions in THC and CO concentrations in a SCC could be calculated for any combustion temperature. It may be possible to measure THC, CO and afterburner temperature for a representative length of time and use these data to back-calculate the values of *A* and *a* for equation 4.3. The values of the parameters *A* and *a* would be combined with estimates of the

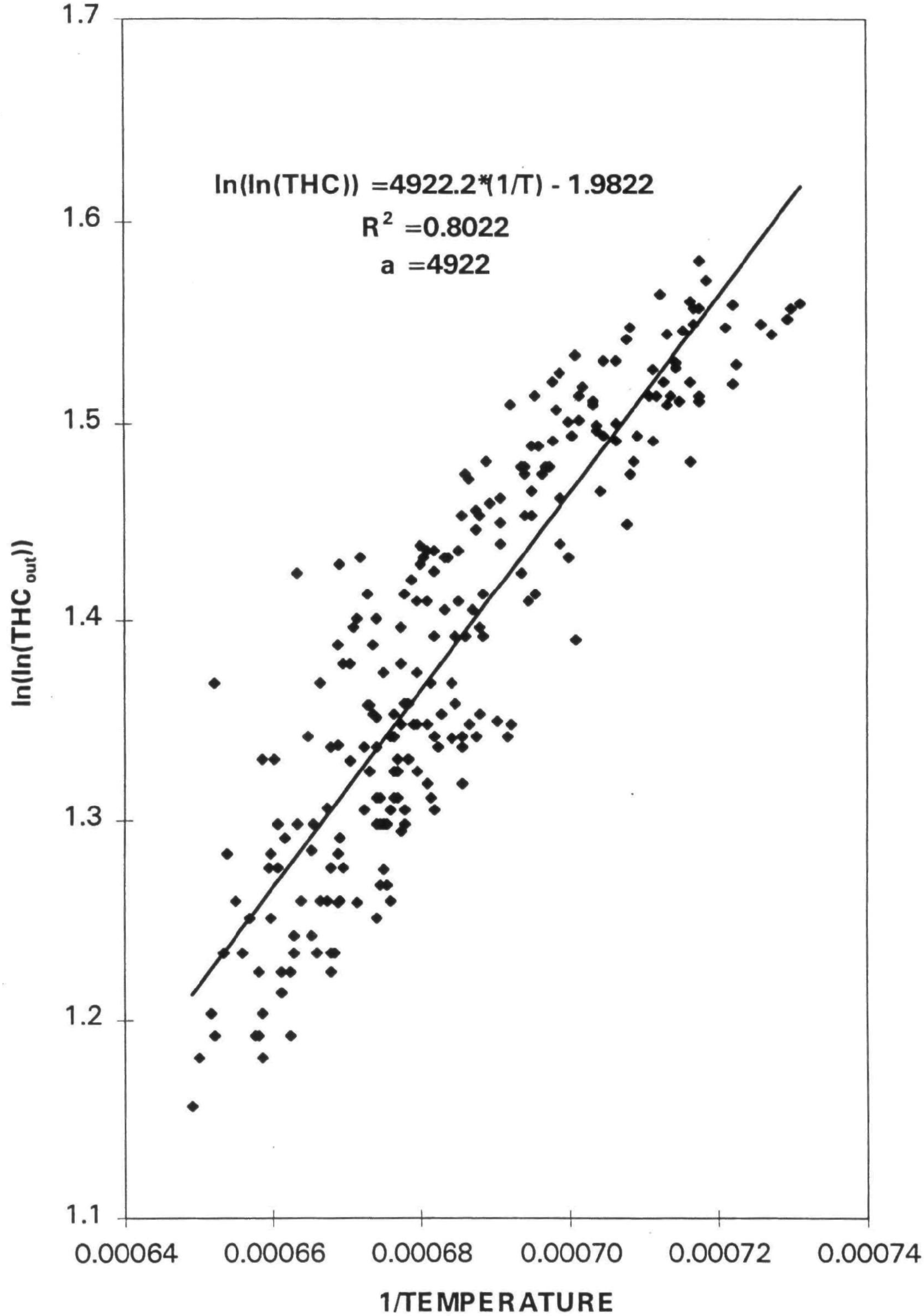

Figure 4.1 Calculate a for THC, Vancouver

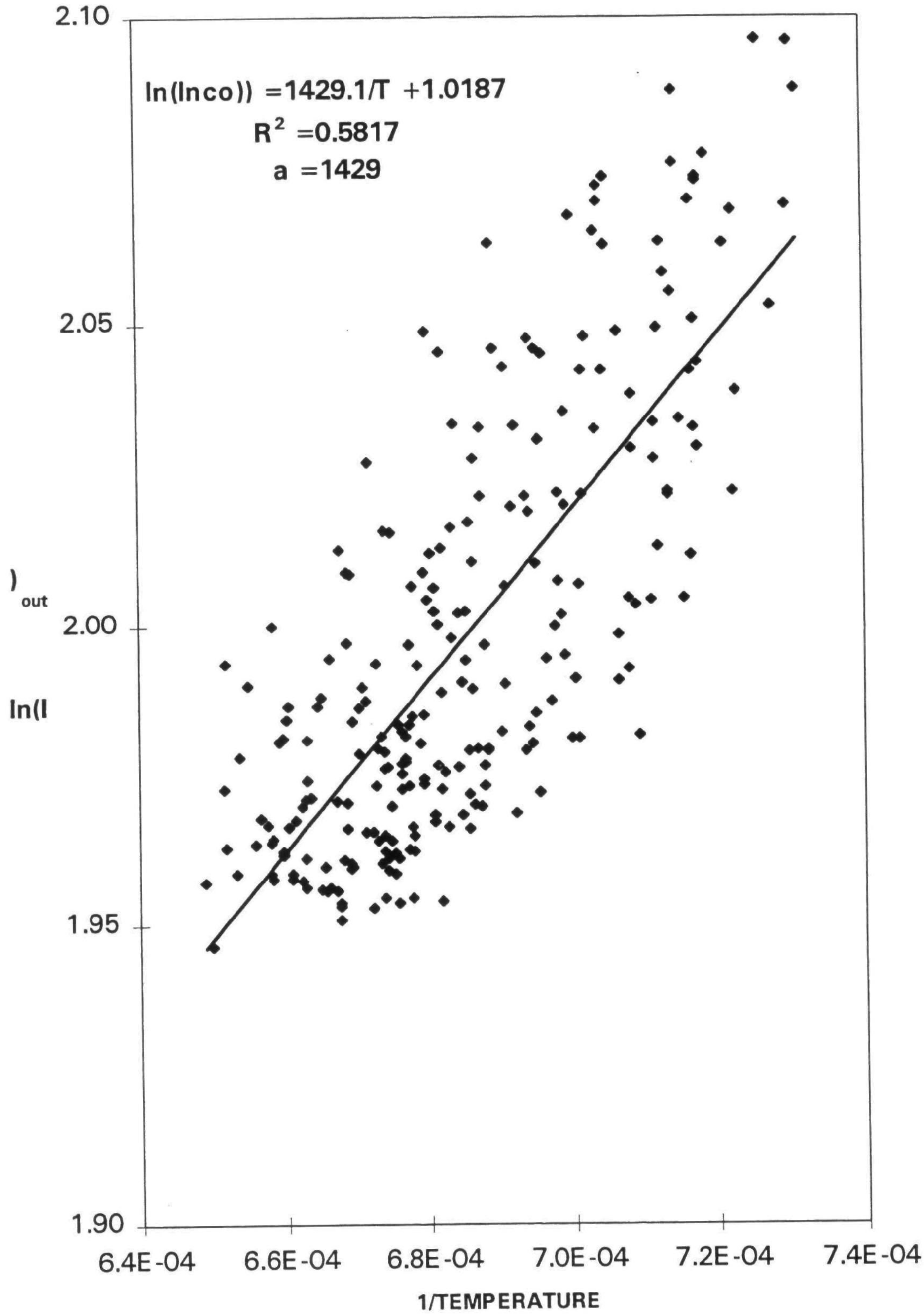

Figure 4.2 Calculate a for CO, Vancouver

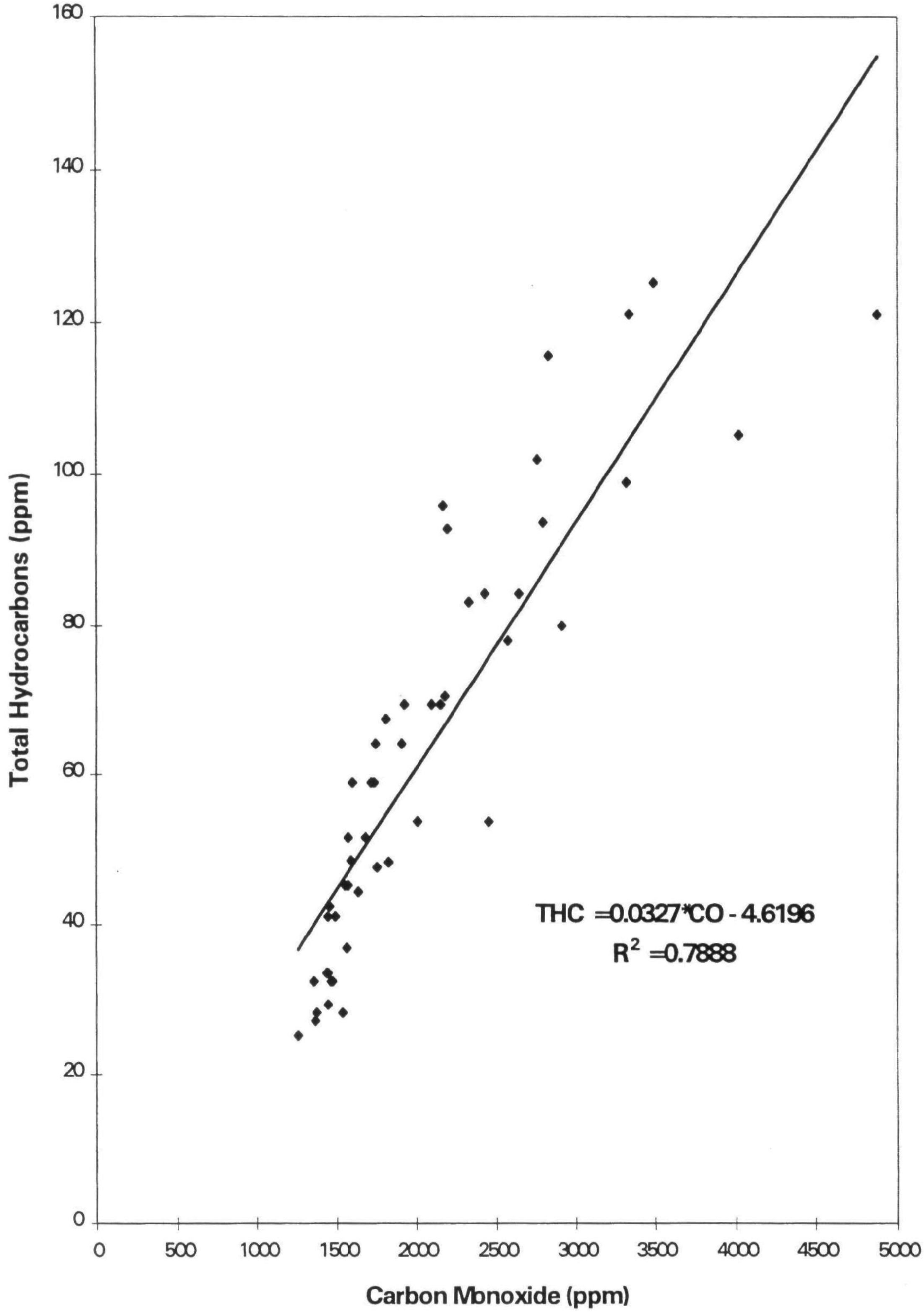

Figure 4.3 THC vs CO, Vancouver Run # 6

retention time of the gases in the combustion zone and used in Eq. 4.8 to calculate the ratio of THC to CO for any given combustion zone temperature. This calculation could be used, together with the results of the continuous CO monitor, to assure compliance with the THC limit. This could work even if the values of A and a varied among sewage sludge incinerators as long as they were relatively constant for each sewage sludge incinerator.

The data from Run Number 6 at Vancouver[2] (Figure 4.3) are representative of the type of correlation between CO and THC that we have seen. Other plots from other sewage sludge incinerators are similar.

Note, however, that the calculation described above is valid only if there is reason to believe that there is a relationship between the concentration of THC and CO in the inlet to the combustion zone. There is no reason to believe that this is so. In fact, there is reason to believe that there is no relationship between THC and CO concentrations at the inlet to the On-Hearth or secondary combustion chamber of sewage sludge incinerators. Consider a MHF. Wet sewage sludge is fed to the second to top hearth (or the top hearth), where heating begins. THC generation begins as the sewage sludge dries. The more volatile of the THC components evaporate. Further THC generation results from partial combustion of other organic components as the drying mass reaches temperatures between 800 and 1,000 °F. Carbon monoxide does not exist in the wet sewage sludge so none of its generation is attributable to evaporation. CO generation is solely attributable to pyrolysis of the organic matter in the sewage sludge. The correlation might yet be decent if the contribution of THC from evaporation is small relative to the total THC.

The argument presented in the preceding paragraph applies to emissions from FBI furnaces as well. In the case of FBI, the wet mixture is injected into a bed of hot well-mixed sand. Drying, evaporation, pyrolysis and combustion all begin more quickly. The shorter period of time required for heating to combustion temperatures may result in a closer correlation between the THC and CO concentrations in the gas entering the freeboard zone.

Most wastewater treatment plants that operate sewage sludge incinerators use final plant effluent as the scrubber liquid. This practice raised the question of the effect of exposing the furnace or afterburner exit gases to the final plant effluent on THC concentration. The effect of this practice could either increase or decrease the concentration of THC in the exit gas. Water soluble organic compounds in the furnace exit gases could be removed by the scrubber, or slightly soluble organic compounds in the final effluent might be stripped from the water by exposure to the hot furnace exit gases. In the first case, the scrubber would assist in meeting the 100 ppm THC limit. In the second case, the scrubber would add THC to the exit gases. We needed to know whether the location of the continuous monitor would have any effect on the reported THC concentrations.

EMISSION RATES OF CHLORINATED DIOXINS AND FURANS

EPA continues to study the emissions and health effects of chlorinated dioxins and furans from combustion sources. This work began during the EPA assessment of dioxin/furan emissions from the combustion of hazardous wastes, but has been expanded to include emissions from all combustion sources. This project included measurement of the emission rates of these classes of compounds from sewage sludge incinerators. The object of these measurements was to characterize the emissions of dioxins and furans from sewage sludge incinerators. No risk assessment of the impacts of these emissions was attempted during this program. We chose EPA Method 23 for collection of the samples for dioxin and furan analysis. This is the method chosen for collection and analysis for these compounds by EPA/OSW and nearly all state and local agencies for analysis of these compounds.

TEST PLANS FOR THE VARIOUS SEWAGE SLUDGE INCINERATORS

The considerations discussed above dictated that sampling be done for THC, and CO at three locations within a sewage sludge incinerator system. These locations are: the exit gases from the furnace; the exit gases from the afterburner and the exit gases from the scrubber. There is just one type of sewage sludge incinerator that is amenable to sampling at all of these locations -- a MHF with a separate secondary combustion chamber (SCC). There is no practicable way to obtain a sample from the region between the On-Hearth and the first hearth of a conventional MHF. Nor, is there a way to sample between the bed and the freeboard of an FBI. There are relatively few FBI with SCC. For these reasons we decided to collect the kinetic rate equation data at a MHF that is equipped with a SCC.

The consortium of New Jersey WWTP operators that was referred to earlier sponsored tests at two different sewage sludge incinerators. One of these tests was done at an FBI and the other was at a MHF/SCC device. We visited the MHF/SCC site during those tests and found those tests complied with the test protocol that we proposed for that type of furnace. The tests that the consortium sponsored at the sewage sludge incinerator were somewhat more limited than we had proposed but seemed to satisfy most of our requirements. We decided to use the New Jersey data to satisfy a portion of our needs and to concentrate most of the project effort on collection of data from other units. With all of the above in mind, we proposed to sample at:

One MHF with a secondary combustion chamber

One MHF with a On-Hearth afterburner

One MHF with no afterburner

One FBI

Completion of sampling at the units listed above would give us one set of data with which to validate the kinetic model (the MHF/SCC unit). It also would give us sufficient data at other types of units to determine whether the kinetic model can be applied to emissions test data from such units. The specific monitoring proposed for the various types of units is outlined in Tables 4.2 through 4.5 These tables provide only the salient attributes of the proposed testing at each of the various sewage sludge incinerators. Complete sampling, analysis and quality assurance plans were presented in the Site Specific Test Plans that were developed for each of the sewage sludge incinerators.

TABLE 4.2
TEST PLAN
MHF FURNACE (secondary combustion chamber)

Monitor 5 days, 24 hours/day, furnace exit, SCC exit and Stack Exit

Temperature Regimen for Tests

Day	SCC Temperature (°F)
1	1,600° F
2	1,400° F
3	1,200° F
4	1,000° F
5	800° F

Monitored Parameters

Location	Measured	Provided by Plant
Furnace	Sewage sludge heat value	Hearth temperatures
	Carbon dioxide	Fuel flow rate
	Temperature	Sewage sludge moisture
	CO	Fuel heat value
	THC	Sewage sludge feed rate
	Oxygen	
	Moisture	
	Flow rate	
SCC exit	Temperature	Temperature
	CO	Fuel heat value
	THC	Fuel flow rate
	Oxygen	
	Moisture	
	Flow rate	
	Carbon dioxide	
Stack Exit	Temperature	
	CO	
	THC	
	Oxygen	
	Moisture	
	Flow rate	
	Carbon dioxide	
Scrubber		Water flow rate

TABLE 4.3

MHF FURNACES (On-Hearth afterburner)
Monitor continuously for 5 days, 24 hours per day, Stack Exit only

Temperature Regimen for Tests

Day	On-Hearth Temperature
1	Normal
2	Normal
3	1,600° F
4	1,200° F
5	800° F

Monitored Parameters

Location	Measured	Provided by Plant
Furnace	Sewage sludge heat value	Hearth temperatures
	Sewage sludge Moisture	Fuel flow
		Fuel heat value
		Sewage sludge feed rate
		Sewage sludge moisture
Stack Exit	Temperature	
	CO	
	THC	
	Oxygen	
	Moisture	
	Flow rate	
	Carbon dioxide	
Scrubber		Water flow rate

TABLE 4.4

MHF FURNACES (no afterburner)
Monitor continuously for 5 days, 24 hours per day, Stack Exit only

Temperature Regimen for Tests

Day	On-Hearth Temperature
1	None
2	None
3	None
4	None
5	None

Monitored Parameters

Location	Measured	Provided by Plant
Furnace	Sewage sludge heat value	Hearth temperatures
	Moisture	Fuel flow
		Fuel heat value
		Sewage sludge feed rate
		Sewage sludge moisture
Stack Exit	Temperature	
	CO	
	THC	
	Oxygen	
	Moisture	
	Carbon dioxide	
Scrubber		Water flow rate

TABLE 4.5

TEST PLAN
FBI FURNACES

Monitor five days, 24 hours/day, furnace exit and Stack Exit

Temperature Regimen for Tests

Day	Freeboard Temperature
1	Normal
2	Normal
3	1,600° F
4	1,200° F
5	800° F

Monitored Parameters

Location	Measured	Provided by Plant
Furnace	Sewage sludge heat value	Freeboard temperature
	Sewage sludge moisture	Bed temperature
		Fuel flow
		Fuel heat value
		Sewage sludge feed rate
Stack Exit	Temperature	
	CO	
	THC	
	Oxygen	
	Moisture	
	Carbon dioxide	
	Dioxins/Furans	
	Flow rate	
Scrubber		Water flow rate

SECTION 5

SOURCES OF DATA USED FOR THIS EVALUATION

INTRODUCTION

This section provides data about the general operation of each sewage sludge incinerator during the period of time that the data were collected. Complete information is not available in some cases. Some data were obtained from plant operators for other purposes and may not contain all of the information that was collected during the tests conducted during this investigation. Other data were obtained from literature which did not report all of the information that we would have liked. These data were used for specific purposes for which they were adequate. For example, the continuous monitoring data that were provided by the Cities of St. Paul and Cleveland, were used to develop statistical models. It was not necessary to know the temperature of the final combustion zone for this purpose, it was enough to know that the temperature was always within the range of operation of the incinerator. Section 6 of this report contains a more complete description of the information that was collected during this investigation. The data are reported in the context of the objectives of the investigation.

ARLINGTON (VIRGINIA) WATER POLLUTION CONTROL PLANT

Facility Description

The Arlington, (Virginia) Water Pollution Control Plant is a publicly operated treatment works (POTW) that processes an average of 30 million gallons per day (mgd) of wastewater. The sludge furnace operates 24 hours per day, 5¾ days per week. The influent to the wastewater treatment facility comes from predominantly domestic sources (98 percent). The treatment facility serves a population of approximately 150,000.

Incoming wastewater is screened at four facilities at the plant and degritted at two locations. Screenings and grit are hauled directly to a landfill. The primary treatment consists of four side by side rectangular tanks which receive the degritted and screened wastewater. A chain and flight collector mechanism moves the settled material (primary sludge) to the influent end of the tank and the floating material (grease) to the effluent end of the tank. The primary sludge is pumped to a gravity thickener; the grease is hauled directly to a landfill.

The secondary treatment system consists of three side by side four-pass aeration basins configured to operate in either a step feed or conventional plug flow mode. Diffused air is used. Six circular clarifiers follow this treatment. The waste sludge from this process is concentrated in a dissolved air flotation thickener. Only the three most recent clarifiers have scum removal mechanisms. The secondary scum is pumped to the primary clarifiers. Site THC-1 advanced treatment includes phosphorous removal. Sludge generated by this process goes to the primary clarifiers.

All sludge is de-watered prior to incineration to reduce the water content of the sludge cake to between 70 to 75 percent by weight. De-watering is a critical step in the process of sludge incineration, because it reduces the thermal demand on the incinerators. A gravity thickener is used to increase the percentage of solids in the primary sludge. A flotation thickener processes the secondary sludge. The combined thickened sludge from those thickeners is then pumped into a storage tank. Lime slurry and ferric chloride solution are used to condition the sludge drawn from the storage tank. Four recessed plate filter presses are available to de-water the conditioned sludge.

The recessed plate filter presses drop sludge into a bunker where the sludge is removed by drag conveyors and deposited onto a belt conveyor system and transported to the furnace.

Incinerator and Air Pollution Control System

Site THC-1 has two identical 22 ft, 3 in. Nichols eight-hearth, MHFs. Only one of the furnaces is operated at a time. Many MHFs use recycled shaft cooling air to reduce auxiliary fuel consumption. However, Site THC-1 does not use recycled shaft cooling air due to problems associated with the original design. Air for combustion is admitted through atmospheric ports located in Hearth No. 7 and Hearth No. 8. The position of the atmospheric port dampers is controlled with manual loading stations located in the control room. The auxiliary fuel system is oil fired and two burners are located on each of Hearth Nos. 2, 4, 5, and 7.

The air pollution control system consists of an adjustable throat venturi scrubber followed by a two plate, impingement tray scrubber. The tray scrubber flue gas exit temperature is nominally 100°F. The position of the venturi adjustable throat is controlled with a manual loading station located in the control room.

Process Description and Operation

The existing Arlington County WPCP has the capacity to treat approximately 30 million gallons per day of raw influent and a maximum of 45 dry tons per day of sewage sludge. The sludge de-watering facility at the plant consists of four fixed-chamber plate and frame filter presses. The de-watered sludge cake from the filter presses is fed to the perimeter of the top hearth of one of the multiple hearth incinerators for processing. There are eight hearths per incinerator. The de-watered cake is raked from the perimeter of the top hearth toward the center shaft where it drops through holes in the center of the hearth. On the next hearth the sludge is raked in the opposite direction. This same process is repeated in all subsequent hearths as the sludge dries and then burns. The dry ash is discharged from the bottom of the incinerator and is stored on-site prior to landfill disposal.

The sewage sludge is the primary fuel for the incinerator. Number 2 fuel oil is used as an auxiliary fuel. The emissions from the incinerator are controlled by a wet scrubber.

Summary of Results

Incinerator Unit No. 2 was tested. Continuous monitoring of THC, CO, CO_2, and O_2 was conducted at two sampling locations from July 21 through July 26, 1995. Three sample runs for dioxin/furan emissions were conducted at the outlet location on July 22 and 23.

Table 5.1 summarizes the concentrations of THC, CO, CO_2 and O_2 measured at the furnace outlet location over the course of the sampling program. Each run corresponds to a 12-hour sampling period, beginning with July 21, midnight to noon (Run No. I-1) and ending with July 26, midnight to noon (I-11). Each reported value represents the average concentration measured during the monitoring period. Table 5.2 reports equivalent data for measurements at the scrubber outlet location.

Table 5.3 presents the percent total solids (EPA Method 160.3) and the gross calorific value of the sewage sludge as delivered to the sewage sludge incinerator (ASTM D-240). The samples analyzed were provided by plant personnel. The samples were composited over 24-hour periods. None of the gross calorific values were above the limit of detection of D-240.

CLEVELAND (OHIO) SOUTHERLY WASTEWATER TREATMENT CENTER

Facility Description

The incinerator installation at the Southerly WWT Center is comprised of four separate, independently operating MHFs. The major items of equipment for each unit are:

- Multiple hearth incinerator
- Combustion air blowers
- Cooling air blower
- Forced draft fan
- Auxiliary burner system
- Waste heat boiler

TABLE 5.1

THC, CO, CO_2, AND O_2 CONCENTRATIONS - FURNACE OUTLET
Arlington, Virginia WWTP, June 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	7/21	7.15	80	675	8.9	10.2
I-2	7/21	7.15	46	926	8.6	10.5
I-3	7/22	7.60	45	1,000	8.4	10.7
I-4	7/22	7.84	63	1,079	9.7	9.3
I-5	7/23	7.80	66	1,706	9.8	9.2
I-6	7/23	7.86	25	778	9.9	8.9
I-7	7/24	7.87	30	1,267	10.6	8.2
I-8	7/24	7.59	29	601	6.8	12.3
I-9	7/25	--	45	1,205	9.6	9.4
I-10	7/25	--	31	806	9.2	9.6
I-11	7/26	--	59	1,192	10.0	9.0

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

- Gas scrubber system
- Ash handling system.

After sludge is de-watered on the vacuum filters, the filter cake is conveyed to one of the four multiple hearth incinerators. In the incinerators, the filter cake is dried and combusted. The end products are sterile, inert ash, and exhaust gas. The ash is slurried to the ash lagoons prior to final disposal in a landfill. The flue gas exhaust system consists of a venturi scrubber and impingement wet scrubber for each incinerator to remove particulates (fly ash). The captured fly ash is mixed with the incinerator and waste heat boiler ash, discharged to the ash sumps, slurried and pumped to the ash lagoons.

TABLE 5.2
THC, CO, CO_2, AND O_2 CONCENTRATIONS -SCRUBBER OUTLET
Arlington, Virginia WWTP, June 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	7/21	7.15	24	387	5.4	14.6
I-2	7/21	7.15	29	535	5.4	14.5
I-3	7/22	7.60	27	607	6.0	13.9
I-4	7/22	7.84	38	663	6.1	13.8
I-5	7/23	7.80	59	911	6.1	13.7
I-6	7/23	7.86	22	462	6.1	13.8
I-7	7/24	7.87	39	721	6.1	13.8
I-8	7/24	7.59	24	467	4.8	15.3
I-9	7/25	--	37	694	5.8	14.2
I-10	7/25	--	23	494	5.9	14.0
I-11	7/26	--	36	726	--	14.1

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

TABLE 5.3

SEWAGE SLUDGE PARAMETERS
Arlington, Virginia WWTP, June 1995

Date	Total Suspended Solids (%)	Gross Calorific Value (BTU/lb)
7/23/95	30.0	1670[1]
7/24/95	28.1	1780[1]
7/25/95	26.5	1890[1]

[1] Limit of detection of ASTM D-240

Filter cake from the vacuum filters is fed into the top of each incinerator through a sludge discharge chute. The filter cake moves through the incinerator. Rabble arms, which are attached to the center shaft and extend to the outer incinerator wall, rotate slowly. Teeth which are attached to the arms move sludge from the center to the outside of the incinerator on the odd numbered hearths (out hearths) and from the outside to the center on even numbered hearths (in hearths). Each odd numbered hearth has drop holes at the outside wall of the incinerator and the even numbered hearths have a drop hole at the center shaft.

The holding time in the incinerators is sufficiently long to evaporate the moisture in the filter cake and to oxidize the organic matter by combustion. The operating temperature is high enough to achieve sterilization of the remaining ash and destruction of odors in the exhaust gases.

As the filter cake moves downward from hearth to hearth, it is dried, combusted, and the resultant ash cooled before dropping into the ash hopper. Air for combustion, which is supplied by the forced draft fan, enters Hearth Nos. 6 and 8. The combustion air is therefore preheated when it reaches the combustion zone. The air is heated to 1,400 - 1,600°F as it passes through the combustion zone. As this air moves through the upper hearths, it helps dry incoming filter cake. The air exits the furnace at the top at a temperature of 800 to 1,200°F. Combustion air is also added at each burner.

In conveying the gases from the outlet of each multiple hearth incinerator to the scrubbers, a waste heat boiler reduces the gas temperature and reclaims energy at the same time. The wet scrubbers employ a venturi-slot section and impingement trays to capture the particles in the gas and sluice them to the ash disposal of the incinerator. The cleaned gas leaves the scrubbers through a mist eliminator to provide droplet-free discharge of gas which is released to the atmosphere through the stack.

Incinerator and Air Pollution Control System

The existing Southerly WWT Center has the capacity to treat approximately 100 million gallons per day of raw influent and a maximum of 150 dry tons per day of sewage sludge. De-watered sludge cake from the vacuum filters is fed to the perimeter of the top hearth of the multiple hearth incinerators for processing. There are nine hearths per incinerator. The de-watered cake is raked from the perimeter of the top hearth toward the center shaft where it drops through holes in the center of the hearth. On the next hearth the sludge is raked in the opposite direction. This same process is repeated in all subsequent hearths as the sludge dries and then burns. The dry ash is discharged from the bottom of the incinerator and is stored on-site prior to landfill disposal. The sewage sludge is used as the primary fuel for the incinerator. Natural gas is used as an auxiliary fuel. The emissions from the incinerator are controlled with a wet scrubber.

The Southerly WWT Center has four identical nine-hearth MHFs. Only three of the furnaces are operated at a time. The MHFs use recycled shaft cooling air to reduce auxiliary fuel consumption. Air for combustion is admitted through atmospheric ports located in Hearth No. 7 and No. 9. The position of the atmospheric port dampers is controlled with manual loading stations located in the control room. The auxiliary fuel system is natural gas fired and two burners are located on each of Hearth Nos. 1, 3, 5, 7, and 9.

Hearth No. 1, also known as the "zero hearth," is used as control for VOC emissions. A natural gas burner is used in the zero hearth to maintain a temperature of approximately 1,600°F. The air pollution control system consists of an adjustable throat venturi scrubber followed by a packed bed scrubber. The scrubber flue gas exit temperature is nominally 100°F. The position of the venturi adjustable throat is controlled with a manual loading station located in the control room.

Summary of Results

The No. 4 Sewage Sludge Incinerator was the unit tested. Continuous monitoring of THC, CO, CO_2, and O_2 was conducted at two sampling locations from July 31 through August 4, 1995. Three sample runs for dioxin/furan emissions were conducted at the outlet location on August 1 and 2.

The average stack gas velocity was 50.2 feet per second (fps) during the sampling program. Volumetric flow rates averaged 21,309 actual cubic feet per minute (acfm) or 17,136 dry standard cubic feet per minute (dscfm). Stack gas temperature averaged 153°F, with a moisture content of 5.3 percent. Composition of the stack gas averaged 3.8 percent carbon dioxide (CO_2) and 15.9 percent oxygen (O_2). Stack gas conditions were consistent throughout the sampling program.

Table 5.3 summarizes the concentrations of THC, CO, CO_2, and O_2 measured at the furnace outlet location over the course of the sampling program. Each run corresponds to a five to 13-hour duration, beginning on July 31 at 1800 hours and ending on August 4 at 0800 hours. Each reported value represents the average concentration measured during the monitoring period. Table 5.4 reports equivalent data for measurements at the scrubber outlet location.

Table 5.6 presents the percentage of total solids (as measured by EPA Method 160.3) and the gross calorific value of the sewage sludge as delivered to the sewage sludge incinerator (as determined by ASTM D-240). The samples analyzed were provided by plant operating personnel. The samples were composited over 24-hour periods.

TABLE 5.4
THC, CO, CO_2, AND O_2 CONCENTRATIONS - FURNACE OUTLET
Cleveland (Southerly), Ohio WWTC, June 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	7/31	5.1	0.9	7.8	4.8	14.2
I-2	7/31	4.2	3.7	3.7	5.1	13.9
I-3	8/1	5.3	0.6	6.2	5.5	13.5
I-4	8/2	7.5	0.8	4.3	5.4	13.5
I-5	8/2	7.1	1.2	5.2	5.4	13.9
I-6	8/3	6.9	6.6	446	5.6	13.6
I-7	8/3	7.1	2.8	5.0	5.1	13.8
I-8	8/4	8.1	2.2	18.3	4.6	14.5

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

TABLE 5.5
THC, CO, CO_2, AND O_2 CONCENTRATIONS - SCRUBBER OUTLET
Cleveland (Southerly), Ohio WWTC, June 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	7/31	5.1	1.8	4.6	3.6	16.1
I-2	7/31	4.2	2.6	2.0	3.8	15.9
I-3	8/1	5.3	2.3	5.4	3.7	15.7
I-4	8/2	7.5	2.4	3.0	3.8	15.7
I-5	8/2	7.1	2.0	2.3	3.8	15.8
I-6	8/3	6.9	4.6	322	3.9	15.7
I-7	8/3	7.1	2.9	2.1	3.7	15.7
I-8	8/4	8.1	0.6	11.3	3.4	16.3

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

TABLE 5.6

SEWAGE SLUDGE PARAMETERS
Cleveland (Southerly), Ohio WWTC, June 1995

Run Number	Date	Total Suspended Solids (%)	Gross Calorific Value (BTU/lb)
I-1	7/31	41.0	6,290
I-2	7/31	40.8	6,820
I-3	8/1	41.7	6,140
I-4	8/2	42.2	7,560
I-5	8/2	44.2	5,850
I-6	8/3	42.2	7,520
1-7	8/3	42.3	6,370
I-8	8/4	42.6	7,520

HUNTINGTON (WEST VIRGINIA) REGIONAL WASTEWATER TREATMENT FACILITY

Facility Description

The original wastewater treatment facilities at the site began operating in 1964 and provided a primary degree of treatment to wastewater received from the City of Huntington and immediate area. In 1984, in response to orders issued by the Ohio River Valley Sanitation Commission, the United States Environmental Protection Agency and the West Virginia Department of Natural Resources, the existing treatment processes at the facilities were upgraded from primary to secondary treatment levels.

An average daily flow volume of approximately 13 million gallons is received at the treatment plant and is subject to a treatment process consisting of screening, grit collection, pre-aeration, primary sedimentation, stabilization utilizing the activated sludge process, secondary clarification and chlorination prior to discharge into the Ohio River.

Incinerator Operating Description

The sludge de-watering and disposal facilities in Huntington utilize continuous belt filter presses to convert the liquid sludges from the wastewater treatment processes into filter cake which contains approximately 22 percent solids and 78 percent water. The filter cake is then mixed with coal and fed into a fluidized bed disposal system where it is burned at a maximum temperature of 1,600°F.

In general, de-watered sludge and coal are injected into the reactor and combustion air flows upward and fluidizes the mixture of hot sand, sludge, and coal. Supplemental fuel oil and/or natural gas can also be supplied by burners. The reactor is a single chamber unit where both moisture evaporation and combustion occur at approximately 1,550°F in either the dense or dilute phases of the sand bed. All the combustion gases pass through the combustion zone with residence time of several seconds.

The reactor flue gases exit the reactor and are directed through a heat exchanger. The heat recovered from the flue gases is used to preheat the fluidizing air. Flue gases exit the heat exchanger at approximately 1,000°F and enter the air pollution control system.

The air pollution control system cleans and cools the hot exhaust gases exiting the heat exchanger. The air pollution control system consists of two sections, each of which serves a specific purpose. The first section is a venturi scrubber where particulate matter in the exhaust gases are removed and the exhaust gas temperature is reduced to approximately 185°F.

The quenched gas changes direction and flows upward through a flooded tray cooling tower. The gas flows upward through two cooling trays and a mist eliminator prior to its emission through a stack at a temperature of approximately 120°F.

Scrubbing water from the venturi section is separated in the lower conical part of the cooling tower and is pumped to an ash lagoon. The scrubbing water from the cooling tower is discharged into the headworks of the treatment plant with the wastewater received at the plant.

Summary of Results

Testing was conducted at the sewage sludge incinerator operated by the Huntington Sanitary Board, Huntington, West Virginia. Continuous monitoring of THC, CO, CO_2, and O_2 was conducted at two sampling locations from August 15 through August 18, 1995. Three sample runs for dioxin/furan emissions were conducted at the outlet location on August 15 and 16.

The average stack gas velocity was 50.51 feet per second (fps) during the sampling program. Volumetric flow rates averaged 9,521 actual cubic feet per minute (acfm) or 7,938 dry standard cubic feet per minute (dscfm). Stack gas temperature averaged 111°F, with a moisture content of 9.1 percent. Composition of the stack gas averaged 7.8 percent carbon dioxide (CO_2) and 11.4 percent oxygen (O_2).

Table 5.7 summarizes the concentrations of THC, CO, CO_2, and O_2 measured at the furnace outlet location over the course of the sampling program. Each run corresponds to a period of continuous sampling (four to ten hours in duration) conducted between August 15 and 18, 1995. Each reported value represents the average concentration measured during the monitoring period. Table 5.8 reports equivalent data for measurements at the scrubber outlet location.

TABLE 5.7

THC, CO, CO_2, AND O_2 CONCENTRATIONS - FURNACE OUTLET
Huntington, West Virginia RWWTF, August 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	8/15	NA	3.7	56.3	8.1	10.8
I-2	8/16	NA	4.5	35.8	7.5	11.8
I-3	8/17	NA	6.3	125	7.1	12.3
I-4	8/17	NA	5.6	155	9.5	9.3
I-5	8/18	NA	1.8	4.7	6.7	12.1
I-6	8/18	NA	5.1	92	7.5	11.5

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

NA - Data not available

TABLE 5.8

THC, CO, CO_2, AND O_2 CONCENTRATIONS - SCRUBBER OUTLET
Huntington, West Virginia RWWTF, August 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	8/15	NA	4.9	50.2	8.2	10.9
I-2	8/16	NA	5.3	36.1	7.6	11.9
I-3	8/17	NA	5.9	109	7.2	12.4
I-4	8/17	NA	4.6	130	9.6	9.6
I-5	8/18	NA	2.0	2.1	7.0	12.4
I-6	8/18	NA	3.8	80	7.1	11.1

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

NA - Data not available

Table 5.9 presents the percentage of total solids (as measured by EPA Method 160.3) and the gross calorific value of the sewage sludge as delivered to the sewage sludge incinerator (as determined by ASTM D-240). The samples analyzed were provided by plant operating personnel. The samples were composited over 24-hour periods.

TABLE 5.9

SEWAGE SLUDGE PARAMETERS
Huntington, West Virginia RWWTF, August 1995

Date	Total Suspended Solids (%)	Gross Calorific Value (BTU/lb)
8/16/95	19.4	3,500
8/17/95	17.9	<1,000
8/18/95	19.4	3,500

HOPEWELL (VIRGINIA) REGIONAL WASTEWATER TREATMENT FACILITY

Facility Description

The incinerator installation at the Hopewell WWT facility is comprised of one separate, independently operating MHF. The major items of equipment for this unit are:

- Multiple hearth incinerator
- Combustion air blowers
- Cooling air blower
- Forced draft fan
- Afterburner system
- Waste heat boiler
- Gas scrubber system
- Ash handling system

After sludge is de-watered on the vacuum filters, the filter cake is conveyed to the multiple hearth incinerator. In the incinerator the filter cake is dried and combusted. The end products are sterile, inert ash and exhaust gas. The flue gas exhaust system consists of a venturi scrubber and a water after-cooler for the incinerator to remove particles (fly ash). The captured fly ash is mixed with the incinerator ash and waste heat boiler ash, discharged to the ash sumps, and trucked to the ash landfills.

Filter cake from the vacuum filters is fed into the top of the incinerator through a sludge discharge chute. The filter cake moves through the incinerator. Rabble arms, which are attached to the center shaft and extend to the outer incinerator wall, rotate slowly. Teeth which are attached to the arms move sludge from the outside to the center of the incinerator on the odd numbered hearths (in hearths) and from the center to the outside on even numbered hearths (out hearths). Each odd numbered hearth has drop holes at the center shaft of the incinerator and the even numbered hearths have a drop hole at the outside wall.

The holding time in the incinerators is sufficiently long to evaporate the moisture in the filter cake and to oxidize the organic matter by combustion. The operating temperature is high enough to achieve sterilization of the remaining ash and destruction of odors in the exhaust gases.

As the filter cake moves downward from hearth to hearth, it is dried, combusted, and the resultant ash cooled before dropping into the ash hopper. Air for combustion, which is supplied by the forced draft fan enters Hearth Nos. 3, 4, 6, and 7. The combustion air is therefore preheated when it reaches the combustion zone. The air is heated to 1,400 - 1,600°F as it passes through the combustion zone. As this air moves through the upper hearths, it helps dry incoming filter cake. The air exits the furnace at the top at a temperature of 800 to 1,200°F. The gas stream then passes through an afterburner at a temperature of 1,400 - 1,600°F to ensure complete combustion.

In conveying the gases from the outlet of the afterburner to the scrubbers, a waste heat boiler reduces the gas temperature and reclaims energy at the same time. The wet scrubbers employ a venturi-slot section and impingement trays to capture the particles in the gas and sluice them to the ash disposal of the incinerator. The cleaned gas leaves the scrubbers and is released to the atmosphere through the stack.

Incinerator and Air Pollution Control System

The existing Hopewell WWT facility has the capacity to treat approximately 50 million gallons of wastewater per day. De-watered sludge cake from the vacuum filters is fed to the perimeter of the top hearth of the incinerator for processing. There are eight hearths in the incinerator. The de-watered cake is raked from the perimeter of the top hearth toward the center shaft where it drops through holes in the center of the hearth. On the next hearth the sludge is raked in the opposite direction. This same process is repeated in all subsequent hearths as the sludge dries and then burns. The dry ash is discharged from the bottom of the incinerator and is stored on-site prior to landfill disposal. The sewage sludge is used as the primary fuel for the incinerator. Natural gas is used as an auxiliary fuel. The emissions from the incinerator are controlled with a wet scrubber.

The MHF uses recycled shaft cooling air to reduce auxiliary fuel consumption. Air for combustion is admitted through atmospheric ports located in Hearth No. 3 and No. 5. The position of the atmospheric port dampers is controlled with manual loading stations located in the control room. The auxiliary fuel system is natural gas fired and burners are located on each of Hearth Nos. 3, 4, 6, and 7.

The afterburner is used as control for VOC emissions with a natural gas burner to maintain a temperature of approximately 1,600°F. The air pollution control system consists of an adjustable throat venturi scrubber followed by a water after-cooler. The scrubber flue gas exit temperature is nominally 100°F. The position of the venturi adjustable throat is controlled with a manual loading station located in the control room.

Summary of Results

Testing was conducted at the sewage sludge incinerator operated at the Hopewell, Virginia regional WWT facility. Continuous monitoring of THC, CO, CO_2, and O_2 was conducted at two sampling locations from December 5 through December 7, 1995.

The average stack gas velocity was 52.3 feet per second (fps) during the sampling program. Volumetric flow rates averaged 22,200 actual cubic feet per minute (acfm) or 16,100 dry standard cubic feet per minute (dscfm). Stack gas temperature averaged 170°F, with a moisture content of 4.3 percent. Composition of the stack gas averaged 4.7 percent carbon dioxide (CO_2) and 15.1 percent oxygen (O_2). Stack gas conditions were consistent throughout the sampling program. These averages may not be representative of normal operating conditions at this sewage sludge incinerator. The primary object of the tests at Hopewell was to gather data relating the concentrations of CO and THC at the inlet to the afterburner to their concentrations at the outlet at various afterburner temperatures. The operators were very responsive to requests of the test team to change operating conditions so that we could gather data at a variety of conditions. These changes precluded normal operations a large percentage of the time during the tests.

Table 5.10 summarizes the concentrations of THC, CO, CO_2 and O_2 measured at the furnace outlet location over the course of the sampling program. Each run corresponds to a period of continuous sampling (one to ten hours in duration) conducted between December 4 and 7, 1995. Each reported value represents the average concentration measured during the monitoring period. Table 5.11 reports equivalent data for measurements at the afterburner outlet location.

Table 5.12 presents the percentage of total solids (as measured by EPA Method 160.3) and the gross calorific value of the sewage sludge as delivered to the sewage sludge incinerator (as determined by ASTM D-240). The sample analyzed was provided by plant operating personnel. The sample was composited over the entire test period.

WATER ENVIRONMENT RESEARCH FOUNDATION REPORT

The Water Environment Research Foundation (WERF) commissioned a study of the emissions of organic compounds from sewage sludge incinerators to increase understanding of those emissions. Richard Kuchenrither, Eugene W. Waltz, Phil Martin, and Albert J. Verdouw were the Principal Investigators of the study. Their report (Project 91-ISP-1), Evaluate and Quantify Sludge Incinerator Hydrocarbon Emissions was published by the WERF in 1993. That study is called the WERF Report in this document.

TABLE 5.10

THC, CO, CO_2, AND O_2 CONCENTRATIONS - FURNACE OUTLET
Hopewell, Virginia RWWTF, December 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	12/5	9.6	130	1,818	7.6	12.0
I-2	12/5	11.2	476	3,006	13.4	4.6
I-3	12/5	11.5	262	1,775	10.4	8.1
I-4	12/6	10.0	48	2,031	9.0	10.0
I-5	12/6	11.2	317	4,066	7.1	11.5
I-6	12/6	11.5	310	372	4.6	14.7
I-7	12/6	13.9	174	3,178	10.4	7.9
I-8	12/7	12.2	109	2,865	7.5	11.1

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

The investigators did a thorough review of the literature and private sources and identified 96 separate tests of sewage sludge incinerators that had been performed for various purposes. These various tests had reported 326 different organic compounds in the exit gas from sewage sludge incinerators. The data that the investigators accumulated were not reported, and were not available for this investigation.

WERF commissioned the investigators to make measurements of total hydrocarbons, carbon monoxide, oxygen, and other pertinent exit gas parameters at 3 sewage sludge incinerators. The purpose of these tests was to provide information about several relationships found during previous tests among THC, emissions of toxic compounds and sewage sludge incinerator operations. The data that were collected were appended to the report and were analyzed by the investigators during this effort. Each test was approximately 11 hours in duration. The locations of the sites tested were not revealed in the report. The facility descriptions for each site given in the following paragraphs have been taken directly from the WERF Report.

TABLE 5.11

THC, CO, CO_2, AND O_2 CONCENTRATIONS - AFTERBURNER OUTLET
Hopewell, Virginia RWWTF, December 1995

Run No.	Date	Sludge Feed Rate	Total Hydro-carbons	Carbon Monoxide	Carbon Dioxide	Oxygen
		ton/hr	ppm[1]	ppm[1]	percent[1]	percent[1]
I-1	12/5	9.6	26	1,327	7.3	12.1
I-2	12/5	11.2	22	1,489	12.6	5.4
I-3	12/5	11.5	21	1,043	9.6	8.8
I-4	12/6	10.0	7	297	5.7	13.8
I-5	12/6	11.2	123	2,450	7.0	11.7
I-6	12/6	11.5	21	1,620	5.2	13.9
I-7	12/6	13.9	36	1,826	9.3	9.4
I-8	12/7	12.2	32	1,606	6.6	11.9

[1]Concentration are on a dry basis; THC concentrations based on propane calibration standards.

TABLE 5.12

SEWAGE SLUDGE PARAMETERS
Hopewell, Virginia RWWTF, December 1995

Date	Total Suspended Solids (%)	Gross Calorific Value (BTU/lb)
12/4/95 -12/7/95	33.4	4000

WERF Site 1

"Site 1 represents a common MH furnace configuration with no afterburning chamber and a high energy venturi/impingement tray scrubber system. The plant provides primary and secondary wastewater treatment for a residential, commercial and light industrial service district. The furnace system is relatively new and processes digested sludge cake." The furnace operating parameters are summarized in Table 5.13.

TABLE 5.13

OPERATING CONDITIONS AT SITE 1

Operating Variable	Run #1	Run #2	Run #3	Run #4
Sludge Feed Rate (dry tons/hour)	1.2	1.2	1.2	1.2
Sludge Cake Solids (%)	19.4	23.0	22.2	21.1
Sludge Cake Volatiles	48.6	48.3	48.7	48.8
Fuel Use (1,000 ft^3/dry ton)	8.8	8.8	6.1	6.1
Average Top Hearth or Afterburner Temp. (°F)	1,078	1,076	913	917
Furnace Exhaust Oxygen (% wet)	9.3	9.3	10.7	10.5
Stack Gas Oxygen (% dry)	8.1	7.7	10.0	10.0
Venturi + Scrubber Differential (inches of water)	26.8	26.9	26.8	26.9

The percentage oxygen data appear anomalous. It is usual for the percentage of oxygen in the stack gas, on a dry basis, to be higher than the wet basis percentage oxygen in the furnace exhaust. Removing water vapor from the furnace exhaust gases would increase the percentage of oxygen in the remaining gas. Leaks in duct systems and the addition of shaft cooling air also tend to increase the percentage of oxygen in the stack gases over that measured in the furnace exhaust.

WERF Site 2

"Site 2 has a large furnace equipped with a detached afterburning chamber followed by a waste heat boiler and a high energy venturi/impingement tray scrubber. The afterburner chamber is internally 9 feet in diameter and about 18.5 feet long with an approximate volume of 1,172 cubic feet. The furnace was originally constructed in 1968 and upgraded in 1983 to add the afterburner chamber, venturi/impingement tray scrubber, and an automated operating control system The plant service district is residential, commercial and industrial." The furnace operating parameters are summarized in Table 5.14.

TABLE 5.14

OPERATING CONDITIONS AT SITE 2

Operating Variable	Run #1	Run #2	Run #3	Run #4
Sludge Feed Rate (dry tons/hour)	1.8	1.9	1.9	2.0
Sludge Cake Solids (%)	23.1	22.5	23.8	24.6
Sludge Cake Volatiles	70.5	71.0	71.0	71.5
Fuel Use (1,000 ft^3/dry ton)	6.5	5.8	2.7	0.75
Average Top Hearth or Afterburner Temp. (°F)	1,275	1,103	1,009	832
Furnace Exhaust Oxygen (% wet)	9.9	10.1	10.7	11.7
Stack Gas Oxygen (% dry)	7.5	8.0	8.2	8.5
Venturi + Scrubber Differential (inches of water)	38.1	37.6	37.4	37.6

The percentage oxygen data appear anomalous. It is unusual for the percentage of oxygen in the stack gas, on a dry basis to be lower than the wet basis percentage oxygen in the furnace exhaust. Removing water vapor from the furnace exhaust gases would increase the percentage of oxygen in the remaining gas. Leaks in duct systems and the addition of shaft cooling air also tend to increase the percentage of oxygen in the stack gases over that measured in the furnace exhaust.

WERF Site 3

"Site 3 was designed and built as a 10 hearth furnace with a large additional "zero" hearth as the afterburner chamber. The zero hearth chamber has an internal height of 12 feet with an approximate volume of 3,725 cubic feet which is over three times the size of the chamber volume of Site 2. The exhaust gas is routed through the outer drop holes opposite the exhaust breeching and back across the hearth. The outer drop holes on the exhaust breeching side of the top hearth are closed. The sludge cake is fed into the furnace through the side of the "second" hearth. The waste heat boiler system is preceded by dry cyclones for large particulate removal. The wet scrubber system includes a low energy, fixed venturi section followed by a series of vertically mounted impingement trays with high pressure water sprays." The furnace operating parameters are summarized in Table 5.15.

The percentage oxygen data at Site 3 are more typical of sewage sludge incinerators. The concentration in the stack gas is considerably higher than the percentage of oxygen in the furnace exhaust. Addition of dilution air to, and removal of water vapor from, the furnace exhaust gas should increase the percentage of oxygen.

TABLE 5.15

OPERATING CONDITIONS AT SITE 3

Operating Variable	Run #1	Run #2	Run #3	Run #4
Sludge Feed Rate (dry tons/hour)	1.6	1.6	1.6	1.5
Sludge Cake Solids (%)	21.7	21.0	22.5	23.4
Sludge Cake Volatiles	72.3	73.7	70.7	69.0
Fuel Use (1,000 ft^3/dry ton)	10.7	6.5	3.5	0.3
Average Top Hearth or Afterburner Temp. (°F)	1,310	1,089	981	650
Furnace Exhaust Oxygen (% wet)	5.9	5.1	6.9	9.3
Stack Gas Oxygen (% dry)	17.4	15.9	16.3	15.3
Venturi + Scrubber Differential (inches of water)	11.2	11.5	10.5	10.8

The WERF Report states that "Each site was tested under routine operating conditions in the "as found" operating mode." The only sewage sludge incinerator operational difficulty noted during the tests was uneven sewage sludge cake distribution on the top hearth and in the burning zone of the sewage sludge incinerator at Site 1. The authors of the WERF Report observed that the uneven cake distribution "resulted in a very uneven burning pattern in the combustion zone which would increase THC emission levels."

Table 5.16 describes the physical characteristics of each of the sewage sludge incinerators. The table was extracted from the WERF Report.

MEMBERS OF THE ASSOCIATION OF MUNICIPAL SEWERAGE AUTHORITIES

Two members of the Association of Municipal Sewerage Authorities (AMSA), the Northeast Ohio Regional Sewer District (Cleveland), and the Metropolitan Council

(St Paul, Minnesota) supplied data for the statistical analysis of long-term trends in THC concentrations in the exit gas from sewage sludge incinerators.

TABLE 5.16

TEST SITE FACILITY DESCRIPTIONS

Parameter	Site 1	Site 2	Site 3
Furnace Size	6-Hearth	11-Hearth	10+'0 'Hearth
Afterburner Configuration	None	Detached	'0' Hearth
Scrubber Equipment	High energy Venturi + impingement tray	High energy Venturi + impingement tray	Dry cyclone + low energy fixed Venturi + high pressure water impingement tray
De-watering Equipment	Centrifuge	Belt Press	Centrifuge
Sludge Conditioning	Polymer	Polymer	Polymer
Sludge Type	Primary + secondary/digested	Primary + secondary	Primary + secondary
Auxiliary Fuel	Natural gas	Natural gas	Natural gas
Operational Handicaps	Uneven cake distribution in top hearths and burn zone	None	None

The Northeast Ohio Regional Sewer District supplied one year of temperature/THC data for each of 4 multiple hearth sewage (MHF) sludge incinerators and for one fluidized bed incinerator that burns only oil and grease. The Metropolitan Council supplied one year of similar data for each of 6 MHF sewage sludge incinerators.

Some, but not all of the data that were available from other test reports were included with the Cleveland and St. Paul data. The data that were supplied for the St.

Paul sewage sludge incinerators are presented in Table 5.17. These data are presented for comparative purposes. The primary purpose of obtaining the long-term data was to evaluate the feasibility of using a statistical approach to analysis of long-term THC data. The data supplied for the Cleveland sewage sludge incinerators contained only THC concentrations, oxygen concentrations, and final combustion stage temperature. Cleveland supplied no sludge feed rate or sludge properties data. The data not supplied was not requested because they were not needed to accomplish the primary use of the Cleveland and St. Paul data. The primary reason for requesting the long-term data was to develop the log-normal distributions of THC concentrations and to evaluate the potential for using relatively short test periods (nominally one-month) to predict the maximum value of the monthly THC concentration in the exit gas from the sewage sludge incinerators. The results of the statistical analysis are discussed in Section 6 of this report.

TABLE 5.17

SUMMARY OF OPERATING CONDITIONS AT TWO (OF 6) ST. PAUL, MINNESOTA SEWAGE SLUDGE INCINERATORS

Operating Variable	Incinerator # 5	Incinerator # 9
Sludge Feed Rate (dry tons/hour)	2.5	2.3
Sludge Cake Solids (%)	30.9	31.5
Sludge Cake Volatiles	76.3	75.5
Fuel Use (1,000 ft^3/dry ton)	Data Not Supplied	
Average Top Hearth or Afterburner Temp. (°F)	1262	1259
Furnace Exhaust Oxygen (% wet)	Data Not Supplied	
Stack Gas Oxygen (% dry)	12.1	13.1
Venturi + Scrubber Differential (inches of water)	Data Not Supplied	

AMSA also supplied a copy of the summary report of the sampling and analysis for dioxins and furans that AMSA submitted to EPA early in 1995. The dioxin/furan data that were contained in the report were included in Section 6 (Observed Emissions of Chlorinated Dibenzo-Dioxins and Dibenzo-Furans) of this report. The authors of this report did not review the data in the report or assess the quality or accuracy of those data. The data are included with the dioxin/furan data collected during this effort for purposes of comparison.

THE ASSOCIATION OF ENVIRONMENTAL AUTHORITIES (NEW JERSEY WWTP OPERATORS)

The Association of Environmental Authorities (a consortium of New Jersey Wastewater Treatment Plant Operators) commissioned sampling and analysis at two sewage sludge incinerators in New Jersey. One of these tests was at the fluid bed sewage sludge incinerator at the Gloucester County Wastewater Treatment Plant. The second test was at the MHF at the Stony Brook Regional Sewerage Authority Plant. The authors of this report reviewed the test plan that the consultants to the Association of Environmental Authorities prepared prior to the beginning of testing, and visited the Stony Brook Facility during the testing. The test designs were similar to those developed for the tests done during this program. The Association of Environmental Authorities did not supply the test data in electronic format. The quantity of the data precluded manual manipulation, so those data could not be analyzed during this investigation.

HAMPTON ROADS SANITARY DISTRICT

Mr. Andy Nelson, Plant Manager, Hampton Roads Sanitation District (HRSD), provided data that were collected during a baseline study of emissions at the Hampton Roads Sanitary District plant in Willliamsburg, Virginia. HRSD performed similar sampling at three other sewage sludge incinerators during the spring of 1993, as part of an evaluation of their existing operations and to provide information needed to plan improvements in the combustion efficiency of their sewage sludge incinerators.

The data consisted of one-minute average values of total hydrocarbons, oxygen, carbon dioxide, and carbon monoxide. The data did not include the temperature of the final combustion zone, so the data could not be used to evaluate the kinetic model. The data did include simultaneous measurements of both CO and THC so they were useful in development of the statistical THC/CO model. The tests were designed to evaluate baseline operating conditions at the sewage sludge incinerator, so no adjustments were made to the routine operating conditions prior to the beginning of sampling. HRSD did not provide operating data, e.g., sewage sludge feed rates, percentage moisture, and percentage volatile solids.

DEECO Inc. performed the testing. Their evaluation of the results includes the assessment:

> "Average hydrocarbon levels for baseline conditions are typically under the 100 ppm level after correction to seven percent oxygen. However,

there are several spikes in hydrocarbons which greatly exceed 100 ppm with and without correction to seven percent oxygen. Further, overnight operating conditions were often in excess of the 100 ppm limit before and after oxygen correction."

PREVIOUS (1991) EPA STUDY

In February 1989, the U.S. Environmental Protection Agency (EPA) drafted sewage sludge regulations under section 503d of the Clean Water Act, proposing to require continuous emission monitoring of total hydrocarbons (THC), The Risk Reduction Engineering Laboratory (REEL) contracted Pacific Environmental Services Inc. (PES) to evaluate the ability of continuous analyzers to operate reliably in the sewage sludge incinerator exhaust stack environment for extended periods of time. PES selected two sewage sludge incinerators for the evaluation. PES installed CO, O_2, and THC monitors in the exhaust stacks of two multiple hearth furnace (MHF) sewage sludge incinerators. MHF were selected because they are, by far the most common type of sewage sludge incinerator, because EPA believed that they presented the most severe test of reliability to continuous monitors, and because EPA believed that MHFs typically have higher concentrations of both CO and THC. The two sewage sludge incinerators selected for sampling during this project were located in Lorton, Virginia and Arlington, Virginia.

Pace Environmental Products, of Horsham, Pennsylvania provided the THC analyzers. Both analyzers were manufactured by J.U.M. Engineering Ges. m.b.H. Both were heated flame ionization detectors. The Milton Roy Corp. of Orange, California provided the Fuji Electric CO analyzers. Both were nondispersive infrared analyzers. PES rented Servomex paramagnetic analyzers for the project.

The samples to be analyzed for O_2 and CO were filtered at the stack, transported through heated Teflon® sample line to the refrigeration condenser. Unfiltered sample gas was delivered to the THC analyzers through heated Teflon® sample lines.

Arlington, Virginia

Data collection began at Arlington, Virginia on June 8, 1991 and was completed on September 9, 1991. The Arlington facility processed approximately 30 million gallons per day of wastewater; 98 percent of the wastewater was from domestic sources from a population of approximately 150,000 persons. The plant provided primary and secondary (activated sludge) treatment. The primary and secondary sewage sludges were combined, treated with lime and ferric chloride and de-watered by recessed plate filter presses. The moisture content of the sewage sludge fired in the sewage sludge incinerator was reduced to 70 to 75 percent.

The two sewage sludge incinerators were 22' 3", Nichols eight-hearth MHFs. Only one furnace operated at a time. The air pollution control system consisted of an adjustable throat venturi scrubber followed by a two plate, impingement tray scrubber. The exit gas temperature from the impingement tray scrubber is nominally 100°F. The sludge feed to the incinerator was erratic during these tests because of variability in the operation of the sewage sludge feed system. There was no means to meter the rate of sewage sludge feed other than the speed of the conveyor belt that delivered the sewage sludge to the sewage sludge incinerators.

No changes in the normal operations of the sewage sludge incinerators were made for the purposes of this study of the reliability of the THC analyzers. Because this was a study of the reliability of instrumentation and not a study of the parameters that affect the concentrations of THC and CO in the exit gas from sewage sludge incinerators, the rates of sewage sludge feed, the temperatures of the various hearths, the percentage moisture in the sewage sludge, the percentage of volatile solids, and the heating value of the sewage sludge were not recorded. The test team did record the concentrations of oxygen, CO, and THC, as well as the temperature of the final combustion stage of the sewage sludge incinerators.

Valid THC data are available for 1,579 of the 1,681 hours that the sewage sludge incinerators operated during the three-month period. This is enough data collected over a long enough period of time that the data can be considered representative of the long-term operation of the sewage sludge incinerators.

Lorton, Virginia

The wastewater treatment plant a Lorton, Virginia treated approximately 40 million gallons per day of primarily domestic wastewater from a population of approximately 400,000 persons. The plant provided primary and secondary (activated sludge) treatment. The plant also provided tertiary treatment consisting of ferric chloride addition for phosphorus removal, chlorination and dechlorination and dual- and mono-media filtration. Sewage sludge de-watering was accomplished by a combination of vacuum filters, belt presses and membrane filter presses.

The wastewater treatment plant at Lorton has two identical MHFs. The two sewage sludge incinerators were 22' 3", Nichols eight-hearth MHFs. Only one furnace operated at a time. The sewage sludge incinerators are equipped with detached, secondary combustion chambers that were designed to attain a 0.5 second retention time. Additional air pollution control equipment consists of a variable throat venturi scrubber and a two-plate impingement tray scrubber.

No changes in the normal operations of the sewage sludge incinerators were made for the purposes of this study of the reliability of the THC analyzers except for a two-week period during August when an optimization study of furnace operating conditions was performed. Because this was a study of the reliability of instrumentation and not a study of the parameters that affect the concentrations of THC and CO in the exit gas from sewage sludge incinerators, the rates of sewage sludge feed, the temperatures of the various hearths, the percentage moisture in the sewage sludge, the percentage of volatile solids, and the heating value of the sewage sludge were not recorded. The test team did record the concentrations of oxygen, CO, and THC, as well as the temperature of the final combustion stage of the sewage sludge incinerators.

Valid THC data are available for 1,355 of the 1,508 hours that the sewage sludge incinerators operated during the three-month period. This is enough data collected over a long enough period of time that the data can be considered representative of the long-term operation of the sewage sludge incinerators.

VANCOUVER, WASHINGTON TESTS

The data for the Vancouver, Washington tests were collected during July 1993. These data were the subject of a paper presented to the 67th Annual Conference & Exposition of the Water Environment Federation (*Measure Twice, Cut Once: A Case History on Upgrading an Operating, 20 Year Old, Multiple Hearth Furnace for the 503s.* F.M. Lewis, O. Boe, and T. Boyer; #AC945402). The authors of the paper provided the complete data set for the purposes of this project.

The Vancouver, Washington plant provides primary and secondary (activated sludge) treatment to wastewater that is generated by a population of approximately 84,000 persons. The sewage sludge produced by the plant is primarily from the domestic wastewater and the residuals from the activated sludge process, though the plant does receive approximately 3 million gallons per year of septage.

The sewage sludge incinerator is an 18'3", seven-hearth, Skinner MHF that was originally manufactured by The Mine and Smelter Company. The original design was for 10,500 wet pounds of sewage sludge per hour with a maximum of 7,900 pounds per hour of water. Higher capacity burners were added in 1986 to increase the capacity to 13,000 pounds per hour of wet sewage sludge with a moisture content of 75%. Sewage sludge feed rates during the 6 tests was from 9,000 to 11,000 wet pounds per hour. The percentage moisture in the sludge during the tests was from 21% to 23%. The percentage of volatile solids was not reported. The air pollution control equipment consists of a venturi scrubber system having a pressure drop of 30" w.c.

The purpose of the tests was to evaluate the parameters that affect the concentrations of CO and THC in the exit gas from the furnace. The duration of each test was approximately 4 hours. The duration of the test program was approximately one week. The duration of the test program, its intended purpose (a parametric study) and the duration of the individual tests all make the results applicable to a short time period. The data were useful for the purpose of evaluating the kinetic model, but do not provide information about long-term emissions from sewage sludge incinerators.

SECTION 6

DISCUSSION OF RESULTS

OBSERVED TOTAL HYDROCARBON CONCENTRATIONS

Section 4 described the intended theoretical approach to analysis of the THC data that were gathered during this effort. The kinetic theory of first order reactions was discussed and the implications for sewage sludge incinerators were described. This section presents the results of the analysis of the gathered data. The objective of this investigation is to find a relationship between the temperature of the final combustion zone and the concentration of THC in the exit gas that will enable the substitution of temperature monitoring for THC monitoring. The first order kinetic equation is the most likely of any conceivable analytical relationship to produce a reliable link between final combustion zone temperature and exit gas THC concentration. Temperature monitoring cannot be a reliable surrogate for THC monitoring unless there is a known relationship between the two parameters. The relationship would be most satisfying if it were analytical, i.e., based on known kinetic theory. Later sections consider the development of empirical (i.e., statistical relationships).

Kinetic Rate Calculations

In Section 4, we described the kinetic theory of first order reaction kinetics, discussed its applicability to sewage sludge incinerators, and described how we could back-calculate the concentration of THC (or CO) from the final combustion zone temperature. Equation 4.1:

$$C_o = C_i exp(-kt) \qquad \text{(Eq. 4.1)}$$

describes the relationship between the concentration of THC at the outlet of the final combustion zone and the concentration of THC at the inlet to the final combustion zone. If measurements of both the inlet and outlet concentrations are made then the value of the parameter k can be calculated directly from equation 4.2:

$$-k = [ln(\frac{C_o}{C_i})]/t \qquad \text{(Eq.4.2)}$$

To make this calculation, we must know the retention time of the gases in the final combustion zone. The volume of the final combustion zone is fixed so the retention time of the gases in the final combustion zone depends on the flow rate of air, its moisture content and the temperature in the final combustion zone. Over periods of many hours or days, the values of these parameters vary widely. Over short periods of time (e.g., 4 hours) these parameters remain constant enough to allow computation of *k*. The value of *k* calculated at any given temperature is unique to the compound being studied. In Section 4, we speculated that the composition of the gases entering the final combustion zone of a sewage sludge incinerator is surely consistent at a given sewage sludge incinerators over relatively short periods of time, and is probably consistent in time for a given sewage sludge incinerator. We also speculated that the composition of these gases is probably consistent among different sewage sludge incinerators.

The temperature of the final combustion zone not only affects the value of the retention time, *t*, it affects the value of the parameter *k*. Equation 4.3 describes the dependence of the reaction rate constant *k* on the temperature at which the reaction occurs.

$$k = B * exp(-a/T) \qquad \text{(Eq 4.3)}$$

The values of the first order reaction rate parameters *B* and *a* are fixed for every chemical compound in a given reaction. The values of *a* can be found by plotting the natural logarithm of *k* against the reciprocal of temperature. The slope of this line is equal to *a*, its intercept is equal to the natural logarithm of *B*. By combining Equations 4.1 and 4.3 we obtained:

$$\left(\frac{C_o}{C_t}\right) = exp(-Bt * exp(-a/T)) \qquad \text{(Eq. 4.5)}$$

Section 4 also describes means to calculate the values of *B* and *a* using measurements of only the exit gas concentration of THC. Equations 4.7, and 4.9:

$$A = Bt \qquad \text{(Eq. 4.7)}$$

$$ln(\frac{C_o}{C_i}) = -A * exp(-a/T) \qquad (Eq. 4.9)$$

combine to become Equation 4.5.

Therefore, we should be able to calculate the values for all parameters of the first order reaction rate equation for combustion of the THC in the exit gas from sewage sludge incinerators by either method if we have values for the gas flow rate, the temperature in the final combustion zone, the volume of the final combustion zone and the inlet and outlet THC concentrations. Most of the data that are available provide only part of these data. For most plants, we have only the exit gas THC concentration, and the temperature of the final combustion zone. The data collected during this project include the gas flow rates at all four sites, the volume of the final combustion zone at two sites, and the concentration of THC at the inlet to the final combustion zone at one site.

The following example has been derived to demonstrate the importance of knowing that the concentration of THC at the inlet to the final combustion zone remains constant. Values of the reaction rate constant, *k*, have been calculated by Equation 4.3 using values of *a* and *B* that are similar to those calculated for the Hopewell, Virginia tests. The concentration of THC at the inlet to the final combustion zone at Hopewell were measured so that the values of these parameters could be estimated. A retention time of 1.5 seconds was selected to be representative of afterburners. A series of inlet concentrations was assumed, and then the concentration of THC in the outlet of the final combustion zone was calculated by Equation 4.1. The results of these calculations are shown in Table 6.1, below. Note that the fraction of THC remaining in the exit gas of the final combustion zone at any given temperature is the same for all inlet THC concentrations. Once the values of the parameters that define the reaction rate constant, *k*, are determined, the fractional reduction in THC concentration in the final combustion zone becomes a constant for any given temperature.

Table 6.1 contains exit gas THC concentrations that are calculated by the first order reaction rate equation using the values of the first order rate equation parameters that are specified. We now can use these calculated exit gas THC concentrations in the modified first order kinetic rate equation, Equation 4.9, to calculate the values of the parameters C_o, a and A. Figure 6.1 displays the plots of $\ln(\ln(THC_o))$ vs the reciprocal of temperature (1/T), from which the value of the parameter a, is derived for the assumed inlet THC concentrations.

TABLE 6.1

CALCULATION OF C_O FROM C_I AND PARAMETERS OF THE KINETIC RATE MODEL

Assume: B = 42 sec^{-1}, a = 4916 °R, t = 1.5 sec

Inlet THC Concentration C_i (ppm)	Temperature (°R)	Reaction Rate Constant ($k = B$*exp(-a/T))	Outlet THC Concentration (ppm) ($C_o = C_i$*exp(-kt))	Ratio (C_o/C_i)
350	1,300	1.0	83.3	23.8%
350	1,400	1.3	53.4	15.3%
350	1,500	1.6	32.5	9.3%
350	1,600	1.9	18.9	5.4%
350	1,700	2.3	10.6	3.0%
750	1,300	1.0	178.5	23.8%
750	1,400	1.3	114.3	15.2%
750	1,500	1.6	69.6	9.3%
750	1,600	1.9	40.6	5.4%
750	1,700	2.3	22.8	3.0%
1,250	1,300	1.0	297.5	23.8%
1,250	1,400	1.3	190.6	15.2%
1,250	1,500	1.6	116.0	9.3%
1,250	1,600	1.9	67.6	5.4%
1,250	1,700	2.3	37.9	3.0%
2,000	1,300	1.0	475.9	23.8%
2,000	1,400	1.3	304.9	15.2%
2,000	1,500	1.6	185.7	9.3%
2,000	1,600	1.9	108.2	5.4%
2,000	1,700	2.3	60.7	3.0%

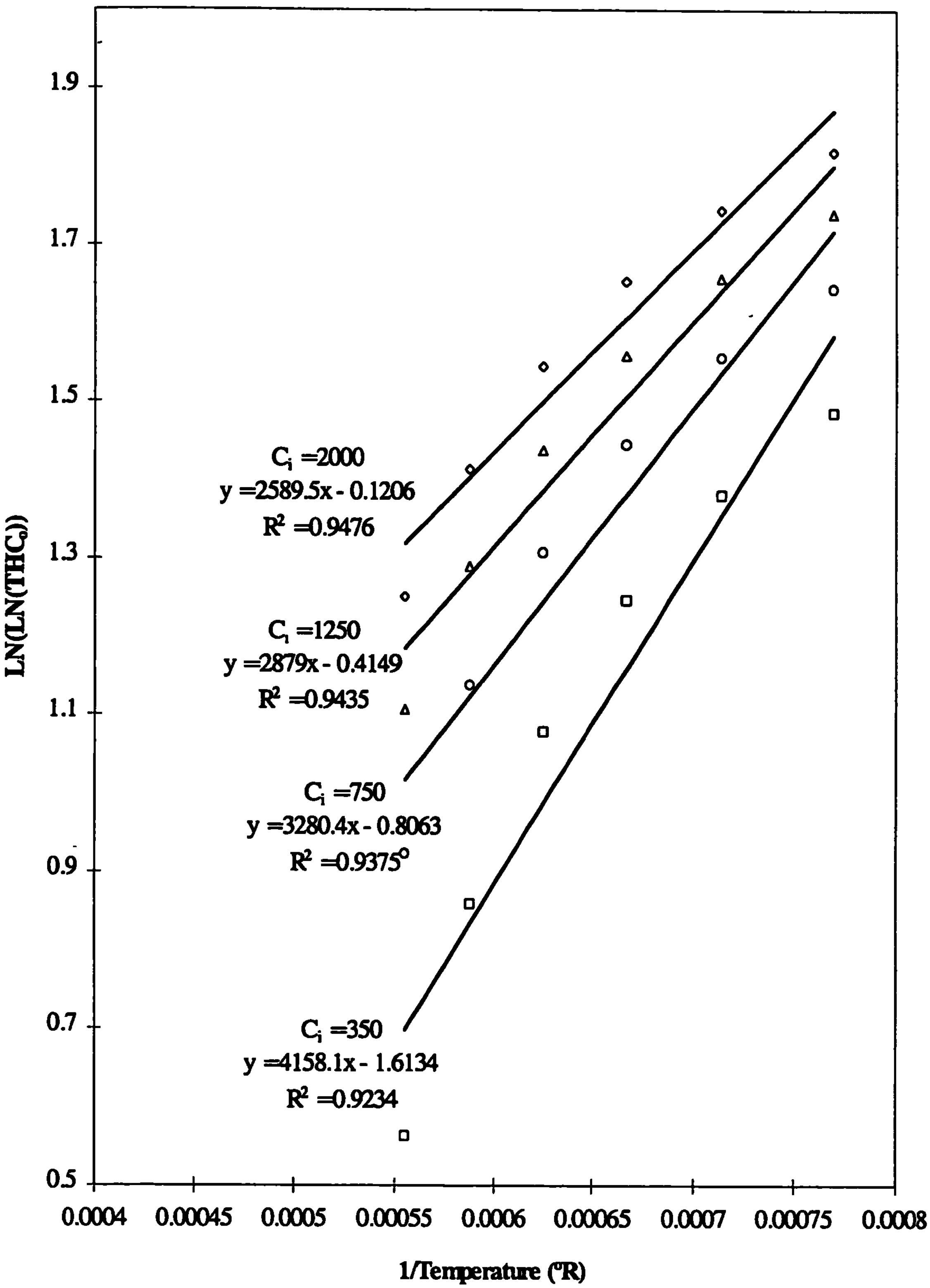

Figure 6.1 Effect of Inlet Concentration on the Values of the Parameter *a* (Use Derived Data)

The slopes of the lines in Figure 6.2 are equal to the negative value of the parameter *A*, the intercepts are equal to the natural logarithm of the parameter *M*. The values of these derived parameters, and the values of the parameter *a*, are displayed in Table 6.2. Note that the value found for each parameter depends upon the value of the THC concentration at the inlet to the final combustion zone. Figures 6.1 and 6.2 display only 4 of the 6 cases for which calculations were made. Note that the values of the parameters *a*, *A*, and C_0 are sensitive to the THC concentration at the inlet to the final combustion zone. The slopes of the lines of best fit in Figure 6.1 are equal to the parameter *a*. Figure 6.2 displays the plot of $\ln(THC_o)$ against $\exp(-a/T)$ from which the values of the parameters *A* and *M* are derived.

Table 6.3 displays the predicted THC exit gas concentrations. Note that the parameters that were developed for the case where the inlet THC concentration was 350 ppm, over-predict the outlet concentrations for cases where the inlet concentration was less than 350 ppm. More serious is the under prediction that results when the inlet THC concentration is greater than the inlet concentration for which the parameters were developed. The predicted outlet concentration for the 1,300°R temperature (86 ppm) is less than the actual exit gas concentration in all cases where the inlet concentration exceeds 350 ppm. If the inlet concentration increases to 500 ppm, the predicted concentration is less than the existing 100 ppm limit whereas the actual exit gas concentration would be greater than 100 ppm. Such occurrences present a regulatory difficulty. A facility that relied on the parameters that were developed at one inlet concentration could be operating in excess of the 100 ppm limit without being aware that they were.

Relationship Between THC Concentration and Final Combustion Temperature

The preceding example demonstrated the constraints on the use of the kinetic model to predict the concentration of THC in the exit gas of an sewage sludge incinerator in the absence of knowledge of the concentration of THC in the gas entering the final combustion zone. It now remains to consider the results when the actual data from sewage sludge incinerators are analyzed. We begin with the data that were collected at Hopewell, Virginia. Table 6.4 contains a representative sample of the THC data that were collected during the testing at Hopewell, Virginia. Only data from December 6, and December 7, 1995 are displayed, but the statistics at the bottom of the page are for the entire data set. The values shown for the first order rate constant, *k*, were calculated by Equation 4.2. The retention times were calculated from flow rate measurements taken in the exhaust stack and the volumes of the final combustion zones. The stack gas flow rates were corrected to the conditions of the afterburner by making temperature, moisture, and oxygen corrections. The values calculated for the constant *k* are relatively consistent, more consistent than either the THC concentration at the inlet or the THC concentration in the exit gas from the afterburner. Note that the THC concentration at the inlet to the final combustion zone varies widely, from a minimum of 36 ppm to a maximum of 1416 ppm. This wide a variation in the inlet THC concentration should lessen the accuracy of the predictions of the exit gas

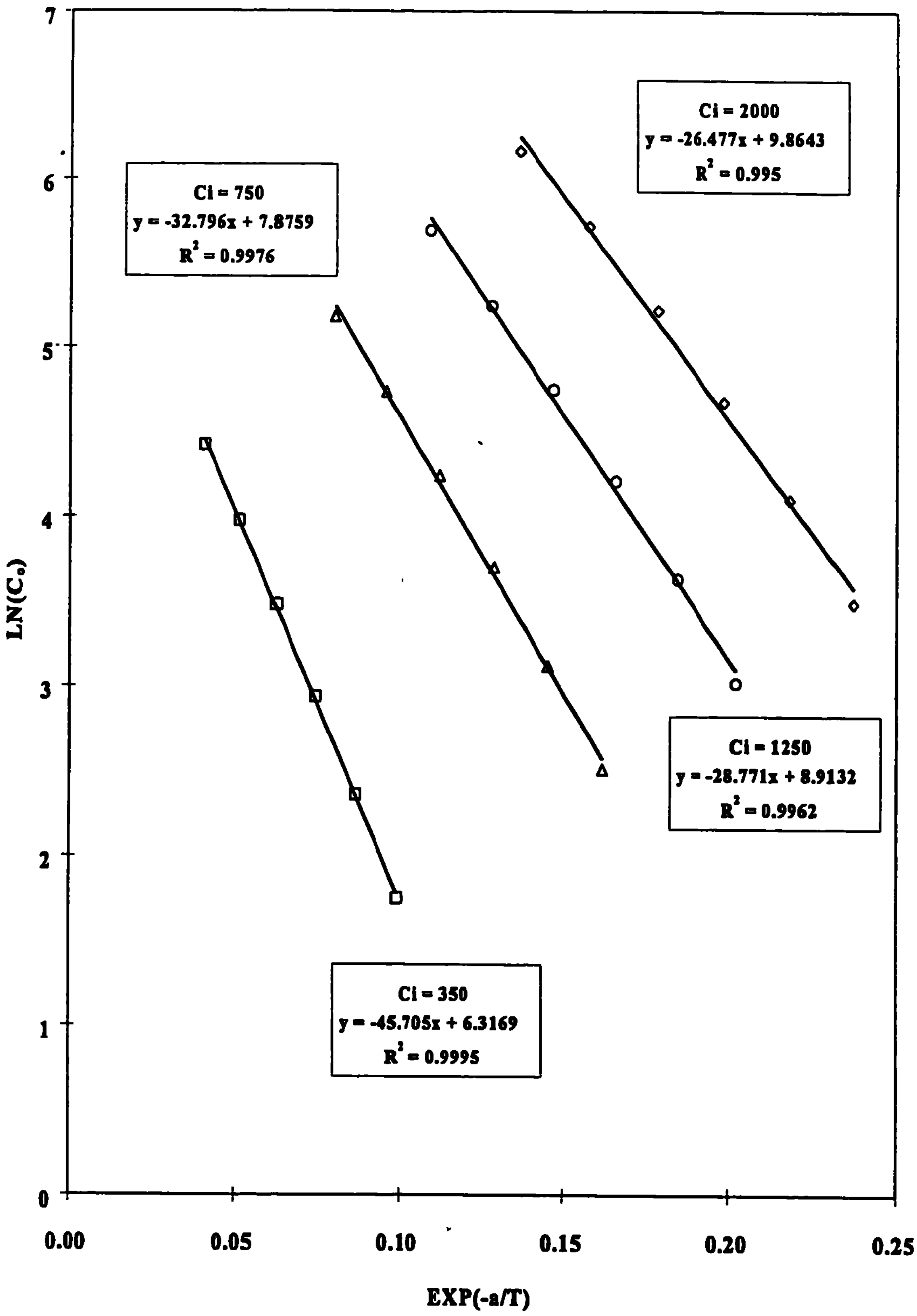

Figure 6.2 Effect of Inlet Concentration on the Values of the Parameters A and C_i

TABLE 6.2

VALUES FOR THE PARAMETERS OF THE MODEL CALCULATED BASED ON VARIOUS ASSUMED VALUES FOR THE THC CONCENTRATION AT THE INLET TO THE FINAL COMBUSTION ZONE

Assumed THC Inlet Concentration	Values of the Parameters for the Kinetic Model Calculated in Figures 6.1 and 6.2		
	a	*A*	C_i
100	7,891	260.3	38.7
350	4,158	45.71	554
500	3,693	38.08	1,151
750	3,280	32.80	2,633
1,250	2,879	28.77	7,429
2,000	2,590	26.48	19,230

concentration of THC. The temporal variation of afterburner inlet THC concentration is displayed graphically in Figure 6.3. The THC data were divided into intervals for analysis. The intervals were selected to group the data according to the THC concentration at the inlet to the SCC. The intervals selected were:

Interval Number	Data Points Included
1	1 - 102
2	103 - 228
3	229 - 331
4	332 - 438
5	All Data

The values of the parameters of the first order rate equation were calculated for the data within each interval. The results of these computations appear in Table 6.5. The values of the parameters vary widely among groups. Figure 6.4 displays the measured exit gas concentrations in the same sequential order as in Figure 6.3. Figure 6.4 also displays the results of prediction of the concentrations at the various times using the values of the parameters calculated using all of the data points. This calculation reveals that the model does a poor job of predicting the relatively high exit

TABLE 6.3

RESULTS OF USING KINETIC PARAMETERS DEVELOPED FOR ONE INLET THC CONCENTRATION TO PREDICT EXIT GAS THC CONCENTRATIONS AT OTHER INLET THC CONCENTRATIONS

Actual THC Concentration in Final Combustion Zone Inlet (ppm)	Temperature of Final Combustion Zone (°R)	Actual THC Concentration in Exit Gas (ppm)	Predicted THC Concentration in Exit Gas (ppm)	Error (ppm)	Error (%)
100	1,300	24	86	62	260
100	1,500	9	32	22	242
100	1,700	3	11	8	248
350	1,300	83	86	2	3
350	1,500	32	32	-1	-2
350	1,700	11	11	0	-1
500	1,300	119	86	-33	-28
500	1,500	46	32	-15	-32
500	1,700	15	11	-5	-28
750	1,300	179	86	-93	-52
750	1,500	70	32	-38	-54
750	1,700	23	11	-12	-54
1,250	1,300	298	86	-212	-71
1,250	1,500	116	32	-84	-73
1,250	1,700	38	11	-27	-72
2,000	1,300	476	86	-390	-82
2,000	1,500	186	32	-154	-83
2,000	1,700	61	11	-50	-83

TABLE 6.4 REPRESENTATIVE RESULTS FROM THE HOPEWELL TESTING

Date	Time	THC (ppm @ 7% O2, Dry) Afterburner Inlet (ppm)	THC (ppm @ 7% O2, Dry) Afterburner Exit Gas (ppm)	Retention Time (sec)	Reaction Rate Constant (k)	Average Afterburner Temperature (oR)
7-Dec-95	5:20	222	54	1.3	1.1	1409
7-Dec-95	5:25	224	47	1.2	1.3	1414
7-Dec-95	5:30	201	39	1.2	1.3	1421
7-Dec-95	5:35	187	32	1.2	1.4	1428
7-Dec-95	5:40	203	30	1.2	1.6	1434
7-Dec-95	5:45	189	33	1.2	1.4	1439
7-Dec-95	5:50	185	28	2.0	0.7	1445
7-Dec-95	5:55	171	24	2.0	0.8	1452
7-Dec-95	6:00	157	20	2.0	0.8	1459
7-Dec-95	6:05	166	19	2.1	0.8	1466
7-Dec-95	6:10	163	18	2.0	1.0	1474
7-Dec-95	6:15	161	18	2.0	0.9	1476
7-Dec-95	6:20	165	19	2.0	0.9	1479
7-Dec-95	6:25	140	18	2.1	1.0	1481
7-Dec-95	6:30	174	20	2.1	1.0	1482
7-Dec-95	6:35	141	20	2.1	1.0	1482
7-Dec-95	6:40	157	20	2.1	1.1	1481
7-Dec-95	6:45	142	20	2.0	1.1	1481
7-Dec-95	6:50	151	19	2.0	1.1	1481
7-Dec-95	6:55	141	20	2.0	1.0	1480
7-Dec-95	7:00	142	19	2.0	1.1	1481
7-Dec-95	7:05	147	24	2.0	1.0	1482
7-Dec-95	7:10	157	23	2.0	1.0	1481
7-Dec-95	7:15	146	27	2.0	1.0	1483
7-Dec-95	7:20	168	37	2.0	1.1	1481
7-Dec-95	7:25	181	40	2.0	1.0	1474
7-Dec-95	7:30	203	57	2.0	1.0	1468
7-Dec-95	7:35	224	64	1.9	1.0	1455
7-Dec-95	7:40	259	93	1.9	1.0	1442
7-Dec-95	7:45	309	112	1.9	0.9	1426
Average		179	34	1.9	1.04	1461
Maximum		309	112	2.1	1.6	1483
Minimum		140	18	1.2	0.7	1409
Rel. Std. Deviation		3876	2271	31.7	19.4	2406
Standard Deviation		39	23	0.3	0.2	24

gas THC concentrations that occurred throughout the test period. This is of most concern for the data points between 350 and 400 (displayed in Figure 6.5). The measured exit gas THC concentrations in the exit gas average 79 ppm and have a maximum of 153 ppm. The predicted exit gas THC concentrations average 41 ppm and have a maxi-mum of 66 ppm. The model under-predicts most of the values. The under-prediction is even more severe around sequence number 250, where the maximum measured exit gas THC concentration is 1,646 ppm. The maximum predicted for this 5-minute average concentration is only 438 ppm. It is true that an under-prediction of 50 percent over a single 5-minute period would have no effect on a compliance determination. However, analysis of the data collected at Hopewell, Virginia demonstrate that the under-prediction was systematic and was caused by the inability of the kinetic model to make accurate predictions when the THC concentration at the inlet to the final combustion zone changed. Because any correlation between temperature and exit gas THC concentration, by definition, is based on a first order kinetic model, such correlations cannot succeed unless the THC concentration at the inlet to the final combustion zone is known, or can be maintained constant in a relatively narrow range. Analysis of the data from other sources confirm these conclusions. Results of analyses, presented in the following paragraphs, demonstrate little correlation between exit gas THC concentration and final combustion zone temperature.

TABLE 6.5

VALUES OF THE PARAMETERS FOR THE FIRST ORDER KINETIC MODEL

Interval	Values of the Kinetic Parameters Calculated for Each Interval		
	a	***A***	C_i
1 - 102	4,801	88.5	685
103 - 228	5,794	124	192
229 - 331	3,830	78.3	15,466
332 - 438	4,794	85.7	1,274
All Data	4,964	129	2,458

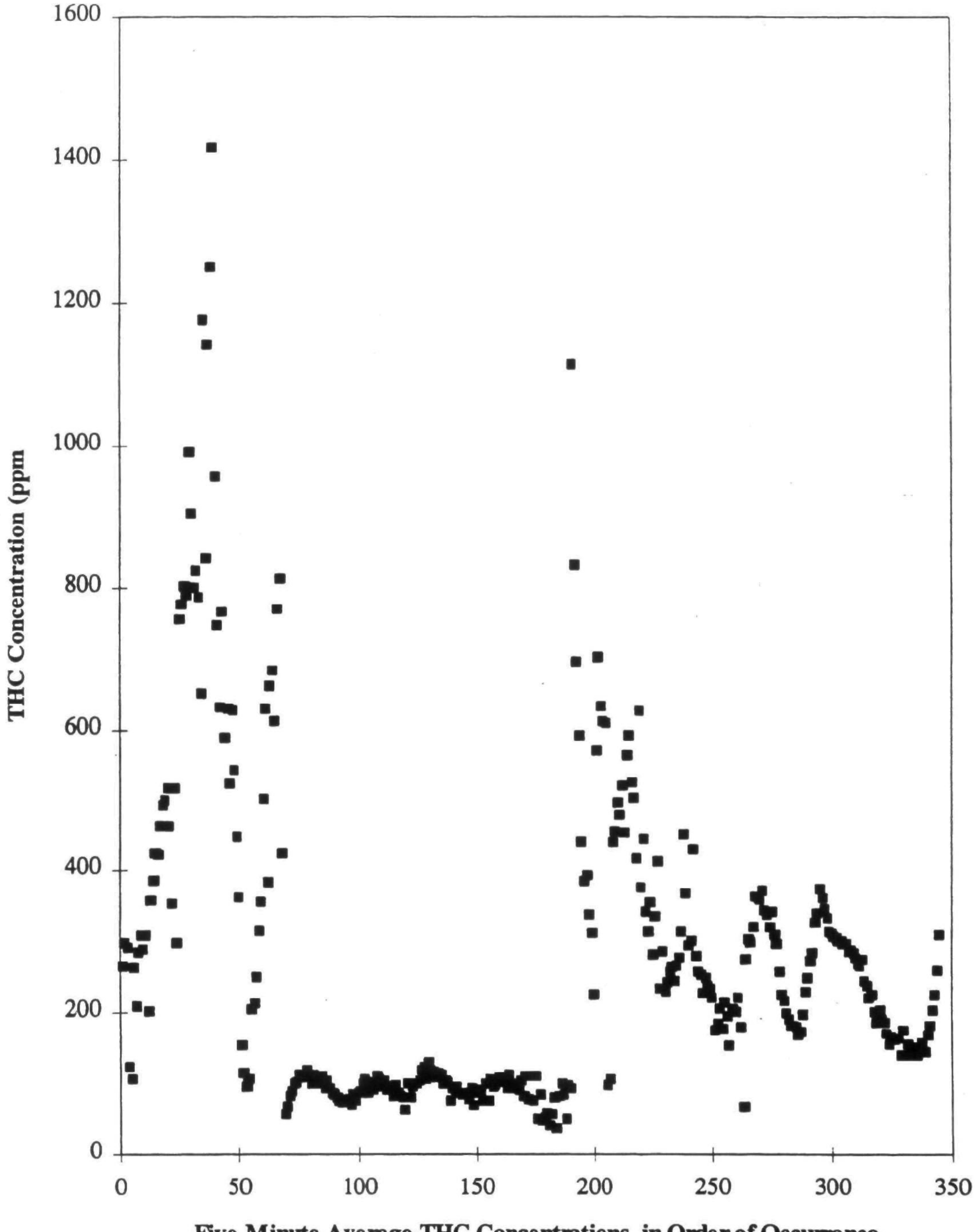

Figure 6.3 Sequence of Inlet THC Concentrations for the Hours of Operation. (Hopewell)

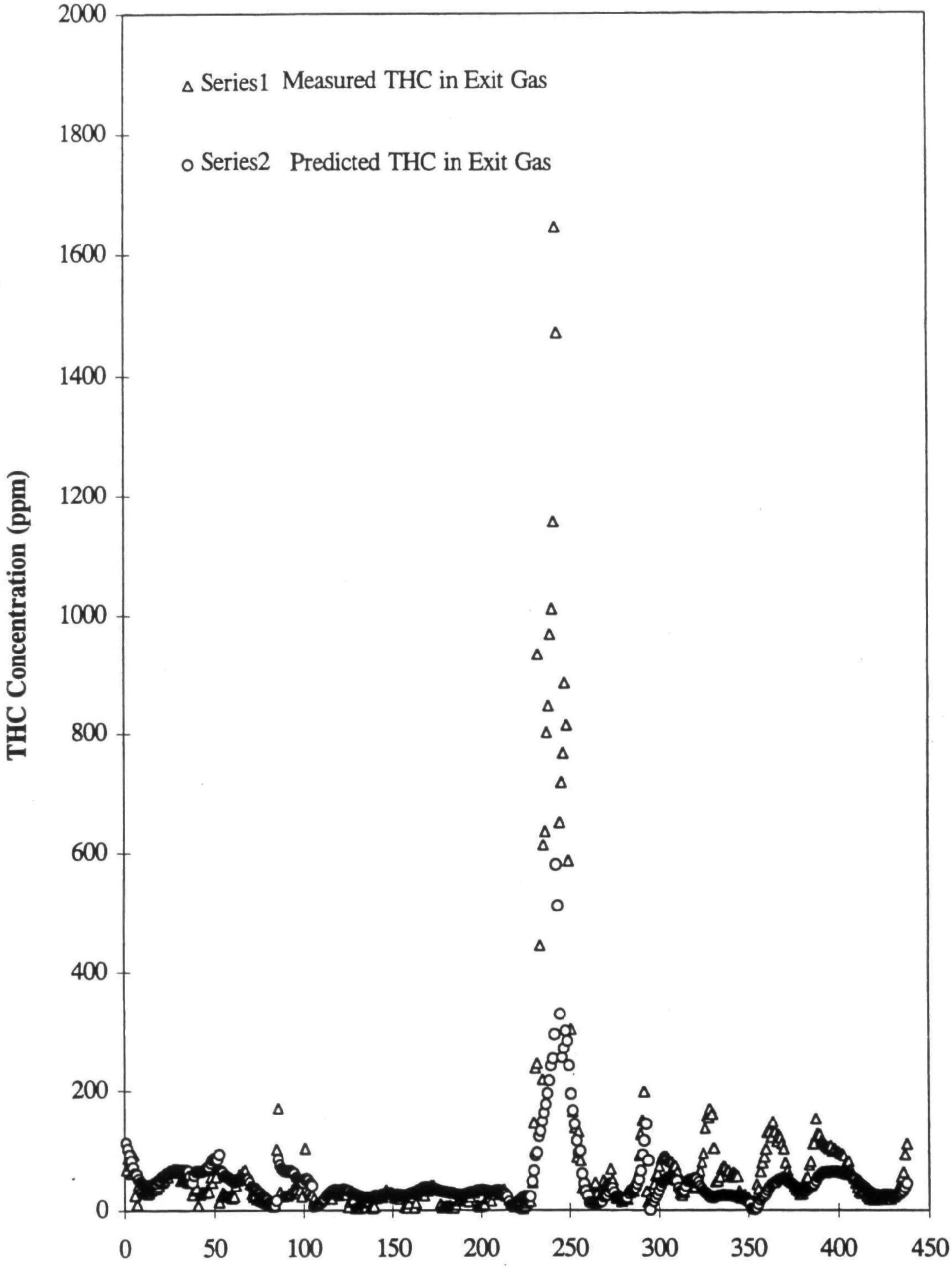

Figure 6.4 Predicted Compared to Measured Exit Gas THC Concentrations. (Hopewell)

The calculation procedures for estimating the values of the parameters for the kinetic model, *k*, *A*, and C_t were performed on all of the plant data available to the authors. The results of these calculations, Table 6.6, demonstrate that there is little consistency among different sewage sludge incinerators. The values of all three parameters vary widely. Further there appears to be little consistency from one time to the next at the same sewage sludge incinerator. Compare the results for the Arlington incinerator from 1991 to those from 1995. The three sets of parameters calculated for the Vancouver sewage sludge incinerators also vary. Those data were collected during testing to evaluate how certain prescribed changes in operating conditions might change the performance of the unit and the THC concentration in the exit gas. The fact that these operating condition changes were made intentionally in no way diminishes the observation that changes in operating conditions alter the relationship between final combustion zone temperature and the THC concentration in the exit gas. We saw in Table 6.5 (the Hopewell, Virginia results) that changes to operating conditions that occur naturally and inadvertently during the course of normal operations change the relationship between temperature in the final combustion zone and the THC concentration in the exit gas. We now observe that the changes in this relationship that occur when operating parameters are purposefully altered are no more dramatic than the changes that occur inadvertently over a period of a few days.

These operating condition changes can consist of the percent moisture in the sewage sludge being fed to the sewage sludge incinerators, the percent volatile solids, the heating value of the volatile solids, the temperature of the hearths below the final combustion zone, the speed of rotation of the shaft, the location of the volatiles burning hearth, the position of the fire on the volatiles burning hearth, or other unlisted and unknown variables.

The results shown in Table 6.7 demonstrate the use of the parameters of the kinetic model to predict the THC concentration in the exit gas. All data from each data set were used to compute the values of the three parameters. These parameters were then used to calculate the predicted THC concentrations at the minimum, maximum and the geometric mean final combustion zone temperatures. In general, the model did a reasonable job of predicting the THC concentration in the exit gas at the average temperature, though there was a significant under-prediction at four plants. The model does a better job of estimating the THC concentration in the exit gas at the maximum temperature. The prediction was significantly less than the measured concentration in only one case. The model seriously under-predicted the maximum concentration in nearly all cases. The most serious of these under-predictions occur in the cases where the data were collected over longer time periods. The data from St Paul for 1995 (both units 5 and 9) were collected over 12 month periods. The data collection durations for both Lorton and Arlington in 1991 were approximately three months. The best predictions occur when the data are collected over short time periods, for example, the Vancouver data were collected over test periods of from 8 to 12 hours. The three WERF tests were of approximately the same duration as the Vancouver tests but the results are not as good. It appears that the longer the time available for process conditions to change, the more such changes occur with the result that the predictive accuracy of the model suffers.

Figure 6.6 graphically displays the weakness of the kinetic model. Two log-normal distributions are shown, one is the distribution of all exit gas THC concentrations observed at the number 9 sewage sludge incinerator operated by the St. Paul, Minnesota, Metropolitan Council during 1995. The second represents the results of prediction of the exit gas concentrations for the year using the parameters of the kinetic model that were developed using the exit gas data and the final combustion zone temperatures that were recorded for the month of May 1995. We used one month of monitoring data for predictive purposes in order to imitate the potential use of the kinetic model for demonstrating compliance with the exit gas THC concentration limit. A practical use of the procedure would be to monitor for a period of time that is representative of the long term operation of the sewage sludge incinerator, use those data to develop the parameters of the kinetic model, and use the final combustion zone temperatures to predict exit gas THC concentrations. Figure 6.8 represents the results of such a computation. The THC monitor reported valid values of the THC concentration for 553 of the 730, (about 75%) of the hours in the month. This percentage of data recovery provides an accurate representation of the behavior of the sewage sludge incinerator. The model under-predicts 43 percent of the exit gas THC concentrations and over-predicts 57 of them. The under-predictions are all at the upper end of the distribution (the highest values are under-predicted). The model over-predicts the lower exit gas THC concentrations, which are of less interest. This model behavior is typical of all of such comparisons that we have prepared, and it mitigates the value of this approach.

The calculated values of the parameters of the kinetic model for the eight months for which there were enough data to allow calculation of the parameters are presented in Table 6.8. Note that the values for the parameter *A* calculated for the months of August and September were negative, resulting in the model predicting the minimum THC concentration to be higher than the maximum THC concentration. This means that the model predicts, for these two months, that higher THC concentrations accrue at higher final combustion zone temperatures. This resulted because there was considerable scatter in the data. The correlation coefficients (r^2) were poor for all months - their values were between 0.02 and 0.32. The slopes of the lines of best fit for this parameter for these two months happened to be negative.

The right-hand portion of Table 6.8 contains the maximum, average, and minimum values of the THC concentration that is predicted if the values for the parameters that were calculated for that particular month are used. The model does a relatively poor job of predicting the maximum THC concentration. This appears to be a well operated sewage sludge incinerator. Evidence of the careful operation consists of the observations that over 99 percent of the observed THC concentrations are less than 15 ppm, that the maximum observed 1-hour concentration was only 123 ppm, and that the average final combustion zone temperature was over 1,250°F. In spite of

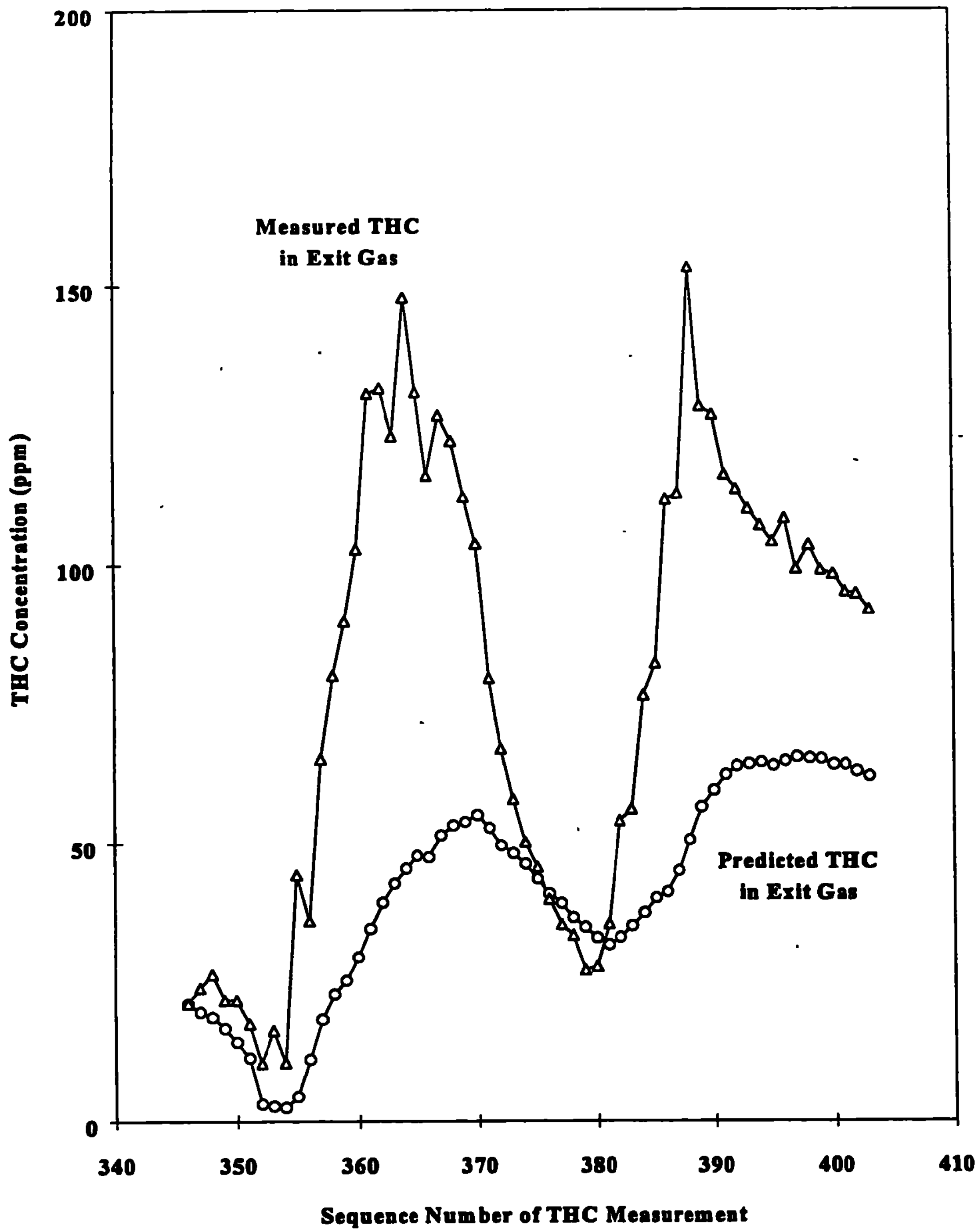

Figure 6.5 Predicted Compared to Measured Exit Gas THC Concentration, Points 350 - 400. (Hopewell)

TABLE 6.6
SUMMARY OF THE PAMETERS OF THE
KINETIC MODEL FOR ALL DATA AVAILABLE

Location	Cin	a	A	Temperature (°R)		
				Geo. Mean	Maximum	Minimum
WERF1 [1]	14623	4929	159	1407	1464	1345
WERF2 [1]	1374	3805	43	1434	1760	1210
WERF3 [1]	382	2855	23	1437	1797	1048
AMSA [1]	590	4013	40	1428	1860	1160
Detroit [1]	1970	4225	59	1515	1710	1360
St Paul 89 [1]	272	5753	98	1616	1810	1460
St Paul 91 [1]	1777	7062	287	1571	1860	1360
St Paul #9 1995 [3]	22.2	6662	74	1718	1897	1409
St Paul #5 1995 [3]	6.2	6510	9.41	1721	2045	1445
Arlington 91	1403	373	3.8	1366	1862	1016
Lorton 91	1595	717	6.5	1284	1644	1110
Arlington 95	1797	2394	22	1317	1623	1128
Cleveland	60.9	5796	52	1900	1904	1510
Huntington	25540	232	10	1345	1419	1103
Hopewell	2458	4964	129	1451	1733	1233
Vancouver 1 [2]	2613	5898	197	1510	1598	1412
Vancouver 5 [2]	648	12371	9771	1542	1641	1438
Vancouver 6 [2]	3498	4922	120	1460	1541	1368

[1] Data from Water Environment Research Foundation Report.
[2] Data from Lewis, Boe, and Boyer
[3] Data supplied by the St. Paul Metropolitan Council.

careful operation, the relationship between exit gas THC concentration and final combustion zone temperature was not consistent enough to support accurate application of the kinetic model. This must mean that factors that are beyond the scope of the first order kinetic model affect the exit gas THC concentration.

TABLE6.7
RESULTS OF THE USE OF THE KINETIC MODEL TO PREDICT THC CONCENTRATION IN THE EXIT GAS FROM SEWAGE SLUDGE INCINERATORS

Location	1/Temperature (°R*10⁴)			THC in Exit Gas (ppm @ 7%, Dry)					
	Avg.	Min.	Max.	Geo. Mean		Minimum		Maximum	
				Pred.	Meas.	Pred.	Meas.	Pred.	Meas.
WERF1[1]	7.106	6.832	7.437	122	341	61	151	250	926
WERF2[1]	6.975	5.683	8.267	67	56	10	3	216	228
WERF3[1]	6.957	5.566	9.546	16	25	3	9	85	273
AMSA[1]	7.001	5.378	8.624	53	60	6	DNA*	168	DNA
Detroit[1]	6.602	5.849	7.355	52	140	13	DNA	141	DNA
St Paul 89[1]	6.189	5.526	6.851	17	30	5	DNA	41	DNA
St Paul 91[1]	6.366	5.378	7.355	72	190	3	DNA	361	DNA
St Paul #9 1995[4]	5.821	5.272	7.095	5	6	2	1	11.5	123
St Paul #5 1996[4]	5.810	4.890	6.920	5	10	4	1	5.6	139
Arlington 91	7.323	5.372	9.846	81	122	65	4	104	122
Lorton 91	7.789	6.084	9.012	39	78	24	7	53	537
Arlington 95	7.594	6.160	8.862	52	60	12	2	131	310
Cleveland	5.263	5.253	6.624	5	6.5	5	2.0	20	6.5
Huntington	7.437	7.045	9.064	6	7	6	1	8	40
Hopewell	6.891	5.770	8.108	36	47	2	25	245	1357
Vancouver 1[2]	6.624	6.259	7.084	50	55	19	20	128	107
Vancouver 5[2]	6.483	6.095	6.956	26	32	4	4	108	113
Vancouver 6[2]	6.849	6.491	7.312	57	61	26	24	133	129
Vancouver 5[3]	6.483	6.095	6.956	25	32	9	4	71	113

[1] Data from Water Environment Research Foundation Report.

[2] Data from Lewis, Boe, and Boyer

[3] Vancouver Run 5 results predicted using kinetic parameters from Run 6

[4] Data supplied by the St. Paul Metropolitan Council.

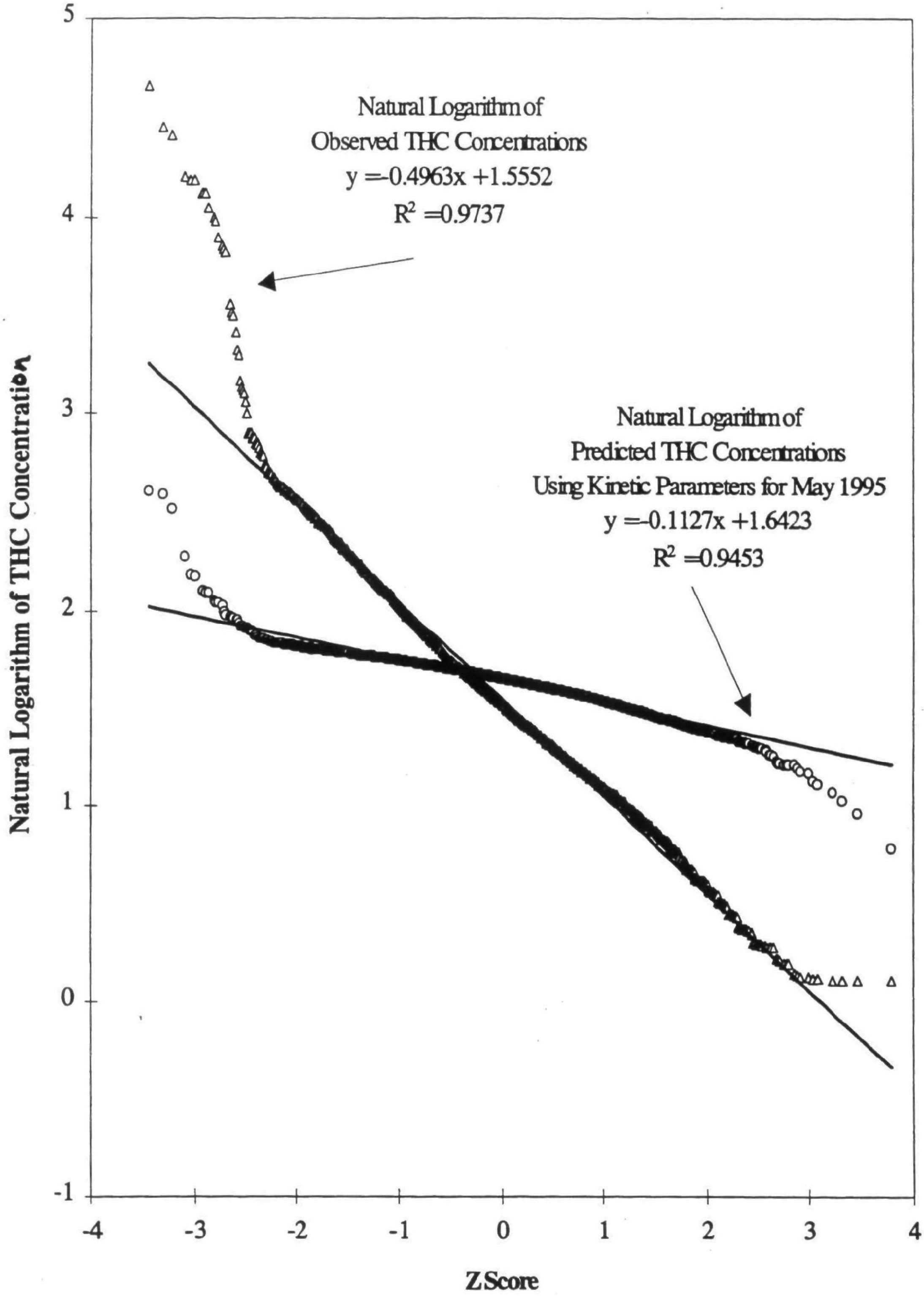

Figure 6.6 Comparison of Observed vs. Predicted Log-Normal Distributions of the THC Concentrations. (St. Paul) 1995 Data

TABLE 6.8 CALCULATED PARAMETERS OF THE KINETIC MODEL AND PREDICTED THC CONCENTRATIONS. ST PAUL, INCINERATOR #9, 1995

Month	Parameters of the Kinetic Model				Predicted THC Concentrations (C_o)		
	a	*A*	ln(C_t)	C_t	Maximum	Geo. Mean	Minimum
Feb	5098	29	3.0	20.5	9	5	3
Mar	6310	78	3.9	48.1	20	7	3
Apr	4277	19	3.4	28.7	11	6	4
May	7510	132	3.3	27.6	15	5	2
Jul	13489	177	3.7	39.3	39	37	34
Aug	3276	-47	1.0	2.8	275	2964	11598
Sep	2904	-59	0.7	2.1	3789	109723	710977
Dec	11554	109	2.5	12.3	12	11	10
All Data	6662	75	3.1	22.2	11	5	2
Observed Concentrations					123	6	1

The testing at Hopewell, Virginia included sampling to determine the THC concentrations both before and after the secondary combustion chamber (SCC). The reason for determining the THC concentration at both locations was to enable calculation of the value for the reaction rate constant, *k* directly from the concentration and temperature data. The volume of the SCC was determined to be 1357 cubic feet from the blue prints of the device that were provided by the operators. The flow rate of stack exit gas was measured by pitot tube traverses, that were done by EPA Method 2. These traverses were done periodically throughout the testing program. Moisture at the three sampling locations were measured by EPA Method 4. The Method 4 samples were collected nearly continuously throughout the testing program. The volumetric flow rate of gas entering and leaving the SCC was calculated by adjusting the stack exit gas flow rates to the temperature, moisture concentration, and oxygen concentration of the gas entering the SCC. The average volumetric flow rate was used to calculate retention time. The SCC was equipped with natural gas burners which added to the flow of gas entering the SCC. The average SCC exit gas flow rate exceeded the SCC inlet gas flow rate by approximately 8 percent.

The concentration data were all adjusted to 7% oxygen and 0% moisture prior to making the calculations of the parameters of the kinetic model. These normalizations of the data to common conditions were necessary to eliminate the effects of flow rate added to the sewage sludge incinerator exit gas by downstream burners and by in-leakage. These normalizations were performed on all data analyzed for this report. Unfortunately, the SCC at Hopewell, Virginia appeared to be a source of both CO and THC. The SCC outlet concentration of CO exceeded the inlet concentration 16% of the time. The outlet concentration of THC exceeded the inlet concentration less, 8% of the time, but enough to conclude that the burners in the SCC were contributing both CO and THC to the SCC exit gas. We do not know how much of these pollutants originated in the SCC at any given time, so calculation of the rate equation parameters can be only approximate. This was unfortunate because it attenuated the value of calculating the parameters of the first order rate equation.

Because the SCC burners contributed THC to the SCC exit gas, the values of *k* were calculated on two subsets of the THC data. The first subset consisted of all of the 5-minute time periods for which inlet and outlet THC concentrations, flow rate values, oxygen concentrations, moisture concentrations and SCC temperature values were available. The second subset consisted of those 5-minute periods that satisfied the criteria above and for which the SCC inlet THC concentration exceeded the SCC outlet concentration by 5 times. The results of these two calculations of *k*, shown in Table 6.9, yielded similar results. The average value, the maximum and minimum values, and the standard deviations are all similar. Of course, these averages are calculated over the temperature ranges displayed. We have shown that the value of *k* is a function of temperature as is described by Equation 4.3. The calculation of the parameters of Equation 4.3 is shown graphically in Figure 6.7 for both data sets. Because the data for the case where $C_i > 5*C_o$, is a subset of the set called "All Data", the points for this subset overlay those for the entire data set. These points are designated by circles with lines through them. The values for the parameters of Equation 4.3, *B* and *a* found from Figure 6-7 are quite different for the two data sets. Using only those data points with large differences between the inlet and outlet THC concentrations probably mitigates the effect of the contribution of the SCC to the THC concentration. The parameters derived from this edited data set are probably more realistic than those derived from the entire data set.

TABLE 6.9
SUMMARY OF CALCULATION OF THE FIRST ORDER RATE CONSTANT
Data from Hopewell

Statistic	Inlet THC > 5x Outlet THC			Entire Data Set (All Data)		
	Retention Time (sec)	Temperature (°R)	*k*	Retention Time (sec)	Temperature (°R)	*k*
Average	2.57	1,471	0.97	2.48	1,446	0.73
Std. Dev.	0.93	66.1	0.40	0.8	63.8	0.39
Rel. Std. Dev.	36.0	4.5	38.6	32.3	4.4	48.4
Maximum	5.96	1,356	2.49	5.96	1,297	2.49
Minimum	1.39	1,631	0.4	1.39	1,631	0.12

There are now two estimates for each of the parameters of the first order reaction model. One estimate was developed from the inlet and outlet THC sampling that was possible at Hopewell, Virginia. The second estimate was derived from the analysis of the outlet THC concentrations only, a technique that would be necessary at most sewage sludge incinerators that have no means of obtaining a sample of the gas entering the final combustion zone. These estimates are summarized below. The parameter A is equal to B times the retention time t; in this case, t is assumed to be the average retention time during these tests, or 2.57 seconds. The estimates are similar but not identical. The use of this version of the first order reaction rate model provides no better estimate of the exit gas THC concentration than the one previously considered. There is still no means to know or predict the concentration of THC at the inlet of the final combustion zone. Lacking this information, these models cannot provide the assured estimates of the exit gas THC concentration that is needed for regulatory purposes.

Source of Estimate	Parameter		
	a	B	A
From Inlet and Outlet Sampling	6,648	89.9	231
From Outlet-Only Sampling	4,964	50.2	129

On many occasions, we have seen plots of exit gas THC concentration plotted against the temperature of the final combustion zone. These plots usually are submitted in support of monitoring of final combustion zone temperature as a surrogate for monitoring of exit gas THC concentration. It appears that it is possible to generate curves that demonstrate excellent correlation between final combustion zone temperature and exit gas THC concentration under controlled conditions, for short periods of time. Figure 6.8 is an example of such a plot. This plot was prepared, by the authors, from data that were sent to us by the persons who performed the testing at the Vancouver, Washington, wastewater treatment plant sewage sludge incinerator. These particular data were collected from 08:30 am through 12:30 pm on July 15, 1993.

The plot presents a satisfying correlation. When such correlations are attempted over longer periods of time, during routine operations, the correlations are less remarkable. Figure 6.9 is a plot of exit gas THC concentration vs final combustion zone temperature at the Lower Potomac Wastewater Treatment Plant, in Fairfax County, Virginia. These data were collected over a three-month period, beginning in July 1993. Figure 6.9 is more representative of the time periods over which such correlations must be reliable for temperature monitoring to be a surrogate for THC monitoring. The existing regulation requires that the monthly average be demonstrated to be less than 100 ppm. The reason that these plots break down over the longer time periods is the same reason that the first order kinetic model breaks down over longer time periods. That is, the concentration of THC at the inlet to the final combustion

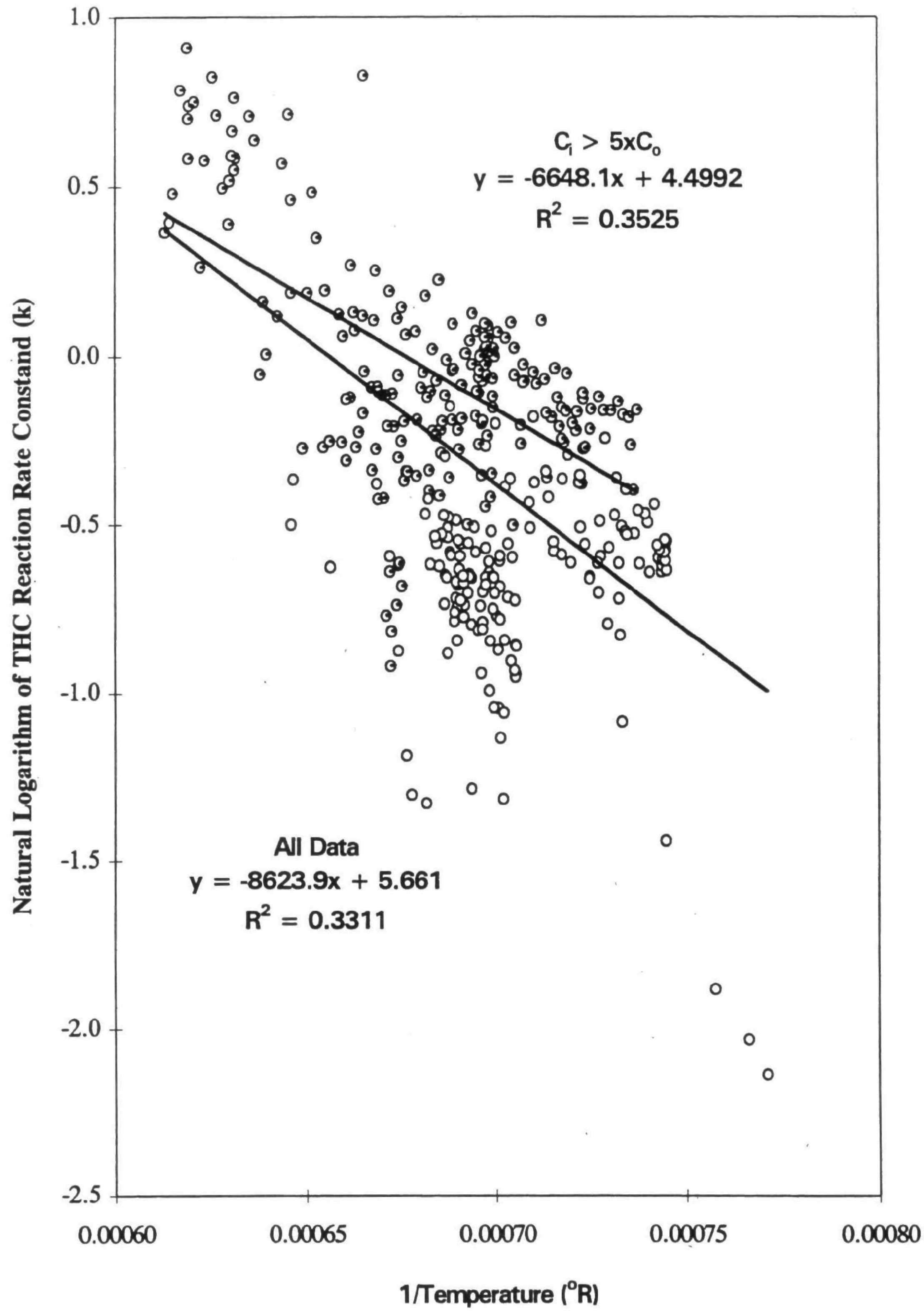

Figure 6.7 Calculation of the Parameters of the First Order Rate Equation from THC Inlet and Outlet Data (Hopewell)

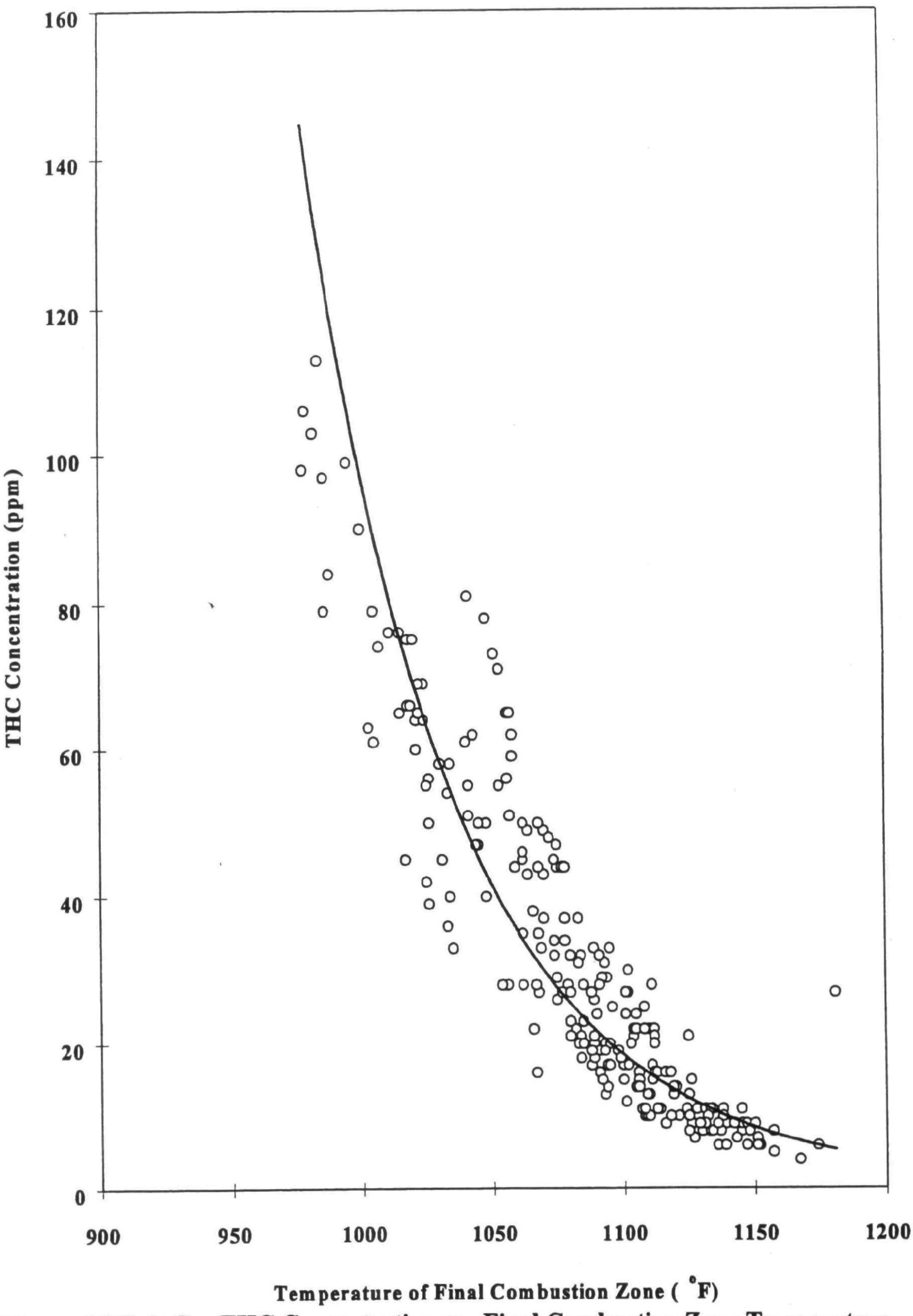

Figure 6.8 Exit Gas THC Concentration vs.. Final Combustion Zone Temperature. Test Number 5 (July 15, 1993) (Vancouver)

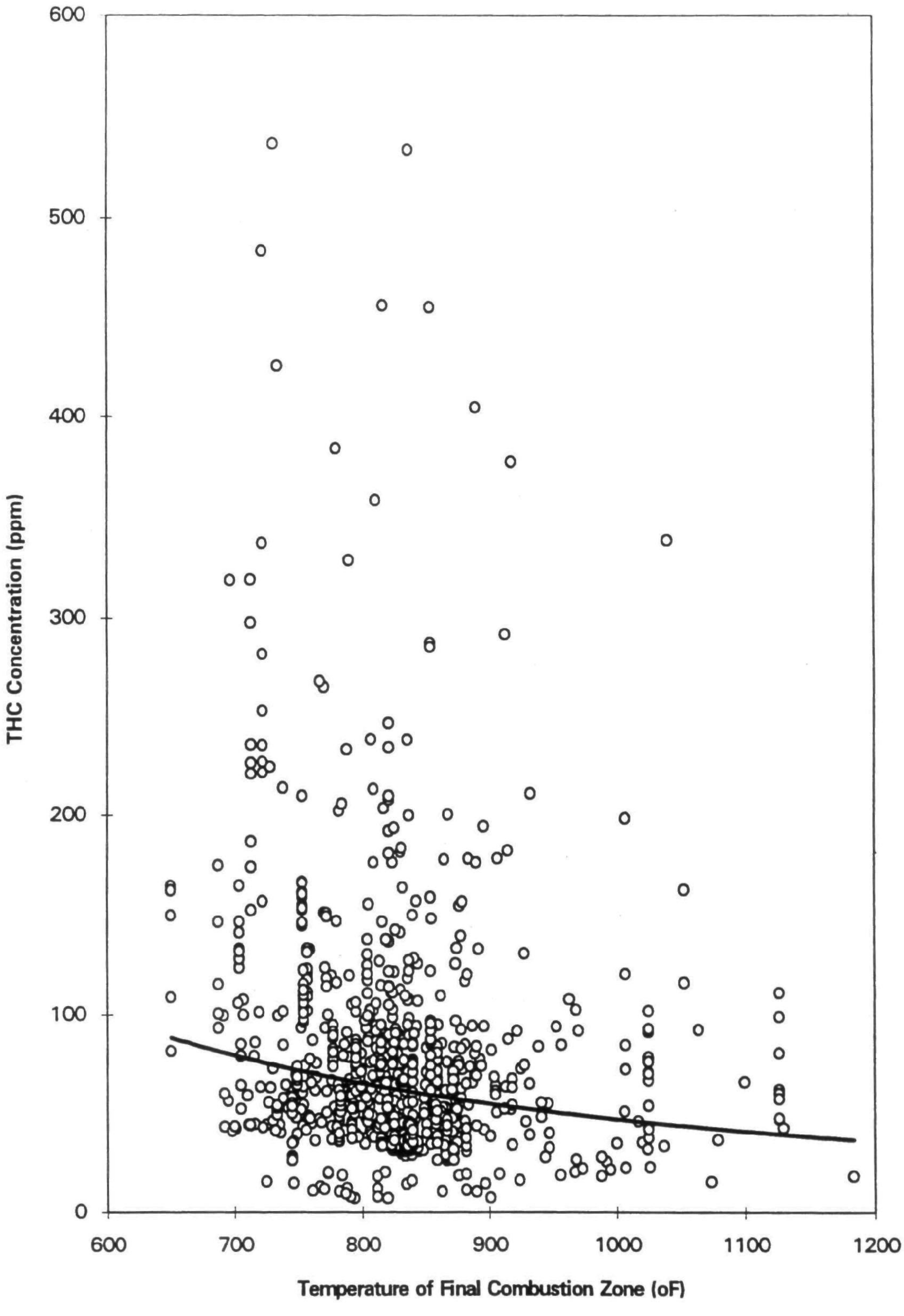

Figure 6.9 Exit Gas THC Concentration vs. Final Combustion Zone Temperature. July through September 1991. (Lorton)

zone does not remain constant over extended time periods. If the THC concentration at the inlet to the final combustion zone were constant, then the THC/temperature correlations would be reliable, and the correlation would be described by the first order rate equation.

Statistical Summaries of Total Hydrocarbon Concentration Data

We have noted elsewhere in this report that the concentrations of both THC and CO are log-normally distributed. That is, a plot of the natural logarithm of the concentration of these gases against the number of standard deviations that the value is removed from the geometric mean of the data, is linear. We considered the possibility that, if the distribution was consistent, it might provide a means to use a relatively short-term test period to provide assurance of continuing operation within the limit of 100 ppm of THC in the sewage sludge incinerator exit gas. The testing conducted during this program was of relatively short duration - approximately one week per plant. Data accumulated over a one year period at 12 sewage sludge incinerators operated by the City of St. Paul, Minnesota were provided by the Metropolitan Council of that city. The Northeast Ohio Sewer District (Cleveland) provided similar data, covering a 7-month period for 5 sewage sludge incinerators. The data from the number 5 sewage sludge incinerator in St. Paul (Figure 6.10) are representative of the type of log-normal distributions that resulted. Not all of the distributions were as linear as the example, but the correlation coefficients (r^2) for all were greater than 0.80, indicating excellent linearity.

During discussions with members of the affected community, it was decided to test the practicability of performing sampling and analysis for a one month period and using the log-normal statistics for those data to compute the expected maximum monthly average concentration. To do this the statistics of the log-normal distribution were calculated for these data sets. Then the same statistics were calculated for each of the 1-month subsets that comprised the set of annual data. The statistics from each monthly analysis were used to compute the value of the concentration that corresponded to the worst expected monthly average exit gas THC concentration. The expectation was that the slopes and intercepts of the lines of best fit for the monthly data sets would be similar to each other and to the slope and intercept of the annual data set. This calculation procedure imitates sampling and analysis of the exit gas THC concentration at a sewage sludge incinerator for one month and using those data to compute the worst expected monthly average concentration. The type of analysis described above has been used by the EPA Office of Air Quality Standards and Planning to extrapolate the worst expected 24-hour average concentration of particulate matter from data that are collected every sixth day.

The geometric mean of a set of data has a frequency of 0.5 and is located 0 standard deviations from the geometric mean of the data set. In a set of 100 normally distributed data points the sixteenth highest will have a frequency of 0.84 and will be

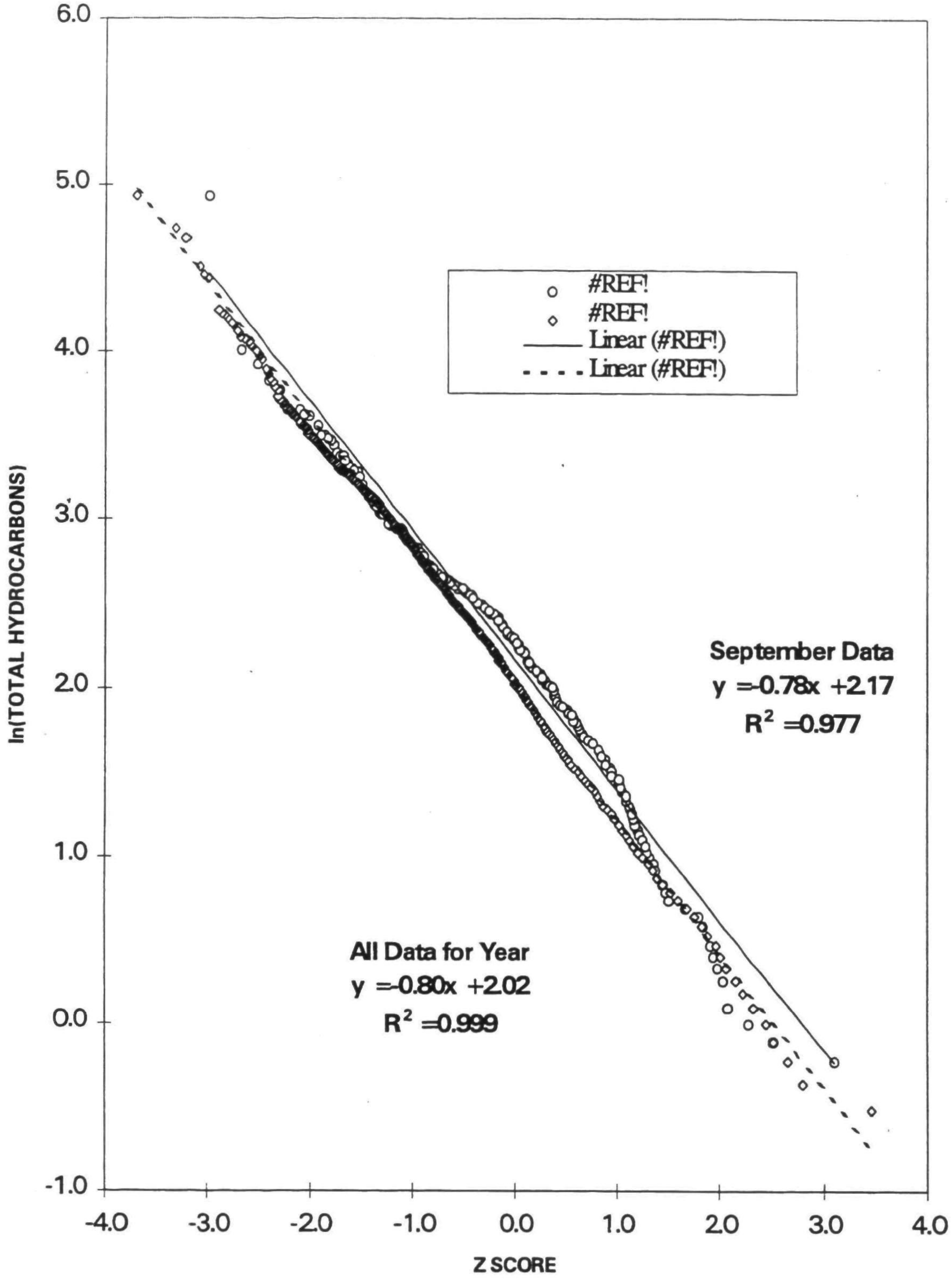

Figure 6.10 Ln(Total Hydrocarbons) vs. Z Score, Data for September and Data for Entire Year 1995 (St. Paul)

located approximately 1 standard deviation from the mean. We have chosen to refer to the number of standard deviations from the mean as 'Z SCORE', as is common and simpler. That means that the Z SCORE of the geometric mean is 0. The Z SCORE of the sixteenth highest will be 1 if the data are ranked in increasing order, or it will be -1 if the data are ranked from highest to lowest. We have adopted the latter convention, all data are ranked from highest to lowest so that the highest concentrations have negative Z SCOREs.

The lowest hourly average value in the month having the highest monthly geometric mean concentration will have a frequency of $^1/_{12}$ (0.083) and a Z SCORE of -1.38. This value will not be equal to the monthly average of the month with the highest concentration, nor is the monthly average equal to the maximum hourly concentration. The geometric mean concentration of the month having the highest average exit gas THC concentration will be the middle ranked hourly concentration during that month. That is, the hourly average concentration that has a frequency of $^1/_{24}$ (0.0417) will be equal to the geometric mean of the month with the highest exit gas THC concentration. The Z SCORE of a frequency of 0.0417 is -1.732. The procedure then, is to calculate the slopes and intercepts of the lines of best fit for the hourly data for each month and then to calculate the value of the concentration that has a Z SCORE of -1.732. The results of these computations are shown in Table 6.10 for two of the St. Paul, Minnesota sewage sludge incinerators. Note that the predicted THC concentrations all exceed the observed maximum monthly exit gas THC concentration except for the prediction using the statistics of the January 1995 data at incinerator # 5. The over-predictions are moderate - up to approximately a factor of 3, which would be acceptable in most instances.

The log-normal distribution describes the population of concentrations of THC in the exit gas from sewage sludge incinerators. Continuous monitoring data collected over a twelve month period includes all of the normal, random variations in operating conditions, sewage sludge feed rates, sewage sludge solids content and auxiliary fuel use that occurred during the year that was monitored. Further, one month of THC monitoring apparently contains the same distribution of the same variations in the same parameters and results in a log-normal distribution that has the same slope and intercept as the full year of monitoring data. This means that continuous monitoring for a one-month period can predict the distribution of THC concentrations for a one-year period, and that the maximum monthly average concentration expected (at a given confidence level) can be predicted by analysis of the data collected over a one-month period.

The differences among the statistics of the log-normal plots (monthly and annual) are not large, but they appear to be significant. They are significant because they imply that the slope and intercept of these distributions are sensitive to changes in sewage sludge character and sewage sludge incinerator operating conditions. Figure 6.11 provides additional evidence that this is true. The figure contains two log-normal distributions for data collected at the Arlington County sewage sludge incinerator. One set of data was collected in 1991, the other was collected during this project (1995).

TABLE 6.10

SUMMARY OF STATISTICS OF LOG-NORMAL THC DISTRIBUTIONS

Month	St. Paul Sewage Sludge Incinerator #5				St. Paul Sewage Sludge Incinerator #9			
	Slope	Intercept	Corr. Coeff. (r^2)	Predicted Max. Month (ppm)	Slope	Intercept	Corr. Coeff. (r^2)	Predicted Max. Month (ppm)
JAN	-0.85	1.69	0.96	23.8	-0.16	1.11	0.83	4.0
FEB	-0.85	1.96	0.98	31.1	-0.35	1.48	0.99	8.1
MAR	-0.72	1.96	0.97	24.7	-0.54	1.88	0.93	16.7
APR	-0.68	1.81	0.96	19.9	-0.44	1.72	0.99	11.9
MAY	Insufficient Data for Analysis				-0.40	1.57	0.96	9.6
JUN	-0.70	2.17	0.97	29.3	-0.59	1.36	0.92	10.9
JUL	-0.84	2.16	0.99	37.2	-0.49	1.33	0.99	8.9
AUG	-0.60	1.60	1.00	14.0	-0.40	1.56	1.00	9.5
SEP	-0.78	2.17	0.98	33.5	-0.43	1.41	0.95	8.6
OCT	-0.97	1.96	0.97	38.1	-0.53	1.58	0.97	12.2
NOV	-0.68	2.27	0.98	31.5	Insufficient Data for Analysis			
DEC	-0.68	2.11	0.99	26.7	-0.42	1.09	0.89	6.1
ALL	-0.80	2.02	1.00	30.2	-0.55	1.48	0.96	11.3
Max. Observed Monthly Average				12.2				6.4

The operators of the plant made significant improvements to the sewage sludge feed system in the time between the collection of the two sets of data. The improvements to the sewage sludge feed system made the rate of delivery more consistent, the large changes in sewage sludge feed rate over short periods of time were eliminated. These improvements had a significant effect on the slope of the line of best fit of the log-normal distribution. Other factors that have been mentioned earlier (sewage sludge heat value, the position of the volatiles burning zone in the MHF, sewage sludge solids content, sewage sludge volatile solids content, auxiliary fuel firing rates, and possibly others) surely have effects on the slope and intercept of the line as well.

The observations that are discussed above mean that significant changes in the construction or operation of the sewage sludge incinerator will have significant effects on the distribution of THC concentrations. Thus, monitoring and specification of the

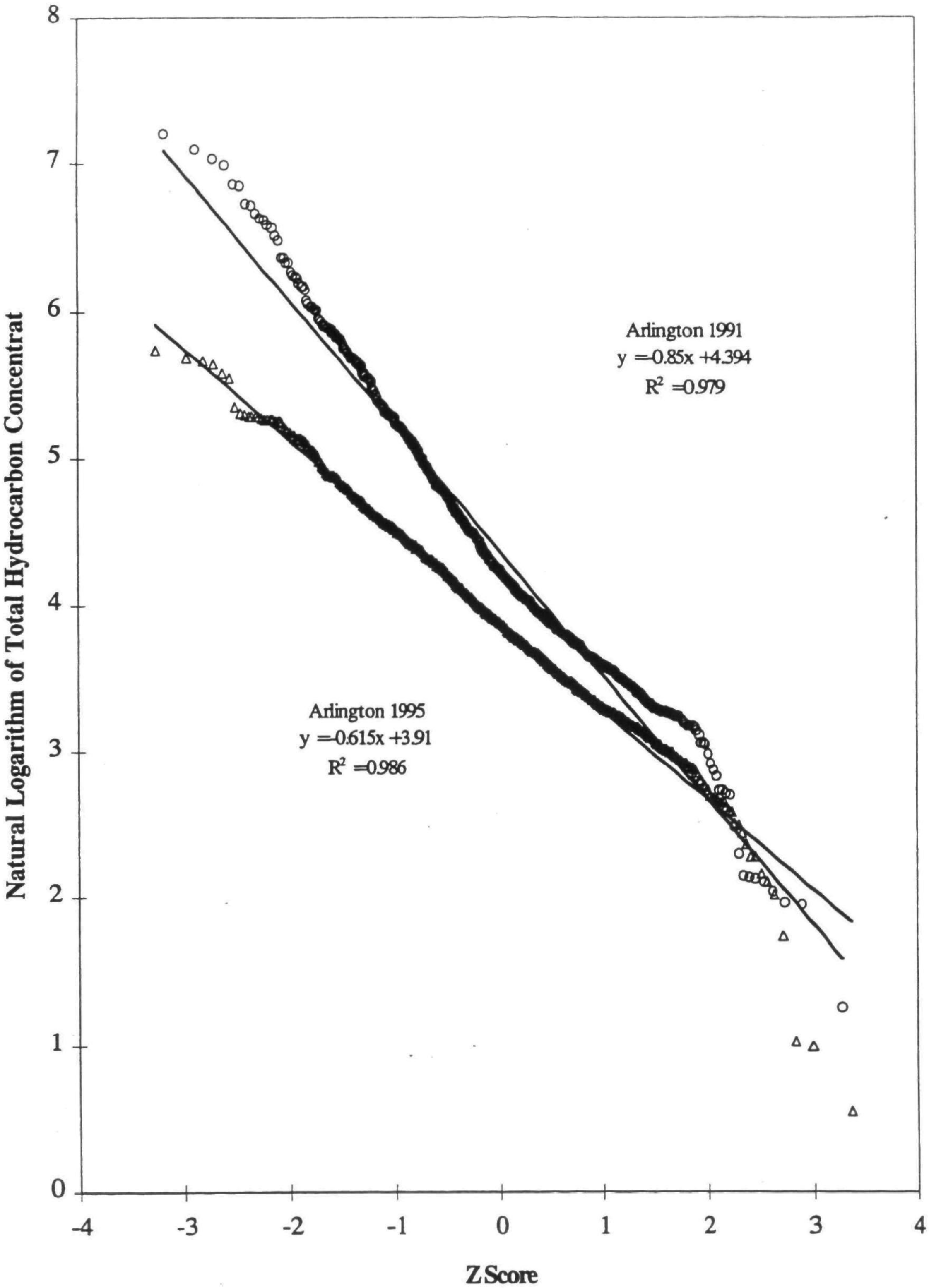

Figure 6.11 Comparison of the Log-Normal Frequency Distributions for 1991 and 1995 (Arlington)

limits of the various parameters must be included in order to assure confidence in the predictions that are made based on one month of THC monitoring. These parameters will have to be monitored. We have no information about the amounts by which the various parameters vary during normal operations of sewage sludge incinerators. Information on normal variations must be gathered before this technique can be incorporated into a permitting system.

OBSERVED CARBON MONOXIDE/TOTAL HYDROCARBONS RELATIONSHIPS

Operators of sewage sludge incinerators have requested development of a correlation between concentrations of carbon monoxide (CO) and total hydrocarbons (THC) in sewage sludge incinerators exit gas. This was one of the issues raised by the consortium of New Jersey sewage sludge incinerators operators, and one that USEPA agreed to pursue.

The first attempts to develop such a correlation were to plot the concentrations of THC against concentrations of simultaneously measured CO. Figures 6.12 through 6.14 are representative of such plots. The correlation between THC and CO observed for the data collected at Arlington, and Huntington demonstrate very little correlation between THC and CO. The data from Cleveland demonstrate a very good correlation, but this result appears to be atypical of the data that have been obtained and analyzed during this program. The best correlations occur for tests that were done over short time periods under highly controlled conditions. The Vancouver and WERF tests are examples. The correlations found during longer tests, i.e., Arlington, 1991, and Lorton tend to be poor.

Figure 6.15 represents all of the data from all of the sources. The correlation between the two parameters does not offer a means to develop a relationship that can be used to support the monitoring of CO as a surrogate for THC. Table 6.11 contains the statistics of the correlations between CO and THC for all plant data. Two of the plants (Cleveland and WERF 1) demonstrated very good correlation between THC and CO. If the correlations were as good for the other plants as they are for these two, it might be possible to develop site specific models that relate THC to CO. The wide variation in the correlation parameters (slope and intercept) and the poor correlation between CO and THC when all of the data from all of the plants are combined (All Plants) demonstrate that this correlation cannot provide an industry-wide relationship between THC and CO.

We believe that the reason that this is true is that the THC and CO that are in the exit gas of sewage sludge incinerators is formed by different mechanisms in different parts of MHF sewage sludge incinerators. It is likely that the primary mechanism of formation of THC is by evaporation and partial oxidation of volatile organic compounds while the sewage sludge resides on the sludge drying hearths.

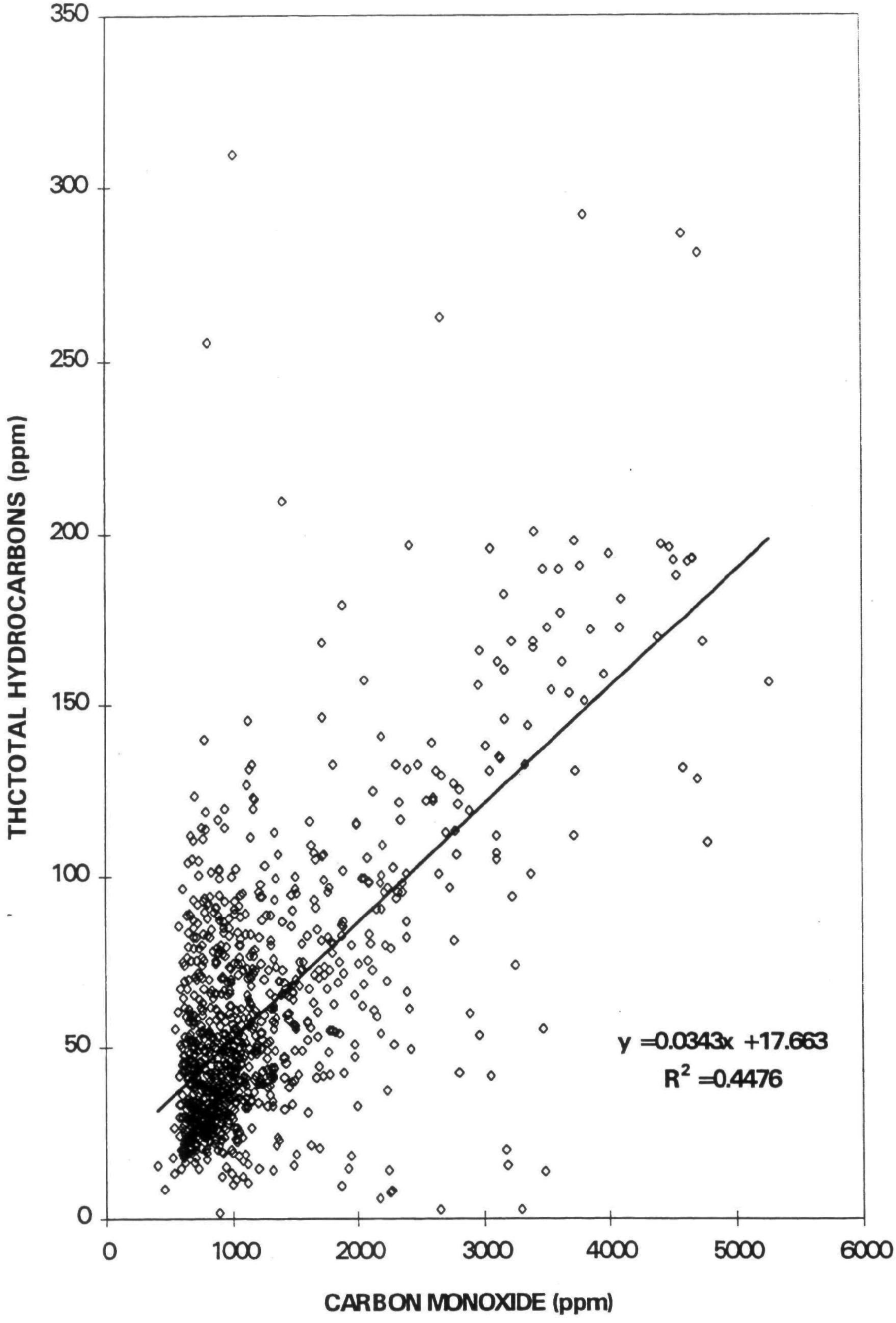

Figure 6.12 Total Hydrocarbons vs. Carbon Monoxide, 1995 (Arlington)

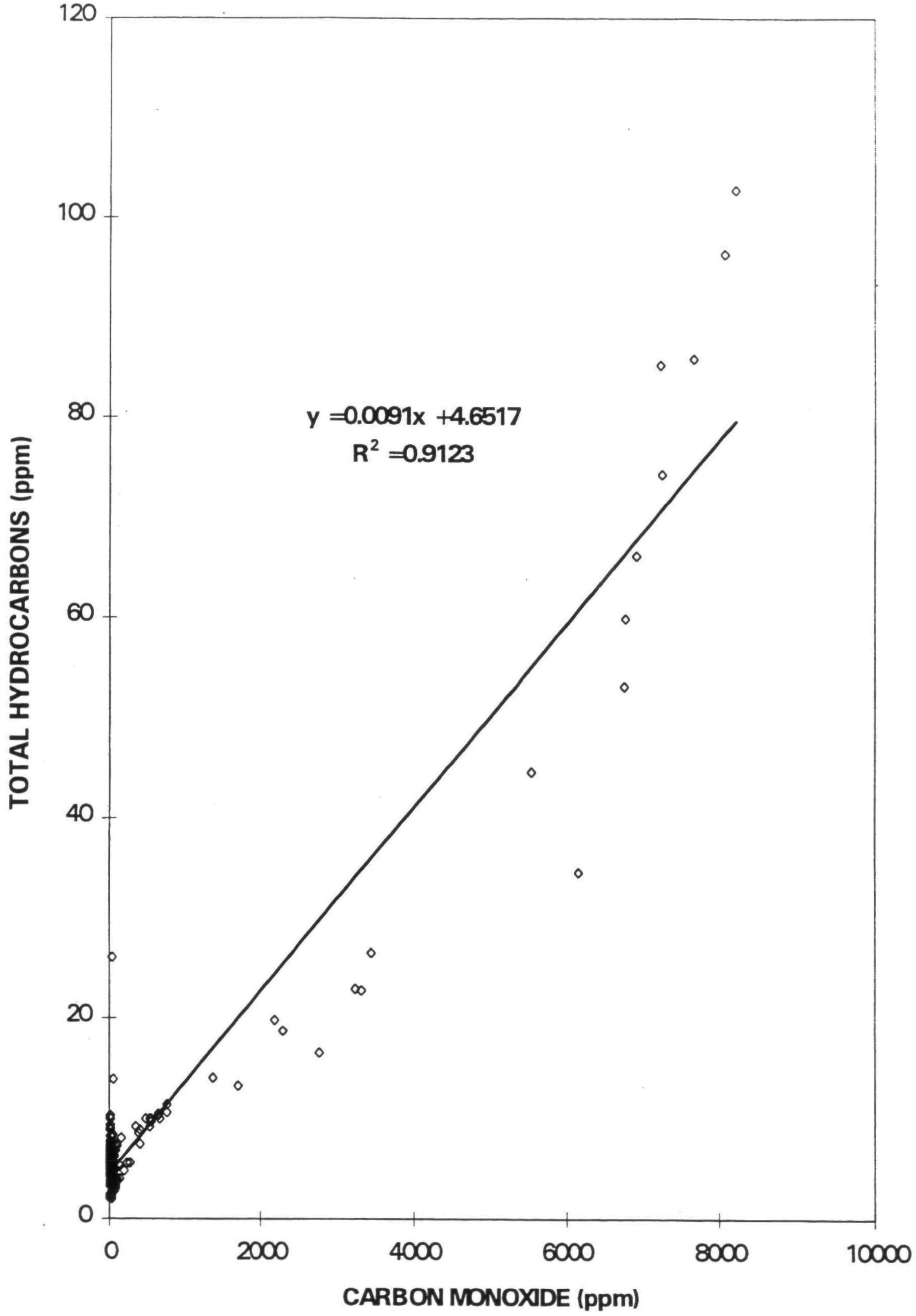

Figure 6.13 Total Hydrocarbons vs. Carbon Monoxide, 1995 (Cleveland)

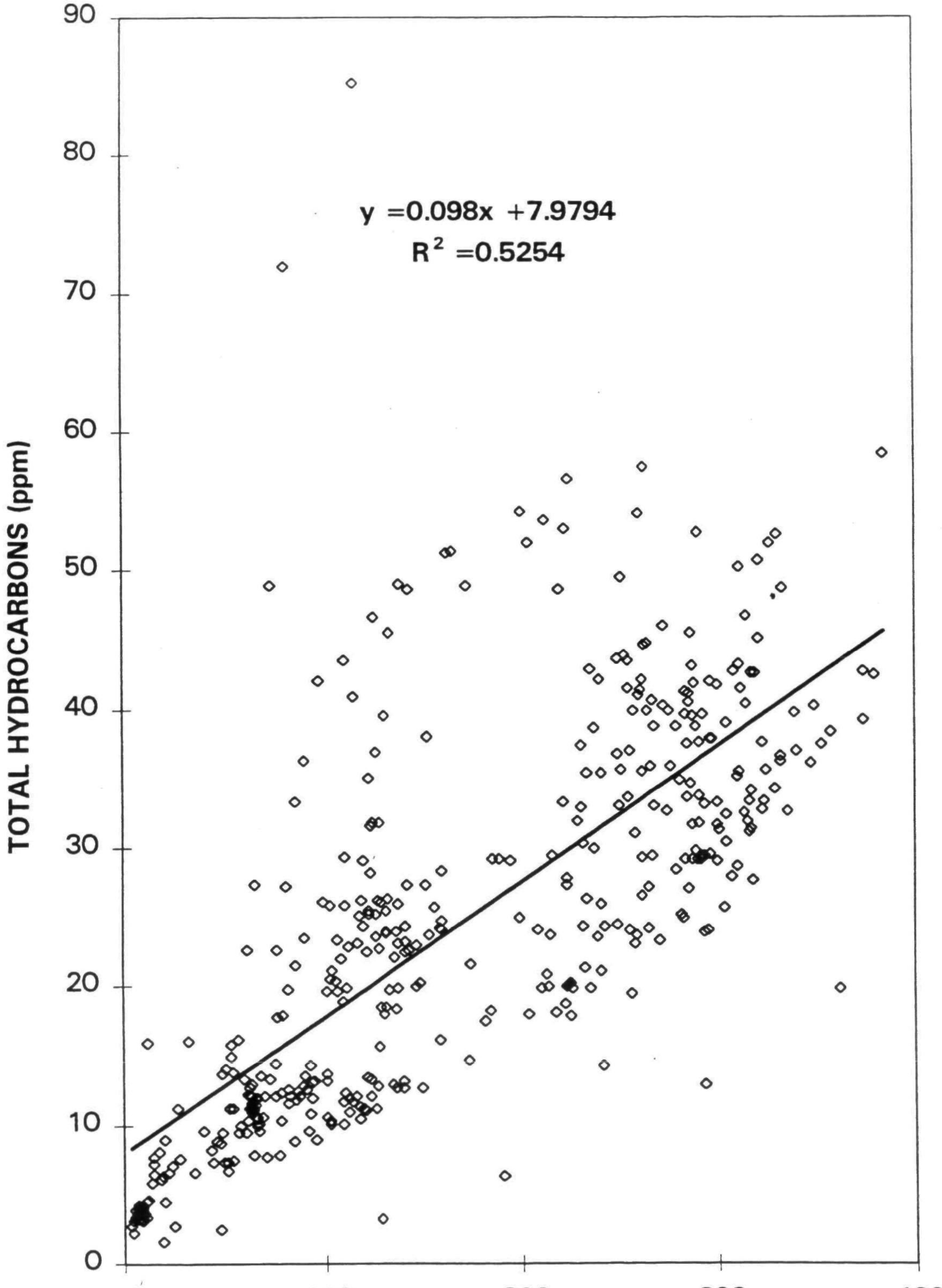

Figure 6.14 Total Hydrocarbons vs Carbon Monoxide 1995 (Huntington)

TABLE 6.11

STATISTICS FOR THE THC/CO CORRELATION

Plant Location	Furnace Type	Statistics of CO/THC Correlations		
		Slope	Intercept	Correlation Coefficient (R^2)
Arlington (1991)	MHF	0.114	-50.67	0.295
Arlington (1995)	MHF	0.034	17.66	0.448
Cleveland	MHF/0H	0.009	4.65	0.912
Hopewell	MHF/SCC	0.039	15.45	0.348
Huntington	FBI	0.098	7.98	0.525
Lorton	MHF	0.055	-16.06	0.505
Vancouver	MHF	0.327	-4.62	0.789
WERF 1	MHF	0.170	-120.56	0.974
WERF 2	MHF/SCC	0.079	-75.34	0.756
WERF 3	MHF/0H	0.834	-28.25	0.541
Williamsburg	MHF	0.013	59.26	0.015
All Plants	N.A.	0.063	16.64	0.176

MHF Multiple Hearth Furnace with no afterburner
MHF/0H Multiple Hearth Furnace with on-hearth afterburner
MHF/SCC Multiple Hearth Furnace with secondary combustion chamber
FBI Fluidized Bed Incinerator with no afterburner

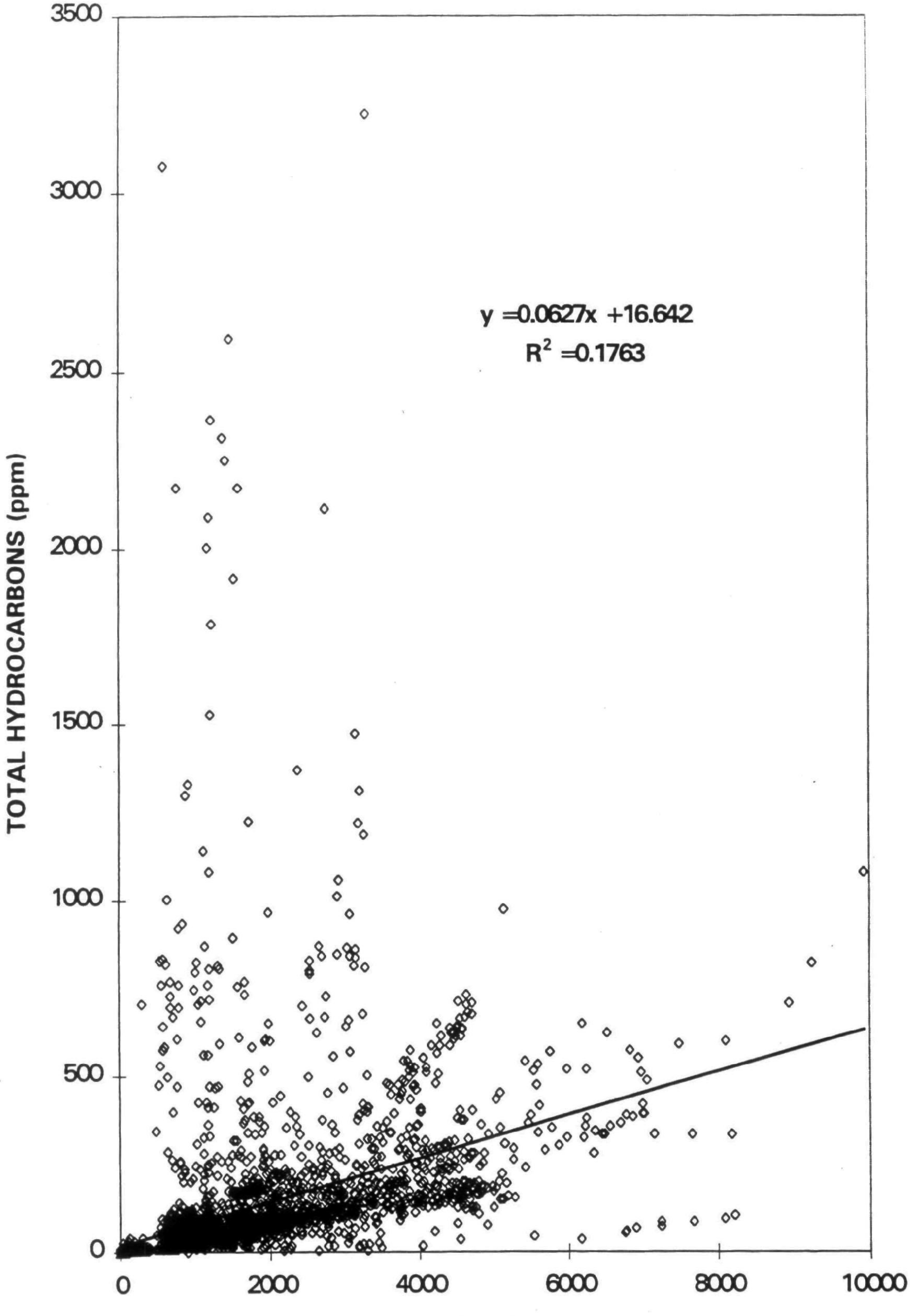

Figure 6.15 Total Hydrocarbons vs. Carbon Monoxide All Plants

Secondary release of THC probably occurs during combustion of the sewage sludge on the volatiles burning hearths. The formation of CO probably occurs primarily by pyrolysis of residual organic matter during the latter stages of the volatiles burning and in the carbon burning zone of the MHF. Further, it is unlikely that fluid bed sewage sludge incinerators form THC and CO in a manner that is similar to their formation in MHF. The data for the long term tests imply that correlations between THC and CO found at a particular plant, during a relatively short-term test may not be applicable for long time periods. This implies that test data collected over a period that is 8 to 24 hours in duration, under controlled conditions, probably will not be representative of operation over an extended period of time.

Logarithmic plots, i.e., ln(THC) vs. ln(CO) offer no better results. Figures 6.16 through 6.18 are log plots of THC vs. CO for the same three plants. In all cases the correlation coefficients (R^2) are worse than for the corresponding THC vs. CO plots.

We previously attempted to develop a correlation between the two parameters that was based upon the first order rate equation. This attempt failed, apparently because the concentration of CO and THC in the inlet gas to the final stage of combustion varies widely and rapidly. These observations do not mean that there is no useable relationship between CO and THC that can be used to support the use of CO monitoring as a surrogate for THC monitoring.

Analysis of the observed total hydrocarbon and carbon monoxide concentrations revealed that both are log-normally distributed. That is, a cumulative plot of the logarithm of the pollutant concentration against the number of standard deviations from the mean (Z SCORE) is linear. A cumulative plot of the concentration of the pollutant against Z SCORE is less linear. The log-normal nature of these distributions is demonstrated by Figures 6.19 through 6.21. The first of these figures is a cumulative normal distribution of the hydrocarbon data collected on Incinerator No. 5 at the St. Paul, Minnesota, Metro Plant during 1995. The data consist of approximately 5500 hourly average THC concentrations, corrected to 7% O_2, dry gas. The second figure (Figure 6.20) is a log-normal distribution of the same data. The correlation is much better for the log-normal than for the normal distribution. Figure 6.21 is the log-normal distribution of the CO data that were collected during this program at the inlet to the afterburner at Hopewell, Virginia. These three figures are representative of the many that were constructed for the 12 different sets of plant data that were available during this program. The results for all plants are similar, sewage sludge incinerators exit gas concentrations are log-normally distributed. The value of these log-normal distributions was explored in the section entitled Observed total Hydrocarbon Concentrations.

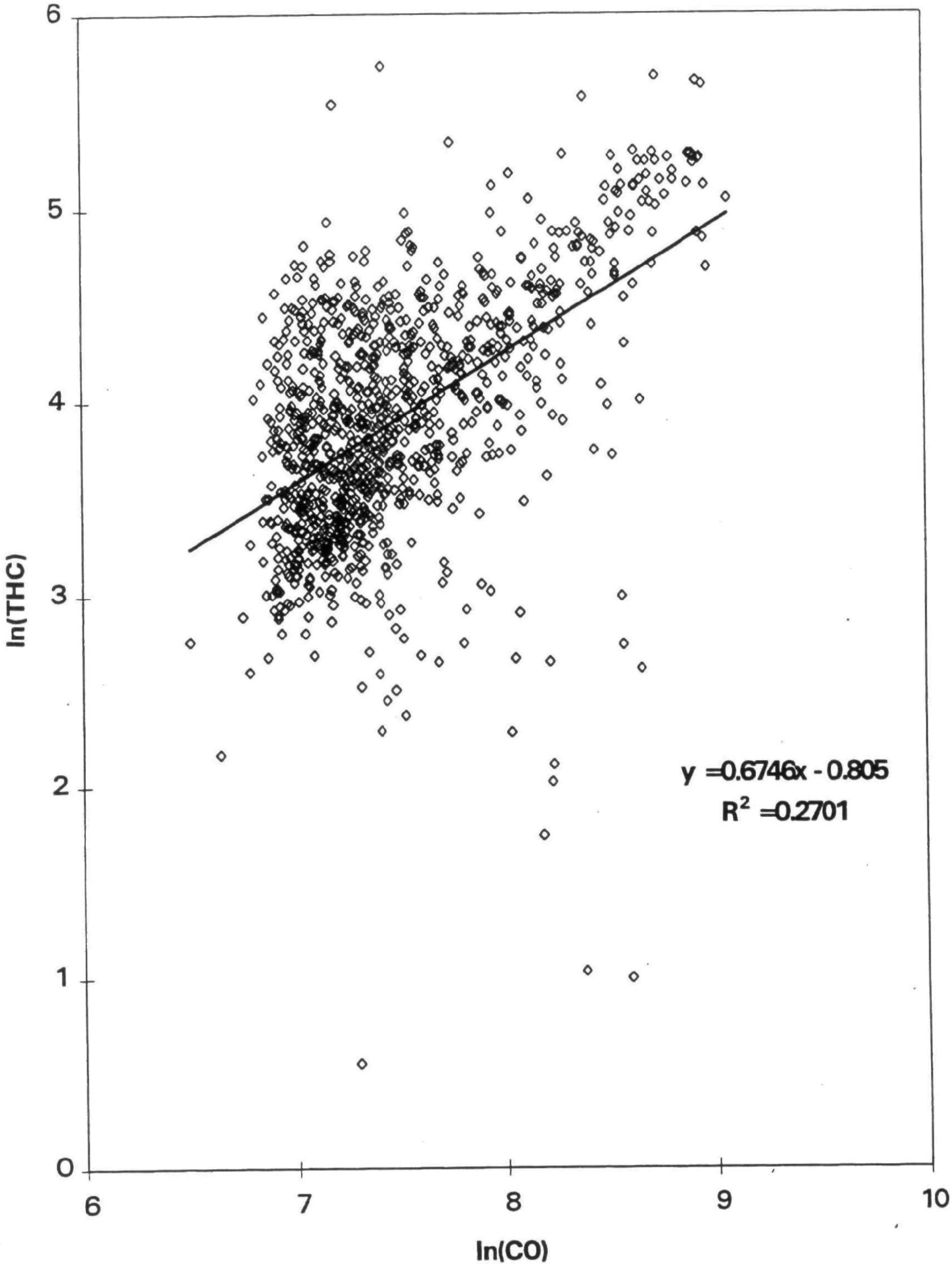

Figure 6.16 ln(THC) vs. ln(CO) 1995 (Arlington)

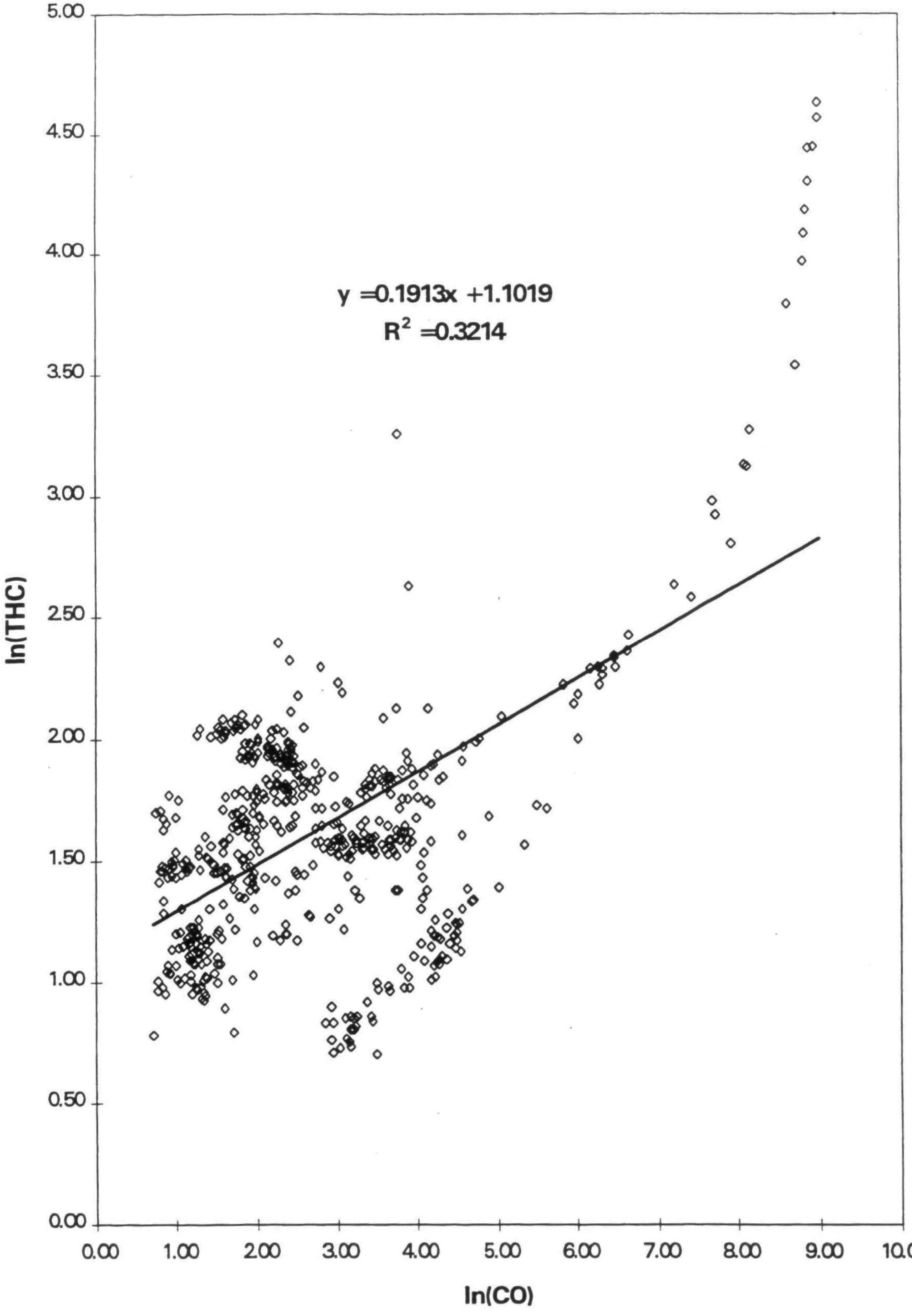

Figure 6.17 ln(THC) vs. ln(CO) 1995 (Cleveland)

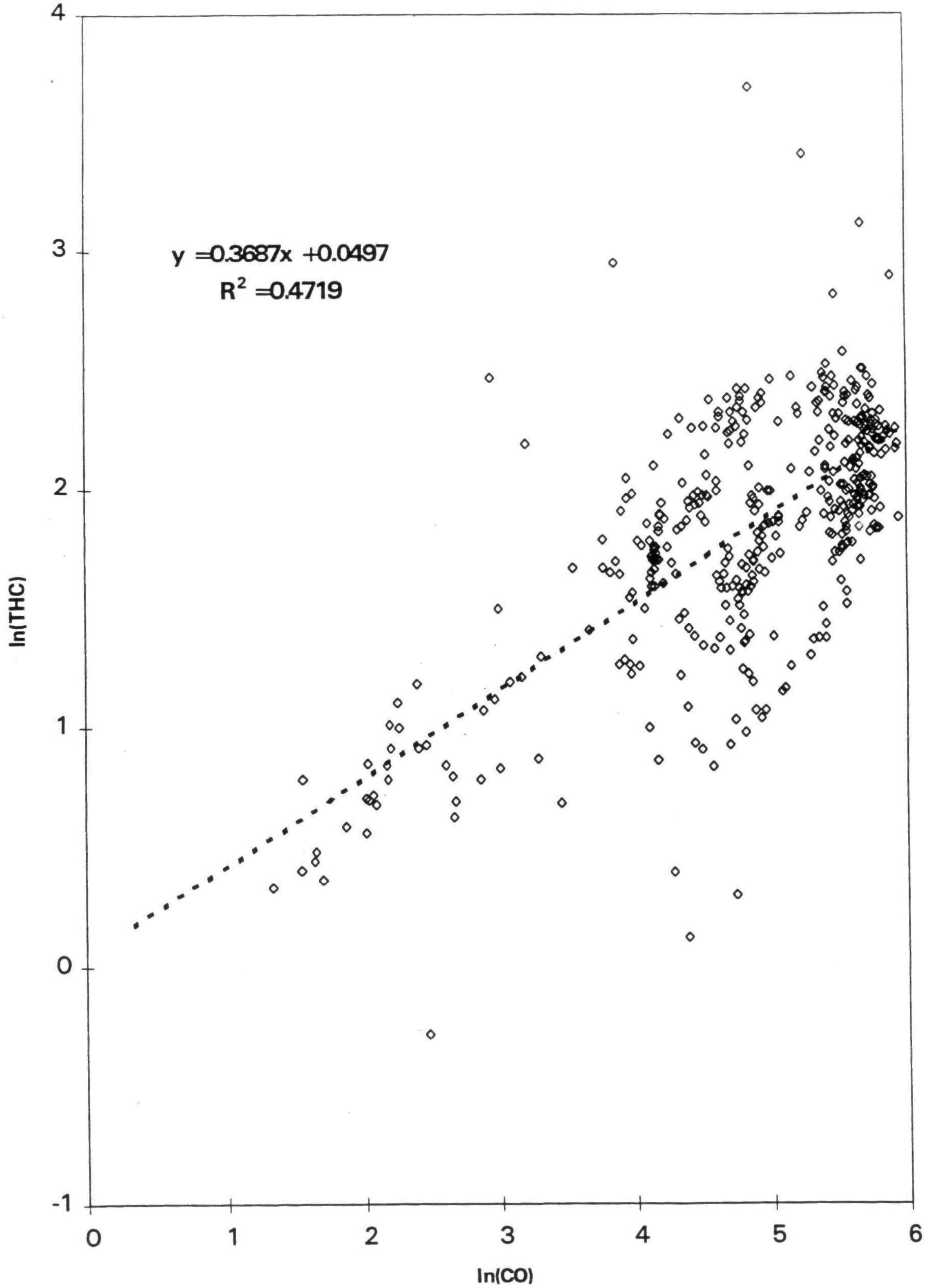

Figure 6.18 ln(THC) vs. ln(CO) 1995 (Huntington)

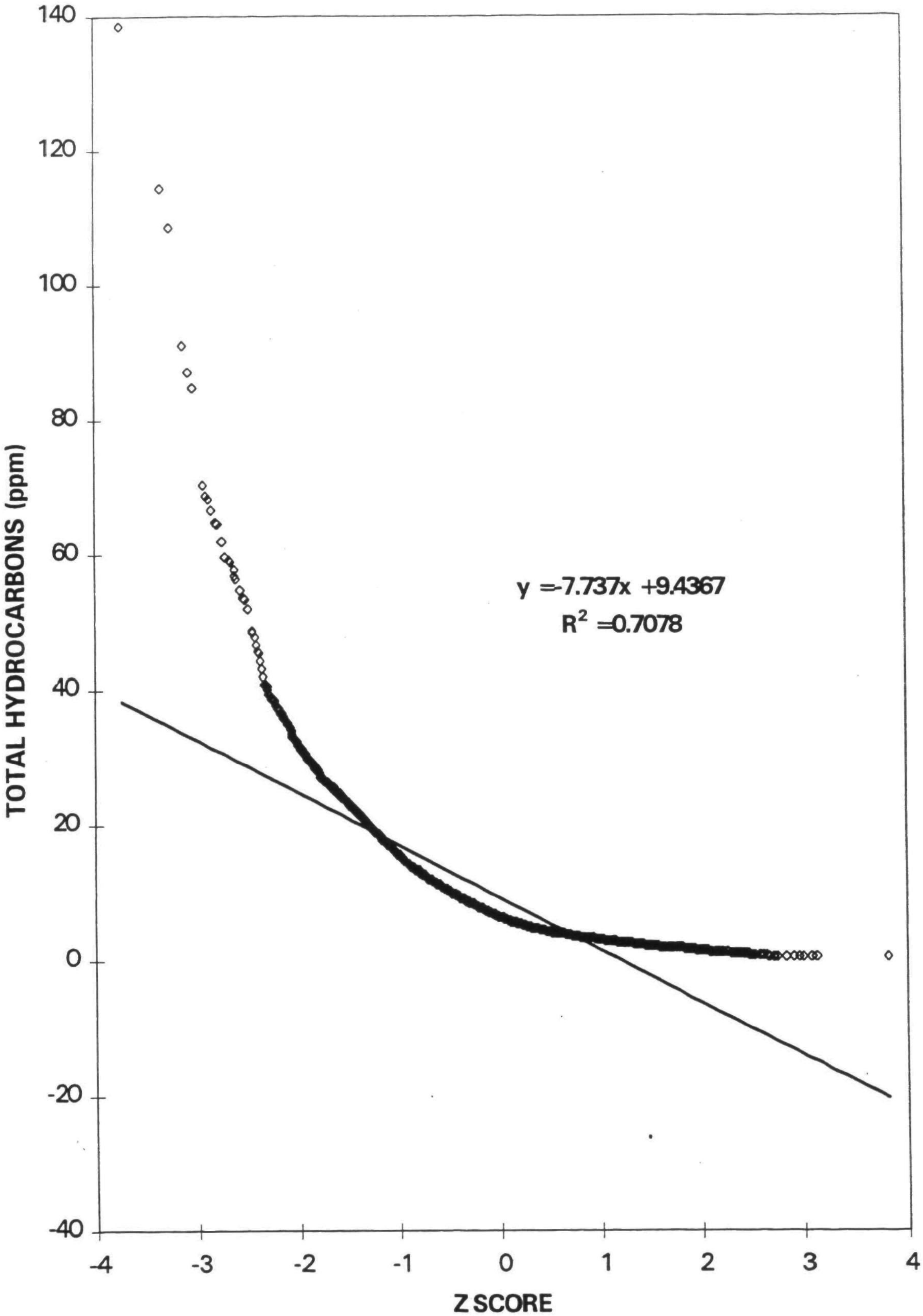

Figure 6.19 Total Hydrocarbons vs. Z SCORE, Incinerator #5, 1995 (St. Paul)

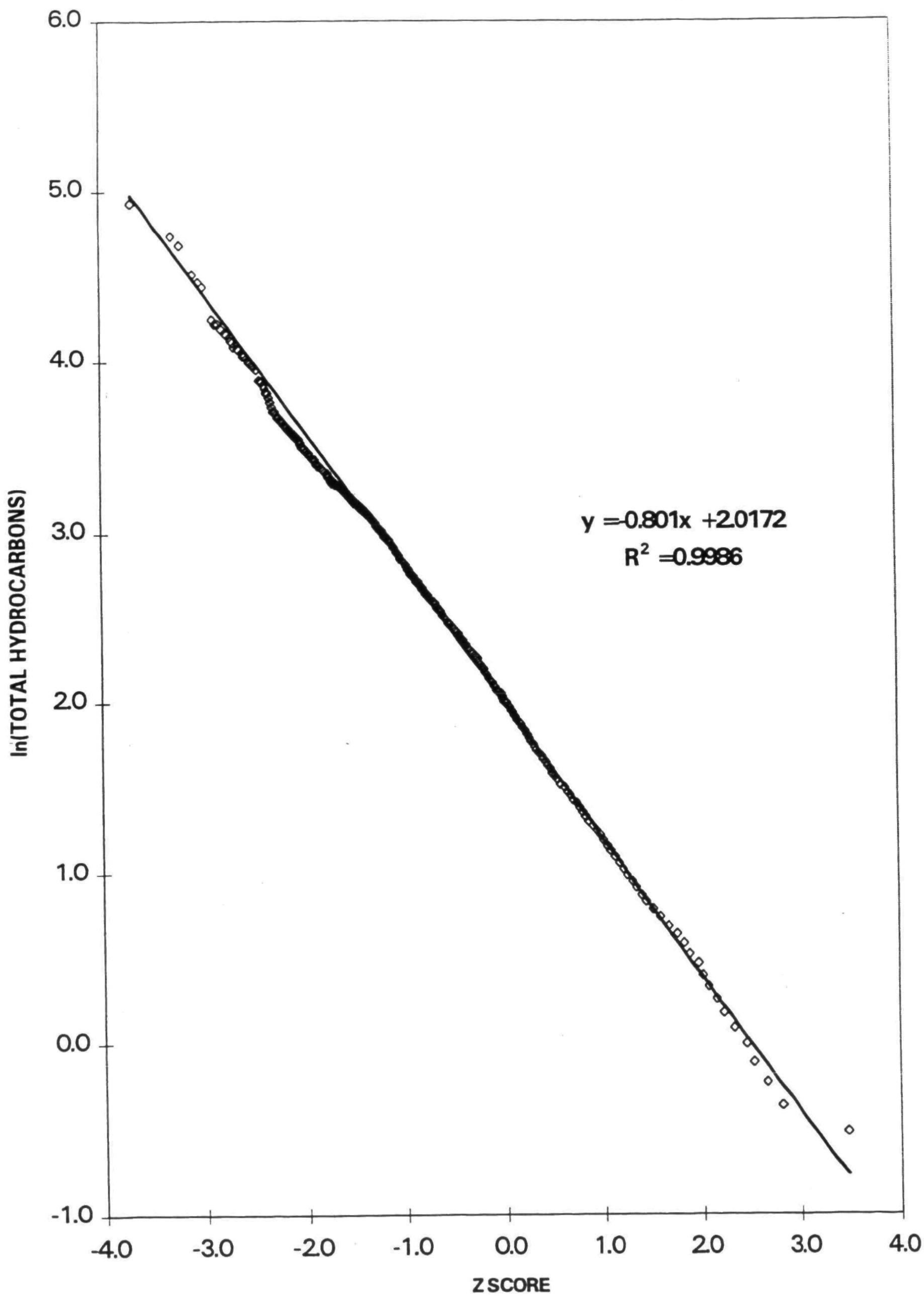

Figure 6.20 Ln(Total Hydrocarbons) vs. Ln(CO), Incinerator #5, (St. Paul)

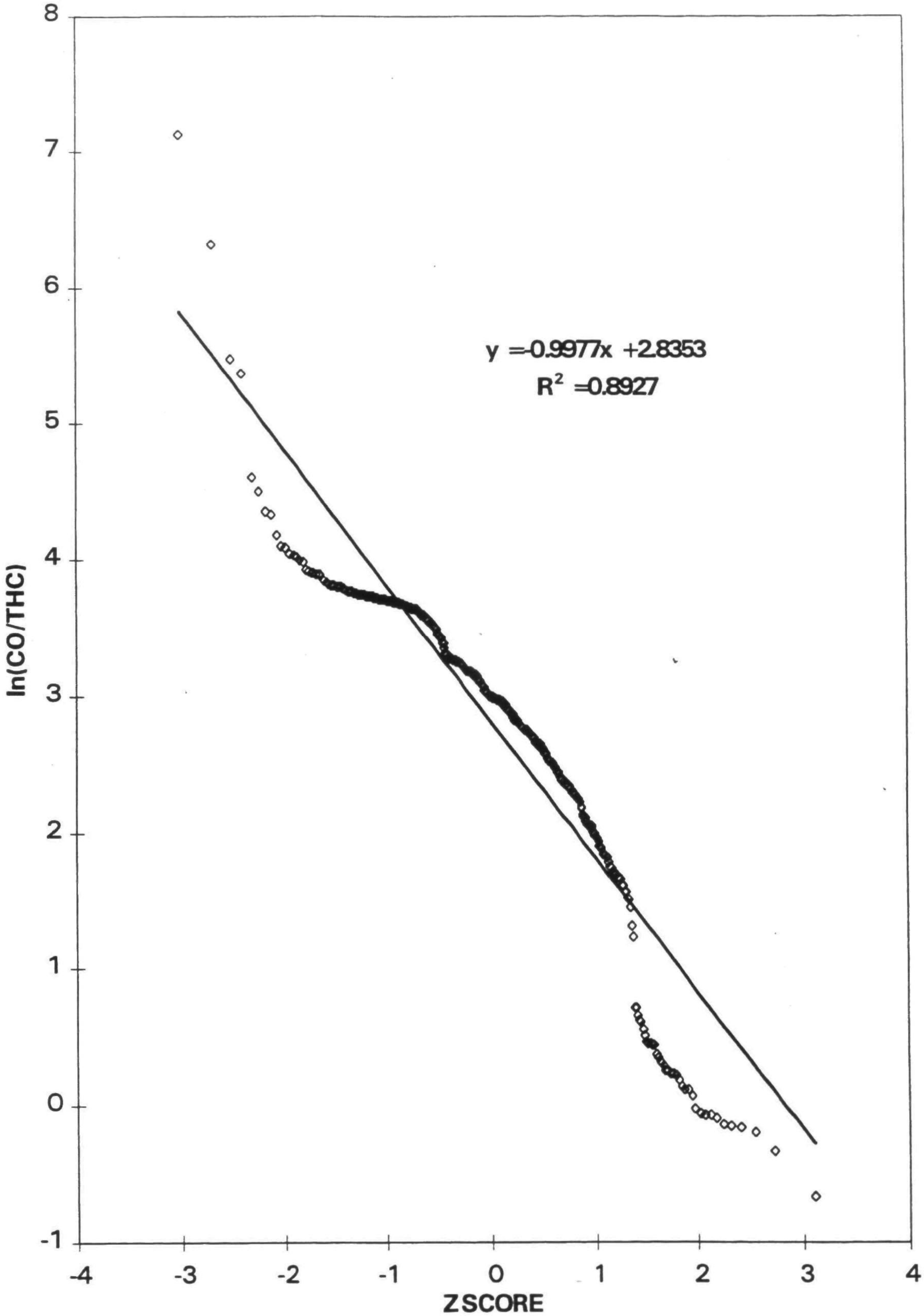

Figure 6.21 Ln(CO/THC) vs. Z SCORE, Furnace Outlet, 1995 (Hopewell)

TABLE 6.12

COMPARISON OF CO/THC RATIOS FOR VARIOUS SEWAGE SLUDGE INCINERATORS

Plant Location	Furnace Type	Ratio of carbon monoxide to total hydrocarbons (CO/THC)			
		Geometric Mean	Maxi-mum	Mini-mum	Coefficient of Variance
Arlington (1991)	MHF	22	238	2	14
Arlington (1995)	MHF	28	1215	3	54
Cleveland	MHF/0H	17	177	2	29
Hopewell	MHF/SCC	49	277	1	41
Huntington	FBI	25	85	2	14
Lorton	MHF	27	268	2	15
Vancouver	MHF	47	207	14	57
WERF 1	MHF	9	11	6	1
WERF 2	MHF/SCC	33	91	10	20
WERF 3	MHF/0H	28	60	3	16
Williamsburg	MHF	15	315	2	13

MHF Multiple Hearth Furnace with no afterburner
MHF/0H Multiple Hearth Furnace with on-hearth afterburner
MHF/SCC Multiple Hearth Furnace with secondary combustion chamber
FBI Fluidized Bed Incinerator with no afterburner

Because the CO and THC concentrations are log-normally distributed we next investigated the distribution of the ratio of the carbon monoxide concentration divided by the total hydrocarbon concentration (CO/THC). The correlation between CO and THC did not appear to be a reliable predictor of the THC concentration. However if a linear frequency distribution could be found for the CO/THC ratio, then perhaps it could be used to estimate a CO concentration below which the THC could be assumed to be less than 100 ppm. The results of the calculation of the statistics of the CO/THC ratios for the various plants, Table 6.12 provides some assurance that this approach might be useful. The average values of the CO/THC ratios were relatively consistent for all of the plants for which we had data. Further, the relative standard deviations (or coefficients of variance) appear to be related to the average CO/THC ratio. These facts imply that the CO/THC ratio also is distributed log-normally, as is expected of a proportional parameter.

Note, that with the exception of the WERF 1 plant, the geometric mean values and coefficients of variance of the CO/THC ratios for the various plants are similar. Even the FBI and the MHF/SCC data fall within the range of the others. The data from the WERF 1 plant appear to differ from the others. This is an artifact of the testing conditions. The duration of this test was approximately 11 hours. For the first four hours, the temperatures on the top three hearths remained relatively constant at 1,000°F, 1,460°F, and 1,360°F respectively for hearths 1, 2, and 3. After 4 hours and 15 minutes, the temperatures of these hearths dropped by 100°F, 130°F, and 170°F respectively. The temperatures remained constant for the remainder of the test. Thus, the test consisted of only two different temperatures in the gas phase in the zone where THC and CO are being burned.

Figures 6.22 and 6.23 are the cumulative normal and cumulative log-normal distributions, respectively, for the CO/THC ratios observed during the tests in Cleveland. The log-normal distribution is obviously superior for this particular data set. Admittedly, this data set shows one of the more remarkable differences between the two distributions. The data for some plants, Huntington, for example, show slightly better correlation for the cumulative normal distribution than for the cumulative log-normal distribution. On balance, the log plots show superior correlation. For this reason, and because the log-normal distribution is theoretically correct for proportional data, the log normal distribution was used for this analysis.

Figure 6.24 displays the lines of best fit for the cumulative log-normal distributions for each of the 11 plants for which we have both CO and THC data. Except for the WERF 1 plant, that was discussed above, all the lines lie within a fairly discrete bundle. Thus we can conclude that the cumulative log-normal distributions of CO/THC ratios are similar among plants, and that this model has potential for providing confidence in a CO concentration below which the THC concentration will be less than 100 ppm. All data from all plants was combined into a single data base to prepare the distribution shown in Figure 6.25. This plot includes the WERF 1 data, even though they do not appear to be consistent with the other data. The correlation is excellent. The plotted distribution can be used to determine the threshold concentration of CO, below which the THC concentration can be expected to be 100 ppm or less.

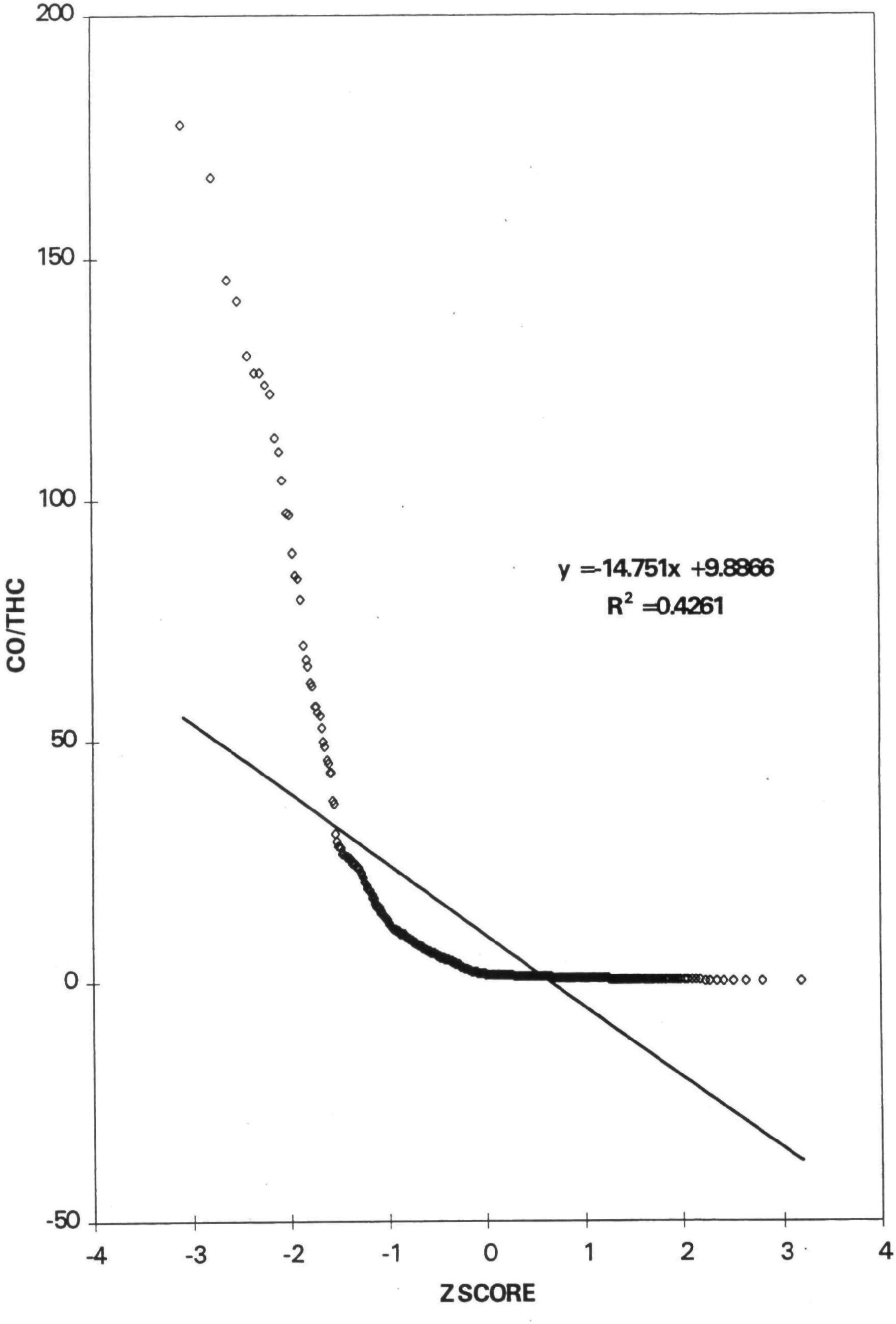

Figure 6.22 CO/THC vs. Z SCORE, 1995 (Cleveland)

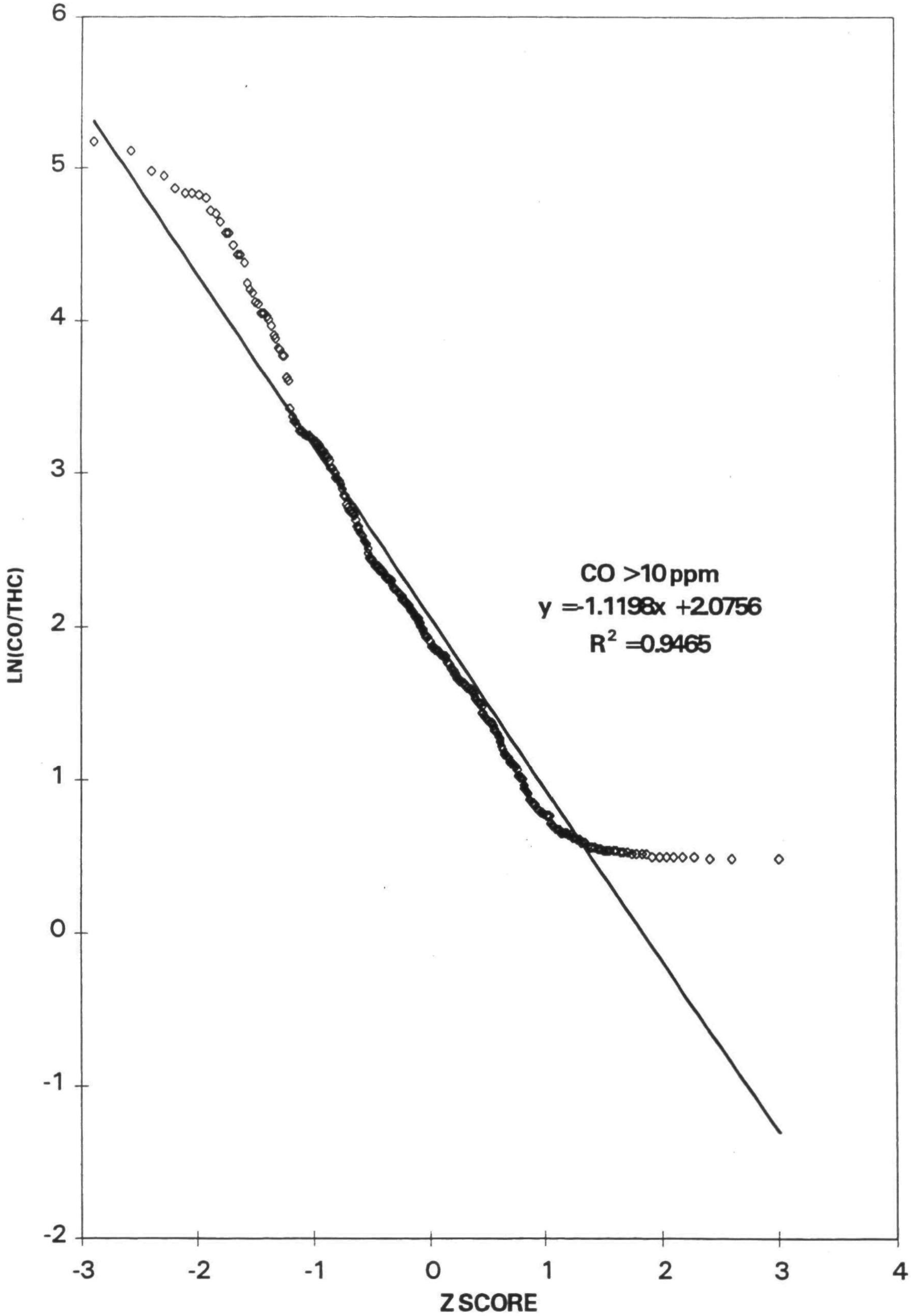

Figure 6.23 ln(CO/THC) vs. Z SCORE, 1995 (Cleveland)

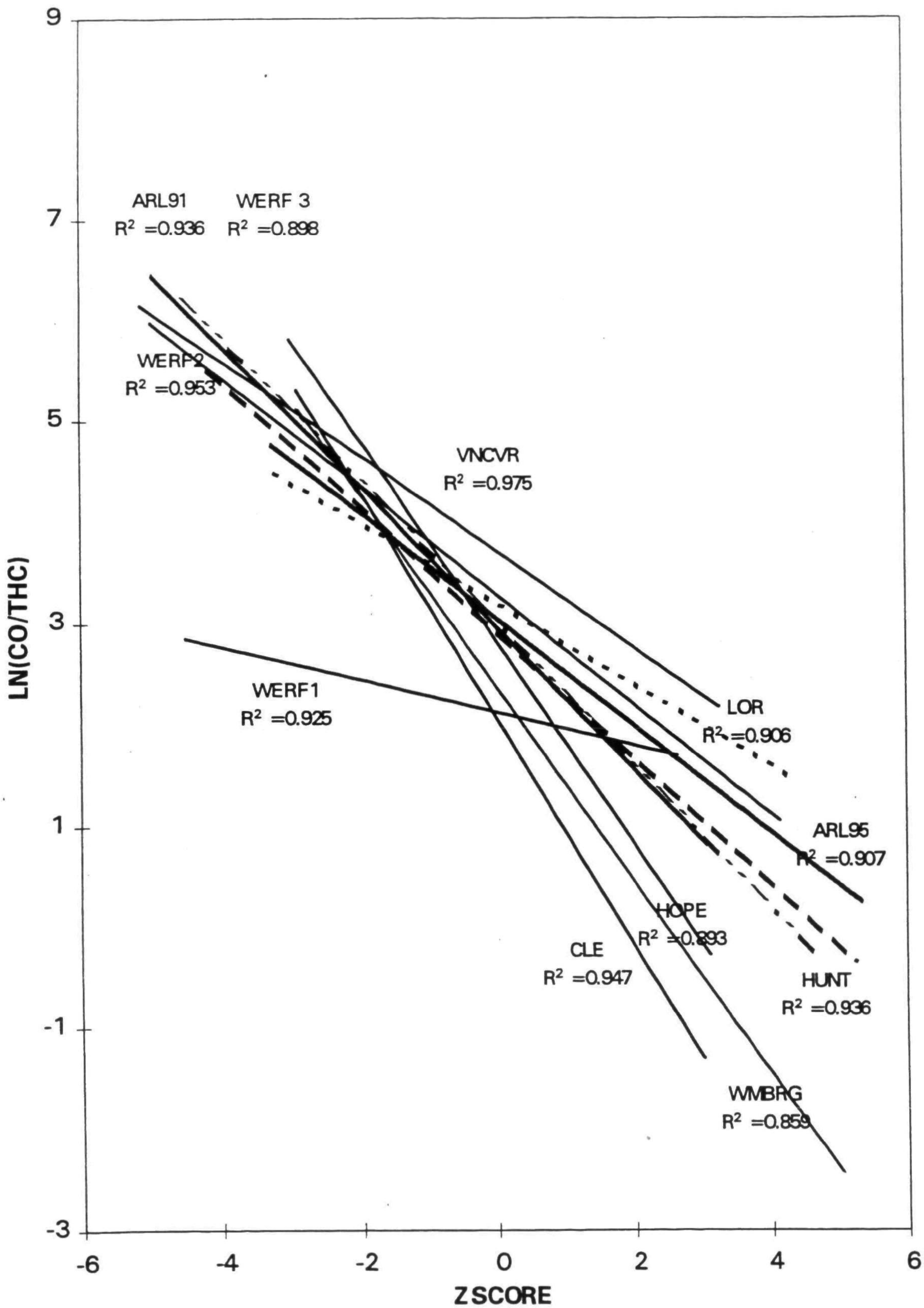

Figure 6.24 Ln(CO/THC) vs. Z SCORE, All Plants

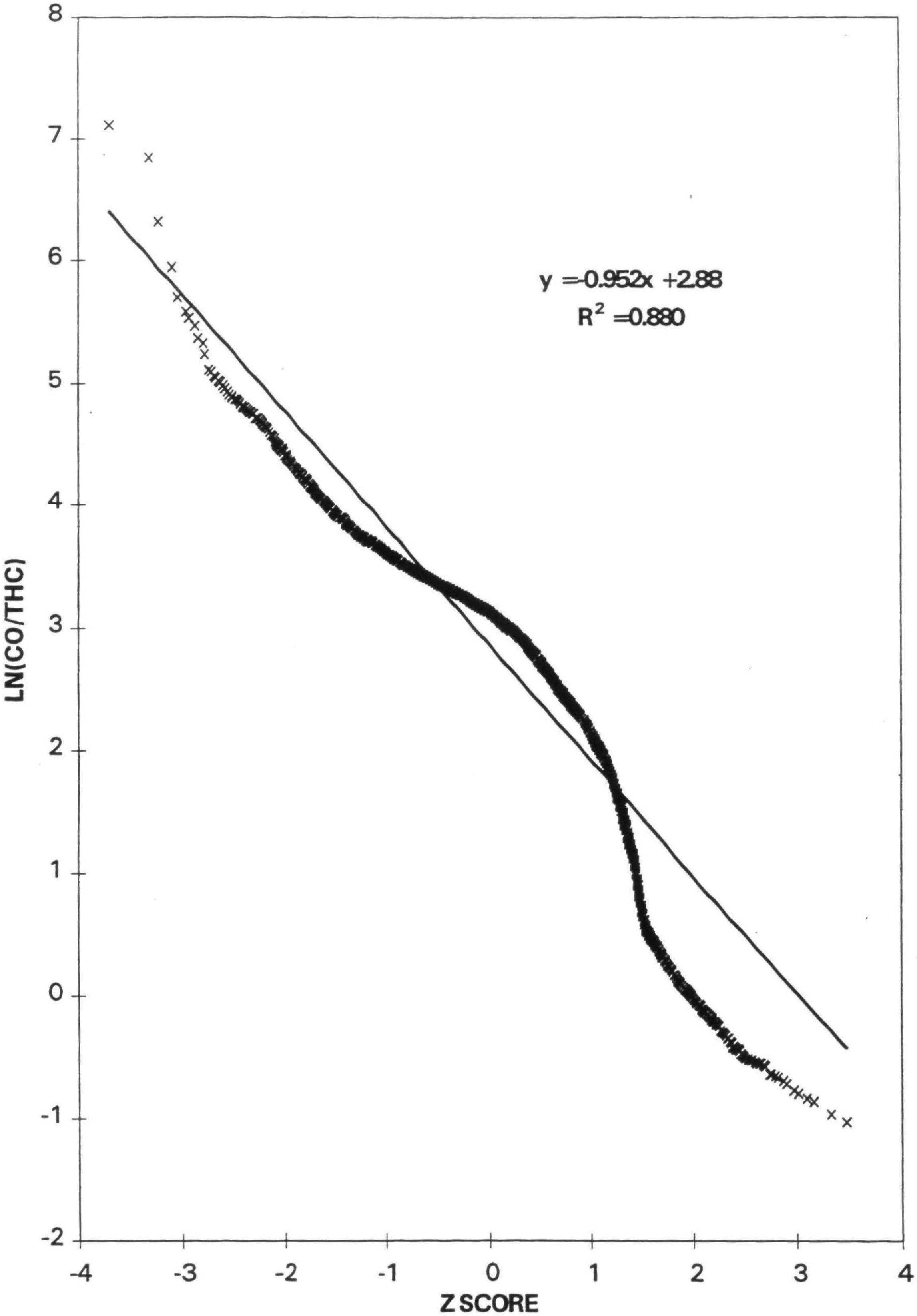

Figure 6.25 Ln(CO/THC) vs. Z SCORE, All Plants

The process of determining the CO concentration at which the THC concentration can be estimated to be below 100 ppm at a given level of confidence is demonstrated in Table 6.13. The data used in the table are the combined data base that consists of all CO and THC data from the 11 plants from which we have data.

TABLE 6.13

SELECTION OF CONFIDENCE LEVEL AND CO CONCENTRATION FROM LOG-NORMAL DISTRIBUTIONS. BASED ON LOG-NORMAL DISTRIBUTION OF ENTIRE DATA SET

Percent of Values Greater Than (Confidence)	Z SCORE	LN(CO/THC)	CO/THC Ratio at Given Confidence	Maximum CO to Assure that THC < 100 ppm
0.1	-3.09	5.82	338.3	33,830
1.0	-2.33	5.10	163.5	16,350
5.0	-1.64	4.45	85.4	8,540
10	-1.28	4.10	60.4	6,040
90	1.28	1.66	5.26	526
95	1.64	1.31	3.72	372
99	2.33	0.67	1.95	195
99.9	3.09	-0.06	0.94	94

From Figure 6.25 we note that:

$$\ln(CO/THC) = 2.88 - 0.952 * ZSCORE$$

Where: Z = Z SCORE (or the number of standard deviations from the mean)

Thus at Z SCORE = 2.33

$$\ln(CO/THC) = 0.667$$

Then:

$$CO/THC = exp(0.667)$$

And:

$$CO/THC = 1.95$$

Since we are looking for the CO concentration at which the THC concentration is equal to or less than 100 ppm:

$$CO = THC * 1.95 = 195 ppm$$

This technique has been used to calculate the 90%, 95% and 99% confidence level concentrations of CO at which THC can be estimated to be 100 ppm or less for each of the 11 plants, and for the combined data base. The results of these calculations are displayed in Table 6.14, along with the slope, intercept, and correlation coefficient of the lines of best fit of each data set. The data from Cleveland show lower CO/THC ratios than typical plants, while the data from Vancouver show higher CO/THC ratios. On the whole the correlations are good. The correlation for the combined data set ("All Data") demonstrate excellent correlation. This frequency distribution can be used to assign a maximum average CO concentration that provides assurance that the THC concentration is 100 ppm or less.

OBSERVED EFFECT OF SCRUBBER ON CONCENTRATION OF TOTAL HYDROCARBONS

During this program, the authors used a great deal of data that were provided by other researchers. These other researchers chose to measure the concentration of THC and CO in the exit gases of the sewage sludge incinerators that they sampled. This choice is not unexpected, since the existing regulation applies to the concentration of THC in the exit gases. During this program, the test team measured concentrations in the breeching between the furnace and in the exhaust stack. The evaluation of the kinetic model required the measurement of THC and CO concentrations in the breeching, prior to any possible influence from the scrubber. Comparison of the results to the exhaust gas regulation requires that concentrations be measured in the exit gases. It is possible that some operators may choose to locate the sample probe for their continuous emission monitoring systems (CEMS) in the breeching rather than in the stack. If this is to happen, they must know the effect of wet scrubbers on the concentration of THC.

TABLE 6.14

PLOT STATISTICS AND THRESHOLD CO CONCENTRATIONS FOR DATA SETS

Plant Location	Statistics for Line of Best Fit			CO to Assure 100 ppm THC with Designated Confidence		
	Slope	Inter-cept	Correlation Coefficient	99%	95%	90%
Arlington (1991)	-0.622	2.937	0.936	444	678	850
Arlington (1995)	-0.525	3.079	0.907	641	917	1,110
Cleveland	-1.198	2.076	0.947	59	126	190
Hopewell	-0.998	2.835	0.893	167	330	474
Huntington	-0.699	2.989	0.936	391	630	812
Lorton	-0.398	3.214	0.906	985	1292	1,493
Vancouver	-0.459	3.795	0.975	1528	2090	2,470
WERF 1	-0.160	2.134	0.925	582	649	688
WERF 2	-0.540	3.291	0.953	764	1100	1,340
WERF 3	-0.707	3.038	0.898	404	653	844
Williamsburg	-0.956	2.363	0.859	115	330	465
All Data	-0.952	2.881	0.880	195	372	526

There are two possible effects that the scrubber might have on the THC concentration in the furnace exit gas. THC concentration may be decreased, or it may be increased by passage through the scrubber. A decrease in THC concentration is easily understood, it could be the result of removal of the relatively water-soluble components of the furnace exit gases. These soluble components consist of the organic alcohols, ketones, acids, and aldehydes that are produced by inefficient combustion. An increase in the THC concentration could be the result of stripping of organic compounds from the scrubber water. Most sewage treatment plants use final effluent to scrub the exit gases from the sewage sludge incinerator. This water may contain organic compounds that could be stripped during passage through the scrubber. It is true that this water has undergone extensive aeration during the secondary treatment stage and that during this treatment most of the volatile and slightly soluble organic constituents have been removed. The next stage in the sewage treatment process is removal of the solids from the wastewater by settling in quiescent tanks for anywhere from 16 to 24 hours. This step would seem to present the opportunity for formation of additional organic compounds through partial biological oxidation of the solids content of the water. This possibility seemed less probable, but was deemed worthy of investigation.

Table 6.15 contains a statistical summary of the data. The average value, the maximum value, the minimum value, and the standard deviation and the relative standard deviation are given for each of the 4 plants that were sampled during this program. Also given are the arithmetic average of the ratio of THC_{out}/THC_{in} and the average of the natural logarithms of these individual ratios.

THC concentration data first were adjusted to standard conditions (7% O_2, Dry) and then the concentration at the scrubber inlet was plotted against the concentration at the outlet from the scrubber for the same 5-minute periods. These plots (Figures 6.26 through 6.29) for the individual plants showed good correlation in some cases - Arlington (1995) and Cleveland - and poor correlation in others - Hopewell and Huntington. Neither the data nor the operating conditions during the collection of the data offer any explanation of why the correlation should be good in some cases and poor in others. When the data from all four plants is pooled and plotted (Figure 6.30) the result is also poor. The slope of these lines should be the ratio by which the inlet concentration is multiplied to estimate the outlet concentration of THC. A second means to calculate the same ratio is to calculate the geometric mean of the ratio outlet THC concentration divided by the corresponding inlet THC concentration. Table 6.16 displays this ratio in the last column. These two estimates of the control effectiveness of the wet scrubber should be comparable. The two estimates are comparable for the cases where the correlation coefficient of the line of best fit is high; the estimates are poorly related when the correlation coefficient of the line of best fit is poor. It appears that a few data points yield unexpectedly high values for the Outlet/Inlet ratio at the Hopewell, Virginia plant. These high values affect the Hopewell data and the pooled data. Some appear to be caused by unexpectedly high inlet THC concentrations, others appear to be caused by unexpectedly low outlet THC concentrations. These values are called unexpected when they do not fall into the same general concentration range as the values that immediately preceded them or followed them in the temporal record. All of the data passed the pertinent quality control checks, so we cannot reject them merely because they do not support this particular analysis.

Table 6.15
SUMMARY OF TOTAL HYDROCARBON CONCENTRATIONS IN TO AND OUT OF WET SCRUBBERS AT SEWAGE SLUDGE INCINERATORS

Statistical Data	Total Hydrocarbon Data			
	(ppm @ 7% O_2, Dry)		Ratio	Ln(Out/In)
	Scrubber Inlet	Scrubber Outlet	Out/In	(Unitless)
Arlington				
Average	60.4	63.2	1.05	0.03
Standard Deviation	40.5	48.3	3.97	0.12
Rel. Std. Deviation	67	76	275	404
Maximum	309.8	479.6	87.58	0.29
Minimum	1.7	21.9	0.10	-0.2
Cleveland				
Average	10.3	8.6	0.83	-0.17
Standard Deviation	15.0	11.9	0.27	0.28
Rel. Std. Deviation	146	139	30	170
Maximum	118.2	93.0	1.95	0.67
Minimum	2.4	2.6	0.43	-0.8
Hopewell				
Average	90.4	44.0	0.49	-0.32
Standard Deviation	226.8	55.2	0.76	0.72
Rel. Std. Deviation	251	126	83	224
Maximum	2189.1	497.8	6.57	1.88
Minimum	3.4	2.1	0.02	-3.8
Huntington				
Average	10.2	7.8	0.77	-0.25
Standard Deviation	4.4	3.3	0.23	0.30
Rel. Std. Deviation	43	42	28	119
Maximum	40.0	29.9	1.63	0.49
Minimum	2.1	1.9	0.37	-1.0
All Plants				
Average	50.9	42.2	0.83	-0.1017
Standard Deviation	110.1	48.4	2.81	0.55
Rel. Std. Deviation	216	115	245	537
Maximum	2189.1	497.8	87.58	4.5
Minimum	1.7	1.9	0.02	-3.8

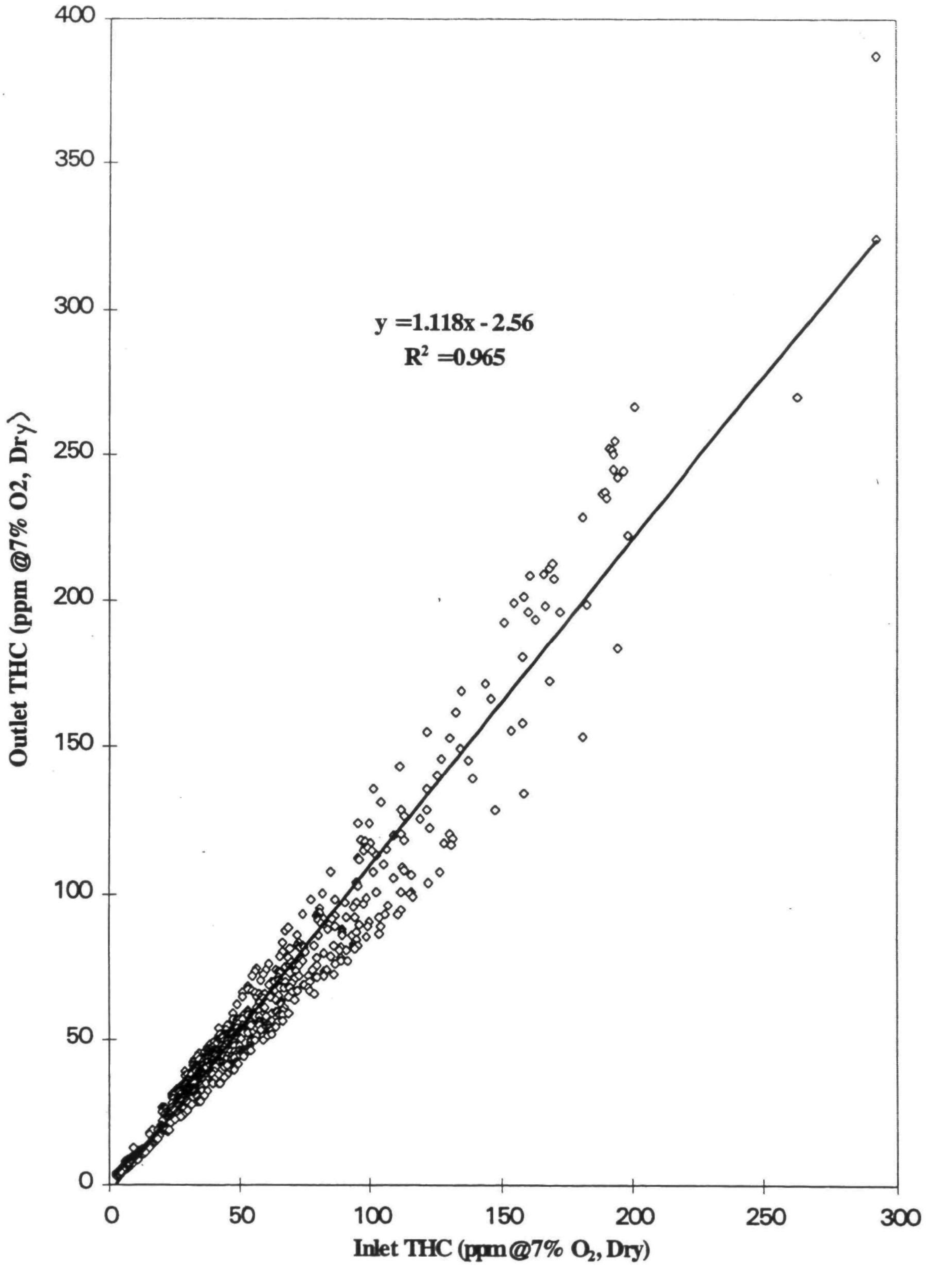

Figure 6.26 Total Hydrocarbon Concentration at Scrubber Inlet vs. Scrubber Outlet. Arlington, Virginia, 1995

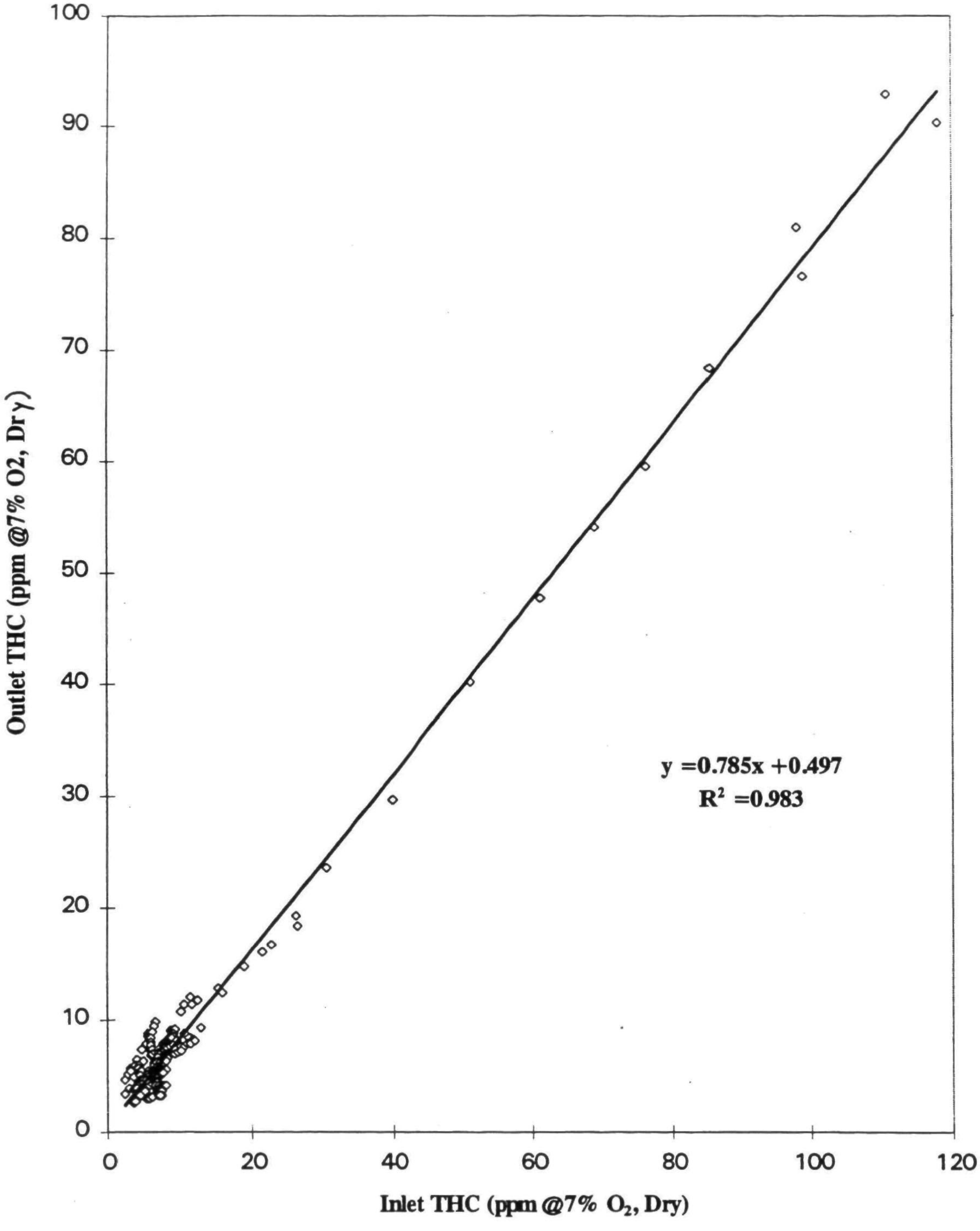

Figure 6.27 Total Hydrocarbon Concentration at Scrubber Inlet vs. Scrubber Outlet. Cleveland, Ohio, 1995

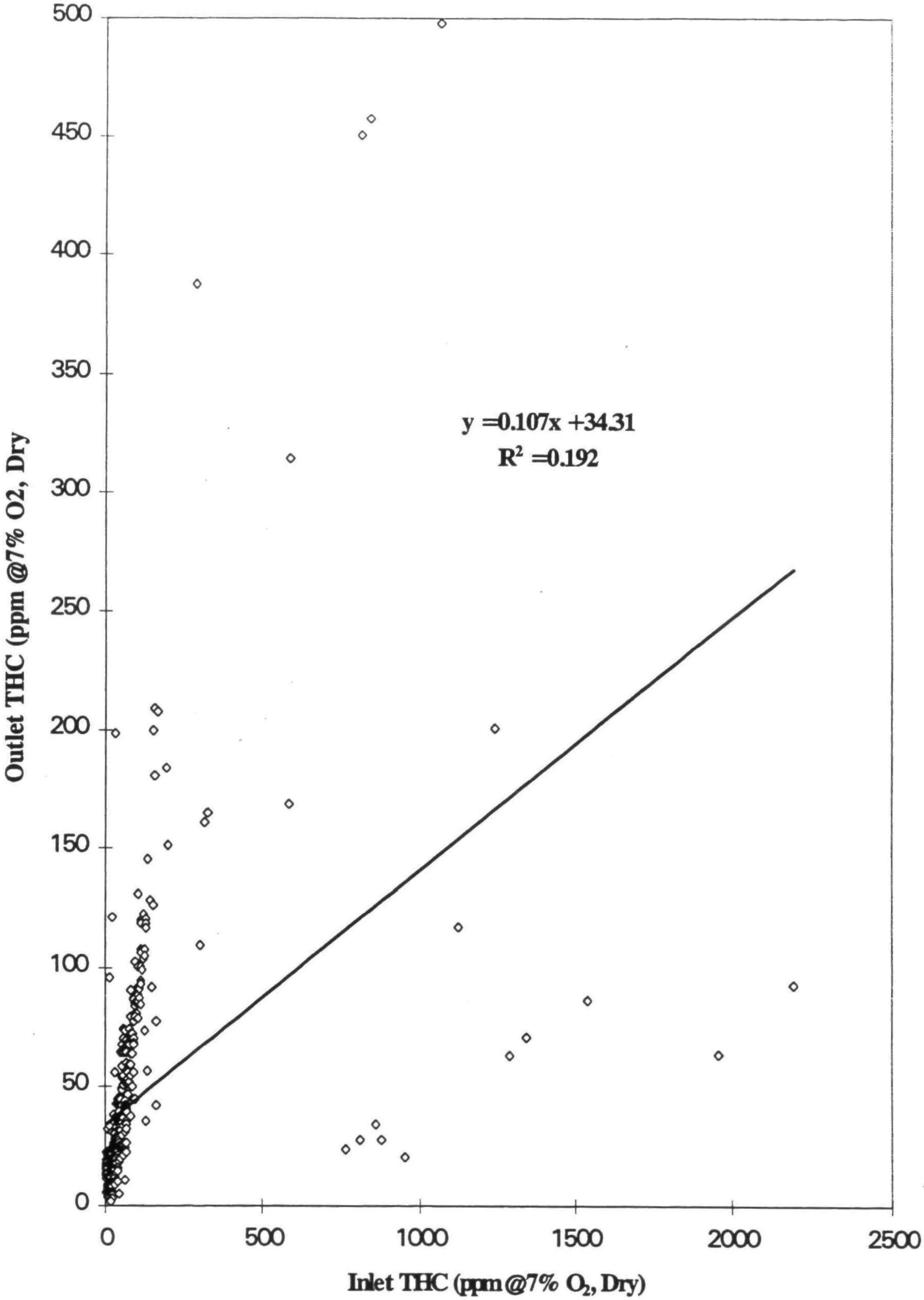

Figure 6.28 Total Hydrocarbon Concentration at Scrubber Inlet vs. Scrubber Outlet. Hopewell, Virginia, 1995

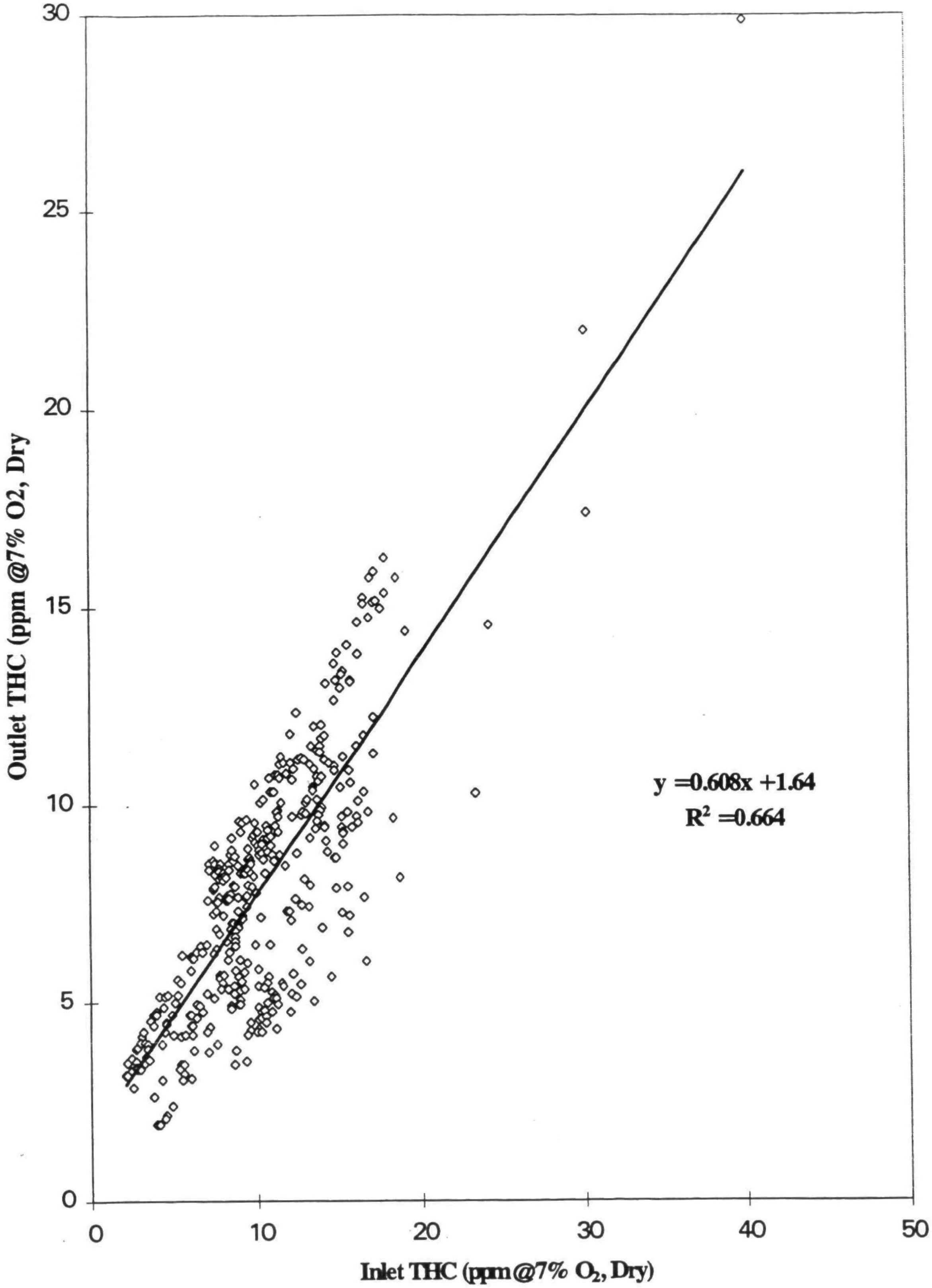

Figure 6.29 Total Hydrocarbon Concentration at Scrubber Inlet vs. Scrubber Outlet. Huntington, West Virginia, 1995

TABLE 6.16

SUMMARY OF PLOT DATA STATISTICS FOR THC_{OUT} VS. THC_{IN} PLOTS

Plant	Statistics for the THC_{out} vs. THC_{in} Plots			
	Slope	Intercept	Correlation Coefficient (r^2)	Arithmetic Average THC_{out}/THC_{in}
Arlington (1995)	1.12	-2.6	0.965	1.07 (a)
Cleveland (1995)	0.78	0.5	0.983	0.86
Hopewell (1995)	0.11	34.4	0.192	0.73
Huntington (1995)	0.61	1.64	0.664	0.78
All Four (pooled)	0.19	32.3	0.193	0.90

(a) The average value of this ratio should be equal to the slope of the line of best fit.

Overall, the data support a conclusion that the wet scrubbers at sewage sludge incinerators remove from 10 to 20 percent of the THC in the inlet gas. The data from Arlington appear to support the contention that the scrubber may contribute THC to the gas stream in some cases.

The second approach selected for analysis of the efficiency of removal of THC by wet scrubbers was preparation of log normal distribution plots of the ratio THC_{out}/THC_{in}. Figures 6.31 through 6.34, which are the log-normal plots for the individual plants demonstrate that this approach has merit. The correlation coefficients for all of the plots are excellent. Figure 6.35 is a similar plot for the pooled data from all four (4) of the plants that were sampled during this program. The correlation for this plot is very good. The analysis presented in Table 6.17 is also encouraging. The intercept of the line of best fit for a log-normal distribution is a the point where Z SCORE is equal to zero. The frequency at Z SCORE = 0 is 50%, which is the mean value of the parameter on the y axis. In this case, the y-axis parameter is the natural logarithm of the ratio THC_{out}/THC_{in}. The anti-log of this number is equal to the geometric mean of the population. In this case the value of the geometric mean calculated by taking the anti-log of the average logarithm of the ratio is nearly identical to the geometric mean found at the 50^{th} percentile of the distribution. Tables 6.16 and 6.17, thus, reaffirm our earlier observation that the log-normal distribution better describes exit gas parameters than does the normal distribution. The results of the analysis demonstrate that, for three of the plants sampled, the scrubber removes from 10 to 25 percent of the THC in the gas entering the scrubber. The scrubber at the

Arlington plant appears to have increased the THC concentration by approximately 3 percent.

TABLE 6.17
SUMMARY OF PLOT DATA STATISTICS
FOR THC_{OUT}/THC_{IN} V.S. Z SCORE PLOTS

Plant	Statistics of THC_{out}/THC_{in} vs. Z SCORE Plots				Statistics of the Data	
	Slope	Inter-cept	Correl. Coef. (r^2)	Estimate of Fraction of THC Remaining {exp(Intercept)}	Geometric Mean (THC_{out}/THC_{in})	Estimate of Fraction of THC Remaining (Geometric Mean)
Arlington (1995)	0.12	0.03	0.97	1.03	0.030	1.03(b)
Cleveland	0.28	-0.17	0.97	0.85	-0.17	.85
Hopewell	-0.66	-0.32	0.85	0.73	-0.32	.73
Huntington	-0.29	-0.29	0.97	0.75	-0.29	.78
All Four (pooled)	-0.50	-0.10	0.84	0.90	-0.10	.90

(b) The geometric mean is equal to the antilogarithm of the intercept of the line of best fit.

The conclusion of this analysis is that, on the average, the wet scrubbers removed 10 percent of the THC in the gases entering the scrubber.

OBSERVED EMISSIONS OF CHLORINATED DIBENZO-DIOXINS AND DIBENZO-FURANS

The U.S. Environmental Protection Agency (EPA) continues to evaluate both the health effects and the emissions of chlorinated dibenzo-dioxins and dibenzo-furans (CDF) in conjunction with the ongoing "Dioxin Reassessment" program. The managers of that program asked the EPA Office of Water to add CDF sampling and analysis to the sampling and analysis that was proposed for this program. CDF emissions were measured in the exit gases from the scrubbers at three of the four plants tested. The plants sampled are described briefly in Table 6.17.

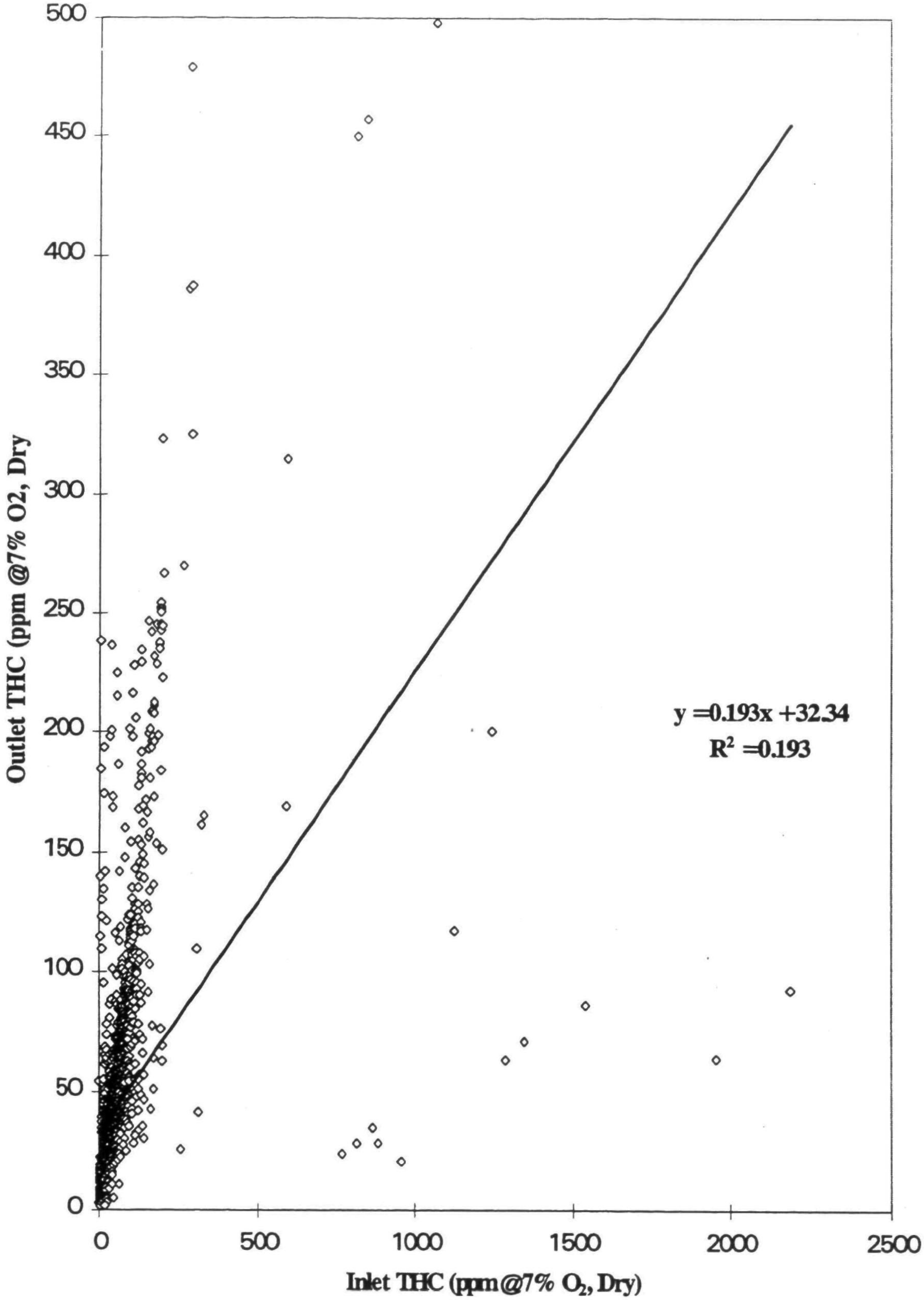

Figure 6.30 Total Hydrocarbon Concentration at Scrubber Inlet vs. Scrubber Outlet. Pooled Data from all 4 Plants Sampled

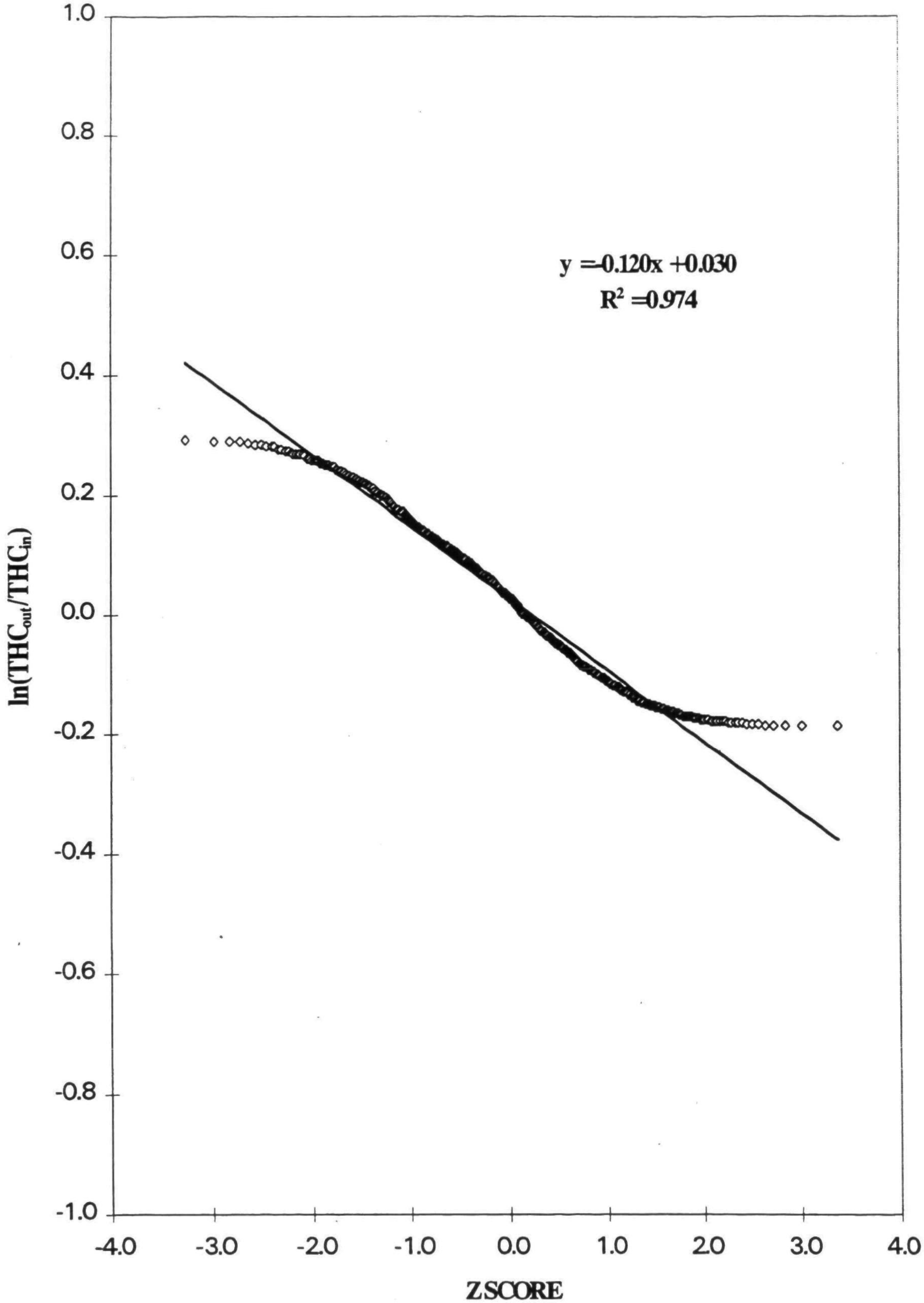

Figure 6.31 ln(THC_{out}/THC_{in}) vs. Z SCORE. Arlington, Virginia, 1995

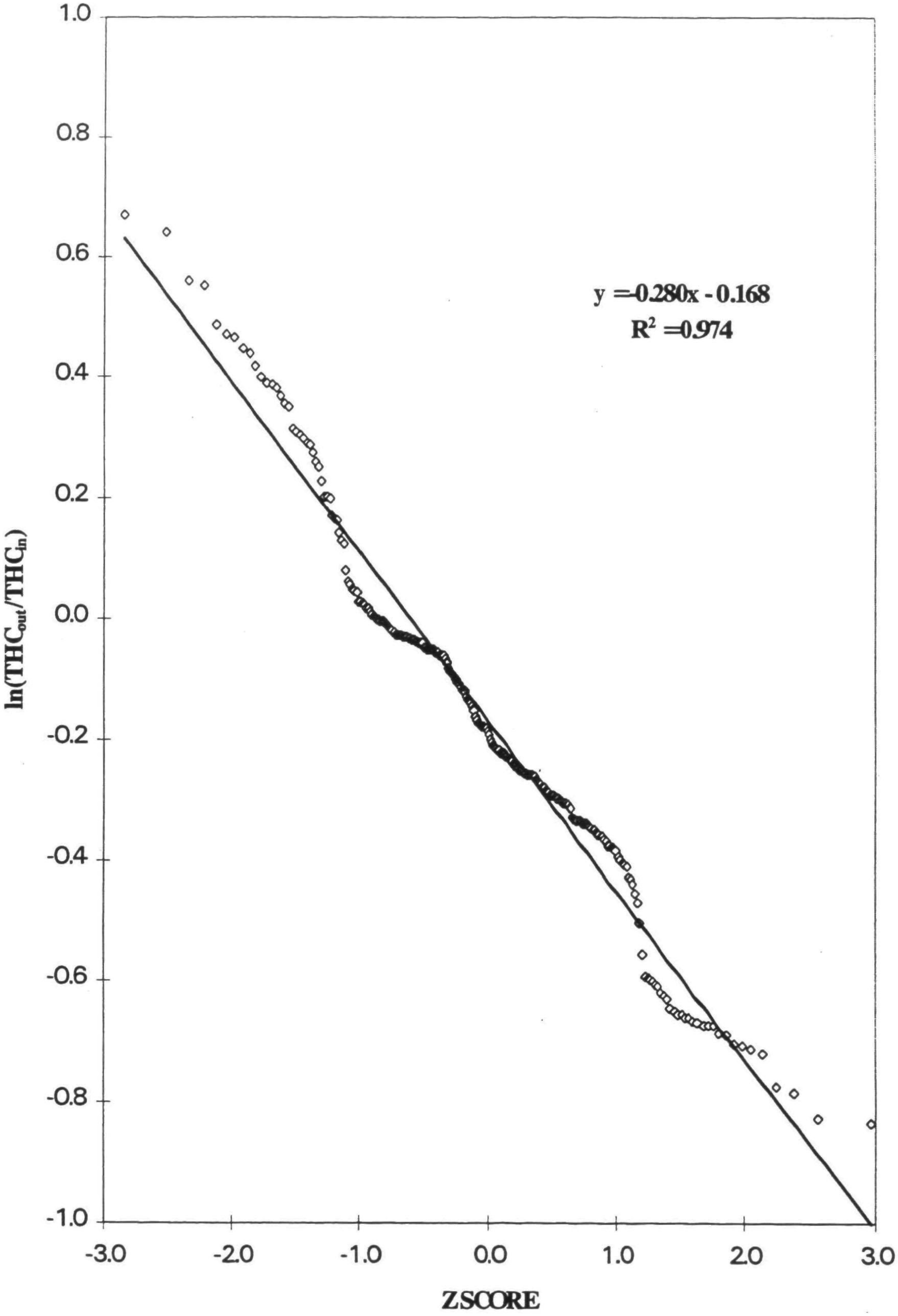

Figure 6.32 ln(THC_{out}/THC_{in}) vs. Z SCORE. Cleveland, Ohio, 1995

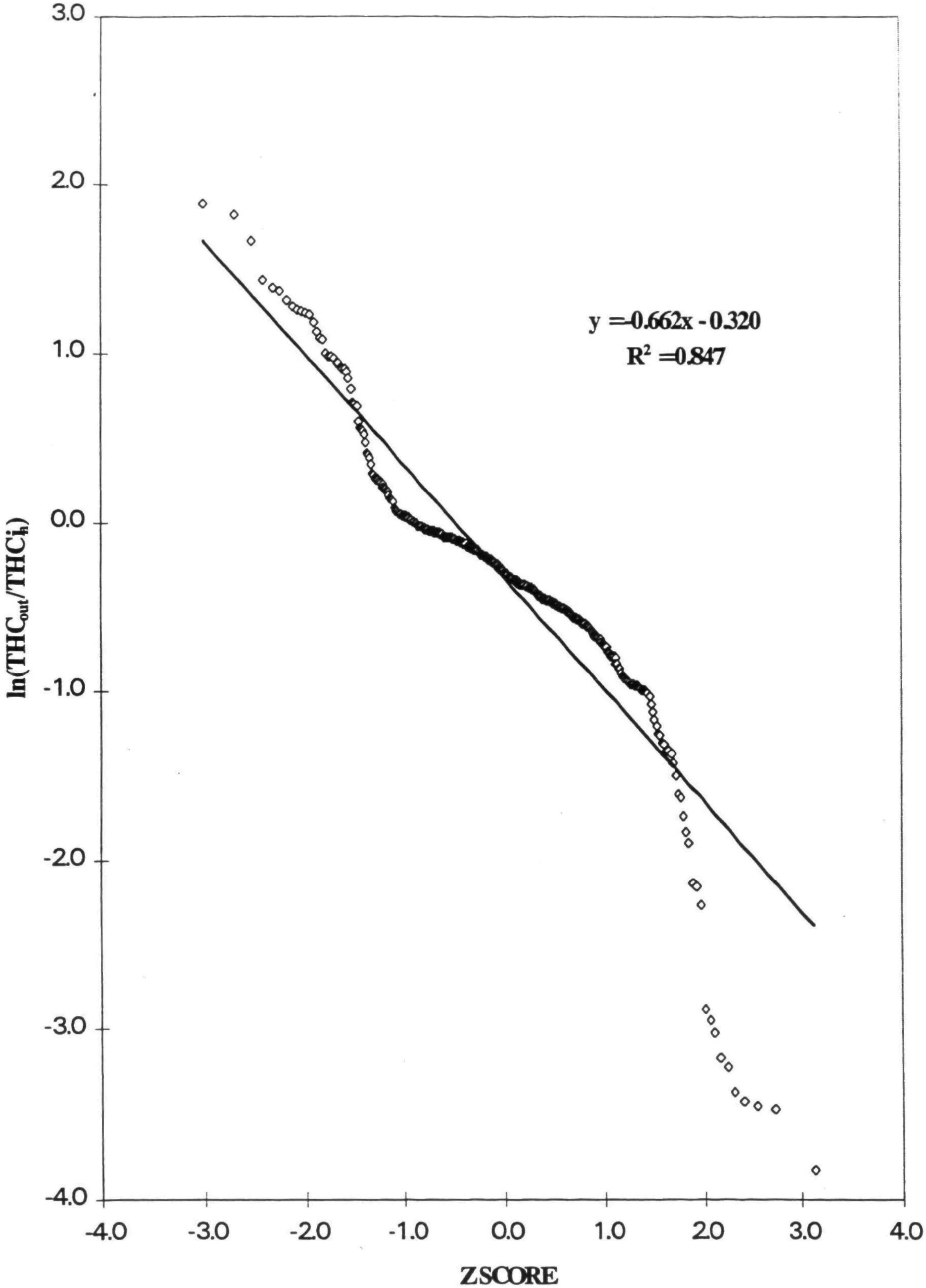

Figure 6.33 ln(THC_{out}/THC_{in}) vs. Z SCORE. Hopewell, Virginia, 1995

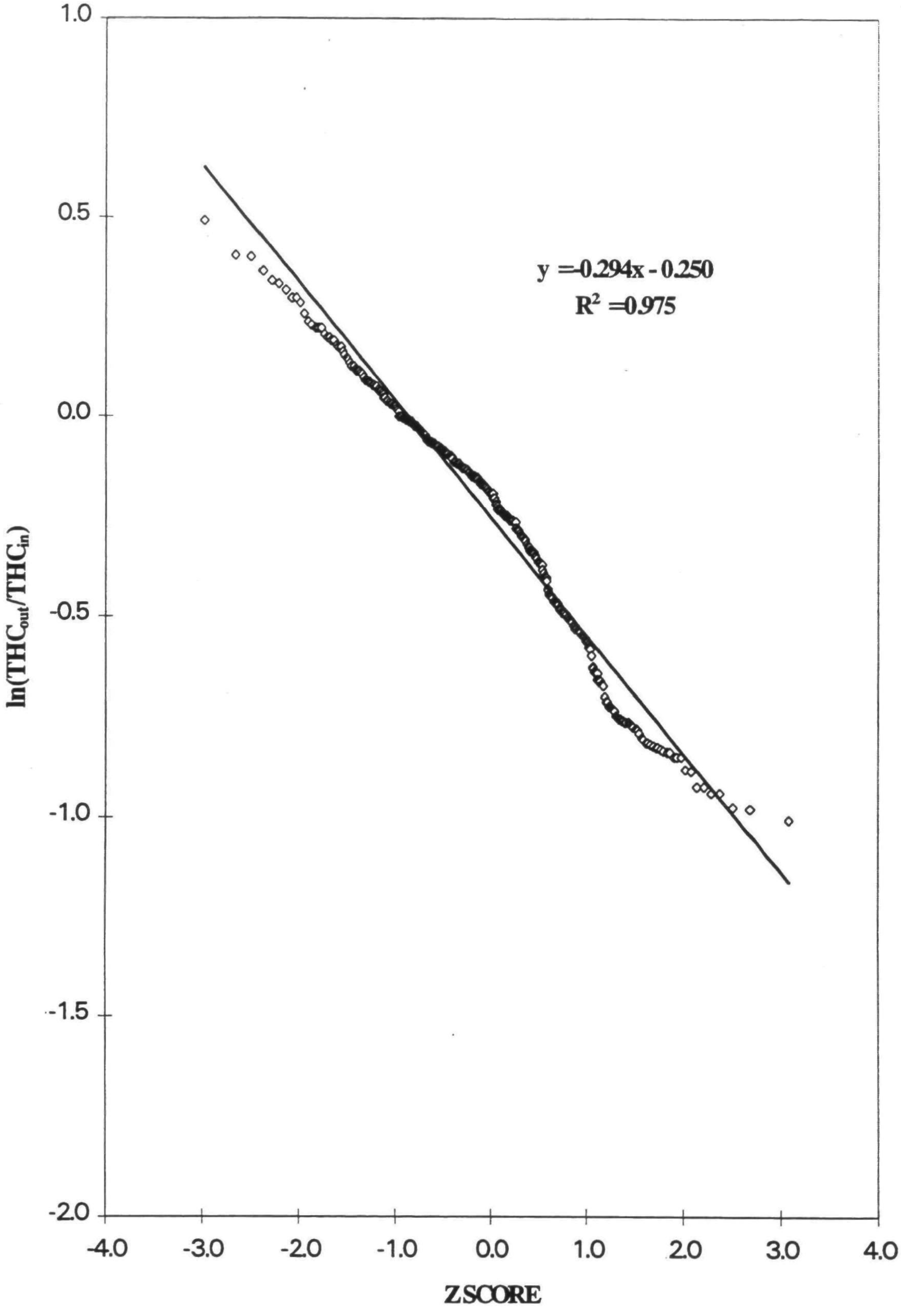

Figure 6.34 ln(THC_{out}/THC in) vs. Z SCORE. Huntington, West Virginia, 1995

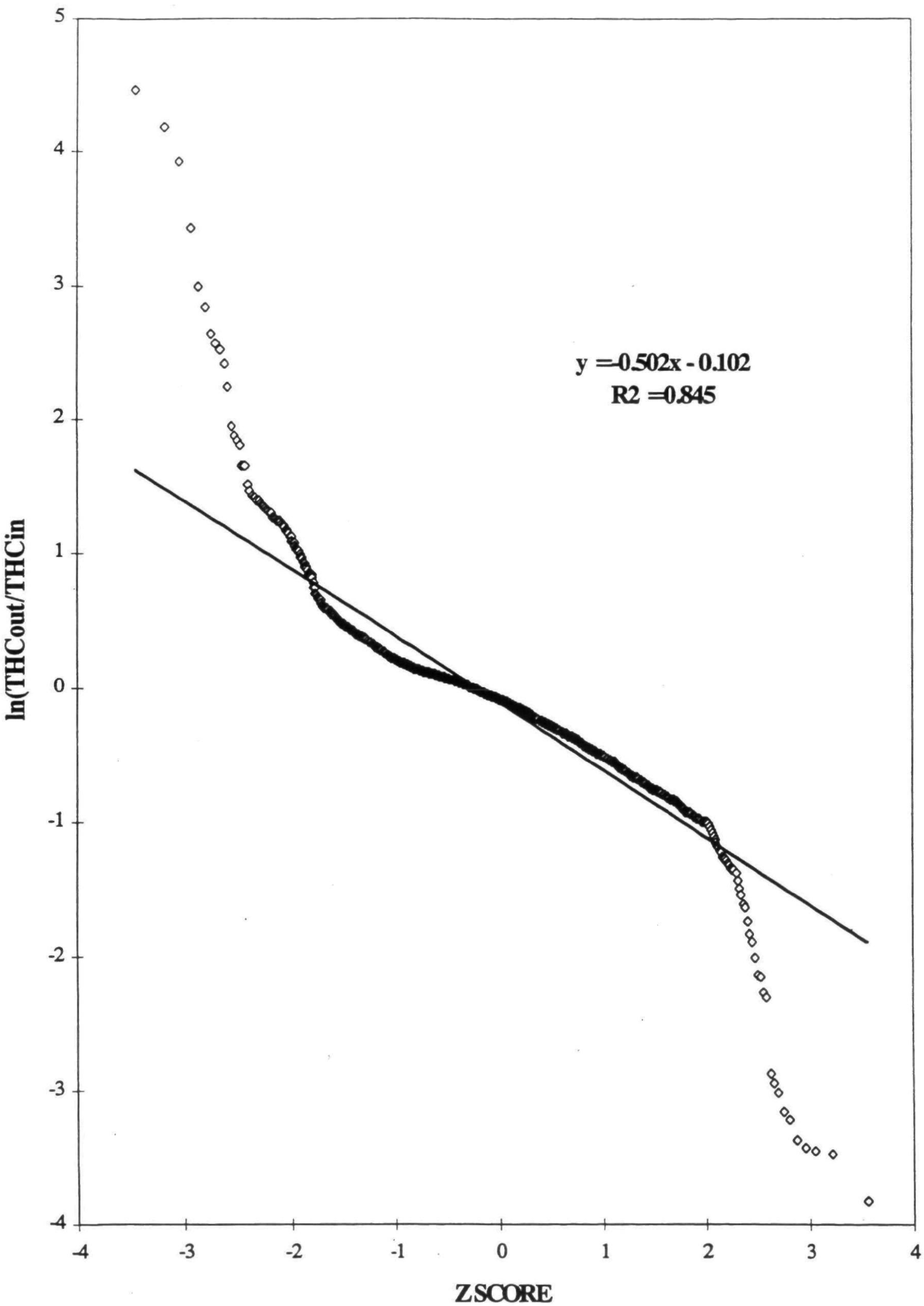

Figure 6.35 ln(THCout /THC_{in}) vs. Z SCORE. Pooled Data from All Plants

TABLE 6.18

DESCRIPTIONS OF THE SEWAGE SLUDGE INCINERATORS TESTED FOR CDF EMISSIONS

Plant Name	Furnace Type	Afterburner Type	Scrubber Type
Arlington (1995)	Multiple Hearth	None	Venturi.
Cleveland	Multiple Hearth	On-Hearth	Venturi
Huntington	Fluid Bed	None	Venturi.

All sampling and analysis for CDF was done by EPA Method 23. The results (in Tables 6.19 through 6.21) are the results of the CDF analyses done during this project. They are expressed as total nanograms of each substance per sample. Tables 6.22 through 6.25 are the same results expressed in nanograms per dry standard cubic meter (std. cond. @ 68°F) of exit gas. The next to last column in Tables 6.22 through 6.25 contains the average results of the three runs with non-detected (ND) taken to be zero (0). The last column in each of these tables contains the average of the three results with ND taken to be equal to the limit of detection of the analysis.

Table 6.26 contains a summary of the CDF data collected by these investigators, and data that were provided to EPA by the Association of Municipal Sewage Authorities (AMSA) in January 1995 and updated in May 1995. The results for the data collected during this project are expressed as a range. The lower of the two values is the average result with ND taken as zero (0); the higher result is the average with ND taken to be the limit of detection during the analysis. The table also contains the concentration limits that EPA recently (March 1996) proposed for hazardous waste combustors, and concentration limits that EPA suggested (July 1996) for medical waste incinerators. These recent regulatory initiatives are included to place the emissions of CDF from sewage sludge incinerators into the perspective of recent EPA thinking.

TABLE 6.19 ANALYTICAL RESULTS ARLINGTON WASTEWATER TREATMENT PLANT (Analytical results in nanograms per sample train)					
ANALYTE	RUN NUMBER				
	1	2	3	TRIP BLANK	FIELD BLANK
Results of isomer specific analyses					
2,3,7,8 TCDF	19.4	7.1	6.9	ND	ND
2,3,7,8 TCDD	2.3	2.4	2.0	ND	ND
1,2,3,7,8 PECDF	2.9	1.9	1.9	ND	ND
2,3,4,7,8 PECDF	10.3	6.0	5.8	ND	ND
1,2,3,7,8 PECDD	1.4	1.4	1.3	ND	ND
2,3,4,7,8 PECDD	ND	ND	ND	ND	ND
1,2,3,4,7,8 HXCDF	2.3	1.6	1.5	ND	ND
1,2,3,6,7,8 HXCDF	1.4	1.0	ND	ND	ND
1,2,3,7,8,9 HXCDF	ND	ND	ND	ND	ND
2,3,4,6,7,8 HXCDF	3.1	2.0	2.4	ND	ND
1,2,3,4,7,8 HXCDD	0.2	0.2	ND	ND	ND
1,2,3,6,7,8 HXCDD	0.6	0.6	ND	ND	ND
1,2,3,7,8,9 HXCDD	0.4	0.4	0.4	ND	ND
1,2,3,4,6,7,8 HPCDF	ND	ND	ND	ND	ND
1,2,3,4,7,8,9 HPCDF	0.7	0.3	0.4	ND	ND
1,2,3,4,6,7,8 HPCDD	1.0	0.5	0.5	ND	ND
OCDF	2.2	0.4	0.4	ND	ND
OCDD	2.4	0.5	0.6	ND	ND
2,3,7,8 TCDD Tox. Eq.	11.0	7.5	6.8	0	0
Surrogate Recovery (%)	157	122	172	--	108
Results of total congener analyses					
TCDF	145.9	117.0	99.7	ND	ND
TCDD	147.9	143.0	112.9	ND	ND
PECDF	64.6	47.9	46.7	ND	ND
PECDD	11.9	14.7	12.6	ND	ND
HXCDF	20.7	15.5	15.5	ND	ND
HXCDD	3.9	4.6	4.2	ND	ND
HPCDF	1.5	0.9	1.2	ND	ND
HPCDD	2.0	1.3	1.1	ND	ND
PCDF	2.2	0.4	0.4	ND	ND
PCDD	2.4	0.5	0.6	ND	ND
Total Dioxins (ng)	168.1	164.1	131.2	0.0	0.0
Total Furans (ng)	235.0	181.7	163.5	0.0	0.0
TOTAL CDF (ng)	403.0	345.8	294.7	0.0	0.0

TABLE 6.20 Table 6.20 ANALYTICAL RESULTS CLEVELAND SOUTHERLY WASTEWATER TREATMENT CENTER (Analytical results in nanograms per sample train)					
ANALYTE	RUN NUMBER				
	1	2	3	TRIP BLANK	FIELD BLANK
Results of isomer specific analyses					
2,3,7,8 TCDF	0.0204	0.045	ND	ND	ND
2,3,7,8 TCDD	ND	ND	ND	ND	ND
1,2,3,7,8 PECDF	ND	ND	ND	ND	ND
2,3,4,7,8 PECDF	ND	ND	ND	ND	ND
1,2,3,7,8 PECDD	ND	ND	ND	ND	ND
2,3,4,7,8 PECDD	ND	ND	ND	ND	ND
1,2,3,4,7,8 HXCDF	ND	ND	ND	ND	ND
1,2,3,6,7,8 HXCDF	ND	ND	ND	ND	ND
1,2,3,7,8,9 HXCDF	ND	ND	ND	ND	ND
2,3,4,6,7,8 HXCDF	ND	ND	ND	ND	ND
1,2,3,4,7,8 HXCDD	ND	ND	ND	ND	ND
1,2,3,6,7,8 HXCDD	ND	ND	ND	ND	ND
1,2,3,7,8,9 HXCDD	ND	ND	ND	ND	ND
1,2,3,4,6,7,8 HPCDF	ND	ND	ND	ND	ND
1,2,3,4,7,8,9 HPCDF	ND	ND	ND	ND	ND
1,2,3,4,6,7,8 HPCDD	ND	ND	ND	ND	ND
OCDF	ND	ND	ND	ND	ND
OCDD	ND	ND	ND	ND	ND
2,3,7,8 TCDD Tox. Eq.	0.0	0.0	0.0	0	0
Surrogate Recovery (%)	127.0	146.0	162.0	113	118
Results of total congener analyses					
TCDF	0.26	0.65	0.12	ND	ND
TCDD	0.1	0.5	0.4	ND	ND
PECDF	0.0	0.5	ND	ND	ND
PECDD	ND	ND	ND	ND	ND
HXCDF	ND	0.3	ND	ND	ND
HXCDD	ND	ND	ND	ND	ND
HPCDF	ND	ND	ND	ND	ND
HPCDD	ND	ND	ND	ND	ND
PCDF	ND	ND	ND	ND	ND
PCDD	ND	ND	ND	ND	ND
Total Dioxins (ng)	0.1	0.5	0.4	0	0
Total Furans (ng)	0.3	1.5	0.1	0	0
TOTAL CDF (ng)	0.4	1.9	0.5	0.0	0.0

TABLE 6.21 ANALYTICAL RESULTS HUNTINGTON WASTEWATER TREATMENT PLANT (Analytical results in nanograms per sample train)					
ANALYTE	RUN NUMBER				
	1	2	3	TRIP BLANK	FIELD BLANK
Results of isomer specific analyses					
2,3,7,8 TCDF	ND	ND	ND	ND	ND
2,3,7,8 TCDD	ND	ND	ND	ND	ND
1,2,3,7,8 PECDF	ND	ND	ND	ND	ND
2,3,4,7,8 PECDF	ND	ND	ND	ND	ND
1,2,3,7,8 PECDD	ND	ND	ND	ND	ND
2,3,4,7,8 PECDD	ND	ND	ND	ND	ND
1,2,3,4,7,8 HXCDF	ND	ND	ND	ND	ND
1,2,3,6,7,8 HXCDF	ND	ND	ND	ND	ND
1,2,3,7,8,9 HXCDF	ND	ND	ND	ND	ND
2,3,4,6,7,8 HXCDF	ND	ND	ND	ND	ND
1,2,3,4,7,8 HXCDD	ND	ND	ND	ND	ND
1,2,3,6,7,8 HXCDD	ND	ND	ND	ND	ND
1,2,3,7,8,9 HXCDD	ND	ND	ND	ND	ND
1,2,3,4,6,7,8 HPCDF	ND	ND	ND	ND	ND
1,2,3,4,7,8,9 HPCDF	ND	ND	ND	ND	ND
1,2,3,4,6,7,8 HPCDD	ND	ND	ND	ND	ND
OCDF	ND	ND	ND	ND	ND
OCDD	ND	ND	ND	ND	ND
2,3,7,8 TCDD Tox. Eq.	0.0	0.0	0.0	0	0
Surrogate Recovery (%)	128.0	116.0	111.0	110	113
Results of total congener analyses					
TCDF	0.041	0.043	0.082	ND	ND
TCDD	5.7	5.4	5.4	ND	ND
PECDF	0.0	ND	ND	ND	ND
PECDD	ND	ND	ND	ND	ND
HXCDF	ND	0.3	ND	ND	ND
HXCDD	ND	ND	ND	ND	ND
HPCDF	ND	ND	ND	ND	ND
HPCDD	ND	ND	ND	ND	ND
PCDF	ND	ND	ND	ND	ND
PCDD	ND	ND	ND	ND	ND
Total Dioxins (ng)	5.7	0.5	5.4	0.0	0.0
Total Furans (ng)	0.06	0.0	0.1	0.0	0.0
TOTAL CDF (ng)	5.7	0.5	5.4	0.0	0.0

TABLE 6.22 CONCENTRATION OF DIOXINS AND FURANS ARLINGTON WASTEWATER TREATMENT PLANT INCINERATOR (All concentrations in nanograms of TEQ per cubic meter)					
ANALYTE	RUN NUMBER				
				AVERAGE	
	1	2	3	ND =0	ND =MDL
Isomer specific concentrations					
2,3,7,8 TCDF	4.07	1.56	1.52	0.24	0.24
2,3,7,8 TCDD	0.49	0.51	0.45	0.48	0.48
1,2,3,7,8 PECDF	0.61	0.41	0.41	0.02	0.02
2,3,4,7,8 PECDF	2.16	1.32	1.28	0.79	0.79
1,2,3,7,8 PECDD	0.30	0.31	0.29	0.15	0.15
2,3,4,7,8 PECDD	ND	ND	ND	0.00	0.00
1,2,3,4,7,8 HXCDF	0.48	0.34	0.33	0.04	0.04
1,2,3,6,7,8 HXCDF	0.29	0.22	ND	0.02	0.02
1,2,3,7,8,9 HXCDF	ND	ND	ND	0.00	0.00
2,3,4,6,7,8 HXCDF	0.65	0.45	0.53	0.05	0.05
1,2,3,4,7,8 HXCDD	0.03	0.04	ND	0.00	0.00
1,2,3,6,7,8 HXCDD	0.13	0.13	ND	0.01	0.01
1,2,3,7,8,9 HXCDD	0.09	0.09	0.08	0.01	0.01
1,2,3,4,6,7,8 HPCDF	ND	ND	ND	0.00	0.00
1,2,3,4,7,8,9 HPCDF	0.15	0.07	0.09	0.00	0.00
1,2,3,4,6,7,8 HPCDD	0.20	0.12	0.10	0.00	0.00
OCDF	0.47	0.10	0.09	0.00	0.00
OCDD	0.51	0.12	0.13	0.00	0.00
2,3,7,8 TCDD Tox. Eq.	10.61	5.79	5.31	1.82	1.83
Surrogate Recovery (%)	127.0	146.0	162.0	113	118
Total congener concentrations					
TCDF	30.7	25.6	22.0	26.1	26.1
TCDD	31.1	31.3	25.0	29.1	29.1
PECDF	13.6	10.5	10.3	11.5	11.5
PECDD	2.5	3.2	2.8	2.8	2.8
HXCDF	4.4	3.4	3.4	3.7	3.7
HXCDD	0.8	1.0	0.9	0.9	0.9
HPCDF	0.3	0.2	0.3	0.3	0.3
HPCDD	0.4	0.3	0.2	0.3	0.3
OCDF	0.5	0.1	0.1	0.2	0.2
OCDD	0.5	0.1	0.1	0.3	0.3
Total Dioxins (ng)	35.3	35.9	29.0	0.0	0.0
Total Furans (ng)	49.4	39.8	36.1	0.0	0.0
TOTAL CDF (ng)	84.7	75.7	65.2	0.0	0.0

TABLE 6.23 CONCENTRATION OF DIOXINS AND FURANS CLEVELAND SOUTHERLY WASTEWATER TREATMENT PLANT (All concentrations in picograms of TEQ per cubic meter)					
ANALYTE	RUN NUMBER				
	1	2	3	AVERAGE ND =0	AVERAGE ND =MDL
Isomer specific concentrations					
2,3,7,8 TCDF	4.23	8.36	ND	0.42	0.55
2,3,7,8 TCDD	ND	ND	ND	0.00	3.96
1,2,3,7,8 PECDF	ND	ND	ND	0.00	0.99
2,3,4,7,8 PECDF	ND	ND	ND	0.00	9.91
1,2,3,7,8 PECDD	ND	ND	ND	0.00	9.91
2,3,4,7,8 PECDD	ND	ND	ND	0.00	0.99
1,2,3,4,7,8 HXCDF	ND	ND	ND	0.00	1.98
1,2,3,6,7,8 HXCDF	ND	ND	ND	0.00	1.98
1,2,3,7,8,9 HXCDF	ND	ND	ND	0.00	1.98
2,3,4,6,7,8 HXCDF	ND	ND	ND	0.00	1.98
1,2,3,4,7,8 HXCDD	ND	ND	ND	0.00	1.98
1,2,3,6,7,8 HXCDD	ND	ND	ND	0.00	1.98
1,2,3,7,8,9 HXCDD	ND	ND	ND	0.00	1.98
1,2,3,4,6,7,8 HPCDF	ND	ND	ND	0.00	0.20
1,2,3,4,7,8,9 HPCDF	ND	ND	ND	0.00	0.20
1,2,3,4,6,7,8 HPCDD	ND	ND	ND	0.00	0.20
OCDF	ND	ND	ND	0.00	0.04
OCDD	ND	ND	ND	0.00	0.04
2,3,7,8 TCDD Tox. Eq.	4.23	8.36	0.00	0.42	40.85
Surrogate Recovery (%)	127.0	146.0	162.0	113	118
Total congener concentrations					
TCDF	53.9	120.8	24.2	66.3	66.3
TCDD	26.9	87.3	70.5	61.6	61.6
PECDF	3.3	100.3	ND	34.5	41.3
PECDD	ND	ND	ND	0.0	19.8
HXCDF	ND	48.3	ND	16.1	29.7
HXCDD	ND	ND	ND	0.0	19.8
HPCDF	ND	ND	ND	0.0	19.8
HPCDD	ND	ND	ND	0.0	19.8
OCDF	ND	ND	ND	0.0	39.6
OCDD	ND	ND	ND	0.0	39.6
Total Dioxins (ng)	26.9	87.3	70.5	0.0	0.0
Total Furans (ng)	57.2	221.1	24.2	0.0	0.0
TOTAL CDF (ng)	84.2	308.4	94.6	0.0	0.0

TABLE 6.24 CONCENTRATION OF DIOXINS AND FURANS HUNTINGTON WASTEWATER TREATMENT PLANT (All concentrations in nanograms of TEQ per cubic meter)					
ANALYTE	RUN NUMBER				
				AVERAGE	
	1	2	3	ND =0	ND =MDL
Isomer specific concentrations					
2,3,7,8 TCDF	ND	ND	ND	0.00	0.00
2,3,7,8 TCDD	ND	ND	ND	0.00	0.00
1,2,3,7,8 PECDF	ND	ND	ND	0.00	0.00
2,3,4,7,8 PECDF	ND	ND	ND	0.00	0.01
1,2,3,7,8 PECDD	ND	ND	ND	0.00	0.01
2,3,4,7,8 PECDD	ND	ND	ND	0.00	0.00
1,2,3,4,7,8 HXCDF	ND	ND	ND	0.00	0.00
1,2,3,6,7,8 HXCDF	ND	ND	ND	0.00	0.00
1,2,3,7,8,9 HXCDF	ND	ND	ND	0.00	0.00
2,3,4,6,7,8 HXCDF	ND	ND	ND	0.00	0.00
1,2,3,4,7,8 HXCDD	ND	ND	ND	0.00	0.00
1,2,3,6,7,8 HXCDD	ND	ND	ND	0.00	0.00
1,2,3,7,8,9 HXCDD	ND	ND	ND	0.00	0.00
1,2,3,4,6,7,8 HPCDF	ND	ND	ND	0.00	0.00
1,2,3,4,7,8,9 HPCDF	ND	ND	ND	0.00	0.00
1,2,3,4,6,7,8 HPCDD	ND	ND	ND	0.00	0.00
OCDF	ND	ND	ND	0.00	0.00
OCDD	ND	ND	ND	0.00	0.00
2,3,7,8 TCDD Tox. Eq.	0.00	0.00	0.00	0.00	0.04
Surrogate Recovery (%)	127.0	146.0	162.0	113	118
Total congener concentrations					
TCDF	0.0	0.1	0.0	0.1	0.1
TCDD	1.1	0.1	0.1	0.4	0.4
PECDF	0.0	0.1	ND	0.0	0.0
PECDD	ND	ND	ND	0.0	0.0
HXCDF	ND	0.0	ND	0.0	0.0
HXCDD	ND	ND	ND	0.0	0.0
HPCDF	ND	ND	ND	0.0	0.0
HPCDD	ND	ND	ND	0.0	0.0
OCDF	ND	ND	ND	0.0	0.0
OCDD	ND	ND	ND	0.0	0.0
Total Dioxins (ng)	1.1	0.1	0.1	0.0	0.0
Total Furans (ng)	0.0	0.2	0.0	0.0	0.0
TOTAL CDF (ng)	1.1	0.3	0.1	0.0	0.0

TABLE 6.25

Table 6.25 CONCENTRATIONS OF DIOXINS AND FURANS[1]

(All concentrations in nanograms per cubic meter)

PLANT	2,3,7,8 TCDD Tox. Eq. (ng/m^3)	TOTAL CONGENERS (ng/m^3)
Proposed Medical Waste Incinerator Rule Feb. 1995 Proposal		
New	1.9	80
Existing	1.9	80
July 1996 EPA "Inclinations"		
New-Large and Medium	0.6	25
Small	2.3	125
Existing- Large	2.3	125
Medium	2.3	125
Small	?	?
Proposed Hazardous Waste Combustor Rule March 1996 Proposal		
New and Existing	0.2	None
Data Collected During This Project		
Cleveland Southerly	0.0004 <TEQ <0.04	0.18 <C <36
Huntington	0.0 <TEQ <0.04	0.52 <C <0.69
Arlington	1.82 <TEQ <1.83	75.2
Data from AMSA Report to USEPA		
AMSA Site A	<0.163	<3.00
AMSA Site B	<0.029	[2]
AMSA Site C	<0.0693	<0.64
AMSA Site D	<0.892	<39.55 [4]
AMSA Site E-1	<0.892	<6.83
AMSA Site E	<0.11	<4.05
AMSA Site F	<0.108	<2.08
AMSA Site G	<0.326	[3]
AMSA Site H	<0.0166	<1.43
AMSA Site I	<0.0162	<4.19
AMSA Site J	<0.437	<12.50
AMSA Site K	<0.341	<13.02

[1] Assumes all compounds are present at their minimum detection limit

[2] Minimum detection limits were not reported

[3] Data are not provided

[4] Average of results from 10 incinerators

SECTION 7

CONCLUSIONS

This conclusions section will consider the results of the analysis of the work that was done in pursuit of accomplishing each of the purposes that were stated in Section 1. During the course of this work, several other observations or conclusions were made by the investigators. These conclusions will be presented as part of the discussion of the conclusions about the purposes.

The first stated purpose was to determine if there is a relationship between the concentrations of CO and THC in the exit gas from sewage sludge incinerators that will support the use of CO monitoring as a surrogate for THC monitoring. The initial investigation of this relationship took the form of using correlations between CO and THC concentrations. Several investigators have reported such correlations in the literature. This study attempted several forms of a correlation. One was a least squares fit of CO concentration vs THC concentration. The second was a statistical analysis of the distribution of CO/THC ratios. The third was the use of a first order kinetic model to relate CO concentration to THC concentration. The conclusions of this study are:

1) Correlation that allows estimation of the THC concentration from the CO concentration does not exist. Correlations between CO and THC appear to occur over the duration of short (4 hrs. to 8 hrs.) tests, but are not reliable for long periods of time.

2) Log-normal distributions of the ratio of CO concentration divided by THC concentration are linear and are reliable. The statistics of the distribution calculated for any given month are similar to the statistics of the annual distribution.

3) The distributions are site specific. An overall distribution was identified, but the correlation was not as good as most of the site specific correlations.

4) Additional data analysis is needed to determine which sewage sludge incinerator operating parameters must be recorded during a one-month test and controlled during subsequent operations.

5) Additional data analysis is needed to determine the allowable limits of variation of the important operating parameters that will allow flexibility for the sewage sludge incinerator operator and assure compliance with the emission standard.

6) The kinetic model did not adequately relate THC concentration to CO concentration. CO concentrations were not related to THC concentrations, probably because the mechanisms and locations of formation of the two pollutants in sewage sludge incinerators are different.

The statistical technique described above is different from a correlation between THC and CO. The statistical technique does not allow estimation of the THC concentration at any particular time, it only provides assurance that over an annual period, that no monthly average THC concentration will exceed 100 ppm. With a correlation technique, if one were possible, one could calculate the concentration of THC at a particular time based on the measured CO concentration.

The second purpose of this study was to measure the concentration of THC in the exit gas from well operated sewage sludge incinerators. Tests were conducted at four sewage sludge incinerators during these tests. The average value of the THC concentrations observed during those tests at the sewage sludge incinerators tested are listed below. These tests were of short duration, from 3 to 5 days in length. No special preparations were undertaken by the operators of any of the sewage sludge incinerators prior to the tests. These average values demonstrate the capability of the equipment over short periods of time, but do not address the THC emission standard, which is a monthly average. The data from Hopewell are not representative of the normal operation of that sewage sludge incinerator because, at the request of the test team, the operators made adjustments to the operation that would increase the THC emissions from the sewage sludge incinerator. Data accumulated from other sources show that typical THC concentrations in the exit gas from sewage sludge incinerators are less than 100 ppm (@7% O_2, Dry).

Additional observations about the concentration of THC in the exit gas from sewage sludge incinerators were made. These are described below.

1) The log-normal distributions of THC concentrations in the exit gas from sewage sludge incinerators were found to be linear.

2) The distribution for individual months were found to be similar to the annual distributions.

3) A test consisting of continuous monitoring of THC and operating parameters for a period of one month could be used to predict the maximum expected 30-day average THC concentration.

TABLE 7.1

SUMMARY OF TOTAL HYDROCARBON CONCENTRATIONS MEASURED AT INCINERATORS LISTED

Plant Location	Plant Description	Average THC Concentration (ppm @7% O2, Dry)
Arlington, Va.	MHF no Afterburner	63.2
Cleveland (Southerly), Oh.	MHF on Hearth Afterburner	8.6
Huntington, WV	Fluid Bed	7.8
Hopewell, Va.	MHF Secondary Combustion Chamber	44.0

4) Additional data analysis is needed to determine which sewage sludge incinerator operating parameters must be recorded during a one-month test and controlled during subsequent operations.

5) Additional data analysis is needed to determine the allowable limits of variation of the important operating parameters that will allow flexibility for the sewage sludge incinerator operator and assure compliance with the emission standard.

The third purpose of the investigation was to measure the concentrations of chlorinated dioxins and furans (CDF) in the exit gas from sewage sludge incinerators. Tests for CDF were done at three of the four sites tested. The test data showed the concentrations of total CDF congeners and 2,3,7,8 TCDD toxic equivalent at all three sites to be less than the concentrations that EPA is considering for medical waste incinerators. Only the concentrations measured at Arlington incinerator, which has no afterburner, were of the same order of magnitude as the proposed medical waste incinerator rules. The concentrations measured at the other two sites were less than the proposed medical waste incinerator regulations by two to three orders of magnitude.

The fourth purpose of this investigation was to study the relationship between final combustion zone temperature (and other operating parameters) and the concentration of THC in the exit gas. It is clear that if there is any relationship between the temperature of the final combustion zone and the concentration of THC in the exit gas, that the relationship will be described by the kinetic model. The study used the first order kinetic model. It is possible that some other order would be more appropriate. It is unlikely that the reaction is other than first order. Other correlation procedures have been tried, for example, simple linear plots of THC concentration vs the temperature of the final combustion zone. Transforms such as plots of the log of THC concentration vs the reciprocal of temperature are more linear. The best fits are found if the plot takes the form dictated by the first order kinetic model. The conclusions of the investigation are:

1) There is a relationship between the decrease in THC concentration in the final combustion zone and the temperature of the final combustion zone. That relationship is described by the first order kinetic model.

2) At a given temperature and oxygen content in the final combustion zone, the fractional destruction of THC in the final combustion zone is constant.

3) The kinetic model correlation between the THC in the exit gas and the temperature of the final combustion zone works well when the concentration of THC in the gas entering the final combustion zone is constant. These correlations usually work well for short (4 to 8 hours) time periods.

4) The concentration of THC in the gas entering the final combustion zone is not constant over long time periods.

5) Changes in sewage sludge incinerator operation or construction affect the concentration of THC in the gas entering the final combustion zone.

6) The kinetic model correlation tends to overpredict the exit gas THC concentration when the concentration of THC entering the final combustion zone is lower than it was when the correlation parameters were defined.

7) The kinetic model correlation tends to underpredict the exit gas THC concentration when the concentration of THC entering the final combustion zone is higher than it was when the correlation parameters were defined.

These last two results seriously compromise the ability of the kinetic model correlation to assure that the monthly average of the exit gas THC concentrations do not exceed 100 ppm. The model will underpredict the highest concentrations.

APPENDIX A

ARLINGTON CONTINUOUS MONITOR DATA

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
	9:55												
	10:00						84						
	10 05						84						
7/21/95	10 10						81						
7/21/95	10:15		5.9		14.1		53		12.3				
7/21/95	10:20		5.6		14.3		476		13.3				
7/21/95	10:25		5.5		14 4		167		14.5				
7/21/95	10:30		5.5		14 5		170		11 3				
7/21/95	10:35		4 6		15.5	97	163		15 9				
7/21/95	10:40		3 6		16.6	176	164	29 2	21.5		715		
7/21/95	10:45	6.7	3 9	12.7	16.2	827	169	53.0	23.6	1071	632		
7/21/95	10:50	7.1	4 2	12.2	15.8	824	170	89.1	25.0	888	521		
7/21/95	10.55	7.6	4 4	11 6	15.5	820	170	66 2	25 0	763	450		
7/21/95	11:00	8 6	5.0	10.2	14.8	825	173	53.7	23 6	697	405		
7/21/95	11:05	9.5	5 4	9.3	14 4	834	174	50 4	26 0	749	431		
7/21/95	11:10	9 2	5 4	9 7	14.3	843	171	45 1	24.0	673	404		
7/21/95	11:15	9 0	5.5	10 0	14.3	842	170	54.1	26.2	664	409		0 1
7/21/95	11:20	9 5	5.7	9.4	14.0	847	170	53.4	27.1	750	465		0 1
7/21/95	11:25	9 2	5.9	9.8	14.0	856	169	46.2	23.7	749	480		0.1
7/21/95	11:30	9.6	6 1	9.3	13.7	863	170	43.7	21.7	795	506		0.1
7/21/95	11:35	10.0	6 3	8.9	13.5	872	170	45.1	19.4	797	508	0.3	0.1
7/21/95	11:40	9 7	6 1	9.3	13.7	868	170	40 7	17.6	694	445	0.3	0.1
7/21/95	11:45	9.3	5.9	9.7	13.9	859	169	42.1	17.1	613	400	0.3	0.1
7/21/95	11:50	9.2	5.7	9.9	14.0	854	169	38.4	17.2	557	361	0.3	0.1
7/21/95	11:55	8 8	5.6	10.2	14.2	847	168	38.4	17.1	499	324	0.3	0.1
7/21/95	12:00	8 4	5.4	10.8	14.4	834	166	45.2	17.7	478	310	0.3	0.1
7/21/95	12:05	8.2	5.2	11.1	14.7	821	165	46.3	18.5	476	309	0.3	0.1
7/21/95	12:10	8.3	5.3	10.9	14.6	819	166	45.4	19.2	502	326	0.3	0.1
7/21/95	12:15		5.4	10.6	14.4	825	166	38.9	19.8		344	0.3	0.1
7/21/95	12:20	8.5	5.4	10.6	14.5	822	166	48.4	21.2	598	379	0.3	0.1
7/21/95	12:25	8.9	5.6	10.1	14.1	834	167	68.5	21.1	623	399	0.3	0.1
7/21/95	12:30	9.0	5.7	10 1	14.1	844	167	54.0	19.3	611	391	0 3	0.1
7/21/95	12:35	8.7	5.5	10.4	14.3	850	166	50.3	18.3	597	385	0.3	0.1
7/21/95	12·40	8.7	5.5	10.5	14.3	856	166	46.1	16.9	582	375	0.3	0.1
7/21/95	12:45	8.5	5.4	10 6	14.4	859	165	39.2	16.9	562	362	0.3	0.1
7/21/95	12:50	7.9	5.1	11.5	14.8	840	164	55.7	20.8	527	342	0.3	0.1
7/21/95	12:55	8.0	5 1	11 4	14.8	834	164	56.2	21.7	478	311	0.3	0.1
7/21/95	13.00	7.8	5.1	11.7	14.9	830	164	55.0	20.5	448	292	0.3	0.1
7/21/95	13:05	7.4	4 8	12.1	15 2	820	163	58.0	20.2	446	291	0.3	0.1
7/21/95	13:10	7.4	4.6	12.0	15.3	829	166	49.7	16.5	476	298	0.3	0.1
7/21/95	13:15	7.2	4.4	12.2	15.5	823	166	53.1	17.3	480	300	0.3	0.1
7/21/95	13:20	7.9	4.8	11.3	15 0	831	168	45.6	16.0	459	282	0.3	0.1
7/21/95	13:25	7.9	4 8	11.3	15.1	827	168	39.1	16.7	443	270	0.3	0.1
7/21/95	13:30	7.6	4.6	11.6	15.3	818	169	48.0	17.8	411	251	0.3	0.1
7/21/95	13:35	8.2	4 8	10.8	15.0	810	172	46.1	19.2	421	249	0.3	0.1
7/21/95	13:40	7.8	4.7	11.2	15.0	802	169	48.3	20.7	491	298	0.3	0.1
7/21/95	13:45	8 2	5.0	10.7	14.8	794	168	50.6	23.7	699	426	0.3	0.1
7/21/95	13:50	8.1	5.0	10.7	14.6	783	167	57.2	33.0	1230	940	0.3	0.1
7/21/95	13:55	7.2	4.6	11.8	14.9	769	163	64.3	33.8	1513	941	0.3	0.1
7/21/95	14:00	7.1	4.5	11.6	15.0	762	165	65.0	36.0	1759	1084	0.3	0.1
7/21/95	14:05	9.6	5.1	8.2	14.2	755	176	195.1	207.6	4200	2229	0.3	0.1
7/21/95	14:10	9.8	5 4	7.9	13.8	761	176	196.1	177.3	4425	2356	0.3	0.1
7/21/95	14.15	9.6	5.7	8.2	13.4	776	172	134.3	156.8	4051	2401	0.3	0.1
7/21/95	14:20	10.8	6.5	6.9	12.4	810	172	146.0	133.8	4050	2458	0.3	0.1
7/21/95	14:25	11.3	7.2	6.6	11.8	836	170	140.0	117.5	3284	2120	0.3	0.1
7/21/95	14:30	11.2	7.2	7.0	12.0	842	168	90.5	78.5	2342	1515	0.3	0.1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/21/95	14 35	10.8	7 1	7 7	12 3	854	167	54 1	34 1	1014	681	0.3	0 1
7/21/95	14 40	10 3	6 7	8 5	12 9	848	165	52 6	29 3	629	418	0 3	0 1
7/21/95	14 45	9 5	6 3	9 3	13 3	840	165	46 7	29 1	511	334	0 3	0 1
7/21/95	14:50	9 2	6 1	9 7	13 6	837	164	53 2	30 0	521	341	0.3	0.1
7/21/95	14.55	8 5	5 6	10.5	14 1	833	164	58 0	30 5	487	315	0 3	0 1
7/21/95	15·00	8.5	5.5	10 5	14 1	833	164	55.9	30 0	559	359	0 3	0 1
7/21/95	15.05	8 7	5 7	10.3	13 9	843	164	52.2	28 4	621	401	0.3	0 1
7/21/95	15:10	8.8	5 7	10.3	13 9	854	165	51.5	26 0	672	430	0.3	0.1
7/21/95	15:15	9 2	5 7	9.9	14 1	857	167	51.7	25 3	776	477	0 3	0.1
7/21/95	15.20	9 5	6 1	9.5	13.7	881	167	42.7	21.3	820	505	0 3	0 1
7/21/95	15:25	9.7	6.2	9 4	13 7	887	167	49.1	24.2	890	542	0.3	0.1
7/21/95	15:30	10.8	6.5	8 2	13.3	923	169	53.4	25.2	1092	637	0.3	0.1
7/21/95	15·35	9 6	5 9	9.6	14 0	938	168	55 7	22.1	668	407	0.3	0.1
7/21/95	15:40	7.3	4.2	12.4	15.9	889	169	45 1	16.3	557	340	0.3	0.1
7/21/95	15·45	7.3	4.2	12.3	15 9	882	170	44.8	14 9	763	462	0 3	0.1
7/21/95	15:50	6.7	3.8	12.8	16.2	871	169	48 7	18 4	781	477	0.3	0.1
7/21/95	15·55	6.7	3.9	12.6	16.0	869	171	45.7	16.2	755	443	0.3	0.1
7/21/95	16 00	7.2	4.2	12.0	15 7	872	171	44 8	15.1	787	459	0.3	. 0.1
7/21/95	16·05	7.7	4.4	11.5	15 4	885	172	37.3	14 3	734	428	0.3	0.1
7/21/95	16.10	7.6	4.4	11 6	15.5	887	171	39.8	14 6	710	419	0.3	0.1
7/21/95	16:15	8.1	4.8	11.3	15.0	911	171	28.2	12.9		406	0.3	0.1
7/21/95	16.20	7.8	4.5	11.6	15.4	921	171	38 4	13 0	623	397	0 3	0.1
7/21/95	16 25	7.1	4.2	12.3	15 8	917	170	46 9	13 3	559	351	0.3	0.1
7/21/95	16:30	6.7	4.0	12.8	16 0	917	170	45.4	13.5	400	239	0.3	0.1
7/21/95	16:35	5.7	3.4	13.9	16.6	892	170	47.2	15.6	566	348	0.3	0.1
7/21/95	16·40	5.8	3.5	13.5	16.5	893	170	48.2	14.3	631	387	0.3	0.1
7/21/95	16:45	6.5	3.8	12.8	16 1	901	171	40.1	12.5	600	358	0.3	0.1
7/21/95	16:50	6 6	3.9	12.8	16.0	902	171	39.1	11.7	596	360	0.3	0.1
7/21/95	16:55					894	222					0.3	0.1
7/21/95	17:00					888	171					0.3	0.1
7/21/95	17:05					878	171					0.3	0.1
7/21/95	17:10					874	171					0.3	0.1
7/21/95	17:15					875	170					0.3	0.1
7/21/95	17:20					873	172					0.3	0.1
7/21/95	17:25					869	172					0.3	0.1
7/21/95	17:30	7 7	4.5	11.2	15.5	872	171		13.6		418	0.3	0.1
7/21/95	17:35	7.9	4 6	11.1	15.4	837	169	43.2	13.8	692	408	0.3	0.1
7/21/95	17:40	8.0	4.6	11.1	15.3	669	169	32.6	13.5	702	414	0.3	0.1
7/21/95	17:45	8 0	4 7	11 0	15.3	868	169	30 9	14 5	705	417	0.3	0.1
7/21/95	17.50	7.7	4.4	11.5	15.5	858	168	28.5	15.9	678	400	0.3	0.1
7/21/95	17:55	7.1	4 2	12.0	15.8	839	167	32.9	18.6	625	368	0.3	0 1
7/21/95	18:00	7.0	4.1	12.0	15.8	828	167	43.2	23.7	557	328	0.3	0.1
7/21/95	18:05	8.0	4.6	10.6	15 1	841	170	38.2	19.9	460	271	0.3	0.1
7/21/95	18·10	8.3	4 9	10.2	14.8	841	168	36.9	22 1	472	278	0.3	0.1
7/21/95	18:15	8 1	5.0	10.5	14.7	836	164	48.0	27.0	550	341	0.3	0.1
7/21/95	18:20	8.8	5.4	9.7	14.2	840	165	42.5	27.8	752	465	0.3	0.1
7/21/95	18:25	9.8	5.9	8.7	13 7	846	165	39.2	30.7	1029	620	0.3	0.1
7/21/95	18:30	10.6	6.3	7.9	13.3	856	165	44.5	36.7	1397	826	0.3	0.1
7/21/95	18:35	10.7	6.4	8.0	13.3	850	163	46.3	39.8	1503	889	0.3	0 1
7/21/95	18:40	11.2	6.6	7.5	13.1	855	162	57.9	43.6	1755	1028	0.3	0.1
7/21/95	18 45	11.4	6.8	7.4	13.0	860	160	52.5	44.2	1736	1034	0.3	0.1
7/21/95	18·50	11.1	6.7	7.8	13.2	867	163	41.6	25.1	1185	727	0.3	0.1
7/21/95	18:55	10.8	6.4	8.2	13.4	877	163	36.5	20.3	963	587	0.3	0.1
7/21/95	19:00	9.7	5 9	9.3	14 0	865	163	33.5	18 7	695	427	0.3	0.1
7/21/95	19:05	9.2	5 6	9.7	14.3	861	164	30 7	15.7	505	313	0.3	0.1
7/21/95	19.10	8.5	5.3	10.5	14.7	840	164	34.2	16.1	466	288	0.3	0.1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/21/95	19:15	8.4	5 2	10.7	14 7	834	163	32 9	18 3	421	267	0.3	0.1
7/21/95	19.20	8 3	5 1	10.8	14.8	832	164	30.0	16 7	401	252	0.3	0 1
7/21/95	19:25	8.4	5 2	10 6	14.7	852	163	32 9	17.3	494	304	0.3	0 1
7/21/95	19·30	9.0	5.5	9 9	14 3	873	164	29 3	16 0	476	295	0 3	0 1
7/21/95	19 35	8.9	5 5	10.1	14 4	881	164	24 1	14 9	448	280	0.3	0 1
7/21/95	19 40	8 5	5 3	10 6	14 7	884	164	24 8	13 5	446	280	0.3	0.1
7/21/95	19 45	8 6	5 3	10.4	14.6	892	164	26 6	13.1	469	293	0 3	0.1
7/21/95	19 50	9.0	5.5	9.9	14 3	905	164	23 4	12 7	528	329	0.3	0 1
7/21/95	19 55	9 5	5 7	9 5	14 1	918	164	24 1	12 0	597	371	0.3	0.1
7/21/95	20 00	10 3	6.3	8 6	13.6	935	164	25 6	13 8	686	412	0.3	0.1
7/21/95	20 05	9 2	5 6	10.2	14.5	929	162	27 6	12 8	549	353	0.3	0.1
7/21/95	20 10	7 0	4.5	12.5	15.6	886	158	33 5	17 2	532	345	0 3	0.1
7/21/95	20 15	6.1	4 0	13.3	16 1	865	157	40 5	18.7	548	361	0 3	0.1
7/21/95	20:20	7 4	4 4	11.7	15 6	871	164	35.1	13.8	483	293	0 3	0 1
7/21/95	20:25	7 8	4.6	11.3	15 3	881	165	30 4	14 6	484	291	0 3	0 1
7/21/95	20 30	7.6	4 7	11.6	15 2	886	161	35 3	16.9	473	301	0 3	0.1
7/21/95	20.35	8 2	5 1	10.7	14 8	894	163	31.5	16 8	506	314	0 3	0 1
7/21/95	20.40	9.0	5 5	9.8	14.4	906	165	29 8	16 6	556	343	0.3	0.1
7/21/95	20:45	9.8	5.9	9.1	14 0	918	165	28 8	16 6	642	395	0 3	0 1
7/21/95	20·50	10.1	6 1	8 8	13.8	913	164	31 3	19.1	849	503	0.3	0.1
7/21/95	20 55	11.1	6 7	7.7	13 2	939	162	35 7	25.2	1043	612	0.3	0.1
7/21/95	21.00	10.1	6 0	9.1	14.1	931	162	37 8	21.9	832	505	0 3	0.1
7/21/95	21.05	7 6	4 6	11.8	15.5	878	161	36.2	16 6	572	355	0.3	0.1
7/21/95	21.10	7 4	4 3	12.0	15 8	847	164	34 8	16.1	635	374	0 3	0.1
7/21/95	21·15	7.2	4 5	11.8	15.5	847	163	32.6	14.8	506	313	0.3	0.1
7/21/95	21·20	8 4	5 1	10.5	14 7	859	165	29.0	12.6	491	301	0.3	0.1
7/21/95	21 25	9 4	5 6	9 4	14.2	873	167	26.3	11 5	501	305	0.3	0 1
7/21/95	21:30	9 9	5.9	8 9	13.9	884	167	23.1	10.6	518	312	0.3	0.1
7/21/95	21·35	9.1	5.5	10.0	14.5	869	165	25.9	11.2	567	340	0 3	0 1
7/21/95	21.40	8.9	5 4	10 2	14 6	864	164	28.6	10.9	582	352	0 3	0.1
7/21/95	21:45	9 2	5.5	9.9	14.4	876	164	25.1	10.5	565	342	0 3	0.1
7/21/95	21:50	8.7	5.2	10 6	14.8	867	164	26.6	11 4	583	358	0 3	0 1
7/21/95	21:55	8 2	5 0	11.0	15.1	873	164	28.9	12 0	586	365	0 3	0.1
7/21/95	22 00	8 2	5 0	11.0	15.1	876	163	26.0	12 6	551	370	0 3	0 1
7/21/95	22·05	8 6	5 2	10 6	14 8	897	164	25 2	10 0	516	327	0 3	0.1
7/21/95	22.10	6 3	3 9	13.1	16.4	847	163	31 5	13 1	744	470	0 3	0 1
7/21/95	22.15	11.5				827	165					0 3	0.1
7/21/95	22·20	10.9				808	165						0.1
7/21/95	22·25	9 8				788	160						0 1
7/21/95	22:30	8 8				764	161						0.1
7/21/95	22 35	8.3				786	167						0.1
7/21/95	22 40	8.2				818	167						0 1
7/21/95	22 45	8 2				822	166						0.1
7/21/95	22 50	8.6				788	168						
7/21/95	22 55	9 5				812	171						
7/21/95	23.00					774	170						
7/21/95	23·05						164						
7/21/95	23 10							53.9					
7/21/95	23:15			7 3		831		28.6		1251			
7/21/95	23 20			8.0		830		25.2		930			
7/21/95	23 25		5 8	9.4	14 1	819	165	20 0	17 2	604	343		
7/21/95	23:30		5 4	10 4	14 5	797	163	24 0	17.8	515	314		
7/21/95	23 35		5 2	11 0	14 8	781	162	23 1	17 2	491	301		
7/21/95	23 40		5 1	11 1	14 9	771	161	27 2	18 2	488	300		
7/21/95	23:45		5 1	11 1	14 9	767	161	27 0	17 7	530	324		
7/21/95	23·50		5 3	10 6	14 6	773	162	25 9	16 8	601	365		

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/21/95	23:55		5.8	9.5	14 0	795	162	23 5	15.7	720	429		
7/22/95	0·00	11.0	6.6	7 8	13 2	836	161	28.1	24.0	991	585		
7/22/95	0 05	9.8	5.9	9 5	14.0	839	161	20 8	16 0	650	416		
7/22/95	0:10	7.7	4 8	11.8	15 2	803	158	22.3	14.7	572	373		
7/22/95	0.15	6.3	4 1	13 3	16 0	759	156	26.3	16.7	620	402	.	
7/22/95	0 20	6.7	4.3	12.7	15.7	766	158	23 7	14 1	539	345		
7/22/95	0·25	7 4	4 7	11.7	15 2	780	162	20 5	12.2	491	306		
7/22/95	0.30	8.2	5.1	10 8	14 7	789	164	19.0	12.6	511	315		
7/22/95	0.35	9.1	5 5	9 7	14 2	801	166	18 4	12 6	556	337		
7/22/95	0.40	9 8	6.0	9 0	13 8	816	167	17 7	12 9	630	379		
7/22/95	0.45	10.2	6.1	8.8	13 7	821	166	20 8	15.2	848	500		
7/22/95	0.50	10 9	6 5	8.0	13.3	845	165	21.2	21.8	1038	610		
7/22/95	0:55	11 4	6 9	7.4	12.9	896	165	25 4	21.7	975	603		
7/22/95	1 00	10.3	6.3	8 9	13 6	914	164	24 4	15 0	759	465		
7/22/95	1.05	6 7	4.3	13.0	15 9	846	160	28.1	15 1	622	433		
7/22/95	1.10	5 9	3.9	13.6	16 2	810	158	30 5	17 1	775	545		
7/22/95	1·15	6 5	4.2	13.0	15.8	810	158	28.5	15 8	775	536		
7/22/95	1 20	6.3	4.1	13 4	16.1	794	158	30 7	19.2	624	428		
7/22/95	1:25	6 8	4.4	12.5	15 5	809	160	24 5	13.7	555	362		
7/22/95	1·30	6.6	4.2	12.8	15.7	801	161	25.0	15.6	671	428		
7/22/95	1.35	7 3	4 6	12.1	15.3	805	161	23 5	16.1	657	419		
7/22/95	1·40	8.1	5 1	11 1	14.9	828	162	21.1	13 4	518	327		
7/22/95	1·45	7.6	4.8	11 8	15.2	822	161	21 8	14.5	508	323		
7/22/95	1.50	7 2	4.5	12.3	15.4	811	160	20.3	15.9	581	368		
7/22/95	1:55	7.1	4.5	12.3	15.4	806	160	22.6	17.1	617	390		
7/22/95	2:00	7.2	4.6	12 2	15.4	805	160	21.6	16 5	577	363		
7/22/95	2 05	6.9	4 4	12.6	15.6	783	159	25.2	20.2	500	316		
7/22/95	2.10	6 0	4.0	13.5	16.1	751	158	30.6	24 3	451	289		
7/22/95	2·15	6.2	4.0	13 1	15.9	745	160	29 2	23.3	432	278		
7/22/95	2:20	6.8	4.3	12.2	15.5	747	161	28.0	21.6	539	335		
7/22/95	2.25	8 0	5 0	10.7	14 6	752	162	27.0	22.9	685	423		
7/22/95	2 30	9 4	5.8	9.0	13.7	763	164	22 8	26.6	958	589		
7/22/95	2:35	10.5	6 3	7 9	13.2	764	163	35 5	36 7	1524	911		
7/22/95	2:40	11 1	6 8	7 0	12.6	774	161	46 5	47.6	2049	1238		
7/22/95	2.45	11.5	7 2	6.5	12.1	799	160	41.4	48 5	2218	1366		
7/22/95	2.50	12 3	8.0	6 0	11 2	845	157	34 4	41.5	2118	1391		
7/22/95	2:55	13.2	8 4	5 4	10.9	883	154	38 5	46.7	2558	1647		
7/22/95	3.00	14 0	8 9	4 5	10 4	928	148	80 8	92.7	3122	1826		
7/22/95	3 05	12.9	8 2	6 0	11 4	959	151	69.4	68.8	2371	1341		
7/22/95	3 10	8.2	5 3	11.6	14 8	901	157	30.0	15 7	587	410		
7/22/95	3·15	6.2	4 0	13.7	16.2	837	155	37 6	23.8	716	503		
7/22/95	3 20	5.1	3 4	14.8	17 0	786	153	47 0	34.5	910	617		
7/22/95	3:25	5.6	3 8	14 1	16 5	789	153	48.7	34 0	846	576		
7/22/95	3 30	5 4	3 7	14.4	16 6	775	152	53.5	38 8	812	564		
7/22/95	3 35	5.2	3 5	14 5	16 7	760	153	56.3	42 5	871	597		
7/22/95	3 40	6 4	4 2	12 9	15 7	783	156	45 5	32.1	939	607		
7/22/95	3 45	6.9	4 5	12 2	15 2	784	155	39.8	30.6	1046	682		
7/22/95	3·50	7 7	5 1	11.2	14.6	796	156	31 2	24.2	791	523		
7/22/95	3 55	8.2	5.4	10 8	14 3	806	157	26 6	19.9	592	390		
7/22/95	4 00	7 7	5 1	11 3	14 6	807	157	24.7	19 0	586	383		
7/22/95	4.05	7 3	4.8	11 8	14.9	797	157	24 7	19 3	872	564		
7/22/95	4 10	7 8	5.1	11 1	14 5	806	157	20 3	17.6	937	614		
7/22/95	4 15	9 0	5.9	9 6	13 6	832	159	18 7	14 6	774	509		
7/22/95	4 20	9 3	6 1	9 5	13 5	847	159	14.8	11 9	495	321		
7/22/95	4 25	7 7	5 1	11.3	14.7	818	158	16 2	13 7	493	319		
7/22/95	4 30	7 5	4 9	11 4	14 8	808	158	18 3	13.8	464	302		

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/22/95	4 35	8.2	5.2	10.5	14 4	810	161	17 1	12.8	438	276		
7/22/95	4:40	8.9	5.6	9.7	13 9	818	163	14.5	12.3	437	273		
7/22/95	4:45	9 6	6 0	9.0	13 5	826	164	10.5	12.1	448	271		
7/22/95	4.50	2.0	6.2	18 1	13 4	828	165	11 3	12 4	482	288		
7/22/95	4:55	2 7	5.9	17 3	13.8	826	165	7 5	12 7	490	290		
7/22/95	5 00	3 1	6 1	16 9	13 6	828	165	14 7	13.3	536	325		
7/22/95	5:05	2.5	6 4	17 6	13 2	835	165	17.2	14 1	663	402		
7/22/95	5.10	3 8	6.8	16 1	12 8	848	166	15.6	15 3	828	505		
7/22/95	5:15	4 9	7 0	14 8	12.6	856	166	11.2	16.1	984	593		
7/22/95	5:20	4 7	6.8	15.0	12.8	870	164	11.9	12.1	713	442		
7/22/95	5 25	4 4	6.7	15 3	13.0	878	163	12.9	11 3	574	369		
7/22/95	5:30	5.0	6 8	14.7	12.9	886	163	12.6	11 8	598	384		
7/22/95	5.35	5 4	6.9	14.3	12.8	896	163	13.3	12 2	637	408		
7/22/95	5:40	5 6	7 0	14.0	12.6	908	163	15.3	13.7	713	457		
7/22/95	5:45	6.1	7 2	13 4	12 4	920	163	14.8	14 7	809	516		
7/22/95	5 50	5 6	6.4	14.0	13.3	901	163	15.8	14 2	706	448		
7/22/95	5.55	4.8	5.5	14.8	14 2	870	162	17.4	14.8	640	415		
7/22/95	6.00	6 9	5.5	12 3	14 2	859	162	4.1	16 3	623	418		
7/22/95	6 05	7.4	5 9	11.8	13.6	854	163	9 0	17.5	656	437		
7/22/95	6 10	7.4	6.6	11.8	12.9	858	164	16 5	19 4	776	500		
7/22/95	6:15	8.0	7 1	11 3	12.4	869	165	18 7	21 7	1022	648		
7/22/95	6 20	8 1	7 6	11.1	11 8	880	165	26 0	32.6	1549	968		
7/22/95	6.25	8.4	8.0	10.8	11 3	889	161	36.7	51.4	2376	1450		
7/22/95	6:30	9.1	8 3	9.9	11 0	890	155	59 6	92 4	3800	1901		
7/22/95	6 35	8.7	8 2	10.5	11 2	883	155	80.0	99 9	3962	1899		
7/22/95	6·40	10.2	7.8	8.9	11.7	919	163	10.7	30.7	1687	1058		
7/22/95	6:45	9.9	7 4	9.2	12 2	913	163	10 7	18.1	933	620		
7/22/95	6.50	10.1	7.3	9.0	12 3	907	164	6 2	19 4	965	640		
7/22/95	6·55	8.8	7 0	10.5	12.7	890	164	19 0	17 2	848	546		
7/22/95	7.00	8 4	6.7	11 0	13 0	876	163	20.5	15 9	711	462		
7/22/95	7 05	8.9	6 6	10.4	13 1	869	163	19 1	18 1	707	464		
7/22/95	7:10	9 4	6.7	9.9	13 1	870	163	18.5	16.6	761	496		
7/22/95	7:15	10 0	6.8	8.6	12 9	873	163	18.3	18.7	884	573		
7/22/95	7·20	11.1	7.4	7 9	12 2	892	163	21 8	23 2	1241	788		
7/22/95	7 25	12.1	7.8	6.7	11 8	925	162	10 8	32.4	1519	947		
7/22/95	7·30	12 3	7.7	6 5	11 9	942	162	31.2	37 0	1749	1073		
7/22/95	7 35	10 9	6.8	8.3	13.0	938	164	19 9	15 9	757	488		
7/22/95	7 40	9 8	6 2	9 5	13.7	916	163	19 6	15.0	644	421		
7/22/95	7:45	8 5	5.3	11 0	14.7	881	162	21 8	16.5	652	428		
7/22/95	7.50	8 0	5.1	11 5	14.9	856	162	23 4	17.5	686	451		
7/22/95	7:55	9 0	5 8	10 2	14.0	872	163	20 6	17.1	663	427		
7/22/95	8 00	9.5	6 1	9.7	13.7	880	163	19.9	17 1	726	466		
7/22/95	8·05	10 0	6 5	9 1	13.3	896	163	11 2	17 8	796	513		
7/22/95	8.10	10.8	6 9	8.2	12.8	914	163	18 3	21.6	924	587		
7/22/95	8·15	10.6	6 7	8 5	13 0	915	163	25.0	22 7	979	626		
7/22/95	8.20	8 9	5 7	10 3	14.1	878	163	19 0	15.5	702	450		
7/22/95	8 25	8.0	5 1	11 4	14 8	837	163	20 3	18.7	657	426		
7/22/95	8 30	8 2	5.2	11.1	14 6	817	163	23 6	21 1	672	437		
7/22/95	8 35	9 1	5.8	9.9	13.9	810	163	23 7	24.7	778	504		
7/22/95	8 40	9 9	6 3	9 0	13 3	813	163	19 9	31.0	1042	673		
7/22/95	8 45	10.7	6 8	8.1	12.8	810	159	39 2	59 5	1884	1204		
7/22/95	8.50	11 4	7.3	7.1	12 2	817	154	54 7	90 6	2744	1720		
7/22/95	8·55	12 1	7.6	6.3	11 8	817	149	79.7	121 9	3902	1960		
7/22/95	9 00	13.0	8.1	5 4	11 2	837	158		302.2	4867	1955		
7/22/95	9 05	10 4	6.8	8.7	13 0	858	162		17 0	1850	1011		
7/22/95	9 10	8 6	5.7	10 8	14 2	833	161		21 2	914	631		

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/22/95	9·15					819	159			1754	1115		
7/22/95	9·20					862	169						
7/22/95	9 25					846	168					0.4	0 1
7/22/95	9·30					836	167					0 4	0.1
7/22/95	9:35					848	154					0.4	0.1
7/22/95	9 40					868	175					0 4	0.1
7/22/95	9·45					874	168			3192		0 4	0 1
7/22/95	9 50	10.8		8.4		870	162	7 9		1723		0 4	0 1
7/22/95	9 55	10 5		8 6		753	165	28 1		1105		0 4	0 1
7/22/95	10:00	10.5	6 3	8.5	13.6	795	166	27.1	18 1	1012	601	0.4	0.1
7/22/95	10·05	10.2	6 3	8.9	13 6	869	165	23 3	17 8	893	563	0 4	0.1
7/22/95	10 10	9.7	6.1	9 5	13 9	865	163	24.4	17.8	759	488	0.4	0.1
7/22/95	10·15	9.3	5.7	10.0	14 3	853	164	23 8	17.6	729	461	0 4	0.1
7/22/95	10.20	9.4	5 6	9 9	14 4	844	167	21 9	16 3	750	459	0 4	0.1
7/22/95	10:25	9.7	5 6	9 6	14 5	833	169	24 6	17 6	856	504	0 4	0 1
7/22/95	10 30	9.9	5 7	9 3	14 4	835	171	22.7	18 4	944	547	0 4	0 1
7/22/95	10:35	10.2	5 8	8 8	14.2	834	172	27.5	19 6	1133	638	0 4	0.1
7/22/95	10 40	10.3	6.0	8.8	13 9	842	169	23.4	18 7	1140	671	0 4	0.1
7/22/95	10.45	9.4	5.8	9.7	14 1	838	165	26 3	19 1	805	506	0 4	0.1
7/22/95	10·50	8.3	5 2	11.0	14 9	815	164	27.0	21 1	697	446	0.4	0.1
7/22/95	10.55	8.9	5.7	10.1	14 1	820	164	26.1	20 5	590	380	0 4	0.1
7/22/95	11:00	8.8	5 7	10.1	14.1	810	165	29 9	22.4	592	387	0 4	0.1
7/22/95	11:05	9 1	5 8	9.7	13 9	804	166	31.6	25 2	688	450	0 4	0.1
7/22/95	11:10	9.7	6.2	9.1	13.5	801	166	33 1	31.0	962	634	0 4	0.1
7/22/95	11:15	10.5	6.7	8.1	12.9	804	165	45.8	47.3	1578	1022	0 4	0.1
7/22/95	11.20	11.2	7.1	7.4	12.4	814	163	58 3	64.8	2119	1364	0 4	0.1
7/22/95	11:25	11.0	6.9	7 8	12.7	806	161	68 5	67 8	2722	1693	0 4	0.1
7/22/95	11 30	11.2	7.0	7 5	12 7	797	156	77.0	99.0	3596	1912	0.4	0.1
7/22/95	11.35	11.6	7 2	7.1	12.5	799	154	104 5	108 8	3838	1951	0 4	0 1
7/22/95	11:40	11 1	6.9	7.9	13.0	816	162	53.5	49.8	2167	1300	0.4	0.1
7/22/95	11·45	10.5	6 5	8.5	13.4	818	165	35 2	29.5	1297	788	0.4	0.1
7/22/95	11·50	9.7	6 0	9.3	13 8	801	165	31 9	26.5	963	597	0 4	0.1
7/22/95	11:55	9.3	5 9	9.9	14.1	780	164	33.6	32 8	1088	680	0.4	0.1
7/22/95	12 00	9.3	5 8	9.8	14.1	770	163	41 9	41.1	1494	910	0 4	0.1
7/22/95	12.05	9.0	5.6	9 9	14.2	766	164	38 7	40 8	1542	942	0.4	0.1
7/22/95	12.10	9.5	5.9	9.3	13.9	768	164	49 9	52 9	1966	1182	0 4	0.1
7/22/95	12 15	10 4	6.6	8.6	13 3	791	158	68 6	73 1	2455	1468	0 4	0 1
7/22/95	12·20	9.0	5 7	10.5	14.3	788	163	33 1	33 3	888	582	0 4	0.1
7/22/95	12 25	8.9	5 6	10.4	14 5	781	164	38 5	31 3	789	509	0 4	0 1
7/22/95	12:30	8 6	5.4	10.7	14 6	776	163	39.5	33 5	782	507	0.4	0 1
7/22/95	12 35	8 6	5 4	10.6	14 5	775	164	40 1	32.9	755	489	0 4	0.1
7/22/95	12.40	10 1	6 5	8.8	13 2	811	166	35 5	29 8	729	485	0 4	0 1
7/22/95	12 45	9 8	6 3	9.2	13 6	808	166	35 5	28.4	832	544	0.4	0.1
7/22/95	12·50	8.7	5.5	10.5	14 5	783	166	40 6	32.5	829	528	0 4	0 1
7/22/95	12:55	8.5	5.3	10 8	14.7	773	166	42.3	33.7	888	562	0 4	0 1
7/22/95	13.00	8.7	5.4	10.5	14 6	771	166	42 9	34.1	932	586	0 4	0.1
7/22/95	13:05	8.7	5 5	10.5	14 5	770	166	40 5	34 6	956	604	0 4	0.1
7/22/95	13.10	8 2	5.2	11.0	14 8	756	166	43.4	36.4	1068	677	0.4	0.1
7/22/95	13:15	8 3	5 2	10 8	14.7	749	165	50 9	40 9	1447	908	0 4	0.1
7/22/95	13·20	10 0	6.4	8 6	13 2	782	166	46 1	54 5	1667	1071	0 4	0.1
7/22/95	13 25	10 1	6.5	8 5	13.1	794	166	42 2	50.6	1609	1050	0 4	0 1
7/22/95	13 30	10 9	7.1	7 5	12 4	811	160	46 6	83 1	2184	1408	0 4	0 1
7/22/95	13:35	11 1	7 1	7 7	12 7	796	148	115 0	120 4	3548	1967	0 4	0 1
7/22/95	13 40	10 2	6.4	9.1	13 6	795	162	59 9	48 6	1691	1054	0 4	0 1
7/22/95	13.45	9.6	6 0	9 6	14 0	792	164	46 1	33 7	1089	688	0 4	0.1
7/22/95	13 50	9 3	5 8	9.9	14 1	789	164	39 8	33 1	970	616	0 4	0 1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/22/95	13.55	8 9	5 6	10 2	14.3	781	164	40 9	33.1	960	600	0.4	0 1
7/22/95	14·00	8 8	5.5	10 2	14.4	769	164	49 8	39 9	1328	814	0 4	0 1
7/22/95	14 05	10 0	6.3	8.7	13.3	791	164	51 6	44 9	1319	854	0.4	0 1
7/22/95	14:10	9.9	6.3	8 7	13 2	793	164	36 5	44 4	1353	878	0.4	0.1
7/22/95	14 15	9.6	6.2	9.0	13 3	785	164	45 2	41.1	1203	795	0 4	0 1
7/22/95	14 20	9 4	6 2	9 2	13 4	776	163	46 1	43.1	1248	818	0 4	0 1
7/22/95	14:25	9 4	6 2	9.3	13 5	778	162	36.9	40 0	1170	777	0.4	0.1
7/22/95	14·30	9 8	6.4	9.0	13.3	789	163	41 8	37 8	1121	735	0 4	0 1
7/22/95	14·35	10 4	6 9	8 3	12 8	817	163	40 1	35 7	1168	768	0 4	0 1
7/22/95	14 40	11.2	7 4	7 7	12 3	850	162	35 6	30 1	1267	847	0 4	0 1
7/22/95	14:45	10 0	6 7	9.2	13 2	862	163	29 5	18 0	685	456	0 4	0 1
7/22/95	14.50	8 8	5 9	10 5	14 0	850	161	34.4	19 3	654	436	0.4	0.1
7/22/95	14·55	8 3	5 6	10 8	14 3	851	161	34.7	18 2	616	412	0.4	0.1
7/22/95	15:00	8 3	5 6	10 8	14 3	854	162	32 9	16 6	555	367	0.4	0 1
7/22/95	15 05	8.9	5 8	10.2	14 0	847	162	33 3	17 6	571	371	0 4	0.1
7/22/95	15 10	8 7	5 7	10 5	14.2	840	163	34.3	17 3	535	343	0 4	0 1
7/22/95	15·15	8.1	5 3	11 2	14.7	829	163	35 0	17.8	502	323	0 4	0 1
7/22/95	15.20	7.8	5 1	11.6	14 9	818	162	37 3	19.7	490	317	0 4	0.1
7/22/95	15·25	7.9	5 2	11.4	14 8	819	162	38.6	19.1	528	343	0 4	0.1
7/22/95	15 30	8.4	5 4	10 7	14 4	829	162	37.0	20 5	594	382	0 4	0 1
7/22/95	15:35	8 9	5.7	10.2	14 1	845	164	36 4	20.7	691	443	0 4	0 1
7/22/95	15.40	9.6	6 2	9.3	13.6	868	169	38.0	22.0	842	533	0 4	0.1
7/22/95	15·45	9 6	6.1	9.4	13 7	885	168	39 3	25.9	970	601	0 4	0 1
7/22/95	15 50	7.4	4.8	12.0	15 2	850	167	32 5	18 2	600	392	0 4	0.1
7/22/95	15.55	6.5	4 2	12.8	15 9	799	168	40.5	23.4	548	348	0.4	0.1
7/22/95	16:00	7.5	4.5	11.6	15 4	793	173	37.7	20.5	514	306	0 4	0.1
7/22/95	16:05	8 2	4.9	10.7	14 9	790	174	35.5	21.1	476	284	0 4	0 1
7/22/95	16:10	9.0	5 3	9 8	14 4	786	175	34.0	24 2	521	311	0 4	0.1
7/22/95	16.15	9 8	5.8	8.9	14.0	784	176	45 6	32 8	807	485	0.4	0 1
7/22/95	16:20	10.2	6.1	8 5	13.6	797	176	41 9	33 6	1054	644	0.4	0 1
7/22/95	16.25	9.3	5 8	9.4	13 9	796	173	41.2	29.3	881	553	0.4	0 1
7/22/95	16:30	10.3	6 4	8 2	13.2	811	173	39 0	35 2	1150	721	0.4	0 1
7/22/95	16:35	11.2	6.9	7 5	12.7	832	174	34.5	35 4	1304	820	0.4	0.1
7/22/95	16·40	10 5	6.6	8 5	13.3	835	174	31 6	21.9	783	501	0.4	0 1
7/22/95	16:45	10 1	6 3	8 7	13 4	836	174	28.8	19 2	668	425	0 4	0 1
7/22/95	16 50	10 1	6.3	8 8	13 4	839	174	28 9	18.8	641	410	0 4	0 1
7/22/95	16·55	10.2	6 4	8.6	13 4	842	173	27.6	17 9	624	394	0 4	0.1
7/22/95	17:00	10 2	6.4	8 6	13 3	843	174	26 8	17.7	622	395	0 4	0 1
7/22/95	17.05	10 0	6.3	8.9	13 5	838	174	27.4	18 3	589	373	0 4	0.1
7/22/95	17·10	9 8	6.2	9 1	13.6	840	174	27 9	19 0	561	355	0 4	0 1
7/22/95	17:15	9.7	6.1	9 3	13.7	840	174	30 8	20 1	636	401	0 4	0.1
7/22/95	17·20	10 3	6.5	8 5	13.3	852	173	31 3	20 4	845	535	0.4	0 1
7/22/95	17 25	11 1	6.9	7.6	12.8	877	173	34 0	23 4	1088	672	0.4	0.1
7/22/95	17:30	11 5	7.1	7 2	12.6	903	173	26.5	27 2	1308	787	0.4	0 1
7/22/95	17·35	12 4	7 6	6.1	12 0	939	167	56 4	57 7	2010	1192	0.4	0 1
7/22/95	17 40	11 8	7.2	6.9	12 5	957	169	65 7	53 4	1667	1010	0.4	0 1
7/22/95	17:45	9.6	6 0	9.3	13.8	948	172	33.9	16 1	821	532	0 4	0.1
7/22/95	17 50	7 7	4.9	11.5	15.0	916	168	32 9	13 5	620	429	0.4	0.1
7/22/95	17 55	6 5	4 3	12 9	15.8	879	167	39 0	16.7	665	459	0 4	0.1
7/22/95	18 00	6.3	4.1	13 2	16.0	853	166	41 4	17 9	649	434	0 4	0 1
7/22/95	18 05	6 2	4 1	13.3	16 0	823	165	44 0	21 2	636	421	0 4	0 1
7/22/95	18·10	7.5	4 6	11 7	15 4	828	171	41 3	16 8	681	416	0.4	0 1
7/22/95	18:15	8 4	5 1	10 6	14 8	841	172	35 8	14 7	712	426	0 4	0 1
7/22/95	18 20	9 2	5.5	9 7	14 3	851	172	34 5	15 4	754	443	0 4	0 1
7/22/95	18 25	9 0	5 4	9.9	14 5	845	173	33 7	15 4	647	381	0 4	0 1
7/22/95	18 30	8 3	4 9	10 8	15 0	822	172	33 3	17 2	558	329	0.4	0 1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/22/95	18 35	7.9	4.8	11.1	15 2	804	172	35.2	19 0	491	292	0.4	0.1
7/22/95	18·40	8.2	4 9	10 7	14 9	795	173	25 8	22.5	483	289	0 4	0.1
7/22/95	18 45	9 0	5 4	9.8	14.4	790	173	42 5	27.1	559	337	0 4	0 1
7/22/95	18.50	10.0	5 8	8.8	13.9	789	173	48 5	37.2	922	560	0 4	0.1
7/22/95	18 55	9.8	6 0	9 0	13 7	795	171	30 1	37 3	1056	656	0 4	0.1
7/22/95	19 00	9 6	6 0	9 1	13 6	793	168	51 6	39 9	1148	730	0 4	0 1
7/22/95	19 05	10.0	6.3	8 6	13 3	800	168	49 2	46 2	1478	934	0 4	0 1
7/22/95	19 10	10.9	6.8	7.6	12 7	810	163	58.2	67 1	1974	1247	0 4	0.1
7/22/95	19 15	12 0	7 4	6 5	12 2	819	149	105 0	120.1	3090	1910	0 4	0.1
7/22/95	19.20	11 9	7 4	6 8	12 3	839	163	62 3	66.5	2221	1395	0.4	0.1
7/22/95	19·25	11.5	7.2	7 3	12 6	847	170	39 3	34.3	1271	808	0 4	0 1
7/22/95	19.30	11.1	7 0	7.6	12 7	850	170	33 1	27 9	1021	660	0 4	0.1
7/22/95	19 35	10.7	6.7	8 1	13 0	845	170	30 7	22.5	751	489	0 4	0 1
7/22/95	19 40	10 1	6 4	8 7	13 4	835	170	27 7	22 2	626	405	0.4	0 1
7/22/95	19:45	9.8	6 2	9.0	13 6	825	169	32.1	24.2	646	418	0 4	0.1
7/22/95	19 50	10.3	6 4	8 5	13.3	827	172	33 3	27.1	778	502	0.4	0.1
7/22/95	19 55	10.4	6.5	8 4	13 3	834	172	33 2	27 8	792	509	0 4	0.1
7/22/95	20·00	10 5	6.6	8 3	13.2	839	171	29 3	26.5	881	563	0 4	0.1
7/22/95	20·05	10.7	6.7	8 1	13.1	850	171	28.3	26 4	934	595	0.4	0.1
7/22/95	20.10	10.9	6.8	8 0	13 0	863	171	26.3	23 9	979	620	0.4	0.1
7/22/95	20·15	10.6	6.6	8.3	13 1	870	170	27 4	19.2	838	533	0.4	0.1
7/22/95	20.20	10.2	6 4	8.7	13 4	875	170	25.9	15 7	716	454	0 4	0.1
7/22/95	20 25	9.3	5 9	9 8	13 9	865	167	25 3	14 8	582	375	0.4	0 1
7/22/95	20·30	8 6	5.5	10 5	14.4	853	166	26 2	15.5	520	337	0.4	0.1
7/22/95	20 35	8 7	5 6	10.4	14.3	849	165	27.2	15 0	475	308	0 4	0.1
7/22/95	20 40	9.6	6.1	9 5	13 7	863	166	25.4	14 9	483	308	0 4	0.1
7/22/95	20 45	9.3	5.9	9 7	13 9	860	166	26 1	15 9	502	317	0 4	0.1
7/22/95	20.50	9.1	5 8	9.9	14 0	860	165	25.5	16.7	518	329	0.4	0.1
7/22/95	20 55	9 1	5.8	9.8	14 0	858	165	23.9	17 2	552	351	0.4	0.1
7/22/95	21.00	9.2	5.8	9.8	14 0	858	164	28.4	17.7	531	340	0.4	0.1
7/22/95	21 05	8.7	5 6	10.4	14.2	849	164	28 3	18 9	493	315	0 4	0.1
7/22/95	21 10	8 2	5 3	10.9	14 6	830	164	33.0	21 8	484	311	0 4	0.1
7/22/95	21·15	8.2	5 3	10.9	14.5	817	163	28 1	25.2	531	342	0.4	0.1
7/22/95	21·20	8.8	5.7	10.1	14 1	812	163	37 4	29.6	682	439	0 4	0.1
7/22/95	21 25	9.9	6 2	8 9	13 5	815	164	39 2	33 7	900	576	0.4	0.1
7/22/95	21 30	10 6	6.6	8 0	13 1	820	164	39 0	40 2	1313	820	0 4	0.1
7/22/95	21·35	11.1	6.9	7.5	12.8	827	162	48 4	53 6	1705	1073	0 4	0.1
7/22/95	21 40	11.7	7 3	6 8	12 4	830	152	75 5	86 9	2589	1617	0 4	0 1
7/22/95	21.45	11.9	7 4	6 6	12 2	842	145	37 7	107 3	2982	1863	0 4	0 1
7/22/95	21 50	11 4	7.2	7.2	12 5	848	160	49.7	50 6	1852	1198	0 4	0.1
7/22/95	21 55	11 3	7.1	7.4	12 6	852	163	33 2	36.4	1448	929	0.4	0 1
7/22/95	22.00	11.2	7 0	7 5	12 7	854	163	21 3		1254	804	0.4	0 1
7/22/95	22 05					858	172					0 4	0.1
7/22/95	22·10					860	163					0.4	0.1
7/22/95	22 15					857	163					0 4	0.1
7/22/95	22 20					848	160					0.4	0.1
7/22/95	22 25					848	168					0 4	0 1
7/22/95	22 30					850						0.4	0 1
7/22/95	22.35					852						0.4	0.1
7/22/95	22 40					872	158		74 3		764	0.4	0.1
7/22/95	22 45					889	158		64 6		781	0.4	0.1
7/22/95	22 50		7 1		12 6	910	161		46 3		660	0 4	0 1
7/22/95	22 55		7 5		12 2		156		74 2		1045	0.4	0 1
7/22/95	23 00		7 8		11 8		142	30 9	93 3		1347	0.4	0 1
7/22/95	23.05	11 9	7 4	7 0	12 3	981	149	40 0	67 0	1425	983	0 4	0 1
7/22/95	23 10	10 0	6 3	9 1	13 6	969	157	19 6	42 5	769	497	0.4	0 1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/22/95	23:15	8.1	5 2	11 2	14 7	940	158	21 0	29 6	616	414	0.4	0 1
7/22/95	23:20	7.1	4 6	12 5	15 4	908	157	22.7	27.2	649	436	0.4	0.1
7/22/95	23·25	6 8	4 4	12 7	15 6	892	157	25 6	24 8	680	454	0 4	0 1
7/22/95	23:30	6 9	4 5	12 6	15 5	882	158	25 7	23.4	695	465	0.4	0.1
7/22/95	23·35	7 7	5 0	11 7	15 0	880	158	26 7	26 3	650	427	0 4	0.1
7/22/95	23 40	7 2	4 6	12 3	15 3	855	158	27.9	29 9	609	394	0 4	0.1
7/22/95	23.45	6 6	4 3	12 9	15 7	828	158	29.9	30.3	571	370	0 4	0 1
7/22/95	23.50	6.8	4 5	12 6	15 5	811	159	32 8	30 3	520	337	0 4	0 1
7/22/95	23:55	7 5	4 9	11 8	15 0	807	160	32.1	30.0	506	328	0.4	0 1
7/23/95	0·00	8 4	5 4	10 7	14 4	809	160	31 6	32 5	533	340	0.4	0.1
7/23/95	0·05	9.7	6 0	9.2	13 7	811	160	37.7	48 8	989	610	0 4	0 1
7/23/95	0:10	11.1	6 6	7.6	13 1	817	152	76 3	98.2	2288	1380	0.4	0.1
7/23/95	0·15	11.9	6 9	6.8	12 7	818	143	118 1	135 8	3828	1924	0 4	0 1
7/23/95	0.20	12 5	7 2	6.1	12 3	828	141	125.2	138 5	4955	1959	0 4	0 1
7/23/95	0:25	13.0	7 5	5.6	12 0	845	140	126 4	138 5	4986	1959	0 4	0.1
7/23/95	0:30	13 2	7 6	5.6	11.9	879	141	121 6	135 2	4507	1959	0 4	0 1
7/23/95	0:35	12 6	7 4	6 2	12 3	898	150	78 0	94 9	2964	1667	0.4	0.1
7/23/95	0.40	11 2	6 7	7.5	13.0	892	164	28 6	32 2	1156	690	0 4	0.1
7/23/95	0:45	10 3	6 1	8 7	13.6	869	165	22.7	24 9	700	427	0.4	0 1
7/23/95	0 50	10.2	6 1	8 9	13 7	855	164	25 1	28.0	706	444	0.4	0.1
7/23/95	0.55	9 6	5 8	9 6	14.1	837	163	26 3	31.6	632	393	0.4	0.1
7/23/95	1:00	9.6	5 8	9 4	14 0	828	162	33.8	37 6	784	482	0 4	0.1
7/23/95	1:05	10 3	6 2	8 7	13 6	834	161	40 0	44 5	1087	668	0 4	0.1
7/23/95	1:10	11.4	6 8	7 4	12.9	857	157	43.6	53 2	1677	1018	0.4	0.1
7/23/95	1:15	10.9	6.5	8 1	13 3	874	162	27 5	30 9	1238	722	0.4	0 1
7/23/95	1·20	10.8	6 4	8 0	13.3	888	163	22 5	23 7	1137	656	0 4	0 1
7/23/95	1:25	11 5	6.8	7 2	12.8	909	163	23.1	25 6	1427	812	0.4	0 1
7/23/95	1:30	11.6	6.9	7 1	12.8	924	163	20.3	24 5	1455	834	0.4	0.1
7/23/95	1:35	11 3	6.7	7.5	13 0	934	164	22 4	22 9	1228	707	0 4	0.1
7/23/95	1.40	9.9	5 9	9 1	13.9	925	166	16.0	14 9	818	482	0.4	0.1
7/23/95	1:45	8.9	5.4	10.1	14 4	909	165	14.8	14 6	689	412	0.4	0.1
7/23/95	1·50	8 7	5 2	10.4	14 6	900	166	15.8	14 2	667	397	0.4	0.1
7/23/95	1:55	9 3	5.5	9 7	14.3	902	165	17.5	17 0	795	463	0 4	0.1
7/23/95	2:00	10.1	5 9	8 8	13.8	913	166	22.1	21 2	1045	594	0 4	0.1
7/23/95	2:05	9.8	5 8	9 2	14 0	907	164	22 1	22 7	1055	604	0 4	0.1
7/23/95	2·10	8 6	5 2	10 4	14.7	881	165	19.4	17 4	688	406	0 4	0 1
7/23/95	2.15	8 2	5 0	10.8	14 8	856	165	19 4	18.8	572	340	0 4	0.1
7/23/95	2.20	8.9	5.3	10 0	14 4	847	166	20 8	19 7	553	326	0 4	0 1
7/23/95	2:25	9 8	5.8	8.9	13 9	845	167	23 4	22 8	639	377	0 4	0 1
7/23/95	2 30	10 7	6.2	8.0	13.4	843	168	32.3	36.6	1071	618	0 4	0 1
7/23/95	2:35	11.5	6 6	6.9	12 9	836	158	81 2	98 1	2500	1414	0.4	0.1
7/23/95	2 40	12.1	6 9	6 4	12 6	832	150	112 8	133.7	3778	1937	0 4	0 1
7/23/95	2·45	12 3	6 9	6 1	12 5	824	149	125.2	138.1	4801	1958	0 4	0 1
7/23/95	2:50	12 4	7.1	6.0	12 3	827	148	128 4	138.1	4800	1958	0 4	0 1
7/23/95	2.55	12 2	7.3	6 3	12 2	848	146	121.5	135.8	3649	1957	0.4	0.1
7/23/95	3.00	11 9	7 1	6 8	12 4	844	146	117 4	131.3	3663	1955	0.4	0 1
7/23/95	3 05	11 5	7 0	7 1	12 6	841	146	98 2	132.1	3598	1943	0 4	0 1
7/23/95	3.10	11 2	6 8	7.3	12.7	834	146	92.1	132 7	3467	1942	0 4	0.1
7/23/95	3.15	10 8	6 5	7 8	12 9	826	149	61.9	119 8	2948	1748	0 4	0 1
7/23/95	3 20	10.4	6 3	8.1	13.2	816	151	30 3	113 6	2752	1639	0 4	0 1
7/23/95	3 25	10.3	6 3	8 2	13 2	809	149	1 5	120 3	3031	1802	0 4	0 1
7/23/95	3 30	10 3	6 4	8 2	13 0	811	153	1 6	95.7	2433	1518	0 4	0 1
7/23/95	3 35	10.4	6 6	8 1	12 8	822	156	-1 6	74.5	2105	1350	0 4	0.1
7/23/95	3.40	10 3	6 6	8 5	13 0	818	150	22 7	87 3	2738	1675	0 4	0 1
7/23/95	3 45	11 0	7 1	7 8	12.5	838	150	11 6	78.5	3013	1801	0 4	0 1
7/23/95	3 50	11 0	7.1	8 2	12 7	854	156	18 4	43 6	1835	1131	0 4	0.1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/23/95	3.55	9.9	6.4	9 5	13 5	856	159	20 3	23 8	878	575	0.4	0 1
7/23/95	4 00	8 9	5.8	10 4	14 1	857	159	22 1	22.1	780	521	0.4	0.1
7/23/95	4 05	8 7	5.7	10 5	14 2	858	158	20 6	22 8	771	507	0 4	0.1
7/23/95	4 10	10 1	6 5	9.1	13 3	888	159	25 3	21 1	1006	633	0 4	0 1
7/23/95	4 15	8 7	5.6	10 7	14.3	886	158	8 8	20 0	675	447	0 4	0.1
7/23/95	4 20	7.0	4 5	12 8	15 6	851	157	19 7	24 9	681	454	0 4	0.1
7/23/95	4:25	5.8	3 9	14.0	16 4	814	155	28 7	27 6	732	496	0 4	0.1
7/23/95	4:30	5 5	3 7	14.4	16.7	794	154	31.3	29.4	769	519	0.4	0 1
7/23/95	4 35	7 5	4 7	11.9	15.3	806	158	30 6	24 4	744	472	0.4	0.1
7/23/95	4 40	9 1	5.5	10.1	14 3	848	162	20 7	18 1	798	485	0 4	0 1
7/23/95	4:45	9.7	5.8	9.3	13 9	870	163	17 5	17 5	864	522	0 4	0 1
7/23/95	4·50	9.8	5 9	9.2	13 9	882	164	14 9	17 1	822	493	0.4	0.1
7/23/95	4.55	8.6	5.2	10.6	14 6	860	163	13 8	18 9	696	419	0 4	0 1
7/23/95	5·00	8 3	4 8	10 9	15 1	828	166	19 7	20 7	641	372	0 4	0 1
7/23/95	5.05	10 2	5 8	8 4	13 8	843	170	21 1	20 1	790	444	0.4	0 1
7/23/95	5:10	10 6	6 1	8.0	13 5	847	171	11 3	22 2	828	479	0.4	0.1
7/23/95	5:15	11 0	6 4	7 5	13 1	842	170	24 3	32.8	1069	622	0 4	0.1
7/23/95	5.20	11.4	6.8	6 9	12.6	840	166	43 2	57 3	1704	1026	0 4	0.1
7/23/95	5:25	11.9	7 1	6.5	12 2	835	158	77 6	101.7	2698	1619	0.4	0.1
7/23/95	5:30	12.4	7 4	5.9	11 9	827	153	113 5	137.3	4408	1959	0.4	0 1
7/23/95	5·35	12.5	7 5	5 8	11 7	824	152	87 2	138 6	4969	1960	0.4	0 1
7/23/95	5.40	12.1	7 3	6.2	11 9	813	152	82.7	138 7	4969	1960	0.4	0.1
7/23/95	5:45	10.8	6 5	7 5	12 8	789	153	113 5	135 4	4489	1960	0 4	0 1
7/23/95	5:50	9 9	5.9	8.4	13.5	780	159	55.7	104 9	3059	1757	0.4	0 1
7/23/95	5·55	8 7	5.4	9.7	14 0	768	163	30 3	64.2	1957	1221	0 4	0 1
7/23/95	6.00	8.1	4 9	10 4	14 6	752	165	57 8	37.2	1612	975	0.4	0.1
7/23/95	6:05	9.1	5 4	9 0	13 8	778	164	47 5	56.7	1849	1083	0.4	0.1
7/23/95	6:10	10 1	6.1	7.5	12.8	797	160	56 7	82.1	2635	1545	0 4	0.1
7/23/95	6:15	11 6	7 2	5 8	11 6	823	151	105 2	123.3	4303	1928	0 4	0.1
7/23/95	6·20	12 5	7 8	5.1	11 0	829	147	117 6	138 4	4984	1959	0.4	0.1
7/23/95	6.25	13 6	8.8	4 9	10 2	931	148	107.7	109.9	4247	1854	0 4	0 1
7/23/95	6:30	13.8	8 2	5 0	11 3	933	147	105 5	121 8	4347	1829	0.4	0.1
7/23/95	6·35	15.2	9 6	3 6	9.7	1058	146	102.1	110.2	3906	1756	0 4	0 1
7/23/95	6:40	9 4	6 1	10 1	13 9	1025	160	31 9	15 1	463	301	0.4	0.1
7/23/95	6·45	4.9	4 6	15 1	15 4	949	161	30 6	15 1	494	303	0.4	0 1
7/23/95	6:50	2.2	4 1	18.0	16 0	933	161	17.9	14.9	458	282	0 4	0.1
7/23/95	6·55	2.0	3.4	18.2	16 9	894	161	23 4	18.4	472	288	0 4	0.1
7/23/95	7·00	1.9	3 2	18 4	17.1	878	162	21 5	15 8	552	330	0 4	0.1
7/23/95	7 05	1 9	3 5	18 3	16 8	876	163	19.7	13 9	656	399	0.4	0 1
7/23/95	7·10	1 8	3 5	18.3	16 7	869	164	19 2	17 9	889	564	0.4	0 1
7/23/95	7 15	5 8	4 0	13.5	15 9	874	166	27 0	14 8	859	519	0 4	0.1
7/23/95	7 20	7 6	4.5	11 5	15 3	885	166	28 2	14.7	786	473	0 4	0 1
7/23/95	7.25	8.0	4 8	11.1	15 1	887	165	22 5	16 2	741	469	0.4	0 1
7/23/95	7.30	7.8	4 7	11 4	15 2	878	165	21 6	15 1	710	429	0 4	0 1
7/23/95	7·35	6 9	4 2	12.4	15 8	846	165	22 8	17.1	637	382	0.4	0.1
7/23/95	7·40	6.6	4 0	12.7	15 9	820	166	23 8	19 1	541	323	0 4	0 1
7/23/95	7 45	7 5	4 5	11 5	15 3	814	167	24 2	19 5	491	291	0 4	0 1
7/23/95	7:50	8.6	5 2	10 1	14 5	817	168	22 9	21.3	542	319	0.4	0.1
7/23/95	7.55	10.0	5 9	8.6	13 7	820	168	28 8	31.7	971	569	0 4	0.1
7/23/95	8 00	10.7	6 3	7 6	13 1	819	165	46 9	47 8	2010	1156	0 4	0 1
7/23/95	8 05	10 4	6 3	8 0	13 2	819	162	54 3	62 6	2171	1286	0 4	0 1
7/23/95	8 10	10 6	6 3	7 8	13 1	821	159	74 7	92 5	2530	1396	0 4	0 1
7/23/95	8 15	10.7	6 9	7 8	12 5	845	160	28 6	64 0	2292	1355	0.4	0 1
7/23/95	8 20	10.7	7 0	8 0	12 5	854	161	30 2	42 8	1573	1012	0 4	0 1
7/23/95	8 25	10 9	7 1	7 9	12 5	863	163	28 1	31 2	1197	776	0 4	0 1
7/23/95	8 30	10 8	7 1	8 0	12 6	869	165	21 2	23 3	900	590	0.4	0 1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/23/95	8.35	10.7	7.0	8.1	12.6	875	165	19 8	19 5	712	471	0 4	0 1
7/23/95	8.40	10.3	6 7	8 7	13 0	877	166	15.2	15.6	589	384	0.4	0 1
7/23/95	8.45	9 6	6 3	9 5	13 5	873	165	15 2	14 6	509	331	0.4	0 1
7/23/95	8·50		6 5		13 2	873	167	11 6	15.4		323	0 4	0 1
7/23/95	8.55		6 7		13 1	873	170	21 1	22 0		459	0.4	0.1
7/23/95	9 00					874	171					0 4	0 1
7/23/95	9 05					864	168						0 1
7/23/95	9:10					866	171						0.1
7/23/95	9·15					856	169					0 2	0 1
7/23/95	9·20				.	859	171					0.2	0.1
7/23/95	9.25					864	171					0 2	
7/23/95	9.30					870	171					0 2	
7/23/95	9:35					876	169					0 2	
7/23/95	9·40					876	170					0.2	
7/23/95	9 45	9 7	5.9	9.2	13.8	874	171		16 1	594	355	0 2	
7/23/95	9:50	9.7	5 9	9.2	13.8	876	172		15 9	612	365	0.2	
7/23/95	9 55	9.8	6 0	9 0	13 8	874	172		16.0	628	374	0 2	
7/23/95	10 00	9.8	5.9	9.1	13.8	871	171		16.6	618	368	0 2	
7/23/95	10·05	9 5	5 8	9.4	14.0	858	171		17.9	611	365	0 2	
7/23/95	10 10	9 7	5.9	9.0	13.8	852	171			710	425	0 2	
7/23/95	10.15	10.5	6 4	8.0	13.2	853	171			1055	638	0.2	
7/23/95	10 20	10.0	6.4	8 7	13.2	850	168		27.7	994	628	0.2	
7/23/95	10·25	10 0	6 4	8.6	13.2	837	166		41.2	1242	787	0 2	
7/23/95	10.30	10.5	6 6	8 1	13 0	840	168		47.7	1656	1024	0 2	
7/23/95	10:35	10 9	6.8	7.5	12 7	847	167		59 2	2034	1231	0.2	
7/23/95	10:40	10 9	7.0	7.7	12 5	855	171		52 2	2052	1283	0.2	
7/23/95	10.45	11.0	7.1	7 7	12.5	863	169		58.3	2261	1386	0 2	
7/23/95	10:50	10 4	6 8	8.5	12 9	863	174		30 1	1187	750	0.2	
7/23/95	10:55	11 3	7.5	7.4	12 2	885	175		28.4	1213	792	0 2	
7/23/95	11.00	11 0	7.2	7.8	12.4	893	175		20.0	817	531	0 2	
7/23/95	11:05	10 5	6.9	8.4	12 8	896	174		16 6	623	405	0 2	
7/23/95	11:10	10.0	6.6	9.0	13 1	895	173		15.6	523	339	0 2	
7/23/95	11 15	9.4	6 2	9 6	13.6	884	174		16.4	478	307	0.2	
7/23/95	11 20	9 6	6.1	9 5	13 7	873	175		18 6	534	332	0.2	
7/23/95	11·25	9 8	6 2	9.1	13.6	870	177		19.3	612	378	0 2	
7/23/95	11:30	10.1	6.3	8 9	13 4	876	177		20.1	729	457	0.2	
7/23/95	11 35	10 0	6.3	9 0	13.5	881	176		18 6	732	455	0.2	
7/23/95	11.40	10.0	6 3	9.0	13 5	888	177		18 0	752	469	0.2	
7/23/95	11.45		6.2		13 6	894	177		16 4		433	0 2	
7/23/95	11·50		6.0		13 8	894	177		15 4		390	0 2	
7/23/95	11·55		6 0		13 8	895	176		15.2		366	0.2	
7/23/95	12.00	9 4	5 8	9 5	14 0	895	177		15.0	585	330	0 2	
7/23/95	12·05	9.3	5 8	9 7	14 0	889	176		16 3	541	328	0 2	
7/23/95	12.10	9.7	5.9	9.2	13.9	891	179		15 6	615	364	0.2	
7/23/95	12·15	9.5	5.8	9 4	14 0	891	178		15 5	614	366	0.2	
7/23/95	12 20	9 4	5 7	9 6	14.1	889	178			603	357	0.2	
7/23/95	12:25	9 3	5.7	9 5	14 1	890	179			566	333	0 2	
7/23/95	12 30	9 3	5.7	9 5	14.0	886	179		15 1	519	305	0 2	
7/23/95	12:35		5 6		14 0	880	179		14.9		308	0 2	
7/23/95	12 40		5 7		13 9	-180	180	29 0	15 6		331	0.2	
7/23/95	12 45	10 1	6 0	8.5	13 6	675	180	28 9	17 0	657	370	0 2	
7/23/95	12.50	10 8	6 4	7 7	13 2	873	181	32 3	24 2	911	527	0.2	
7/23/95	12 55	10 4	6 2	8 3	13 5	866	181	25 7	22.6	869	515	0 2	
7/23/95	13.00	10 1	6 2	8 6	13 5	870	179	21 6	19 7	741	450	0 2	
7/23/95	13 05	10 2	6 3	8 6	13.4	873	179	22 5	19.5	764	469	0 2	
7/23/95	13 10	9 5	6 2	9 3	13 4	868	176	22 5	19 5	780	494	0 2	

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DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/23/95	13·15	10.3	6 6	8 3	13 0	874	176	23.3	23.2	935	591	0 2	
7/23/95	13·20	11.1	7.0	7.5	12 6	888	177	23.5	21 5	956	594	0 2	
7/23/95	13 25	10 3	6 6	8 5	13 2	883	176	17 2	16 4	654	409	0 2	
7/23/95	13.30	10 2	6.2	8.7	13 5	868	177	9.7	20.2	642	389	0.2	
7/23/95	13 35	10 2	6.3	8 5	13.3	870	178	16 4	18 2	609	383	0 2	
7/23/95	13:40	9 6	6 0	9.2	13 7	856	177	18 8	18 5	505	307	0 2	
7/23/95	13.45	9 4	5.9	9.4	13.8	849	176	18.7	19.5	494	296	0.2	
7/23/95	13·50	9.7	6 1	9.1	13 6	856	176	19 1	19 5	489	298	0 2	
7/23/95	13:55	9.5	5 8	9 5	14.0	848	178	21 1	22.1	531	317	0 2	
7/23/95	14·00	9 7	5.9	9.3	13 9	843	179	24 9	24.4	633	380	0 2	
7/23/95	14 05	9.7	5 7	9.2	14 0	848	179	21.9	21.2	584	338	0.2	
7/23/95	14:10	10.9	6.3	7 7	13 5	859	181	28.4	30.7	1151	630	0 2	
7/23/95	14·15	9 3	5 5	9 6	14 3	856	180	15.6	17.2	524	298	0.2	
7/23/95	14:20	9.6	5 7	9 1	14 1	856	179	16 3	16 2	547	311	0.2	
7/23/95	14 25	9 7	5 7	9 1	14 0	862	179	11 9	15.1	540	306	0 2	
7/23/95	14:30	10 0	5.8	8 8	13 9	863	179	15.6	15 8	566	321	0.2	
7/23/95	14.35	10 2	6 0	8 4	13 7	868	180	13 0	14.9	587	331	0.2	
7/23/95	14:40	10.7	6.1	7.9	13.6	871	182	18.8	19 3	869	474	0.2	
7/23/95	14·45	9 6	5.7	9.2	14.0	867	179	13 3	13.8	516	295	0 2	
7/23/95	14.50	9.6	5 7	9.2	14 0	864	179	13.1	13.7	515	296	0.2	
7/23/95	14:55	9 5	5 6	9.3	14 1	862	179	13.8	13.6	508	293	0 2	
7/23/95	15:00	9.5	5 7	9 3	14.1	859	179	12.9	13.9	519	299	0 2	
7/23/95	15:05	9.3	5.5	9.5	14 2	852	179	14 3	13.8	509	292	0.2	
7/23/95	15·10	9.4	5.6	9.3	14.1	849	180	17.0	16.0	570	332	0 2	
7/23/95	15·15	10.0	5.9	8.6	13 8	854	180	17 7	19 4	731	420	0.2	
7/23/95	15.20	10.8	6.3	7.7	13.3	862	180	25.4	26.1	1064	613	0.2	
7/23/95	15:25	11.2	6 5	7.3	13 1	869	181	24.5	29 8	1250	708	0 2	
7/23/95	15:30	10.8	6.3	7 7	13 3	867	181	19.1	22.9	993	570	0 2	
7/23/95	15·35	10.5	6 1	8.1	13 5	859	179	42 9	40 2	1046	585	0 2	
7/23/95	15:40	11 2	6.6	7.1	13 0	874	182	24.6	29.7	1318	767	0.2	
7/23/95	15:45	11 2	6 6	7.1	12.9	879	181	30.9	34.1	1415	824	0.2	
7/23/95	15.50	11 6	6 9	6.8	12.8	877	177	46 8	53.4	2173	1243	0.2	
7/23/95	15:55	11.4	6.8	7 2	12.9	878	179	40.4	45.1	1801	1028	0.2	
7/23/95	16:00	11.1	6 6	7 6	13 2	883	181	28 0	30 0	1249	720	0.2	
7/23/95	16·05	10.9	6 5	7 7	13 2	885	182	28.4	28.6	1184	676	0.2	
7/23/95	16·10	10.6	6.3	8 1	13 4	887	182	19.5	22 0	895	516	0.2	
7/23/95	16:15	10.9	6 4	7 8	13.2	890	181	24 7	26.2	1092	621	0.2	
7/23/95	16·20	10.3	6 0	8 6	13.8	885	181	17.7	21.3	825	482	0.2	
7/23/95	16 25	9 9	5.9	8.9	13.9	882	180	19.9	18 9	703	403	0 2	
7/23/95	16:30	9.8	5 8	9 1	13 9	888	180	16.1	17.1	573	326	0 2	
7/23/95	16·35	9.6	5 7	9.3	14 1	884	180	16 2	17 8	570	326	0.2	
7/23/95	16 40	9.0	5.4	10.0	14 5	880	180	16.9	17.3	527	300	0 2	
7/23/95	16 45	8 6	5 3	10.5	14 6	874	179	18.3	16 2	499	287	0 2	
7/23/95	16 50	8.5	5 2	10.5	14 7	879	178	13.9	14 1	489	282	0.2	
7/23/95	16:55	8.2	5.1	10.9	14 8	874	178	16.1	15 0	539	323	0 2	
7/23/95	17:00	8.7	5 3	10.2	14 5	893	178	15.4	14 8	604	355	0.2	
7/23/95	17 05	8.9	5 3	10 2	14.6	906	179	14.3	14.5	612	356	0.2	
7/23/95	17:10	7.9	4 6	11 1	15 3	885	180	12 4	12 5	618	348	0 2	
7/23/95	17 15	7.9	4 5	11.0	15 3	872	181	12.6	12 2	656	357	0.2	
7/23/95	17·20	8 0	4 6	11.0	15 3	864	182	12 2	11 7	576	315	0.2	
7/23/95	17 25	8 2	4 8	10 7	15 1	859	182	11.8	11 9	522	286	0 2	
7/23/95	17 30	8 4	4 9	10.4	15 0	854	183	13 2	12.9	504	277	0 2	
7/23/95	17 35	8 8	5.1	10.1	14.7	855	184	12 6	13.4	518	283	0 2	
7/23/95	17 40	8 1	4.9	11 0	14 9	848	180	17 6	15 8	495	285	0 2	
7/23/95	17 45	9.3	5 6	9 4	14 1	875	181	18.2	17 2	562	326	0 2	
7/23/95	17 50	10 0	5 8	8 7	13 8	889	182	12 8	14 9	568	330	0 2	

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DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/23/95	17.55	9 5	5 6	9 3	14 2	878	182	15 3	17 4	638	369	0.2	
7/23/95	18·00	9.3	5 5	9 6	14 3	868	181	16.1	16 8	583	330	0 2	
7/23/95	18 05	8.9	5 3	9 9	14 5	862	181	15 2	16 7	541	305	0 2	
7/23/95	18·10	8.9	5 3	9 9	14 4	858	181	16 3	17 6	579	327	0 2	
7/23/95	18.15	9 5	5 6	9.2	14 1	863	181	16 7	18 6	660	380	0 2	
7/23/95	18 20	10.3	6 1	8.3	13 6	874	182	15 8	20 1	788	452	0 2	
7/23/95	18:25	10 9	6.3	7.7	13 3	885	183	17 2	20 7	892	511	0 2	
7/23/95	18:30	10.7	6 2	8 0	13 5	884	182	16 0	19 8	857	496	0 2	
7/23/95	18.35	9.9	5 8	9 0	14 0	869	181	13 0	18 3	679	392	0 2	
7/23/95	18.40	9.7	5.7	9.2	14.1	864	182	17.1	17 3	658	378	0.2	
7/23/95	18.45	10.3	6.1	8.4	13.6	876	182	15 0	17 3	776	447	0.2	
7/23/95	18·50	10 9	6.4	7 7	13 3	885	183	16 1	20 4	991	559	0 2	
7/23/95	18 55	11.8	6 7	6.8	12 9	886	181	41 4	46.9	1894	1056	0 2	
7/23/95	19.00	10 5	6 2	8.2	13 5	885	183	17 2	21 0	974	572	0 2	
7/23/95	19 05	10 2	6 1	8.6	13 7	881	182	14 3	18.3	794	466	0 2	
7/23/95	19·10	9 8	5 8	9 1	14 0	876	181	14 1	16 0	608	354	0 2	
7/23/95	19 15	9.9	5 9	9 0	13.8	879	181	10 6	14 0	539	311	0.2	
7/23/95	19 20	9.6	5.8	9.3	14.0	877	181	11 5	13 5	517	299	0.2	
7/23/95	19·25	9.5	5.7	9 4	14.1	876	181	11.7	12.8	502	289	0.2	
7/23/95	19·30	9.5	5.7	9 5	14.1	875	180	11 1	13 4	506	289	0.2	
7/23/95	19.35	9.4	5 7	9.5	14.1	880	181	11.7	13 1	512	292	0.2	
7/23/95	19.40	9.5	5.7	9.4	14 1	885	181	11.3	12 6	590	338	0.2	
7/23/95	19 45	10.2	6 0	8 6	13.7	904	181	11.7	13.9	708	403	0 2	
7/23/95	19 50	11.2	6.6	7.5	13.1	938	178	35.3	44.5	1706	950	0 2	
7/23/95	19 55	9 1	5.4	10.0	14.5	941	179			604	367	0.2	
7/23/95	20 00	7 1	4.4	12 3	15.6	892	177			542	344	0.2	
7/23/95	20 05	6 3	4 0			863	177					0.2	
7/23/95	20 10					862	182	15.2				0.2	
7/23/95	20 15					863	183	13 6				0.2	
7/23/95	20.20					847	177	11 3				0 2	
7/23/95	20:25					845	176	16 6				0.2	
7/23/95	20.30					851	180	20.9				0 2	
7/23/95	20.35					858	182	23 7				0 2	
7/23/95	20·40					865	181	29 2				0 2	
7/23/95	20 45					874	180	29.1				0 2	
7/23/95	20 50					881		25.7				0.2	
7/23/95	20 55					875		14 0				0.2	
7/23/95	21 00					873		4.8				0.2	
7/23/95	21·05		5 6		14 1	872	180	4.5	21 5		357	0 2	
7/23/95	21·10		5.6		14 2		180	13.8	19.2		357	0.2	
7/23/95	21 15	10.0	5.7	8 8	14 0	867	181	16.1	18.2	595	346	0.2	
7/23/95	21.20	10 3	6 0	8 4	13 8	870	181	17 5	19.4	686	408	0 2	
7/23/95	21 25	10 6	6 2	8.1	13.6	870	182	18 4	24.4	940	555	0.2	
7/23/95	21 30	10 9	6 3	7.8	13 5	872	181	15.4	30 3	1283	755	0.2	
7/23/95	21·35	11 2	6 5	7 4	13 3	877	180	16 6	31 7	1333	786	0.2	
7/23/95	21 40	11 6	6 7	6.9	13 0	886	179	16.1	34.8	1633	950	0 2	
7/23/95	21 45	11 6	6.7	6 9	13 0	894	179	15 6	38.2	1699	985	0.2	
7/23/95	21 50	11 5	6 7	6 9	13.1	897	180	14 1	34 9	1516	886	0.2	
7/23/95	21 55	11 0	6 4	7 8	13 4	891	180	16 6	20.3	974	589	0.2	
7/23/95	22 00	9 4	5.5	9 4	14.4	867	178	15 1	15 9	477	286	0 2	
7/23/95	22 05	8 9	5.3	9 9	14 6	852	178	5 2	16 3	369	220	0.2	
7/23/95	22 10	9 2	5 4	9.6	14.4	845	179	8 2	18 8	438	264	0 2	
7/23/95	22.15	10 0	5 8	8 8	14 0	844	179	10 8	20.9	613	368	0 2	
7/23/95	22.20	10 5	6 1	8 4	13 7	849	180	8 4	25.5	828	498	0 2	
7/23/95	22 25	10 3	5.9	8 6	13 9	849	180	1 2	24.8	797	479	0 2	
7/23/95	22 30	10 4	6.0	8 4	13 8	855	179	10 1	24 6	858	519	0 2	

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/23/95	22 35	10.6	6 2	8.1	13 6	866	180	13 5	23 4	927	552	0.2	
7/23/95	22·40	10.9	6.3	7 9	13.5	877	180	8.6	21 8	1016	592	0.2	
7/23/95	22:45	10.8	6.2	7.9	13 5	882	180	9 4	20 0	936	543	0.2	
7/23/95	22:50	11.1	6 5	7 4	13.3	894	180	8 4	20 1	998	581	0 2	
7/23/95	22·55	11.3	6 5	7.3	13 2	900	180	10 5	24 1	1288	746	0.2	
7/23/95	23·00	11 2	6 4	7 5	13 4	906	180	10 7	21 7	1168	689	0.2	
7/23/95	23.05	10 7	6 2	8.2	13.7	901	179	17 3	18 2	955	561	0.2	
7/23/95	23:10	10.2	5 9	8 8	14 0	897	179	39 2	13 3	671	398	0 2	
7/23/95	23:15	10.0	5.7	9.0	14.1	892	179	73 7	14 0	690	404	0 2	
7/23/95	23·20	9 9	5.7	9.1	14 2	894	179	90 1	13 2	672	395	0 2	
7/23/95	23·25	10 0	5.7	8.9	14 2	896	179	76 3	14 4	779	451	0 2	
7/23/95	23·30	10 4	6.0	8.4	13 8	907	179	81 6	15 6	861	500	0.2	
7/23/95	23.35	10 4	6.0	8.4	13 9	910	180	37 8	18.5	940	536	0 2	
7/23/95	23:40	9 2	5 4	9.7	14 5	890	179	57 5	14 9	672	389	0 2	
7/23/95	23.45	8 7	5 1	10.0	14 7	875	179	29 7	13 1	529	308	0 2	
7/23/95	23·50	8 7	5 1	10 0	14 7	864	179	17 6	14 0	506	295	0 2	
7/23/95	23:55	9.3	5.4	9.3	14 4	862	180	21 2	15.2	537	311	0.2	
7/24/95	0·00	10 2	5.9	8.5	13 9	863	180	20.7	19.0	679	398	0 2	0.1
7/24/95	0·05	10 9	6.2	7 8	13 5	868	181	26 5	24 9	991	575	0.2	0 1
7/24/95	0·10	11.6	6.7	6 8	13 1	873	179	42 0	50 0	1802	1026	0 2	0 1
7/24/95	0·15	12.3	7 1	6.1	12.6	880	169	34 1	93 7	2980	1670	0 2	0 1
7/24/95	0.20	12.7	7 2	5.8	12 5	884	164	45.4	117.5	3770	1918	0 2	0.1
7/24/95	0:25	12.7	7.2	5.7	12.5	895	166	77.6	110 3	3533	1894	0 2	0.1
7/24/95	0:30	12 5	7 0	6.0	12.7	892	168	84 6	106.0	3325	1836	0.2	0.1
7/24/95	0:35	12.1	6.9	6.4	12 9	897	176	6.0	67.9	2356	1393	0.2	0.1
7/24/95	0:40	12.0	6 8	6.5	13 0	892	177	11 1	69.2	2329	1337	0.2	0.1
7/24/95	0:45	11.7	6.7	6.9	13.1	892	181	23.4	43.9	1616	951	0.2	0.1
7/24/95	0:50	11.3	6.4	7.3	13.4	880	181	17.5	38 0	1328	778	0.2	0.1
7/24/95	0:55	11.0	6.3	7.8	13.6	874	181	13.0	29 1	990	597	0.2	0.1
7/24/95	1.00	10 8	6.1	8.0	13.7	865	181	11.9	30 6	1003	591	0.2	0.1
7/24/95	1 05	10 8	6.1	8.1	13.8	859	181	11 2	31 2	1037	604	0 2	0.1
7/24/95	1·10	11.5	6 6	7.1	13 3	870	178	7 3	61.0	1851	1086	0.2	0.1
7/24/95	1·15	11.7	6.7	6.9	13 2	886	178	4 3	57.5	2188	1275	0.2	0.1
7/24/95	1·20	11 9	6.7	6.7	13 1	904	178	6 4	55.6	2320	1291	0.2	0 1
7/24/95	1 25	12.9	7.2	5.5	12 5	930	167	11 5	106 1	3855	1912	0 2	0.1
7/24/95	1.30	13 8	7.9	4 5	11 5	1000	169	13 8	105 8	3762	1780	0 2	0 1
7/24/95	1·35	9 9	5.7	9.3	14.3	978	181	13 0	12.7	631	409	0 2	0.1
7/24/95	1:40	6.9	4.0	12.7	16.3	891	177	14 2	16 5	843	511	0 2	0.1
7/24/95	1:45	5 0	2.9	14.7	17 5	823	177	14.1	22 6	770	457	0.2	0.1
7/24/95	1·50	6.7	4 0	12 6	16.1	837	177	16 9	17 3	495	291	0 2	0 1
7/24/95	1:55	7 5	4 5	11.4	15 4	857	178	17.2	13 9	407	243	0 2	0.1
7/24/95	2 00	8 5	5 1	10 2	14.7	874	179	8 5	13.6	454	272	0 2	0.1
7/24/95	2 05	9 8	5 7	8.9	14 1	886	180		14 4	587	348	0 2	0 1
7/24/95	2·10	10.7	6 3	7 9	13 5	907	181		15 3	709	429	0 2	0.1
7/24/95	2·15	11.3	6 6	7 1	13 1	921	181		17 3	906	539	0 2	0.1
7/24/95	2:20	11 4	6 7	7.0	13 0	932	181		16.5	923	552	0 2	0.1
7/24/95	2·25	11.1	6 5	7.4	13 3	921	181		20.1	1128	653	0 2	0 1
7/24/95	2·30	10 3	6 0	8 5	13 8	904	180		18 3	852	508	0.2	0 1
7/24/95	2.35	10 0	5 9	8 9	13 9	893	179		19 2	747	455	0 2	0.1
7/24/95	2.40	9 8	5 8	9 1	14.1	886	179		18.1	634	381	0.2	0 1
7/24/95	2·45	9.9	5 8	9 0	14 0	880	180		18 6	653	390	0 2	0 1
7/24/95	2·50	10 7	6 2	8 0	13 5	897	181		26 0	930	551	0 2	0 1
7/24/95	2·55	11.7	6 8	6 7	12 9	919	182		35 5	1675	978	0 2	0.1
7/24/95	3.00	12 3	7.0	6 2	12 7	929	174		75 1	2948	1632	0 2	0 1
7/24/95	3.05		7 9		11 5	970	162		134 3		1982	0 2	0 1
7/24/95	3 10		8 8		10 6	1045	163		137 6		1983	0 2	0 1

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DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/24/95	3:15		6 3		13 8	1068	180		27.6		682	0 2	0.1
7/24/95	3.20		4 2		16.1	944	173		17 0		255	0.2	0.1
7/24/95	. 3.25		3 3		17.1	881	170		22 9		411	0.2	0.1
7/24/95	3.30		3 4		16.6	857	182		19.2		415	0.2	0 1
7/24/95	3:35		4 0		15 9	846	185		16.3		312	0.2	0 1
7/24/95	3:40		4 7		15.1	851	184		16 0		258	0.2	0.1
7/24/95	3 45		4 4		15 5	830	179		18 3		250	0.2	0 1
7/24/95	3 50		5 0		14.9	821	181		22 1		328	0.2	0 1
7/24/95	3.55		5 5		14.3	841	181		26.3		530	0.2	0.1
7/24/95	4 00		6.3		13.4	872	178		53.8		1200	0.2	0 1
7/24/95	4.05		6 5		13.3	914	181		25.3		908	0 2	0 1
7/24/95	4.10		6 8		13.1	946	181		17 4		805	0 2	0.1
7/24/95	4.15		7 6		12 0	998	175		52.0		1289	0 2	0.1
7/24/95	4 20		7 3		12 5	1025	179		31 1		1151	0.2	0.1
7/24/95	4.25		5 7		14 2	1016	178		8.1		209	0 2	0 1
7/24/95	4 30		3 8		16 4	949	176		9.5		283	0.2	0.1
7/24/95	4.35		3.2		16.9	902	177		14.8		493	0 2	0.1
7/24/95	4 40		3 2		17.1	871	177		18 7		480	0 2	0 1
7/24/95	4.45		3 4		16.8	852	178		18 5		419	0 2	0 1
7/24/95	4 50		4 0		16.1	848	179		16.7		346	0.2	0 1
7/24/95	4.55		4 8		15.1	863	180		14.5		295	0.2	0.1
7/24/95	5:00		5 3		14.5	871	181		15 1		326	0 2	0.1
7/24/95	5:05		5 8		13.8	881	182		15 8		381	0.2	0.1
7/24/95	5:10		6 2		13 5	894	182		17.4		455	0.2	0.1
7/24/95	5:15		6 6		13.2	884	184		54.5		1156	0.2	0.1
7/24/95	5:20		6 7		12.9	877	177		90.7		1495	0.2	0.1
7/24/95	5:25		6 9		12.7	877	174		102 9		1746	0.2	0.1
7/24/95	5·30		7.2		12.4	878	170		116 0		1857	0.2	0.1
7/24/95	5:35		7.3		12 2	867	166		138 0		1983	0.2	0.1
7/24/95	5.40		7 2		12.4	875	170		117 4		1802	0 2	0.1
7/24/95	5.45		7 1		12 4	907	180		38.4		1044	0.2	0 1
7/24/95	5:50		7 1		12 5	919	181		35 6		977	0.2	0 1
7/24/95	5:55		7 3		12.4	930	180		37.0		1148	0.2	0.1
7/24/95	6.00		7 1		12.7	929	180		31 3		928	0.2	0.1
7/24/95	6·05		7 3		12 5	946	179		39 8		1076	0 2	0.1
7/24/95	6:10		7 4		12 4	966	177		58 5		1338	0 2	0 1
7/24/95	6·15		7 3		12.4	980	179		45 6		1180	0.2	0.1
7/24/95	6:20		6 9		12 9	981	181		22 6		725	0.2	0 1
7/24/95	6:25		6 1		13.8	958	179		12.1		383	0 2	0 1
7/24/95	6·30		5 5		14 4	930	178		9 8		263	0.2	0.1
7/24/95	6:35		5 2		14.7	919	177		9 2		217	0.2	0 1
7/24/95	6·40		5 1		14.8	911	177		10 1		218	0.2	0.1
7/24/95	6:45		5 3		14 6	909	178		10 8		248	0 2	0.1
7/24/95	6·50		5 7		14.1	920	179		11 2		303	0 2	0 1
7/24/95	6 55		6 2		13.6	940	180		11 6		381	0 2	0 1
7/24/95	7.00		6 9		12.8	977	181		16 9		549	0 2	0.1
7/24/95	7.05		7 3		12 5	1015	175		70 4		1288	0 2	0 1
7/24/95	7·10		5 9		14 2	992	181		13 5		437	0 2	0 1
7/24/95	7:15		4 5		15 8	947	178		12 2		422	0 2	0.1
7/24/95	7:20		4 4		15 8	921	178		14 6		474	0 2	0.1
7/24/95	7:25		4.4		15.7	910	178		14 2		403	0 2	0 1
7/24/95	7:30		4 4		15 6	906	178		13 8		412	0 2	0 1
7/24/95	7 35		4 7		15 4	908	179		15 0		431	0 2	0 1
7/24/95	7·40		5 0		15 1	913	179		15 0		448	0 2	0.1
7/24/95	7·45		5 3		14 7	926	180		15 3		446	0 2	0 1
7/24/95	7 50		5 1		14 8	935	178		13 8		452	0 2	0 1

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DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/24/95	7.55		4.7		15.3	925	176		13 0		408	0.2	0 1
7/24/95	8:00		4 8		15 3	884	179		16.4		427	0.2	0.1
7/24/95	8·05		4 6		15.4	857	179		16 9		363	0 2	0 1
7/24/95	8·10		4 8		15 2	846	180		17 8		337	0 2	0.1
7/24/95	8 15		5.3		14 6	842	180		21.4		396	0 2	0.1
7/24/95	8:20		5.8		14.0	843	180		36 0		662	0.2	0 1
7/24/95	8:25		6.1		13 7	850	177		55 1		1057	0.2	0.1
7/24/95	8.30		6.3		13 5	854	175		66 1		1209	0.2	0 1
7/24/95	8:35		6 7		13.1		161		125 3		1947		0 1
7/24/95	8 40		7.0		12.8		159		138 3		1983		0.1
7/24/95	8.45		7 1		12 7		174		71.3		1475		0 1
7/24/95	8.50		7 0		12 9		175		70 1		1494		0 1
7/24/95	8 55		6 8		13 0		180		47.6		1155		0.1
7/24/95	9·00		6 7		13 2		182		33.9		887	0.3	0.1
7/24/95	9 05		6.5		13 5		182		26 9		682	0 3	0.1
7/24/95	9.10		6.3		13.6		181		24 3		595	0.3	0.1
7/24/95	9·15		6 2		13.8		181		21.7		498	0 3	0.1
7/24/95	9.20		6 0		14.0	871	180		23.1		507	0 3	0.1
7/24/95	9:25		6.2		13 7	882	181		24 2		584	0.3	0.1
7/24/95	9.30		6 3		13 7	898	180		21 7		634	0.3	0 1
7/24/95	9.35		6.3		13.7	916	180		18 2		575	0 3	0 1
7/24/95	9:40		6.8		13 1	948	180		27.1		880	0.3	0.1
7/24/95	9.45		7.0		12 9	972	181		31.6		945	0.3	0 1
7/24/95	9·50		6.1		14.0	970	180		24 4		580	0.3	0.1
7/24/95	9:55		4 7		15 5	933	178		13 5		408	0.3	0.1
7/24/95	10:00		4.5		15 7	923	177		14.6		393	0.3	0.1
7/24/95	10:05					905	176				124	0.3	0.1
7/24/95	10.10					905	176				8	0.3	0.1
7/24/95	10:15					911	175					0.3	0.1
7/24/95	10 20					927	177					0.3	0.1
7/24/95	10 25					943	177					0.3	0.1
7/24/95	10·30					985	179					0.3	0.1
7/24/95	10.35					1007	178					0.3	0.1
7/24/95	10:40					924	176					0.3	0.1
7/24/95	10.45					847	178					0 3	0.1
7/24/95	10:50					824	182					0 3	0 1
7/24/95	10:55		3 4		16 8	800	180		31.3			0.3	0.1
7/24/95	11 00		3 8		16 3	789	181		33 0		346	0.3	0.1
7/24/95	11.05		4.5		15 4	784	181		45 2		681	0 3	0.1
7/24/95	11.10		5 0		14 9	787	176		73.5		1284	0 3	0 1
7/24/95	11:15		5.1		14 3	788	171		98 4		1654	0 3	0.1
7/24/95	11·20		5 6		14.2	794	163		132.1		1967	0.3	0.1
7/24/95	11:25		6 0		13.7	823	167		111.9		1790	0.3	0.1
7/24/95	11:30		6.8		13.0	868	165		111.0		1868	0.3	0.1
7/24/95	11.35		4 6		15 5	842	175		31.7		862	0 3	0.1
7/24/95	11.40		3.5		16 8	787	171		34.2		831	0.3	0.1
7/24/95	11.45		5.6		14 4	832	175		19 8		424	0 3	0.1
7/24/95	11:50		5.1		15 0	843	172		16.2		346	0 3	0.1
7/24/95	11.55		4 4		15.8	831	170		16 6		350	0.3	0.1
7/24/95	12:00		4 0		16 3	810	169		18.7		430	0.3	0 1
7/24/95	12 05		4 0		16 1	807	169		21.1		504	0 3	0.1
7/24/95	12.10		4 3		15 8	808	170		18 2		443	0.3	0.1
7/24/95	12.15		4 4		15 6	812	170		17 7		401	0.3	0 1
7/24/95	12 20		4.5		15 6	815	170		17 8		393	0.3	0.1
7/24/95	12,25		4 4		15 6	819	169	25 7	17 7		403	0.3	0 1
7/24/95	12 30		4.5		15 5	826	169	22 8	16 8	638	388	0.3	0.1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/24/95	12:35		4.4		15.7	831	170	17.0	16.6	662	404	0.3	0.1
7/24/95	12:40	7.1	4.3		15.7	831	169	16.2	17.1	686	419	0.3	0.1
7/24/95	12:45	7.3	4.6	11.9	15.4	839	170	13.9	15.6	605	382	0.3	0.1
7/24/95	12:50	7.5	4.7	11.7	15.3	848	169	16.0	14.1	569	344	0.3	0.1
7/24/95	12:55	7.6	4.7	11.6	15.3	853	168	14.9	23.8	514	312	0.3	0.1
7/24/95	13:00	7.6	4.8	11.7	15.3	854	167	16.7	86.5	503	308	0.3	0.1
7/24/95	13:05	7.3	4.6	12.0	15.4	853	168	16.4	72.2	530	326	0.3	0.1
7/24/95	13:10	7.1	4.4	12.2	15.7	843	170	19.2	22.8	601	368	0.3	0.1
7/24/95	13:15	7.3	4.5	12.0	15.6	847	169	20.8	17.7	637	389	0.3	0.1
7/24/95	13:20	7.5	4.6	11.8	15.5	855	169	21.1	18.0	706	430	0.3	0.1
7/24/95	13:25	7.8	4.8	11.4	15.3	866	169	18.5	16.9	723	441	0.3	0.1
7/24/95	13:30	7.8	4.8	11.3	15.2	873	169	18.6	15.9	628	380	0.3	0.1
7/24/95	13:35	6.9	4.2	12.5	15.9	851	168	20.0	18.4	562	342	0.3	0.1
7/24/95	13:40	6.4	3.7	13.0	16.5	798	171	33.5	25.5	517	299	0.3	0.1
7/24/95	13:45	8.1	4.4	10.8	15.6	785	176	36.3	26.8	457	241	0.3	0.1
7/24/95	13:50	7.2	4.1	11.8	15.9	789	175	34.8	26.9	599	325	0.3	0.1
7/24/95	13:55	7.5	4.2	11.4	15.7	779	175	49.2	39.0	1188	638	0.3	0.1
7/24/95	14:00	7.9	4.4	10.9	15.4	771	175	50.1	40.7	1659	889	0.3	0.1
7/24/95	14:05	8.2	4.7	10.4	15.1	791	175	49.5	44.8	1708	942	0.3	0.1
7/24/95	14:10	7.8	4.8	10.7	14.9	805	172	39.7	36.2	1640	971	0.3	0.1
7/24/95	14:15	8.0	5.0	10.4	14.6	822	172	35.6	33.5	1698	1021	0.3	0.1
7/24/95	14:20	8.9	5.5	9.4	13.9	853	173	28.5	30.5	1639	994	0.3	0.1
7/24/95	14:25	10.6	6.6	7.3	12.8	903	175	27.6	28.6	1491	918	0.3	0.1
7/24/95	14:30	11.1	6.8	7.1	12.8	930	173	36.7	35.4	1785	1090	0.3	0.1
7/24/95	14:35	10.5	6.4	8.2	13.4	960	173	16.5	18.6	1067	645	0.3	0.1
7/24/95	14:40	11.4	6.9	7.0	12.8	1024	173	13.0	14.5	680	414	0.3	0.1
7/24/95	14:45	10.1	6.1	8.9	13.8	1052	170	9.2	11.0	349	207	0.3	0.1
7/24/95	14:50	6.0	3.7	13.7	16.7	945	167	13.8	14.5	466	277	0.3	0.1
7/24/95	14:55	5.5	3.4	14.2	17.0	913	167	15.5	14.6	532	313	0.3	0.1
7/24/95	15:00	4.9	3.0	14.9	17.3	890	168	16.5	14.4	644	387	0.3	0.1
7/24/95	15:05	4.8	2.9	14.9	17.4	874	169	18.4	15.2	714	442	0.3	0.1
7/24/95	15:10	5.2	3.0	14.3	17.3	861	174	20.0	16.5	864	521	0.3	0.1
7/24/95	15:15	5.9	3.2	13.5	17.0	855	178	20.6	16.1	859	479	0.3	0.1
7/24/95	15:20	6.4	3.5	12.8	16.6	853	179	18.3	14.6	636	346	0.3	0.1
7/24/95	15:25	6.1	3.4	13.0	16.7	842	177	17.4	15.1	583	320	0.3	0.1
7/24/95	15:30		3.6		16.5	837	177	16.3	16.1	510	299	0.3	0.1
7/24/95	15:35		3.9		16.1	842	177	19.7	15.3	519	281	0.3	0.1
7/24/95	15:40		4.1		16.0	843	177	18.4	15.7	663	356	0.3	0.1
7/24/95	15:45		4.4		15.6	860	177	16.1	14.2		433	0.3	0.1
7/24/95	15:50		5.2		14.7	894	177	29.4	11.4	484	415	0.3	0.1
7/24/95	15:55	6.7	4.9	13.2	15.3	901	175	95.6	9.4	453	282	0.3	0.1
7/24/95	16:00	5.9	3.8	13.7	16.4	872	174	108.4	12.2	532	346	0.3	0.1
7/24/95	16:05	5.5	3.7	14.0	16.4	874	175	44.1	14.3	572	391	0.3	0.1
7/24/95	16:10	5.2	3.6	14.4	16.6	870	175	26.2	15.1	522	362	0.3	0.1
7/24/95	16:15	4.9	3.3	14.5	16.8	854	176	22.3	15.6	544	365	0.3	0.1
7/24/95	16:20	5.8	3.8	13.4	16.2	858	180	19.7	14.3	517	333	0.3	0.1
7/24/95	16:25	5.8	4.0	13.5	16.0	860	178	19.0	14.7	474	314	0.3	0.1
7/24/95	16:30	5.3	3.8	14.1	16.3	853	175	19.1	16.5	468	319	0.3	0.1
7/24/95	16:35	5.9	4.1	13.4	15.8	860	176	18.2	15.9	466	317	0.3	0.1
7/24/95	16:40	6.3	4.4	13.0	15.6	867	176	16.9	15.3	446	305	0.3	0.1
7/24/95	16:45	6.5	4.5	12.8	15.4	869	175	15.7	15.5	437	300	0.3	0.1
7/24/95	16:50	6.4	4.4	13.0	15.5	865	175	16.7	15.9	413	285	0.3	0.1
7/24/95	16:55	6.1	4.3	13.3	15.7	856	175	16.7	16.9	381	264	0.3	0.1
7/24/95	17:00	6.1	4.3	13.2	15.6	848	176	17.9	18.2	363	250	0.3	0.1
7/24/95	17:05	6.5	4.5	12.7	15.3	845	177	18.1	19.0	364	250	0.3	0.1
7/24/95	17:10	6.8	4.8	12.3	15.0	846	177	18.2	19.8	389	271	0.3	0.1

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DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/24/95	17:15	7.3	5.1	11.8	14.7	847	178	19.4	20.9	439	306	0.3	0.1
7/24/95	17:20	7.4	5.2	11.7	14.5	845	178	20.4	21.7	493	347	0.3	0.1
7/24/95	17:25	7.1	5.0	12.1	14.8	841	179	21.3	21.3	511	358	0.3	0.1
7/24/95	17:30	7.4	5.2	11.7	14.6	844	179	20.8	21.2	585	410	0.3	0.1
7/24/95	17:35	7.3	5.2	12.0	14.7	838	179	22.2	23.2	626	446	0.3	0.1
7/24/95	17:40	7.1	5.1	12.2	14.8	833	178	21.9	20.8	583	415	0.3	0.1
7/24/95	17:45	7.3	5.2	12.0	14.7	838	177	18.8	19.2	559	398	0.3	0.1
7/24/95	17:50	7.3	5.3	11.9	14.6	847	176	16.6	17.5	544	388	0.3	0.1
7/24/95	17:55	7.7	5.6	11.5	14.1	874	177	13.9	15.3	515	380	0.3	0.1
7/24/95	18:00	7.5	5.5	11.7	14.2	885	176	11.6	13.1	479	358	0.3	0.1
7/24/95	18:05	7.0	5.4	12.3	14.3	904	174	9.3	10.5	420	326	0.3	0.1
7/24/95	18:10	6.5	5.1	13.0	14.8	902	171	8.5	9.7	370	294	0.3	0.1
7/24/95	18:15	6.7	5.1	12.8	14.8	906	170	8.9	9.6	377	292	0.3	0.1
7/24/95	18:20	7.0	5.2	12.3	14.6	906	169	9.3	10.3	416	313	0.3	0.1
7/24/95	18:25	6.9	5.1	12.5	14.8	904	169	10.4	10.6	439	330	0.3	0.1
7/24/95	18:30	6.5	4.8	13.0	15.0	906	169	9.9	11.0	447	338	0.3	0.1
7/24/95	18:35	6.7	5.0	12.6	14.8	916	168	10.9	11.2	456	349	0.3	0.1
7/24/95	18:40	7.1	5.2	12.2	14.5	933	169	10.7	11.1	486	372	0.3	0.1
7/24/95	18:45	6.8	5.1	12.6	14.8	942	169	9.5	10.5	463	358	0.3	0.1
7/24/95	18:50	5.7	4.3	13.8	15.6	926	169	10.6	11.2	487	379	0.3	0.1
7/24/95	18:55	5.8	4.4	13.6	15.5	921	169	9.9	11.2	475	367	0.3	0.1
7/24/95	19:00	5.7	4.3	13.7	15.6	917	170	10.7	10.9	468	359	0.3	0.1
7/24/95	19:05	5.7	4.3	13.7	15.5	914	171	10.0	9.2	446	346	0.3	0.1
7/24/95	19:10	6.1	4.5	13.2	15.3	914	176	9.9	10.4	473	353	0.3	0.1
7/24/95	19:15	5.9	4.5	13.5	15.3	913	176	10.2	10.3	444	344	0.3	0.1
7/24/95	19:20	5.3	4.2	14.2	15.7	901	173	9.7	11.0	414	333	0.3	0.1
7/24/95	19:25	5.0	4.1	14.5	15.9	891	173	10.4	12.1	415	337	0.3	0.1
7/24/95	19:30	5.4	4.3	14.0	15.5	894	174	10.8	11.7	416	334	0.3	0.1
7/24/95	19:35	5.7	4.6	13.7	15.3	896	174	9.5	11.5	390	316	0.3	0.1
7/24/95	19:40	5.4	4.4	14.0	15.5	882	174	10.8	12.2	343	278	0.3	0.1
7/24/95	19:45	5.0	4.1	14.6	15.9	861	174	12.0	13.9	302	245	0.3	0.1
7/24/95	19:50	4.9	4.0	14.6	15.9	846	175	13.4	16.8	293	236	0.3	0.1
7/24/95	19:55	6.2	4.8	13.0	14.9	845	180	19.2	19.6	383	296	0.3	0.1
7/24/95	20:00	6.4	5.1	12.8	14.6	847	181	22.7	23.8	555	443	0.3	0.1
7/24/95	20:05	6.6	5.4	12.6	14.3	847	180	24.8	29.7	784	647	0.3	0.1
7/24/95	20:10	6.6	5.4	12.6	14.2	844	178	26.4	30.9	839	704	0.3	0.1
7/24/95	20:15	6.8	5.6	12.4	14.0	850	178	31.0	36.1	962	808	0.3	0.1
7/24/95	20:20	6.6	5.5	12.7	14.2	853	179	22.5	26.2	701	594	0.3	0.1
7/24/95	20:25	6.6	5.6	12.8	14.1	861	178	22.1	25.8	666	578	0.3	0.1
7/24/95	20:30	6.9	5.8	12.6	14.0	872	178	20.6	24.3	647	566	0.3	0.1
7/24/95	20:35	7.0	5.9	12.4	13.8	884	178	19.7	22.1	647	565	0.3	0.1
7/24/95	20:40	6.3	5.3	13.2	14.4	886	178	14.7	17.7	512	444	0.3	0.1
7/24/95	20:45	6.2	5.3	13.3	14.5	892	178	12.3	14.8	468	406	0.3	0.1
7/24/95	20:50	6.2	5.3	13.3	14.5	899	178	10.4	12.5	450	391	0.3	0.1
7/24/95	20:55	6.2	5.4	13.2	14.4	910	178	9.8	12.0	434	376	0.3	0.1
7/24/95	21:00	6.6	5.6	12.8	14.1	926	178	9.4	11.1	434	380	0.3	0.1
7/24/95	21:05	6.8	5.9	12.6	13.9	942	178	9.0	11.4	465	400	0.3	0.1
7/24/95	21:10	6.2	5.4	13.4	14.6	939	177	8.4	9.9	370	320	0.3	0.1
7/24/95	21:15	5.7	4.9	14.1	15.1	924	176	7.9	10.0	348	306	0.3	0.1
7/24/95	21:20	5.6	4.9	14.1	15.2	920	175	8.8	10.8	365	320	0.3	0.1
7/24/95	21:25	5.3	4.6	14.4	15.4	915	175	9.7	10.9	370	325	0.3	0.1
7/24/95	21:30	5.2	4.6	14.4	15.4	915	175	10.0	11.7	394	349	0.3	0.1
7/24/95	21:35	5.6	4.9	14.0	15.0	930	177	10.8	11.7	424	377	0.3	0.1
7/24/95	21:40	6.2	5.4	13.4	14.5	959	178	10.3	11.4	429	395	0.3	0.1
7/24/95	21:45	6.3	5.5	13.5	14.5	988	177	8.5	9.4	356	328	0.3	0.1
7/24/95	21:50	4.3	3.9	15.8	16.4	947	174	8.0	9.0	405	388	0.3	0.1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/24/95	21:55	3 9	3 6	15.9	16.6	916	173	10.7	11.7	484	453	0.3	0.1
7/24/95	22:00	3.7	3 4	16.1	16 8	889	174	11.2	12.2	415	376	0.3	0.1
7/24/95	22 05	4 3	3.7	15.3	16.4	880	179	11 3	11 2	442	374	0 3	0.1
7/24/95	22 10	4 9	4 3	14.7	15.7	888	181	11 0	10 5	423	365	0 3	0 1
7/24/95	22 15	5 5	4 9	14.1	15 0	905	181	9 2	9.6	400	356	0 3	0.1
7/24/95	22.20		5 2		14 7	927	178		8 8		326	0 3	0 1
7/24/95	22.25					940	177					0 3	0 1
7/24/95	22.30					953	174					0 3	0.1
7/24/95	22:35			-		963	169					0 3	0 1
7/24/95	22.40					954	169					0 3	0.1
7/24/95	22:45					935	174					0 3	0.1
7/24/95	22.50					916	174					0 3	0.1
7/24/95	22.55					886						0 3	0 1
7/24/95	23 00					872						0 3	0.1
7/24/95	23 05		4.1		15 6		175		20.0		381	0.3	0.1
7/24/95	23 10	7 0	4 2	12 1	15 5	820	176	40 3	22.4	675	373	0.3	0.1
7/24/95	23:15	7 3	4 3	11 8	15.4	805	176	42 0	30 8	718	417	0 3	0.1
7/24/95	23:20	7.7	4 6	11.3	15 2	795	175	37.8	35.0	904	522	0 3	0 1
7/24/95	23.25	8 0	4 8	10 9	15.0	786	175	49.4	40 9	1363	781	0.3	0.1
7/24/95	23·30	8.3	4 9	10 5	14.7	780	175	50 9	45.8	1796	1034	0 3	0.1
7/24/95	23 35	8 5	5 1	10.0	14.5	780	173	66 3	58.0	2212	1270	0 3	0.1
7/24/95	23.40	9 1	5 4	9.4	14.1	778	174	63 2	55.6	2307	1327	0.3	0.1
7/24/95	23:45	9 9	5 8	8 6	13.7	782	170	78 0	71.4	2711	1569	0.3	0.1
7/24/95	23:50	10.4	6 1	7 9	13.3	791	168	85 2	83.2	2938	1715	0.3	0.1
7/24/95	23:55	10.9	6 4	7 4	13 0	798	165	106.8	99 0	3045	1786	0.3	0.1
7/25/95	0·00	11 4	6 6	6.9	12.8	807	163	114 7	110.9	3265	1879	0.3	0.1
7/25/95	0 05	10.9	6 4	7.7	13.2	810	174	63.3	58.7	1998	1190	0.3	0.1
7/25/95	0:10	10.5	6.1	8.2	13.5	804	175	45.0	39.9	1434	848	0.3	0 1
7/25/95	0·15	10.1	5 9	8.7	13.8	797	174	43.1	37.5	1362	802	0 3	0.1
7/25/95	0:20	9 8	5.7	9.1	14.0	793	174	42.8	36.4	1306	758	0.3	0.1
7/25/95	0·25	10 5	6.1	8.3	13.6	793	172	60.9	54.6	1852	1078	0 3	0 1
7/25/95	0:30	10.5	6 2	8.4	13.5	805	173	51.3	42.1	1515	903	0 3	0 1
7/25/95	0:35	10.5	6.3	8.5	13.5	829	173	29.5	27.3	896	545	0 3	0 1
7/25/95	0 40	10.4	6 2	8.7	13 6	842	172	23.3	21.4	733	442	0 3	0.1
7/25/95	0·45	10.1	6 0	9.0	13 8	850	171	19 8	17 2	636	375	0 3	0.1
7/25/95	0:50	9.7	5 7	9 5	14 1	853	171	17.1	14.5	594	343	0.3	0 1
7/25/95	0.55	8 8	5 2	10.4	14.7	848	170	16.7	14 3	569	329	0 3	0.1
7/25/95	1.00	8 5	5 0	10 6	14 8	846	170	16 3	14 1	530	306	0 3	0.1
7/25/95	1 05	8 6	5 2	10 4	14 7	849	170	16.3	14 2	520	301	0.3	0.1
7/25/95	1·10	8 5	5 1	10 6	14 8	847	170	17 1	14.9	497	288	0.3	0.1
7/25/95	1.15	9 1	5 3	10 0	14 6	846	171	18.4	16 1	504	287	0.3	0.1
7/25/95	1 20	9 2	5.3	9 9	14 5	846	171	18.0	16 8	520	295	0.3	. 0.1
7/25/95	1 25	8 5	5 1	10.7	14 9	847	170	19.6	17 6	520	300	0 3	0 1
7/25/95	1.30	8 5	5.0	10.7	14 9	846	170	19 7	17 9	546	313	0 3	0 1
7/25/95	1·35	8 6	5 1	10.5	14 8	846	170	19 1	18 0	580	333	0.3	0 1
7/25/95	1:40	8 5	5 0	10.6	14 8	845	170	19.7	18.0	526	302	0.3	0 1
7/25/95	1:45	8 7	5 1	10 3	14 8	835	171	20.9	19 0	491	278	0 3	0 1
7/25/95	1 50	8 4	4.9	10 7	15 0	825	172	22.1	20.4	460	261	0 3	0.1
7/25/95	1·55	8 7	5 0	10 1	14.7	824	172	22.8	20.4	504	288	0 3	0.1
7/25/95	2 00	9 2	5 3	9.5	14.4	828	172	22.0	19 8	534	306	0 3	0.1
7/25/95	2 05	8 6	5 0	10.3	14 7	813	171	29 0	26 0	695	398	0 3	0 1
7/25/95	2 10	8 4	5 0	10 2	14.7	802	171	33.1	27 9	1145	648	0 3	0 1
7/25/95	2 15	9 0	5.2	9 4	14 2	799	171	40.6	32 6	1753	992	0 3	0 1
7/25/95	2 20	8.6	5 1	9 9	14 4	789	171	40 3	33 6	1654	947	0.3	0 1
7/25/95	2 25	10.3	5 8	8 1	13 7	772	163	103 7	92 3	3150	1693	0 3	0 1
7/25/95	2 30	10 5	6 0	8 0	13 5	782	166	91 5	79.7	2957	1663	0.3	0 1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/25/95	2 35	10.9	6 4	7 3	13 0	794	162	106 1	100.4	3121	1686	0.3	0 1
7/25/95	2·40	11 9	6 9	6 6	12 6	807	154	133 8	135.6	4786	1985	0.3	0.1
7/25/95	2.45	9.7	5.8	9 4	14 1	805	172	54 7	42.5	1734	1026	0.3	0.1
7/25/95	2 50	10.2	6.0	8.7	13 7	817	172	42 3	35 4	923	549	0 3	0.1
7/25/95	2.55	10 5	6.3	8 1	13.2	844	173	27.8	22.7	986	608	0.3	0.1
7/25/95	3.00	10 0	6.0	8.8	13 6	847	171	22 8	19 4	703	426	0.3	0 1
7/25/95	3 05	10 4	6.2	8 3	13.4	846	172	24 6	22 1	915	558	0.3	0.1
7/25/95	3:10	10 3	6.1	8.5	13 6	843	172	26 0	22 5	920	565	0 3	0.1
7/25/95	3.15	9 9	5 9	9.1	13 8	836	171	26 1	23 0	839	513	0.3	0.1
7/25/95	3·20	10.0	5.9	8 8	13 8	840	171	30 1	25 3	972	585	0.3	0 1
7/25/95	3·25	10.3	6 0	8 5	13 6	846	171	32.5	27.0	1103	658	0 3	0.1
7/25/95	3 30	10 8	6.4	8.0	13 3	855	171	35 9	30 8	1255	752	0.3	0.1
7/25/95	3:35	11 2	6 6	7.7	13.1	868	171	31 6	28.1	1172	694	0.3	0 1
7/25/95	3·40	10 7	6 3	8 4	13 5	881	171	21 7	19.0	914	533	0 3	0.1
7/25/95	3 45	10 1	6.0	8 9	13.8	885	170	18 3	16.6	812	473	0 3	0.1
7/25/95	3 50	10 2	6 0	8.7	13.8	894	170	17 4	15.4	809	465	0 3	0.1
7/25/95	3 55	10 3	6 0	8 6	13.7	902	170	16.5	14 7	815	464	0.3	0.1
7/25/95	4·00	10 0	5 8	9.1	14 0	901	171	14 2	13 7	710	406	0.3	0 1
7/25/95	4:05	9.4	5.4	9.7	14.4	890	171	14 9	13.7	664	377	0.3	0 1
7/25/95	4·10	9.2	5.3	9.8	14.5	881	171	15 9	14 1	685	384	0.3	0 1
7/25/95	4 15	9.0	5.2	10.1	14.7	875	171	15 9	14.1	673	380	0.3	0.1
7/25/95	4·20	8.8	5 1	10.4	14 8	874	170	16.1	13.5	666	376	0.3	0.1
7/25/95	4 25	8.9	5 2	10.1	14 7	873	170	16 3	13.8	729	407	0 3	0 1
7/25/95	4.30	9.2	5 3	9 8	14 5	876	171	16 2	13.8	734	412	0 3	0.1
7/25/95	4 35	9.0	5.2	10.0	14.6	871	172	15.9	13.5	643	361	0.3	0.1
7/25/95	4:40	8.3	4 8	10.8	15.0	852	172	16.1	14.1	514	289	0.3	0 1
7/25/95	4·45	7.8	4.5	11.3	15.4	829	171	19 3	16.4	448	251	0.3	0.1
7/25/95	4:50	7.8	4.5	11.2	15 3	814	171	22.3	18.7	426	238	0 3	0.1
7/25/95	4:55	8.4	4 8	10 4	14.9	815	172	33 4	28.3	726	413	0.3	0.1
7/25/95	5 00	8.6	5 0	10 1	14.6	814	173	42 2	37 2	1213	705	0.3	0.1
7/25/95	5 05	8.7	5 2	9.9	14.4	804	170	65 0	54.0	2071	1188	0.3	0 1
7/25/95	5.10	8 7	5.2	9 8	14.4	806	172	51 4	40.9	1889	1093	0 3	0 1
7/25/95	5:15	10.0	5.7	8.3	13.7	816	173	53.1	43.1	2175	1214	0.3	0.1
7/25/95	5:20	10.6	6.3	7.6	13 1	827	168	72.3	64 8	2993	1733	0 3	0.1
7/25/95	5:25	11.5	6 9	6.8	12 4	846	163	91 0	89 3	3400	1854	0 3	0 1
7/25/95	5.30	10.8	6 6	7.8	12 9	856	174	33 1	30.6	1519	973	0.3	0 1
7/25/95	5:35	10 5	6.4	8 1	13 1	852	173	26 3	23 9	949	589	0.3	0.1
7/25/95	5·40	10 8	6.5	7.9	13.1	849	173	31 6	28.9	1124	695	0.3	0.1
7/25/95	5 45	10 2	6 0	8 6	13.7	832	173	31 9	27.9	1053	637	0 3	0 1
7/25/95	5.50	9 5	5.6	9 2	14.0	820	173	32 7	29.4	979	571	0 3	0.1
7/25/95	5:55	10.1	6 0	8.6	13 6	821	173	41 4	35 7	1229	727	0.3	0 1
7/25/95	6:00	10.1	6.0	8.7	13 7	822	173	39 1	36 6	1239	734	0.3	0.1
7/25/95	6 05	9.7	5 7	9.1	13 9	814	171	54 7	50 8	1503	853	0.3	0 1
7/25/95	6:10	11.5	6 6	7.1	13 0	812	155	134.7	136 5	3403	1835	0.3	0.1
7/25/95	6·15	12.0	7.0	6.9	12 6	845	163	98.1	92 4	3402	1641	0 3	0 1
7/25/95	6.20	10.6	6.5	8.4	13 2	879	174	24 9	20 1	831	519	0 3	0.1
7/25/95	6:25	9 8	6.0	9.3	13 8	884	172	18.8	16 5	693	419	0 3	0 1
7/25/95	6:30	9 6	5.8	9 5	14 0	885	170	16.9	14 7	671	404	0.3	0.1
7/25/95	6.35	10 2	5.9	8 8	13 8	888	172	15 4	13 9	739	435	0 3	0 1
7/25/95	6·40	10 0	5.8	9 0	14 0	887	172	14 6	12 7	657	383	0 3	0 1
7/25/95	6 45	9 4	5.4	9.7	14.5	875	171	12.9	11 6	623	353	0 3	0 1
7/25/95	6 50	9.1	5 2	10 0	14 6	868	172	13 5	11 7	609	345	0.3	0 1
7/25/95	6·55	8.5	4.9	10.8	15 0	862	171	14 0	12 4	600	345	0 3	0 1
7/25/95	7.00	7 9	4 7	11 5	15 3	854	170	16 0	13 5	624	365	0.3	0.1
7/25/95	7·05	7 8	4 6	11 6	15 4	847	170	16 4	14 5	651	387	0 3	0.1
7/25/95	7 10	7 7	4 6	11 7	15 4	840	170	17 4	14 9	615	364	0 3	0 1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/25/95	7:15	7.6	4.5	11.8	15.5	832	171	18.7	15.9	567	332	0.3	0.1
7/25/95	7:20	7.3	4.3	12.2	15.7	817	170	21.3	18.0	535	315	0.3	0.1
7/25/95	7:25	7.6	4.6	11.6	15.3	816	170	23.1	19.8	539	320	0.3	0.1
7/25/95	7:30	8.4	5.1	10.6	14.6	828	171	24.5	20.7	544	325	0.3	0.1
7/25/95	7:35	8.4	5.2	10.6	14.6	823	172	26.5	24.5	628	379	0.3	0.1
7/25/95	7:40	8.6	5.2	10.4	14.5	817	171	37.1	32.0	851	512	0.3	0.1
7/25/95	7:45	8.9	5.4	9.9	14.3	814	171	52.9	42.1	1374	810	0.3	0.1
7/25/95	7:50	9.1	5.5	9.6	14.1	813	171	58.0	48.3	1702	1009	0.3	0.1
7/25/95	7:55	9.3	5.7	9.4	13.9	820	170	61.0	54.2	1826	1096	0.3	0.1
7/25/95	8:00	9.7	6.0	8.9	13.4	845	172	39.6	36.3	1271	787	0.3	0.1
7/25/95	8:05	10.1	6.4	8.4	13.1	856	172	35.0	31.9	1192	742	0.3	0.1
7/25/95	8:10	10.6	6.6	7.9	12.9	859	171	51.2	48.4	1682	1044	0.3	0.1
7/25/95	8:15	10.9	6.7	7.5	12.7	867	175	33.2	30.3	1231	766	0.3	0.1
7/25/95	8:20	11.0	6.9	7.4	12.6	874	174	27.3	26.7	1064	670	0.3	0.1
7/25/95	8:25	9.7	6.2	9.0	13.3	865	171	21.7	22.9	726	467	0.3	0.1
7/25/95	8:30	9.6	6.3	9.2	13.3	862	169	21.3	22.7	718	465	0.3	0.1
7/25/95	8:35	9.2	6.1	9.7	13.5	854	169	23.3	24.3	803	517	0.3	0.1
7/25/95	8:40	9.0	5.9	9.8	13.6	853	170	25.6	25.6	928	589	0.3	0.1
7/25/95	8:45		6.1		13.4	861	172		26.4		630	0.3	0.1
7/25/95	8:50					891	173					0.3	0.1
7/25/95	8:55					910	170					0.3	0.1
7/25/95	9:00					916	169					0.3	0.1
7/25/95	9:05					931	169					0.3	0.1
7/25/95	9:10					944	168					0.3	0.1
7/25/95	9:15					966						0.3	0.1
7/25/95	9:20					977						0.3	0.1
7/25/95	9:25					968						0.3	0.1
7/25/95	9:30	8.1		10.9		945		19.7		599		0.3	0.1
7/25/95	9:35	8.2		10.7		937		20.7		668		0.3	0.1
7/25/95	9:40	8.4		10.4		942		20.1		738		0.3	0.1
7/25/95	9:45	9.6		9.0		966		18.5		722		0.3	0.1
7/25/95	9:50	10.0		8.5		983		16.7		691		0.3	0.1
7/25/95	9:55	9.0		9.7		964		14.7		672		0.3	0.1
7/25/95	10:00	8.0	4.8	10.9	14.9	936	172	15.0	16.3	732	465	0.3	0.1
7/25/95	10:05	7.8	5.0	11.0	14.6	921	172	16.3	15.6	745	473	0.3	0.1
7/25/95	10:10	8.0	5.1	10.7	14.4	912	173	17.0	16.0	725	459	0.3	0.1
7/25/95	10:15	8.2	5.3	10.5	14.2	904	172	17.1	17.1	701	452	0.3	0.1
7/25/95	10:20	8.3	5.4	10.4	14.1	895	172	19.4	18.6	709	459	0.3	0.1
7/25/95	10:25	8.6	5.7	10.0	13.8	889	172	21.0	19.9	756	490	0.3	0.1
7/25/95	10:30	9.6	6.2	8.9	13.3	896	174	22.4	21.1	859	546	0.3	0.1
7/25/95	10:35	10.1	6.6	8.2	12.8	911	175	20.7	19.8	984	623	0.3	0.1
7/25/95	10:40	10.1	6.6	8.3	12.8	910	174	19.1	18.7	1018	653	0.3	0.1
7/25/95	10:45	9.8	6.4	8.7	13.0	912	173	14.9	15.3	832	538	0.3	0.1
7/25/95	10:50	9.5	6.3	9.0	13.2	912	172	11.8	13.3	611	395	0.3	0.1
7/25/95	10:55	9.9	6.5	8.6	13.0	914	172	11.6	12.8	529	338	0.3	0.1
7/25/95	11:00	9.5	6.2	9.2	13.3	907	172	11.3	13.3	514	329	0.3	0.1
7/25/95	11:05	9.2	6.1	9.4	13.4	908	172	10.8	13.0	483	310	0.3	0.1
7/25/95	11:10	8.9	5.9	9.8	13.7	907	172	12.3	14.2	541	350	0.3	0.1
7/25/95	11:15	8.7	5.8	9.9	13.8	905	172	13.2	15.0	620	403	0.3	0.1
7/25/95	11:20	8.9	5.9	9.8	13.7	903	172	14.2	15.7	629	408	0.3	0.1
7/25/95	11:25	8.5	5.6	10.4	14.1	883	172	17.4	16.7	668	435	0.3	0.1
7/25/95	11:30	8.2	5.4	10.8	14.3	877	171	17.4	17.2	643	417	0.3	0.1
7/25/95	11:35	8.0	5.3	11.0	14.5	874	170	18.1	18.0	661	429	0.3	0.1
7/25/95	11:40	9.0	5.6	9.9	14.2	872	173	18.3	17.9	674	413	0.3	0.1
7/25/95	11:45	9.7	5.9	9.1	13.8	882	175	16.2	16.1	651	385	0.3	0.1
7/25/95	11:50	9.0	5.5	9.9	14.3	876	174	16.2	16.4	550	328	0.3	0.1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/25/95	11.55	8.3	5.1	10 7	14 8	861	174	17 4	17 9	507	301	0 3	0 1
7/25/95	12 00	8.0	4 9	11 1	15 0	844	174	20 8	19 4	479	282	0 3	0.1
7/25/95	12 05	8 0	4 9	11.0	14 9	847	174	21 7	20 1	473	279	0 3	0 1
7/25/95	12·10	8.0	5 0	10.8	14 8	852	174	22 0	20.7	565	337	0 3	0 1
7/25/95	12.15	8.4	5 2	10.2	14 4	857	174	23 4	21 0	649	389	0 3	0 1
7/25/95	12.20	8 4	5 4	10 2	14 1	862	172	22 5	21 6	729	458	0 3	0 1
7/25/95	12 25	7.9	5 2	10 8	14 3	856	171	23 9	22 4	869	562	0 3	0 1
7/25/95	12.30	7.7	5.1	11 0	14 4	847	171	26 4	25.3	1137	731	0.3	0 1
7/25/95	12.35	8.4	5 6	9.9	13 8	855	172	28.9	26.6	1186	759	0 3	0.1
7/25/95	12 40	8.1	5.3	10.3	14 1	838	172	35 7	32 4	1438	914	0.3	0 1
7/25/95	12 45	8.2	5 3	10.0	13 9	831	173	38 0	34 8	1576	998	0.3	0 1
7/25/95	12 50	10.5	6 8	7 3	12 2	860	175	88 5	78 6	2540	1625	0.3	0 1
7/25/95	12·55	9.1	5 8	9 3	13 6	849	174	91 5	81 6	2840	1797	0.3	0 1
7/25/95	13 00	7 2	4 8	11.4	14 7	809	172	50 0	43 5	1844	1216	0 3	0.1
7/25/95	13 05	9 1	6 0	9.1	13 3	851	173	37 2	33 4	1490	954	0.3	0 1
7/25/95	13 10	9.3	6.1	9 0	13 2	872	173	27 3	25.9	1338	852	0.3	0.1
7/25/95	13·15	9.5	6.2	9 0	13 2	878	172	22 5	22.4	1101	700	0 3	0.1
7/25/95	13:20	8 7	5.7	10.0	13 9	863	170	15 3	16.5	619	406	0.3	0.1
7/25/95	13 25	8 6	5.7	10.1	13 9	862	169	14 5	16 1	503	323	0.3	0.1
7/25/95	13 30	8 3	5 5	10.5	14 1	861	169	15 5	18 0	475	304	0.3	0.1
7/25/95	13 35	8 0	5 2	11 0	14 5	851	169	19 3	21.3	495	316	0.3	0.1
7/25/95	13:40	7.5	4.9	11.6	14 8	841	168	18 2	22 3	531	342	0.3	0.1
7/25/95	13 45	8.1	5.3	10.7	14 3	866	170	16 4	18 5	457	293	0 3	0.1
7/25/95	13 50	7.8	5.2	11.0	14.4	868	170	13 4	18 6	453	290	0 3	0 1
7/25/95	13 55	7.8	5.1	11.0	14 5	869	170	15 0	19 4	521	334	0.3	0 1
7/25/95	14 00	7.8	5.2	11 0	14 4	870	170	13 7	19 3	594	382	0 3	0.1
7/25/95	14 05	8.1	5.3	10 5	14 2	877	170	13 2	18.2	624	402	0 3	0.1
7/25/95	14 10	8.5	5 6	10.1	13 9	888	171	9 6	16.9	622	398	0.3	0 1
7/25/95	14·15	8.5	5 8	10 1	13 7	897	170	10.5	15.7	619	395	0.3	0.1
7/25/95	14 20		6.0		13 5	908	170	6.9	14 9	596	378	0.3	0.1
7/25/95	14 25		5 9		13.7	903	169	6 6	15 2	588	371	0.3	0 1
7/25/95	14:30		4.5		15 4	859	168	7 0	18.7	635	412	0 3	0 1
7/25/95	14.35		4.1		15 9	834	167	9 5	22 4		401	0 3	0 1
7/25/95	14 40		4 4		15 4	854	168	21.1	20 9		357	0 3	0.1
7/25/95	14:45		4.4		15 4	863	174	26.3	15 9		291	0 3	0 1
7/25/95	14 50		5.3		14 3	152	175	16 3	17 8		331	0.3	0.1
7/25/95	14 55	9.5	5.3	9 0	14 3	839	175	24 0	18 9	533	320	0 3	0 1
7/25/95	15 00	9 5	5.7	9 0	13 9	851	177	28 7	20.8	576	339	0 3	0 1
7/25/95	15 05	9.8	5.8	8 5	13.7	847	180	31 0	24 7	725	424	0 3	0 1
7/25/95	15·10	10.1	6 1	8 1	13 3	850	180	35 0	28 9	1010	603	0 3	0 1
7/25/95	15.15	9 2	5 6	9 2	13 8	844	177	31 7	25 7	880	534	0 3	0.1
7/25/95	15:20	9 8	5 9	8 5	13 5	842	179	37 5	31 0	1198	711	0 3	0 1
7/25/95	15.25	9 8	5 9	8 4	13 4	843	179	40 8	33 0	1350	801	0 3	0 1
7/25/95	15 30	10.2	6 2	7 9	13 1	851	180	44 2	36 4	1585	953	0 3	0 1
7/25/95	15:35	10.3	6.4	7.9	13 0	861	179	40 4	32 4	1383	847	0 3	0 1
7/25/95	15:40	10.9	6 7	7.3	12 6	876	179	38 0	32 9	1419	875	0 3	0.1
7/25/95	15 45	10.4	6 4	7 9	13 0	882	178	27 6	22 7	999	618	0 3	0.1
7/25/95	15 50	9 9	6.1	8.5	13 3	883	177	21 1	17 7	749	462	0.3	0.1
7/25/95	15·55	9.7	6.0	8.8	13 5	886	177	18 1	15.4	666	410	0 3	0 1
7/25/95	16 00	9 5	5.9	9 0	13 6	887	177	16 3	14 4	632	387	0 3	0 1
7/25/95	16.05	9 4	5 9	9.0	13 6	890	177	15 4	13.5	603	369	0 3	0 1
7/25/95	16.10	9 5	5 9	9.0	13 6	894	177	13 5	12.5	547	334	0 3	0 1
7/25/95	16 15	9 3	5 8	9.2	13 7	893	176	13 4	12 7	520	319	0 3	0 1
7/25/95	16 20	8 9	5 6	9 7	14 0	889	176	13 5	13 0	498	305	0 3	0 1
7/25/95	16 25	8 5	5 4	10 1	14 2	883	175	13 9	13 2	474	289	0 3	0 1
7/25/95	16.30	8 6	5 5	10 0	14 1	888	176	14 6	14 0	516	317	0 3	0 1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/25/95	16 35	8 5	5.4	10 1	14.1	888	176	16 1	15 0	590	365	0 3	0 1
7/25/95	16:40	9 0	5 6	9 6	13 9	894	176	15 6	14 4	663	409	0.3	0.1
7/25/95	16:45	9 9	6 2	8 5	13 3	913	176	13.9	13 0	693	428	0 3	0.1
7/25/95	16.50	10 7	6 7	7 7	12 8	938	177	12.4	11 6	673	409	0 3	0.1
7/25/95	16:55	9.1	5 7	9 8	14 0	922	175	11 3	11.7	572	350	0.3	0.1
7/25/95	17 00	7 6	4 8	11 5	15.0	895	174	13 4	12 7	585	362	0.3	0.1
7/25/95	17 05	8.1	4.9	10 8	14 8	891	177	13 5	12 1	582	345	0 3	0.1
7/25/95	17:10	7.9	4 8	10 9	14.9	880	178	15.1	12 8	549	322	0 3	0.1
7/25/95	17.15	8.3	5.0	10.3	14 7	871	179	15.8	13 1	540	313	0.3	0.1
7/25/95	17.20	8.7	5.2	9 8	14 4	870	180	16.3	13 4	548	316	0.3	0.1
7/25/95	17·25	9 4	5.5	9.1	14.0	877	181	16 8	13 9	593	340	0 3	0.1
7/25/95	17 30	10 0	5 9	8.5	13.6	883	182	17.4	14.7	648	376	0 3	0.1
7/25/95	17·35	10.4	6.1	8.1	13 4	890	182	17 2	14 6	665	384	0 3	0.1
7/25/95	17:40	10 3	6 1	8 1	13.4	891	182	16.9	14 2	636	371	0 3	0.1
7/25/95	17:45	9 9	5 8	8 6	13 7	884	181	16 9	14 4	609	353	0 3	0.1
7/25/95	17·50	9 9	5 8	8 4	13.7	877	182	19 2	16 2	632	367	0 3	0.1
7/25/95	17:55	9.4	5.7	9 0	13 7	870	180	19.3	16 8	613	366	0.3	0 1
7/25/95	18.00	9.4	5.7	9 0	13 8	863	180	20.0	17 2	576	342	0 3	0.1
7/25/95	18 05	9.5	5.7	8 9	13 7	859	180	23.1	19 9	624	372	0.3	0.1
7/25/95	18:10	9.7	5.9	8 6	13 6	853	180	27 8	24.1	807	481	0 3	0.1
7/25/95	18.15	10.4	6.3	7 8	13 1	855	181	38 1	32.6	1252	741	0.3	0 1
7/25/95	18 20	10.7	6.4	7.6	13.0	861	182	40.9	34.8	1421	844	0 3	0.1
7/25/95	18:25	11 0	6 6	7.1	12.8	870	183	46 0	39.7	1650	971	0 3	0 1
7/25/95	18:30	11.7	7.1	6.4	12 2	886	183	61.6	54.7	2293	1395	0 3	0 1
7/25/95	18:35	10.5	6.6	8.1	13.0	889	179	28 0	25.1	1175	743	0.3	0.1
7/25/95	18.40	9.8	6.2	8.9	13.5	892	178	22.2	19.9	911	568	0 3	0 1
7/25/95	18 45	9 9	6 2	8 8	13 4	904	178	23.6	20.6	1134	697	0 3	0.1
7/25/95	18 50	10.8	6 9	7 6	12 6	942	179	26.1	22.3	1705	1065	0 3	0.1
7/25/95	18.55	12 7	7 8	5.5	11.6	981	180	43.6	35.1	1865	1091	0.3	0.1
7/25/95	19.00	10 7	6.8	8 3	12 8	1006	174	32.1	25.7	1121	696	0 3	0.1
7/25/95	19 05	7 5	4.7	12.0	15.4	906	173	16.6	14 3	703	454	0 3	0.1
7/25/95	19:10	7 3	4 4	12.0	15.5	880	176	16.9	15.6	751	456	0 3	0.1
7/25/95	19.15	7.2	4.3	11 9	15.5	870	178	16 5	16.5	575	342	0.3	0.1
7/25/95	19·20	7.5	4.6	11.3	15.1	870	178	15 3	15.4	488	288	0.3	0.1
7/25/95	19·25	7.5	4.7	11.4	15.0	868	177	17.5	17.1	523	316	0.3	0.1
7/25/95	19:30	8.1	5.0	10.6	14.6	869	178	15.8	17.6	604	360	0 3	0.1
7/25/95	19 35	8.7	5 4	9.9	14 1	879	178	16.3	16.7	704	429	0 3	0.1
7/25/95	19 40	10 2	6.2	8 3	13.3	899	179	14.7	15.7	817	493	0.3	0.1
7/25/95	19 45	11.2	6.8	7 2	12.7	921	180	15.2	16 4	1070	622	0 3	0 1
7/25/95	19 50	10.9	6 6	7.8	13.1	929	180	14.3	16 7	976	577	0 3	0 1
7/25/95	19.55		5 6		14.1	908	178		13.1	707	415	0.3	0.1
7/25/95	20 00		4.8		15.0	882	177		13 7	604	354	0 3	0.1
7/25/95	20 05		4.7		15.1	875	177		13.5	525	307	0.3	0.1
7/25/95	20·10		4 6		15.1	865	178		14 7	505	296	0 3	0.1
7/25/95	20 15		5 0		14.6	866	179		14 7	508	298	0.3	0.1
7/25/95	20:20		5.3		14.2	870	179		15 0	579	340	0 3	0 1
7/25/95	20.25		5 7		13 8	879	180		15 6	680	405	0.3	0.1
7/25/95	20·30		6 2		13.3	890	180		16.1	757	453	0.3	0.1
7/25/95	20.35		6 4		13.1	895	181		15 9	764	455	0 3	0.1
7/25/95	20 40		6 0		13 5	888	180		15.6	643	381	0.3	0.1
7/25/95	20.45		5 7		13 8	874	180		18.4	613	361	0 3	0.1
7/25/95	20 50		5 9		13 6	868	180		22 3	721	436	0 3	0.1
7/25/95	20.55		6 2		13 2	866	181		29 5		619	0 3	0.1
7/25/95	21 00					863	180					0 3	0.1
7/25/95	21 05					868	180					0 3	0 1
7/25/95	21 10					874	182					0 3	0.1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/25/95	21:15					892						0.3	0 1
7/25/95	21:20					907						0 3	0 1
7/25/95	21·25					894						0 3	0 1
7/25/95	21:30					899						0 3	0 1
7/25/95	21:35					912						0.3	0 1
7/25/95	21 40		7 0		12 6	923	176		13 1		710	0.3	0 1
7/25/95	21·45		6 8		12 9		179		16 6		536	0 3	0 1
7/25/95	21.50	10 1	6 3	8 9	13 5	906	179	16.1	14.8	667	438	0.3	0 1
7/25/95	21:55	9 7	6 0	9.3	13.8	903	178	14 2	14.0	577	352	0.3	0 1
7/25/95	22:00	9 2	5 8	9.8	14 0	897	178	14 6	14 4	555	343	0.3	0 1
7/25/95	22 05	9 1	5 7	9.8	14 0	900	177	13.9	14 2	589	365	0 3	0.1
7/25/95	22.10	9 2	5.8	9 6	13 9	900	177	15 9	14 9	669	419	0.3	0 1
7/25/95	22:15	9 9	6 2	8 8	13 4	909	178	14 8	14 2	724	453	0 3	0.1
7/25/95	22 20	10 7	6 7	7 9	12.9	926	178	13 6	13.4	767	479	0.3	0 1
7/25/95	22.25	10 8	6 7	7 9	13 0	930	178	15 2	14 2	856	522	0 3	0 1
7/25/95	22:30	10 6	6 5	8.2	13 2	932	179	15 5	14 2	811	494	0.3	0.1
7/25/95	22.35	9 6	6 0	9 3	13 8	922	177	13.1	12 2	669	410	0 3	0.1
7/25/95	22:40	8 6	5 4	10 3	14 4	906	176	12 7	12.1	588	365	0 3	0.1
7/25/95	22.45	9 1	5 6	9.7	14.1	898	177	13 8	13 0	590	358	0.3	0.1
7/25/95	22 50	9 0	5 6	9.8	14 1	894	177	14 3	13 8	593	365	0.3	0 1
7/25/95	22.55	9 5	5.9	9.3	13 8	898	178	15 4	14 2	640	392	0 3	0 1
7/25/95	23.00	10.0	6.2	8.7	13 5	903	178	15.5	15.0	707	436	0.3	0 1
7/25/95	23.05	10 6	6.6	8 0	13.1	913	178	16 1	15.2	772	476	0.3	0 1
7/25/95	23·10	10.7	6.6	8.0	13.1	915	179	15 7	14.8	788	482	0.3	0.1
7/25/95	23:15	10.4	6 4	8.2	13 2	911	179	14.7	15.0	769	472	0.3	0 1
7/25/95	23.20	10.5	6.4	8 1	13 1	909	180	16 5	16.0	781	479	0.3	0 1
7/25/95	23.25	10.7	6 6	7.8	13.0	907	181	16 7	16 8	817	502	0.3	0.1
7/25/95	23 30	10.5	6.6	8.1	13 1	904	180	17.6	17 6	761	477	0.3	0.1
7/25/95	23 35	10.6	6 6	8 0	13 1	899	180	20 0	20 1	821	507	0.3	0 1
7/25/95	23.40	11.1	6 9	7.4	12 7	903	180	25 1	23 9	1060	656	0 3	0.1
7/25/95	23.45	11.4	7.1	7.1	12 4	913	181	26 2	25.1	1212	762	0.3	0 1
7/25/95	23 50	11.9	7.4	6 5	12 1	920	181	35 8	33.6	1740	1089	0.3	0 1
7/25/95	23 55	12.0	7 4	6 6	12 2	916	182	43 9	40.5	2031	1278	0 3	0 1
7/26/95	0:00	12.0	7.4	6 7	12 2	923	182	32.5	30.6	1529	952	0 3	0 1
7/26/95	0·05	11.4	7.0	7 4	12 6	921	181	21 6	21.0	1125	701	0 3	0 1
7/26/95	0·10	10 4	6 5	8 5	13.3	908	179	15 0	16 0	757	474	0 3	0 1
7/26/95	0:15	9 9	6 2	9 0	13 6	894	179	16 3	16 1	656	407	0.3	0.1
7/26/95	0 20	10.1	6.1	8 9	13 7	880	180	19 0	18 8	699	429	0.3	0 1
7/26/95	0 25	9 9	6.0	9 1	13 8	869	180	21.7	20.5	676	414	0.3	0 1
7/26/95	0:30	9 7	5.9	9 2	13 9	863	179	28 4	26.5	731	451	0.3	0.1
7/26/95	0.35	10 3	6 3	8 4	13 4	878	181	34.7	35 2	1291	799	0.3	0.1
7/26/95	0 40	10.1	6.3	8 8	13 5	875	180	24.3	22 3	815	512	0.3	0 1
7/26/95	0:45	9.9	6.1	9.0	13 7	875	179	20 8	20 8	691	428	0 3	0 1
7/26/95	0.50	9 7	6 0	9 2	13 8	874	179	22 3	20 5	697	429	0 3	0 1
7/26/95	0.55	10 0	6 2	8.9	13.6	878	179	21 1	20 0	756	464	0 3	0 1
7/26/95	1 00	10.1	6 2	8 8	13 5	884	179	19 8	18 8	733	455	0 3	0 1
7/26/95	1.05	10 1	6.2	8 8	13 6	883	179	20 4	19 5	733	446	0.3	0 1
7/26/95	1·10	10.7	6 5	8.1	13.3	889	·179	22 9	21.4	896	548	0 3	0.1
7/26/95	1.15	10.7	6.5	8.0	13 2	894	180	22.9	21 2	921	559	0 3	0.1
7/26/95	1:20	10 7	6.5	8 1	13 3	895	180	22 9	20 9	938	563	0 3	0 1
7/26/95	1:25	10.3	6 3	8 5	13 4	898	179	18 7	19 1	806	498	0 3	0 1
7/26/95	1·30	10.1	6 3	8 7	13 5	893	178	20 1	20 2	748	464	0 3	0 1
7/26/95	1 35	9 5	5 9	9 5	13 9	881	177	22 6	21 4	683	425	0 3	0 1
7/26/95	1.40	9 0	5 6	10 0	14 2	871	178	28 1	25 3	791	486	0 3	0 1
7/26/95	1 45	10 2	6 4	8.5	13 3	894	179	41 4	35 0	1543	927	0 3	0 1
7/26/95	1 50	13 4	8 2	4 8	11 1	989	172	221 0	207 1	4409	3165	0 3	0.1

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/26/95	1.55	14 8	9 0	3.6	10.4	1164	173	213 5	184 7	3332	2551	0.3	0.1
7/26/95	2·00	7 1	4.4	12.7	15.9	1095	173	30 6	9 8	441	270	0 3	0.1
7/26/95	2.05	7 1	4 3	12.7	16.0	994	175	34 4	12 7	778	467	0.3	0.1
7/26/95	2:10	5 5	3.3	14.3	17.1	926	176	37 9	18.2	1115	681	0.3	0 1
7/26/95	2 15	4 7	2 8	15.2	17.6	870	178	41 9	22.4	1226	709	0 3	0 1
7/26/95	2·20	5 0	2.9	14 6	17 4	845	179	41.1	24 4	1382	806	0.3	0.1
7/26/95	2.25	6.1	3 6	13.3	16.6	847	181	41 8	25 6	1292	756	0 3	0.1
7/26/95	2:30	7.1	4 0	12.3	16.1	850	181	39.4	24.8	1108	635	0.3	0 1
7/26/95	2:35	8 0	4.6	11 1	15.4	863	181	30 8	21 8	1003	575	0 3	0 1
7/26/95	2.40	8 5	4 9	10 4	15 1	874	181	29 9	19 6	897	505	0 3	0 1
7/26/95	2 45	10 3	5 8	8.3	13.9	891	183	32 7	24 0	1368	737	0.3	0 1
7/26/95	2.50	11.0	6 2	7 5	13 6	902	184	52 3	42 2	2016	1072	0 3	0 1
7/26/95	2·55	10 6	6.0	8.1	13 8	911	184	41 3	31 6	1698	923	0.3	0.1
7/26/95	3·00	9 6	5 7	9 3	14.2	910	180	19 2	14 9	837	478	0.3	0 1
7/26/95	3 05	10.0	6 0	8 9	13 9	922	180	19 4	15 4	814	476	0 3	0.1
7/26/95	3 10	10.4	6 2	8.4	13 6	939	180	16.9	16 2	782	476	0 3	0.1
7/26/95	3:15	11 7	7 0	6 8	12 6	969	180	62 9	56 1	1536	890	0.3	0 1
7/26/95	3 20		6.3		13 5	976	179	116 4	88 3	2189	1321	0 3	0.1
7/26/95	3 25		4 8		15 3	915	178	16 5	14.3	870	537	0 3	0.1
7/26/95	3:30		5 0		15 0	898	180	22 7	17 3	1006	569	0 3	0 1
7/26/95	3.35		4.9		15.0	887	180	21 8	17 6	981	550	0.3	0.1
7/26/95	3·40		4 7		15.2	871	179	20 0	17.4	784	449	0.3	0 1
7/26/95	3.45		5.0		14 9	860	180	21 9	18 3	749	426	0.3	0.1
7/26/95	3 50		5 3		14.5	857	180	21 7	19 1	710	409	0 3	0 1
7/26/95	3 55		5.6		14 1	858	180	20.8	20 4	754	445	0 3	0.1
7/26/95	4 00		6 0		13.7	861	180	26 1	23.4	960	573	0 3	0.1
7/26/95	4 05		5 2		14 8	837	179	25 8	24 0	985	576	0.3	0 1
7/26/95	4 10		5 3		14 6	826	179	31 5	33 5	1373	780	0 3	0 1
7/26/95	4·15		6.1		13.7	835	180	91.3	83 2	3266	1844	0 3	0.1
7/26/95	4·20		7.1		12.5	862	174	230.5	217 0	4840	3180	0 3	0.1
7/26/95	4 25		7 5		12 0	924	172	230 2	223 9	4230	3224	0.3	0.1
7/26/95	4 30		4.1		16 2	868	178	22 3	21.4	1006	588	0.3	0 1
7/26/95	4·35		5 0		15.2	837	178	26 9	22.5	1140	625	0.3	0 1
7/26/95	4·40		4 9		15 2	837	177	21 2	20 2	877	498	0.3	0.1
7/26/95	4 45		5 5		14.4	853	177	18.5	17 6	933	529	0 3	0 1
7/26/95	4 50		5 3		14 6	864	176	14.7	14 4	830	483	0.3	0.1
7/26/95	4 55		5 6		14 2	877	177	12.2	13 2	834	484	0 3	0 1
7/26/95	5 00		5 6		14 2	885	177	12 4	12 2	789	448	0 3	0.1
7/26/95	5.05		4 9		15.1	868	176	12 2	13.1	703	408	0 3	0.1
7/26/95	5·10		4 9		15 1	853	175	15.8	15.2	783	446	0 3	0 1
7/26/95	5.15		6 4		13 3	895	178	27 3	23 3	1368	743	0.3	0.1
7/26/95	5·20		6.1		13 7	915	177	11 9	12.8	871	493	0 3	0 1
7/26/95	5·25		5 5		14 3	907	177	10 9	11 6	711	416	0 3	0.1
7/26/95	5 30		5 3		14 6	896	176	12 6	12 8	729	419	0 3	0.1
7/26/95	5.35		4 7		15 3	868	176	13 8	14.7	681	393	0 3	0 1
7/26/95	5 40		5 1		14 7	852	176	17 0	16 5	690	389	0 3	0 1
7/26/95	5 45		5 7		14 0	857	178	19 5	18 5	810	457	0 3	0 1
7/26/95	5 50		5 9		13 8	861	178	19 5	19.4	841	492	0 3	0 1
7/26/95	5 55		6 2		13 4	870	178	22 9	21 4	988	588	0 3	0.1
7/26/95	6 00		6 8		12.9	885	179	32 7	34 5	1521	901	0 3	0 1
7/26/95	6 05		7 5		12 0	909	180	74 7	77 8	3035	1789	0 3	0 1
7/26/95	6 10		8 0		11 4	952	178	114 9	124 1	3833	2296	0 3	0 1
7/26/95	6 15		7 2		12 5	981	178	54.7	41 1	1723	999	0 3	0 1
7/26/95	6 20		5 2		15 0	919	177	10.9	12 5	552	333	0 3	0 1
7/26/95	6 25		3 8		16 4	845	175	19 4	21 2	947	550	0 3	0 1
7/26/95	6 30		4 0		16 2	803	175	31 5	26 0	831	484	0 3	0 1

Arlington Virginia
Continuous Monitor Data
July 1995

DATE	TIME	CO2		O2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/26/95	6.35		4.7		15 3	811	176	60 0	53 1	1335	781	0 3	0.1
7/26/95	6 40		5 1		14 7	809	177	34 9	34 5	938	560	0 3	0.1
7/26/95	6 45		4 6		15 3	799	177	32 2	28 0	842	501	0.3	0 1
7/26/95	6 50		4 0		15 9	771	179	31 2	31 7	1000	583	0 3	0.1
7/26/95	6 55		3 8		15 9	762	179	36 3	34 4	827	491	0 3	0 1
7/26/95	7 00		3 3		16 6	757	175	41 4	42 4	1084	674	0 3	0.1
7/26/95	7·05		3 3		16 5	757	174	56 3	48 8	1536	971	0 3	0.1
7/26/95	7:10		5 2		14 1	823	175	68 0	66 2	2271	1441	0 3	0.1
7/26/95	7:15		8 2		10.4	967	169	180 5	188 4	4683	3970	0 3	0 1
7/26/95	7 20		8 7		10.4	1093	172	90 1				0.3	0.1
7/26/95	7.25					1093	166					0.3	0.1
7/26/95	7:30					966	167					0 3	0 1
7/26/95	7.35					890	171					0.3	
7/26/95	7.40					878	170					0.3	
7/26/95	7:45					893	172					0 3	
7/26/95	7 50					910	176						
7/26/95	7 55					929	177						

APPENDIX B

CLEVELAND CONTINOUS MONITOR DATA

Cleveland (Southerly) Ohio
Continuous Monitor Data
August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/31/95	17.00				15 7	592							
7/31/95	17 05					591							
7/31/95	17.10					591							
7/31/95	17.15					590							
7/31/95	17·20					591							
7/31/95	17.25					593							
7/31/95	17 30					591	172						
7/31/95	17:35					591	173						
7/31/95	17·40					588	265						
7/31/95	17 45					592	174						
7/31/95	17:50					592	177						
7/31/95	17:55					593	174						
7/31/95	18·00	4.7		14.2		593	172	5.9					
7/31/95	18:05	5.0	3.8	14.0	15.8	593	174	4.7					
7/31/95	18:10	5.1	3.8	13.8	15.7	593	172	3.5		5.2	2.7	0.13	0.05
7/31/95	18:15	5.1	3.8	13.9	15.8	592	174	2.7	-0.4	5.2	2.9	0.13	0.05
7/31/95	18:20	5.3	3.9	13.6	15.6	592	174	2.7	-0.4	4.6	2.4	0.13	0.05
7/31/95	18:25	5.7	4.2	13.1	15.3	593	175	2.1	0.1	3.5	1.8	0.13	0.05
7/31/95	18 30	6.5	4.7	12.2	14.6	596	175	1.7	0.8	1.9	0.8	0.13	0.05
7/31/95	18:35	5.3	3.9	13.7	15.7	597	174	1.5	1.6	2.0	0.7	0.13	0.05
7/31/95	18 40	5.2	3.9	13.8	15.7	597	172	1.2	1.7	2.2	0.5	0.13	0.05
7/31/95	18:45	5.1	3.8	13.8	15.8	597	172	1.1	1.4	2.5	0.5	0.13	0.05
7/31/95	18:50	5.4	4.0	13.5	15.5	597	173	0.9	1.2	2.0	0.4	0.13	0.05
7/31/95	18.55	5.1	3.8	13.9	15.9	595	175	0.8	1.1	2.2	0.6	0.13	0.05
7/31/95	19.00	5.1	3.8	13.9	15.8	595	174	0 8	1.1	2.2	0.3	0.13	0.05
7/31/95	19 05	4.8	3.5	14.3	16.1	594	175	0.7	1.1	3.0	0.8	0.13	0.05
7/31/95	19:10	4.8	3.6	14.2	16.1	594	175	0.8	1.0	3.3	0.9	0.13	0.05
7/31/95	19:15	4.6	3.5	14.4	16.2	595	173	0.8	1.1	4.1	1.4	0.13	0.05
7/31/95	19:20	4.7	3.5	14.4	16.2	594	173	0.7	1.1	5.3	2.3	0.13	0.05
7/31/95	19:25	4.8	3.6	14.2	16.0	593	172	0.7	1.3	5.8	2.7	0.13	0.05
7/31/95	19:30	5.0	3.7	14.0	15.9	593	172	0.6	1.4	5.5	2.1	0.13	0.05
7/31/95	19:35	5.1	3.8	13.9	15.8	593	172	0.4	1 2	4.9	1.9	0.13	0.05
7/31/95	19 40	5.2	3.9	13.6	15.7	593	174	0.3	1.2	4.4	1.5	0.13	0.05
7/31/95	19 45	5.3	3.9	13.6	15.7	593	174	0.2	1.4	3.8	1.1	0.13	0.05
7/31/95	19:50	5.2	3.9	13.7	15.7	594	174	0.1	1.5	3.9	1.1	0.13	0.05
7/31/95	19·55	5.1	3.8	13.8	15.8	594	173	0.1	1.7	3.9	1.1	0.13	0.05
7/31/95	20 00	5.1	3.8	13.9	15.8	594	173	0.0	1.7	4.3	1.3	0.13	0.05
7/31/95	20·05	5.4	4.0	13.4	15.5	595	172	-0.3	1.5	3.4	0.8	0.13	0.05
7/31/95	20:10	5.3	3.9	13.6	15.6	596	172	-0.5	1.6	2.7	0 4	0.13	0.05
7/31/95	20:15	5.1	3 8	13.8	15.8	595	173	-0.6	1.9	3.0	0.6	0.13	0.05
7/31/95	20:20	5.2	3.8	13.8	15.8	594	174	-0.5	1.8	3.1	0.6	0.13	0.05
7/31/95	20:25	5.3	3 9	13.5	15.6	595	175	-0.6	1.9	3.0	0.6	0.13	0.05
7/31/95	20:30	5.3	3.9	13.6	15.6	595	175	-0.8	2.1	2.4	0.1	0.13	0.05
7/31/95	20·35	5.0	3.7	13 9	15.9	595	173	-0.9	2.0	2.9	0.7	0.13	0.05
7/31/95	20·40	5.1	3 8	13.9	15.8	595	172	-1.0	2.1	3.6	1.0	0.13	0.05
7/31/95	20 45	5.1	3.8	13 8	15.8	595	173	-1.0	2.1	3.3	0.8	0.13	0.05
7/31/95	20:50	5.2	3.8	13.7	15.7	596	173	-1.1	2.2	3.2	0.7	0.13	0.05
7/31/95	20.55	5.2	3.9	13 7	15.7	595	173	-1.2	2.0	3.2	0.6	0.13	0.05
7/31/95	21:00	5.1	3.8	13.8	15.8	594	174	-1.2	2.4	3.1	0.7	0.13	0.05
7/31/95	21·05	5 2	3.8	13 8	15.8	594	174	-1.2	2.3	3.1	0.7	0.13	0.05
7/31/95	21:10	5.2	3 8	13.8	15.8	594	175	-1 4	2.1	3 0	0.5	0.13	0.05
7/31/95	21:15	5.2	3.9	13 7	15.7	595	174	-1.6	1.8	2.9	0.5	0.13	0.05
7/31/95	21.20	5.2	3.9	13.7	15.7	596	173	-1 6	2.2	2 8	0.4	0.13	0.05
7/31/95	21:25	5.2	3 9	13 7	15.7	596	172	-1.8	2.0	2.8	0.4	0.13	0.05
7/31/95	21 30	5.2	3 9	13.8	15 8	596	172	-1.7	2.0	3.0	0.5	0.13	0.05
7/31/95	21·35	5.2	3.9	13.8	15 8	596	173	-1.8	2 2	2.7	0.6	0.13	0 05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
7/31/95	21:40	5.1	3.8	13.9	15.9	595	175	-1.9	2.0	3.1	0.7	0.1	0.0
7/31/95	21.45	5.2	3.8	13.8	15.8	595	175	-1.9	2 5	3.0	0.8	0.1	0.0
7/31/95	21:50	5.2	3.8	13.8	15.8	595	175	-0.9	2.2	3.6	1.1	0.1	0.0
7/31/95	21:55	4.9	3.7	14.2	16.0	599	174	-1 6	2 0	4 4	1.5	0.1	0.0
7/31/95	22.00	4.7	3.5	14.5	16.3	599	171	-1.7	2 3	6.2	2.7	0.1	0.0
7/31/95	22·05	4.6	3.5	14.6	16 3	598	171	-1.8	2.2	8.7	4.3	0.1	0.0
7/31/95	22:10	4.7	3.6	14.5	16.2	596	171	-2.0	2.1	10.2	5.3	0.1	0.0
7/31/95	22:15	4.9	3.7	14.2	16.0	594	172	-2.1	2.0	8.4	4.2	0.1	0.0
7/31/95	22:20	4.9	3.7	14.1	16.0	592	173	-2.1	1.8	7.4	3.7	0.1	0.0
7/31/95	22:25	5.1	3.8	14.0	16 0	589	173	-2.4	1.7	6.1	3.0	0.1	0.0
7/31/95	22:30	5.2	3.8	13.8	15.9	589	173	-2.6	1.4	5.3	2.6	0.1	0.0
7/31/95	22·35	5.3	3.9	13.7	15.8	589	172	-2.7	1.4	4.8	2.2	0.1	0.0
7/31/95	22.40	5.4	4.0	13.6	15.7	591	171	-2.8	1.0	4.1	1.6	0.1	0.0
7/31/95	22.45	5.3	3.9	13.7	15.8	591	171	-2.8	1.0	3.5	1.4	0.1	0.0
7/31/95	22:50	5.3	4.0	13.7	15.7	591	170	-2.9	0.8	3.3	1.2	0.13	0.05
7/31/95	22:55	5.2		13.8		592	170	-3.0		3.1		0.13	0.05
7/31/95	23:00	5.2		13.8		591	172	-3.1		3.4		0.13	0.05
7/31/95	23.05	5.2		13.8		590	173	-2.9		3.6		0.13	0.05
7/31/95	23.10	5.4		13.6		591	172	-3.2		2.8		0.13	0.05
7/31/95	23:15	5.3		13.7		592	174	-3 3		2.6		0.13	0.05
7/31/95	23.20		3.9		15.8	592	174				1.8	0.13	0.05
7/31/95	23:25		3.8		15.9	586	172		1.8		2.1	0.13	0.05
7/31/95	23:30		3.8		15.9	590	172		1.8		2.0	0.13	0.05
7/31/95	23:35	5.0	3.8	14.1	15.9	592	171	2.3	1.6	3.3	2.0	0.13	0.05
7/31/95	23:40	5.2	3.9	13.8	15.8	591	171	1.9	1.5	1.9	1.0	0.13	0.05
7/31/95	23:45	5.1	3.8	14.0	15.9	592	171	1.6	1.6	1.2	0.5	0.13	0.05
7/31/95	23·50	4.0	3.0	15.4	16.9	591	170	1.5	1.4	2.1	1.2	0.13	0.05
7/31/95	23:55	3.6	2.7	15.8	17.2	589	169	1.6	1.6	3.9	2.4	0.13	0.05
8/1/95	0:00	3.3	2.5	16.2	17.5	587	169	1.6	1.8	7.0	4.7	0.13	0.05
8/1/95	0:05	3.2	2.4	16.4	17.6	585	168	1.5	1.8	11.3	6.9	0.13	0.05
8/1/95	0:10	3.1	2.3	16.5	17.7	583	167	1.5	1.9	17.9	11.4	0.13	0.05
8/1/95	0:15	3.0	2.3	16.6	17.8	580	167	1.7	1.9	35.8	23.2	0.13	0.05
8/1/95	0:20	3.0	2.3	16.5	17.7	577	168	1.8	2.2	68.0	45.2	0.13	0.05
8/1/95	0:25	3.2	2.5	16.3	17.5	575	166	1.8	2.2	80.3	53.7	0.13	0.05
8/1/95	0:30	3.6	2.7	15.8	17.2	576	166	1.8	2.2	66.5	44.3	0.13	0.05
8/1/95	0:35	4.0	3.0	15.2	16.8	577	165	1.6	2.1	54.2	35.9	0.13	0.05
8/1/95	0:40	4.4	3.3	14.8	16.4	579	163	1.5	2.0	35.4	23.1	0.13	0.05
8/1/95	0:45	4.5	3.4	14.6	16.3	581	163	1.5	1.9	29.2	18.7	0.13	0.05
8/1/95	0.50	4.8	3.6	14.3	16 1	582	162	1 4	1.9	18.6	11.8	0.13	0.05
8/1/95	0:55	4.8	3.6	14.2	16.1	583	162	1 3	1.8	13.9	8.9	0.13	0.05
8/1/95	1.00	4.8	3.7	14.2	16.0	584	162	1.1	1.7	10.9	7.1	0.13	0.05
8/1/95	1:05	4.9	3.7	14.2	16.0	584	163	1.0	1.6	8.7	5.4	0.13	0.05
8/1/95	1:10	5.0	3.7	14 0	15.9	585	163	0.9	1.6	6.4	4.0	0.13	0.05
8/1/95	1:15	4.8	3.6	14.2	16.1	585	162	0.8	1.5	,5.3	3.4	0.13	0.05
8/1/95	1:20	4.9	3.7	14.1	16.0	586	162	0.7	1.5	4 4	2.8	0.13	0.05
8/1/95	1·25	4.5	3.4	14.6	16.3	586	163	0.7	1.4	5.4	3.2	0.13	0.05
8/1/95	1:30	4.6	3.4	14.5	16.3	586	163	0.7	1.4	5.5	3.4	0.13	0.05
8/1/95	1 35	4.5	3.4	14.6	16.3	586	164	0.7	1.4	6.2	3.9	0.13	0.05
8/1/95	1:40	4.6	3.5	14.5	16.3	586	164	0 6	1.4	5 8	3.4	0.13	0.05
8/1/95	1:45	4.5	3.4	14.6	16.3	586	164	0.6	1.4	5.3	3.2	0.13	0.05
8/1/95	1:50	4.4	3.3	14.7	16.4	586	165	0.6	1.4	6 2	3.8	0.13	0 05
8/1/95	1 55	4.5	3.4	14.6	16.3	586	164	0.5	1.4	7 1	4.5	0.13	0.05
8/1/95	2 00	4.6	3.5	14.5	16.3	586	163	0.5	1.4	6 2	3.9	0.13	0.05
8/1/95	2 05	4.5	3.4	14.6	16 4	586	164	0.5	1.4	6 8	4.3	0.13	0.05
8/1/95	2:10	4.5	3.4	14.6	16.4	586	164	0 5	1.4	6 9	4.3	0.13	0.05
8/1/95	2 15	4 5	3 4	14.5	16.3	586	163	0 5	1.4	6 4	3.9	0.13	0 05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/1/95	2.20	4.5	3.4	14.6	16.3	586	164	0.4	1.4	6.7	4.2	0.1	0.0
8/1/95	2:25	4.5	3.4	14.6	16.3	586	163	0.4	1.4	6.6	4.1	0.1	0.0
8/1/95	2:30	4.5	3.4	14.6	16.4	586	165	0.4	1.4	7 4	4.5	0.1	0.0
8/1/95	2 35	4.5	3.4	14 6	16 3	586	164	0.4	1 4	6.8	4.3	0.1	0.0
8/1/95	2·40	4.6	3.4	14.5	16.3	586	164	0.3	1.5	6.9	4.2	0.1	0.0
8/1/95	2:45	4 5	3.4	14.5	16.3	586	164	0.3	1.5	6.8	4.1	0.1	0.0
8/1/95	2·50	4.6	3.4	14.5	16.3	586	163	0.3	1.4	6.2	3 8	0.1	0.0
8/1/95	2·55	4.5	3.4	14.6	16.3	586	163	0.3	1.5	6.7	4.2	0.1	0.0
8/1/95	3:00	4.4	3.3	14.7	16.4	586	164	0.4	1.6	8.2	5.0	0.1	0.0
8/1/95	3·05	4.7	3.5	14.4	16.2	586	164	0.3	1.5	7.2	4.4	0.1	0.0
8/1/95	3:10	4.7	3.5	14.4	16.2	586	164	0.2	1.6	6.5	3.9	0.1	0.0
8/1/95	3:15	4.8	3.6	14.3	16.1	586	164	0.3	1.6	5.3	3.2	0.1	0.0
8/1/95	3:20	4.6	3.5	14.5	16.3	587	164	0 3	1.6	4.7	2.9	0.1	0.0
8/1/95	3·25	4.4	3.3	14.7	16.4	586	163	0.4	1 6	6.6	4.2	0.1	0.0
8/1/95	3:30	4.5	3.4	14.6	16.3	586	164	0.3	1.7	6.7	4.3	0.13	0.05
8/1/95	3:35	4.5	3 4	14.6	16.4	586	164	0.2	1.7	6.4	4.0	0.13	0.05
8/1/95	3:40	4.5	3.4	14.6	16.3	586	164	0.2	1.7	7.2	4.6	0.13	0.05
8/1/95	3:45	4.7	3.5	14.4	16.2	586	163	0.1	1.7	6 1	4.0	0.13	0.05
8/1/95	3:50	4.7	3.5	14.4	16.2	587	164	0.1	1.9	4.7	3.0	0.13	0.05
8/1/95	3:55	4.5	3.4	14.6	16.4	586	165	0.1	2.0	5.8	3.7	0.13	0.05
8/1/95	4.00	4.6	3.5	14.4	16.2	586	164	0.0	1.8	4.9	3.2	0.13	0.05
8/1/95	4·05	4.5	3.4	14.5	16.3	587	164	0.0	2.0	5.3	3.4	0.13	0.05
8/1/95	4:10	4.5	3.4	14.6	16.4	586	163	0.1	2.1	5.9	3.7	0.13	0.05
8/1/95	4:15	4.4	3.3	14.7	16.4	586	163	0.1	2.2	6.6	4.1	0.13	0.05
8/1/95	4:20	4.4	3.3	14.7	16.4	586	163	0.1	2.3	7.1	4.5	0.13	0.05
8/1/95	4·25	4.4	3.3	14.6	16.4	586	164	0.1	2.3	7.3	4.5	0.13	0.05
8/1/95	4:30	4.4	3.3	14.7	16.4	585	164	0.1	2.3	7.9	4.9	0.13	0.05
8/1/95	4:35	4.4	3.3	14.7	16.4	585	164	0.0	2.6	8.6	5.4	0.13	0.05
8/1/95	4·40	4.6	3.4	14.5	16.3	585	164	0.0	2.5	8.1	5.0	0.13	0.05
8/1/95	4·45	4.6	3.5	14.4	16.2	586	163	-0.1	2.5	6.6	4.0	0.13	0.05
8/1/95	4:50	4.5	3.4	14.5	16.3	586	163	0.0	2.3	6.9	4.2	0.13	0.05
8/1/95	4:55	4.5	3.4	14.5	16.3	586	163	0.0	2.3	6.9	4.2	0.13	0.05
8/1/95	5·00	4.5	3.4	14.5	16.3	585	162	0.0	2.4	7.1	4.4	0.13	0.05
8/1/95	5 05	4.5	3.4	14.5	16.3	586	163	-0.1	2.3	6.9	4.2	0.13	0.05
8/1/95	5:10	4.6	3.4	14.5	16.3	585	163	-0.1	2.4	6.9	4.0	0.13	0.05
8/1/95	5.15	4.5	3.4	14.6	16.3	585	163	0 0	2.2	7 2	4.2	0.13	0.05
8/1/95	5:20	4.6	3.5	14.4	16.2	586	163	-0.1	2.2	6.8	4.2	0.13	0.05
8/1/95	5:25	4.6	3.5	14.4	16.2	586	163	-0.2	2.2	6.0	3.6	0.13	0.05
8/1/95	5:30	4.5	3.4	14.6	16.3	586	163	0.0	2.2	6.3	4.0	0.13	0.05
8/1/95	5:35	4.4	3.3	14.7	16 4	586	163	0.0	2.3	7.2	4.4	0.13	0.05
8/1/95	5 40	4.5	3.4	14.6	16.4	586	164	0.0	2.3	7.4	4.7	0.13	0.05
8/1/95	5 45	4.6	3.5	14.4	16.2	586	163	-0 1	2.2	6.4	4.1	0.13	0.05
8/1/95	5.50	4.6	3.5	14.5	16.3	585	164	-0.2	2.2	6.2	4.0	0.13	0.05
8/1/95	5 55	4.6	3.4	14.5	16.3	586	164	-0.2	2.5	6.0	3.7	0.13	0.05
8/1/95	6 00	4.5	3.4	14.6	16.3	586	163	-0.2	2.2	6.0	3.8	0.13	0.05
8/1/95	6 05	4.4	3.3	14.7	16.4	585	164	-0.2	2.4	7.1	4.4	0.13	0.05
8/1/95	6:10	4.5	3.4	14.6	16 3	585	163	-0.1	2.3	7.5	4.6	0.13	0.05
8/1/95	6·15	4.4	3.3	14.7	16.4	585	163	-0.2	2.2	8.0	5.1	0.13	0.05
8/1/95	6·20	4.5	3.4	14.5	16.3	585	163	-0.1	2.2	7.7	4.7	0.13	0.05
8/1/95	6:25	4.4	3.3	14.7	16 4	585	163	-0.2	2.3	7.5	4.6	0.13	0.05
8/1/95	6 30	4.4	3.3	14.7	16.4	585	163	-0.1	2.2	9.0	5.5	0.13	0.05
8/1/95	6 35	4.5	3.4	14 6	16.3	584	163	-0.1	2.3	8.6	5.4	0.13	0.05
8/1/95	6 40	4.5	3.4	14.6	16 4	584	163	-0.1	2 4	10.7	6.7	0.13	0.05
8/1/95	6 45	4.4	3.3	14.7	16.4	584	163	-0.1	2.4	13.4	8.5	0.13	0.05
8/1/95	6 50	4 4	3.3	14.7	16.4	584	162	0.0	2.4	18.1	11 6	0.13	0.05
8/1/95	6 55	4 6	3 4	14.5	16.3	584	164	-0.1	2.4	18.4	11.7	0.13	0.05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/1/95	7:00	4.7	3.6	14.3	16.2	584	163	0.0	2.3	18.7	12.0	0.1	0.0
8/1/95	7 05	4.9	3.7	14.2	16.0	563	165	0.2	2.6	16.9	10.9	0.1	0.0
8/1/95	7:10	4.7	3.6	14.4	16.1	567	162	0.1	2.2	24.6	16.2	0.1	0.0
8/1/95	7 15	5.4	4.0	13.5	15.6	560	164	-0.1	2.1	10.2	5.9	0.1	0.0
8/1/95	7·20	5.5	4.1	13.3	15.4	560	163	-0.3	2.0	6.7	3.7	0.1	0.0
8/1/95	7 25	5.7	4.2	13.1	15.3	561	164	-0.4	2.0	4.1	2.1	0.1	0.0
8/1/95	7.30	5.7	4.2	13.1	15.3	562	164	0.4	2.4	3.1	1.6	0.1	0.0
8/1/95	7 35	5.7	4.2	13.1	15.3	562	164	-0.2	2.6	2.0	0.9	0.1	0.0
8/1/95	7.40	5.5	4.1	13.3	15.4	563	164	-0.3	2.2	1.8	0.8	0.1	0.0
8/1/95	7:45	5.5	4.1	13.3	15.5	563	164	-0.4	2.2	1.7	0.7	0.1	0.0
8/1/95	7 50	5.5	4.1	13.3	15.5	562	166	-0.5	2.1	1.3	0.5	0.1	0.0
8/1/95	7:55	5.3	3.9	13.6	15.7	561	166	-0.4	2.2	1.5	0.6	0.1	0.0
8/1/95	8 00	5.1	3.8	13.9	15.8	561	166	-0.3	2.3	2.4	1.2	0.1	0.0
8/1/95	8 05	5.2	3.8	13.8	15.8	561	166	-0.3	2.1	2.8	1.4	0.1	0.0
8/1/95	8 10	5.2	3.9	13.8	15 8	562	167	-0.4	2.1	2.6	1.3	0.13	0.05
8/1/95	8·15	5.2	3.9	13.7	15.7	562	167	-0.4	2.0	3.1	1.6	0.13	0.05
8/1/95	8:20	5.3	3.9	13.6	15.7	562	167	-0.5	2.0	2.6	1.2	0.13	0.05
8/1/95	8:25	5.2	3.9	13.7	15.7	562	167	-0 4	2.1	3.3	1.7	0.13	0.05
8/1/95	8·30	5.4	4.0	13.4	15.6	563	168	-0.5	2.0	2.5	1.2	0.13	0.05
8/1/95	8 35	5.3	4.0	13.6	15.6	563	168	-0.5	2.1	2.3	1.1	0.13	0.05
8/1/95	8:40	5.2	4.0	13.8	15.7	564	167	-0.4	2.1	2.5	1.1	0.13	0.05
8/1/95	8·45		4.0		15.6	562	168		2.2	1.1	0.8	0.13	0.05
8/1/95	8:50		3.8		15.8	564	168		2.3	2.5	1.1	0.13	0.05
8/1/95	8:55		3.8		15.8	564	169		2.5	3.0	1.4	0.13	0.05
8/1/95	9.00		3.8		15.9	563	168		2.7	3.4	1.5	0.13	0.05
8/1/95	9·05		3.8		15.9	563	168		2.8		2.1	0.13	0.05
8/1/95	9·10					560	169		2.8		1.4	0.13	0.05
8/1/95	9:15					555	168				0.8	0.13	0.05
8/1/95	9:20					556	169				0.9	0.13	0.05
8/1/95	9:25					563	169				0.9	0.13	0.05
8/1/95	9.30					561	169				-0.3	0.13	0.05
8/1/95	9:35					564	169					0.13	0.05
8/1/95	9 40					564	169					0.13	0.05
8/1/95	9 45					564	169					0.13	0.05
8/1/95	9 50					564	166					0.13	0.05
8/1/95	9.55					564	167					0.13	0.05
8/1/95	10.00	5.2	3.8	13.9	15.9	564	170	4.2		5.0	4.3	0.13	0.05
8/1/95	10:05	5.4	3.9	13.7	15.7	565	170	4.0		4.3	3.5	0.13	0.05
8/1/95	10:10	5.2	3.8	13.9	15.9	565	170	3.8		4.6	3.7	0.13	0.05
8/1/95	10:15	5.2	3.8	13.9	15.9	564	170	3.7	2.8	4.8	3.7	0.13	0.05
8/1/95	10:20	5.3	3.9	13.7	15.8	564	169	3.6	2.7	4.8	3.4	0.13	0.05
8/1/95	10:25	5.2	3.8	13.9	15.8	564	169	3.5	2.5	4.4	3.3	0.13	0.05
8/1/95	10:30	5.2	3.8	13.8	15.8	565	169	3.5	2.3	4.7	3.4	0.13	0.05
8/1/95	10.35	5.3	3 8	13.8	15.8	565	169	3.4	2.1	4.5	3.2	0.13	0.05
8/1/95	10:40	5.1	3.7	14.0	16.0	565	170	3.4	2.1	5.0	3.6	0.13	0.05
8/1/95	10:45	5.2	3.7	13.9	15.9	565	170	3.3	2.1	5.7	4.1	0.13	0.05
8/1/95	10.50	5.2	3.7	13.9	15.9	565	170	3.3	2.1	5.6	3.9	0.13	0.05
8/1/95	10·55	5.3	3.9	13.7	15.7	565	170	3.3	2.0	5.6	3.8	0.13	0.05
8/1/95	11 00	5.3	3.8	13.7	15.8	565	170	3.3	2.0	5.6	3.8	0.13	0 05
8/1/95	11 05	5.4	3.9	13.6	15.7	565	170	3.5	2.0	5.3	3.5	0.13	0 05
8/1/95	11 10	5.4	3.9	13.7	15.7	566	170	3.5	2.0	5 0	3.3	0.13	0.05
8/1/95	11 15	5.3	3.8	13.7	15.8	566	170	3.4	2.0	5.0	3.2	0.13	0.05
8/1/95	11 20	5.2	3.8	13.8	15 8	541	170	3.6	2.0	5.0	3.3	0.13	0.05
8/1/95	11.25	5.3	3.9	13.7	15 7	567	169	3.5	1 9	5.3	3.5	0.13	0.05
8/1/95	11.30	5.5	4 0	13.5	15 6	567	169	3.3	1 8	4.4	2.8	0.13	0.05
8/1/95	11 35	5 4	3.9	13.6	15.7	568	170	3 3	1.9	3.8	2.6	0.13	0.05

Cleveland (Southerly) Ohio
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August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/1/95	11:40	5.2	3.8	13 8	15.9	568	170	3.3	2.0	4.2	2.6	0.1	0.0
8/1/95	11:45	5.2	3.8	13 9	15.9	568	170	3.3	2.1	4.6	2.8	0.1	0.0
8/1/95	11 50	5.2	3.8	13.8	15.8	568	171	3.4	2.2	4.7	3.0	0.1	0.0
8/1/95	11 55	5.3	3.8	13.8	15.8	568	172	3.5	2.2	4 5	2.8	0.1	0.0
8/1/95	12:00	5.3	3.8	13.8	15.8	568	172	3.6	2.3	4.6	2.8	0.1	0.0
8/1/95	12:05	5.2	3.8	13.8	15.8	569	171	3.5	2.2	4.2	2.5	0.1	0.0
8/1/95	12·10	5.1	3.7	14.0	15.9	569	171	3.6	2.4	5 0	3.0	0.1	0.0
8/1/95	12:15	5.2	3.7	13.9	15.9	569	172	4.5	2.5	5 4	3.3	0.1	0.0
8/1/95	12 20	5.1	3.7	14.0	15.9	569	170	3.9	2.5	5 8	3.5	0.1	0.0
8/1/95	12:25	5.3	3.9	13.7	15.7	569	170	3.7	2.4	5.0	3.1	0.1	0.0
8/1/95	12:30	5.2	3.8	13.9	15.8	569	169	3.7	2.4	4.9	2.8	0.1	0.0
8/1/95	12.35	5.3	3.8	13.8	15.8	568	170	3.8	2.4	4 9	2.8	0.1	0.0
8/1/95	12·40	5.3	3.9	13.7	15.7	569	171	3.6	2.3	4.2	2.3	0.1	0.0
8/1/95	12:45	5.1	3.7	14.0	15.9	569	170	3.6	2.2	4.9	2.8	0.1	0.0
8/1/95	12:50	5.2	3.8	13.9	15.9	569	172	3.6	2.2	5.0	2.8	0.13	0.05
8/1/95	12:55	5 1	3 7	14.0	15.9	569	172	3.5	2.2	4 7	2.9	0.13	0.05
8/1/95	13:00	5.2	3.8	13.9	15.9	569	172	3.5	2.3	5.1	2.9	0.13	0.05
8/1/95	13.05	5.2	3.8	13.8	15.8	569	173	3.5	2.4	5.0	2.8	0.13	0.05
8/1/95	13:10	5.2	3.8	13.8	15.9	569	173	3.5	2.5	4.7	2.6	0.13	0.05
8/1/95	13·15	5.4	3.9	13.6	15.7	569	173	3.6	2.5	4.3	2.4	0.13	0.05
8/1/95	13 20	5.3	3.9	13.6	15.7	569	173	3.6	2.5	3.9	2.1	0.13	0.05
8/1/95	13:25	5.3	3.9	13.7	15.8	570	173	3.6	2.6	3.3	1.9	0.13	0.05
8/1/95	13:30	5.1	3 7	13.9	15.9	570	171	3.6	2.6	3.9	2.2	0.13	0.05
8/1/95	13 35	5.2	3 8	13.9	15.9	570	172	3.5	2.6	4.4	2.4	0.13	0.05
8/1/95	13:40	5.2	3.8	13.8	15.8	570	172	3.5	2.6	4.1	2.0	0.13	0.05
8/1/95	13:45	5.2	3.7	13.9	15.9	570	173	3.6	2.7	4.0	2.2	0.13	0.05
8/1/95	13:50	5.2	3.8	13.8	15.8	570	174	3.6	2.7	3.9	2.2	0.13	0.05
8/1/95	13 55	5.1	3.7	14.0	15.9	570	174	3.5	2.7	4.1	2.4	0.13	0.05
8/1/95	14 00	5.3	3.8	13.8	15.8	570	174	3.9	2.7	4.0	2.1	0.13	0.05
8/1/95	14.05	5.1	3.7	13.9	15.9	570	174	3.8	2.7	3.9	2.0	0.13	0.05
8/1/95	14:10	5.2	3.8	13.8	15.9	570	173	3.6	2.7	3.9	2.1	0.13	0.05
8/1/95	14:15	5.2	3.8	13.8	15.8	570	174	3.6	2.8	4.0	2.1	0.13	0.05
8/1/95	14:20	5.3	3.8	13.7	15.8	570	173	3.7	2.8	3.9	2.0	0.13	0.05
8/1/95	14 25	5.3	3.9	13.6	15.7	571	173	3.6	2.6	3.3	1 6	0.13	0.05
8/1/95	14·30	5.2	3.8	13.8	15.9	571	175	3.6	2.6	3.4	1.6	0.13	0.05
8/1/95	14.35	5.3	3 8	13.7	15.8	570	174	3.5	2.6	3.2	1.5	0.13	0.05
8/1/95	14 40	5.2	3 8	13.8	15.8	571	174	3.6	2.7	3.1	1.5	0.13	0.05
8/1/95	14 45	5.3	3.8	13.6	15.7	571	175	3.6	2.7	2 9	1.3	0.13	0.05
8/1/95	14 50	5.3	3.8	13.7	15.8	572	174	3.6	2 7	3 0	1.3	0.13	0 05
8/1/95	14.55	5.1	3.7	13.9	15.9	571	173	3.6	2.7	3 8	1.9	0.13	0.05
8/1/95	15 00	5.4	3.9	13.6	15.7	571	174	3.6	2.7	2.8	1.3	0.13	0.05
8/1/95	15 05	5 1	3.7	13.9	15.9	571	174	3.7	2.8	2.8	1.6	0.13	0.05
8/1/95	15·10	5.3	3.8	13.7	15.8	571	175	3.6	2.8	3.0	1.4	0.13	0.05
8/1/95	15·15	5.2	3.8	13.8	15.8	571	174	3.6	2.7	2.8	1.2	0.13	0.05
8/1/95	15 20	5.1	3.7	14.0	15.9	571	174	3.6	2.6	3.3	1.6	0.13	0.05
8/1/95	15 25	5.2	3.8	13.8	15.8	571	173	3.7	2.6	3.1	1.5	0.13	0.05
8/1/95	15.30	5.1	3.7	13.9	15.9	571	174	3.7	2.6	3.0	1.5	0.13	0.05
8/1/95	15.35	5.1	3.7	13.9	15.9	571	173	3.7	2 6	3.3	1 6	0.13	0.05
8/1/95	15:40	5.2	3.8	13.8	15.8	571	174	4.1	2.7	3.4	1.6	0.13	0.05
8/1/95	15:45	5.3	3.8	13.7	15.8	571	174	4.1	2 9	2.9	1.3	0.13	0.05
8/1/95	15 50	5.3	3.8	13.7	15.8	571	174	4.1	3.1	2 7	1.1	0.13	0.05
8/1/95	15 55	5 2	3.8	13.8	15.9	571	174	4.0	3.1	2 9	1 3	0.13	0.05
8/1/95	16:00	5 2	3.8	13.7	15.8	571	174	4 0	3.2	2 6	1 2	0.13	0.05
8/1/95	16.05	5.1	3.7	13 8	15.9	571	174	4 0	2.9	2.7	1 2	0.13	0.05
8/1/95	16 10	5.2	3.7	13.8	15.8	571	173	4 0	3.0	3.3	1.5	0.13	0.05
8/1/95	16 15	5 3	3 8	13.6	15.8	572	175	4 1	3.0	2 6	1 2	0.13	0.05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/1/95	16:20	5.2	3.7	13.8	15.9	572	176	4.0	3 0	2.6	1.2	0.1	0.0
8/1/95	16:25	5.1	3.7	13.9	15.9	571	177	4.1	3 1	2.7	1.4	0.1	0.0
8/1/95	16.30	5.3	3.8	13.6	15.8	571	177	4.2	3.2	2.5	1 2	0.1	0.0
8/1/95	16:35	5.4	3.9	13.5	15.7	572	177	4.1	3.1	1.7	0.6	0.1	0.0
8/1/95	16.40	5.1	3.7	13.9	15.9	572	175	4.1	3.0	2.1	0.8	0.1	0.0
8/1/95	16:45	5.1	3.7	13.9	15.9	572	176	4.0	3.0	2.5	1.3	0.1	0.0
8/1/95	16·50	5.2	3.8	13.7	15.8	572	176	4.0	3.0	2.2	0.9	0.1	0.0
8/1/95	16:55	5.0	3.6	13.9	16.0	572	176	4.0	3.0	2.6	1.2	0.1	0.0
8/1/95	17·00	5.1	3.7	13.9	15.9	572	173	3.9	3.0	2.6	1.2	0.1	0.0
8/1/95	17:05	5.3	3.8	13.6	15.8	572	173	3.9	3.1	2.2	0.9	0.1	0.0
8/1/95	17:10	5.2	3.8	13.7	15.8	572	174	4.0	3.2	2.1	1.0	0.1	0.0
8/1/95	17.15	5.2	3.8	13.7	15.8	572	174	4.0	3.2	2.3	0.8	0.1	0.0
8/1/95	17:20	5.2	3.8	13.7	15.8	572	175	3.9	3.3	2.2	0.9	0.1	0.0
8/1/95	17.25	5.3	3.8	13.6	15.7	572	174	3.9	3.2	2.2	0 8	0.1	0.0
8/1/95	17:30	5.3	3.8	13.7	15.8	572	173	3.9	3.2	1.6	0.5	0.13	0.05
8/1/95	17:35	5.1	3.7	13.9	15.9	572	173	3.9	3.1	2.0	0.8	0.13	0.05
8/1/95	17:40	5.2	3.7	13.7	15.8	572	173	3.9	3.1	1.9	0.6	0 13	0.05
8/1/95	17:45	5.3	3.8	13.6	15.7	573	174	4.0	3.0	2.1	0 6	0.13	0.05
8/1/95	17:50	5.9	4.2	12.9	15.2	573	174	3.8	3.0	0.7	0.1	0.13	0.05
8/1/95	17:55	5.3	3.8	13.6	15.7	573	174	3.8	2 9	0.2	-0.1	0.13	0.05
8/1/95	18 00	4 5	3.2	14.6	16.5	571	175	3.8	2.8	0.3	0.0	0.13	0.05
8/1/95	18:05	4.0	2.8	15.4	17.0	571	173	3.7	2.7	0.1	-0.1	0.13	0.05
8/1/95	18:10	3.4	2.4	16.0	17.5	563	178	3.9	2.7	3.0	1.2	0.13	0.05
8/1/95	18:15	3.7	2.5	15.5	17.3	555	185	4.0	2.8	3.8	1.5	0.13	0.05
8/1/95	18·20	3.8	2.5	15.3	17.2	555	185	4.0	3.0	5.8	2.7	0.13	0.05
8/1/95	18:25	4.1	2.8	14.9	16.9	558	183	4.0	3.1	7.7	3.7	0.13	0.05
8/1/95	18·30	4.3	3.0	14.7	16.7	562	179	4.0	3.1	8.4	4.2	0.13	0.05
8/1/95	18:35		3.3		16.4	562	179	4.0	3.1		3.5	0.13	0.05
8/1/95	18:40					562	178					0.13	0.05
8/1/95	18·45					565	178					0.13	0.05
8/1/95	18:50					566	178					0.13	0.05
8/1/95	18:55					568	179					0.01	0.05
8/1/95	19:00					569	180					0.14	0.05
8/1/95	19 05					571	180					0.14	0.05
8/1/95	19:10					569	182					0.14	0.05
8/1/95	19:15					572	182					0.14	0.05
8/1/95	19:20						178					0.14	0.05
8/1/95	19:25											0.14	0.05
8/1/95	19:30											0.14	0.05
8/1/95	19:35											0.14	0.05
8/1/95	19·40	5.4		13.4		575		1.6		0.8		0.14	0.05
8/1/95	19:45	5.3		13.6		576		1.3		0.8		0.14	0.05
8/1/95	19:50	4.8		14.3		575		1.3		2.3		0.14	0.05
8/1/95	19:55	4.2	2.6	15.1	17.0	573	173	1.6	1.6	9.6	10.4	0.14	0.05
8/1/95	20:00	3.9	2.5	15.4	17.1	571	174	1.5	1.4	20.0	14.0	0.14	0.05
8/1/95	20·05	4.0	2.6	15.3	17.0	570	173	1.5	1 5	28.0	19.0	0.14	0.05
8/1/95	20·10	4.1	2.7	15.2	16.9	568	171	1.5	1.6	33.6	22.6	0.14	0.05
8/1/95	20 15	4.2	2.8	15 0	16.8	567	171	1.7	1.6	37.7	25 3	0.14	0.05
8/1/95	20:20	4.3	2.9	14.8	16.7	568	171	1 7	1.6	41.9	28.5	0.14	0.05
8/1/95	20.25	4.5	3.0	14.6	16 5	565	170	1.7	1.6	42.0	28.7	0.14	0.05
8/1/95	20:30	4.8	3.3	14 1	16.2	561	170	1.6	1.6	34.5	23.8	0.14	0.05
8/1/95	20.35	5.3	3.6	13.5	15.8	562	170	1 4	1.4	21.1	15.5	0.14	0.05
8/1/95	20 40	5.7	3 9	12.9	15.4	564	170	1 2	1 3	16.4	12.6	0.14	0.05
8/1/95	20·45	6.7	4.5	11.7	14 5	567	170	0 9	1.0	7.9	7.2	0.14	0.05
8/1/95	20 50	8.4	5.6	9 6	13.0	571	171	0.6	0.7	3 6	4.3	0.14	0 05
8/1/95	20.55	9.2	6.2	9 0	12.5	587	170	0 4	0.7	6 2	5.7	0.14	0.05

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/1/95	21.00	7.5	5.1	11.4	14.0	596	169	0 2	0.6	5.5	5.7	0.1	0.0
8/1/95	21·05	6.7	4.5	12.1	14.6	588	169	0.1	0.4	0.6	2.3	0.1	0.0
8/1/95	21 10	6.4	4.3	12.5	15.0	582	172	0.0	0.2	0.5	2.2	0.1	0.0
8/1/95	21:15	6.2	4.2	12.7	15.2	579	173	-0 1	0.0	0.5	2.1	0.1	0.0
8/1/95	21.20	6 0	4.0	12.9	15.4	579	170	-0.3	0.6	0.7	2.3	0.1	0.0
8/1/95	21 25	5.8	3.9	13.1	15.5	578	168	-0 2	0.3	0.8	2.3	0.1	0.0
8/1/95	21 30	5 6	3.8	13.4	15.7	578	168	-0 2	-0.1	1.1	2.4	0.1	0.0
8/1/95	21:35	5.5	3.7	13.4	15.7	577	170	-0.3	-0.2	1.2	2.6	0.1	0.0
8/1/95	21:40	5.6	3.8	13.3	15.7	577	171	-0.3	-0.2	1.3	2.7	0.1	0.0
8/1/95	21:45	5.6	3.8	13.3	15.7	577	172	-0 4	-0.1	1.5	2.8	0.1	0.0
8/1/95	21.50	5.5	3.7	13.5	15.8	577	173	-0 4	-0.1	1.6	2.9	0.1	0.0
8/1/95	21:55	5.6	3.8	13.3	15.6	577	173	-0.3	0.0	1.5	2.9	0.1	0.0
8/1/95	22.00	5.8	3.9	13.1	15.5	577	173	-0 4	0.7	1.4	2.8	0.1	0.0
8/1/95	22.05	5.7	3.8	13.2	15.6	577	173	-0.5	0.4	1.6	2.9	0.1	0.0
8/1/95	22:10	5 7	3.9	13.1	15.5	577	173	-0 5	0.6	1 4	2.8	0.14	0.05
8/1/95	22 15	5.8	3.9	13.0	15.5	577	173	-0.5	0.6	1.1	2.7	0.14	0.05
8/1/95	22:20	5.7	3.8	13.2	15.6	577	173	-0 4	0.5	1.3	2.5	0.14	0.05
8/1/95	22:25	5.6	3.8	13.3	15.6	577	173	-0.4	0.4	1.5	2.6	0.14	0.05
8/1/95	22:30	5.8	3.9	13.0	15.5	577	175	-0.6	0.3	1.4	2.6	0.14	0.05
8/1/95	22 35	5.8	3.9	13.1	15.5	577	175	-0.6	0.3	1.3	2.6	0.14	0.05
8/1/95	22.40	5.5	3.7	13.5	15.8	576	173	-0 6	0.8	1.6	2.6	0.14	0.05
8/1/95	22:45	5.5	3.7	13.4	15.7	576	174	-0.6	0.7	1.7	2.8	0.14	0.05
8/1/95	22:50	5.6	3.8	13.3	15.6	576	174	-0.7	0.8	1.8	2.8	0.14	0.05
8/1/95	22:55	5.5	3.7	13.5	15.8	575	174	-0.6	1.3	2.2	3.1	0.14	0.05
8/1/95	23 00	5.5	3.7	13.4	15.8	575	175	-0.5	1.3	2.5	3.1	0.14	0.05
8/1/95	23.05	5.5	3.7	13.4	15.7	575	175	-0.5	1.3	2.3	3.1	0.14	0.05
8/1/95	23.10	5.7	3.9	13.2	15.6	575	175	-0 3	1.5	1.9	2.9	0.14	0.05
8/1/95	23·15	5.6	3.8	13.3	15 6	575	175	-0.4	1.3	1.6	2.9	0.14	0.05
8/1/95	23:20	5.5	3.7	13.5	15.8	575	175	-0.5	1.3	1.9	2.9	0.14	0.05
8/1/95	23 25	5.6	3.7	13.4	15.8	574	176	-0 5	1.1	2.1	2.8	0.14	0.05
8/1/95	23:30	5.6	3.8	13.3	15.7	575	176	-0.7	1.1	1.9	2.7	0.14	0.05
8/1/95	23:35	5.4	3.7	13.5	15.8	574	175	-0.6	1.0	2.1	2.7	0.14	0.05
8/1/95	23.40	5.5	3.7	13.5	15.8	574	176	-0.7	1.1	2.3	2.8	0.14	0.05
8/1/95	23.45	5.5	3.8	13.4	15.7	574	176	-0.5	1.0	2.3	2.6	0.14	0.05
8/1/95	23.50	5.6	3.8	13.3	15.7	574	175	-0.3	0.9	2.1	2.5	0.14	0.05
8/1/95	23·55	5.7	3.8	13.2	15 6	574	176	-0 2	0.8	2.1	2.5	0.14	0.05
8/2/95	0 00	5.6	3.8	13.2	15 6	574	176	-0.3	0.9	2.0	2.6	0.14	0.05
8/2/95	0·05	5.8	3.9	13.1	15.5	574	176	-0.3	0.9	1.9	2.4	0.14	0.05
8/2/95	0:10	5.8	3.9	13.0	15.5	574	176	-0.5	0.9	1.7	2.2	0.14	0 05
8/2/95	0:15	5.9	4.0	12.9	15.4	575	176	-0.5	1.1	1.4	2.0	0.14	0.05
8/2/95	0:20	5.8	3.9	13.1	15 5	575	176	-0.5	1.1	1.2	2.0	0.14	0.05
8/2/95	0.25	5.9	4.0	13.0	15.4	576	175	-0.5	1 1	1.1	2.1	0.14	0.05
8/2/95	0.30	5.8	4 0	13.0	15.5	577	175	-0.6	1.5	0.9	2.2	0.14	0.05
8/2/95	0.35	5.7	3.8	13.2	15.6	576	175	-0.7	1.4	1.0	2.2	0.14	0.05
8/2/95	0:40	5.6	3.8	13.4	15.7	576	175	-0.6	1.7	1.0	2.2	0.14	0.05
8/2/95	0·45	5.1	3.5	14.1	16.2	574	175	-0.5	2.0	5.2	4.5	0.14	0.05
8/2/95	0.50	5.0	3.4	14 2	16 3	572	175	-0.3	1.9	8.4	6.8	0.14	0.05
8/2/95	0·55	5.1	3.5	14.1	16 2	570	175	-0 2	1.9	10.0	7.7	0.14	0.05
8/2/95	1 00	5 2	3.5	14 0	16.1	570	175	0 0	1.8	9.3	7.3	0.14	0.05
8/2/95	1 05	5.1	3.5	14.1	16.2	568	174	0 0	1.9	11.6	8.4	0.14	0.05
8/2/95	1·10	5.1	3.4	14.1	16 2	567	174	0.1	2.0	13.2	9.7	0.14	0.05
8/2/95	1 15	5.0	3.4	14.2	16 3	567	174	0.1	2 0	14.0	10.0	0.14	0.05
8/2/95	1.20	5.1	3.5	14 1	16 2	566	174	0 2	1.9	14.4	10.5	0.14	0.05
8/2/95	1 25	5.2	3 5	14.0	16 1	565	173	0.3	2 5	14 6	10.7	0.14	0.05
8/2/95	1 30	5.3	3.6	13 9	16 1	565	173	0.7	2.0	14.3	10.3	0.14	0.05
8/2/95	1 35	5.3	3.6	13 9	16 0	565	173	0.5	2 0	12.0	9.1	0.14	0.05

Cleveland (Southerly) Ohio
Continuous Monitor Data
August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/2/95	1 40	5.0	3.4	14.2	16.3	564	173	0.6	2.3	15.3	11.3	0.1	0.0
8/2/95	1:45	5.2	3.5	14.1	16.2	564	173	0.9	2.5	16.6	12.1	0 1	0.0
8/2/95	1·50	5.3	3.6	13.9	16.0	563	173	0.7	2.5	15.1	11.1	0.1	0.0
8/2/95	1.55	5.2	3.5	14.0	16.1	563	173	0.3	2.4	15.1	10.9	0.1	0.0
8/2/95	2 00	5.2	3.6	14.0	16 1	563	173	0.4	2.6	14.1	10.1	0.1	0.0
8/2/95	2:05	5.4	3.7	13.8	15.9	563	172	0.2	2.8	14.5	10.5	0.1	0.0
8/2/95	2:10	5.6	3.8	13.5	15.7	563	172	0 1	2.9	13.0	9.3	0.1	0.0
8/2/95	2:15	5.7	3.9	13.3	15.6	563	172	0 3	3.0	10.7	8.0	0.1	0.0
8/2/95	2·20	6.0	4.1	12.9	15.3	564	173	-0.1	3.2	8.4	6.6	0.1	0.0
8/2/95	2:25	6.1	4.2	12.8	15.2	565	173	0.1	3.1	5.2	4.4	0.1	0.0
8/2/95	2:30	5.7	3.9	13.3	15.7	565	174	-0.1	3.2	6.1	4.8	0.1	0.0
8/2/95	2:35	5.9	4.0	13.1	15.5	565	174	0 0	3.2	4.8	4.0	0.1	0.0
8/2/95	2:40	5.9	4.0	13.1	15.5	566	174	0.1	3.1	4 3	3.7	0.1	0.0
8/2/95	2:45	6.0	4.1	12.9	15.4	567	175	-0.2	3.2	3 6	3.1	0.1	0.0
8/2/95	2:50	5.5	3.8	13.5	15.8	567	175	-0.1	3.3	3.8	3.5	0.14	0.05
8/2/95	2·55	5.5	3.8	13.6	15.8	566	174	0.0	3.2	4.7	4.1	0.14	0.05
8/2/95	3.00	5.6	3.8	13.4	15.7	566	175	-0.2	3.4	4.9	4.1	0.14	0.05
8/2/95	3.05	5.7	3.9	13.2	15 6	566	176	0.0	3.5	4.6	4.1	0.14	0.05
8/2/95	3:10	5.9	4.0	13.0	15.4	566	174	-0.2	3.5	3.8	3.4	0.14	0.05
8/2/95	3.15	5.8	4.0	13.1	15.5	567	175	-0.2	3.4	2.9	2.9	0.14	0.05
8/2/95	3:20	5.6	3.8	13 4	15.7	567	175	-0.2	3.5	3.3	3.1	0.14	0.05
8/2/95	3:25	5.5	3.7	13.6	15.9	566	176	-0.4	3.6	4.3	3.8	0.14	0.05
8/2/95	3:30	5.6	3.8	13.4	15.7	566	176	-0.5	3.6	4.2	3.8	0.14	0.05
8/2/95	3:35	5.5	3.8	13.5	15.8	566	176	-0.4	3.9	4.4	4.0	0.14	0.05
8/2/95	3:40	5.4	3.7	13.7	15.9	566	176	-0.3	4.0	4.5	3.8	0.14	0.05
8/2/95	3:45	5.3	3.6	13.8	16.0	565	175	-0 2	4.2	5.7	4.6	0.14	0.05
8/2/95	3:50	5.4	3.7	13.6	15.9	565	176	-0.3	4.2	5.6	4.8	0.14	0.05
8/2/95	3:55	5.5	3.8	13.5	15.8	565	176	-0.3	4.4	6.3	5.2	0.14	0.05
8/2/95	4:00	5.8	4.0	13.1	15.5	565	175	-0.5	4.2	5.0	4.4	0.14	0.05
8/2/95	4·05	5.7	3.9	13.3	15.6	565	176	-0.1	4.1	4.1	3.9	0.14	0.05
8/2/95	4:10	5.6	3.9	13.4	15.7	565	176	-0.3	4.2	3.8	3.7	0.14	0.05
8/2/95	4.15	5.6	3.8	13.4	15.7	565	176	-0 2	4.2	4.6	4.1	0.14	0.05
8/2/95	4·20	5.7	3.9	13.3	15.6	566	175	-0.4	4.2	4.3	3.9	0.14	0.05
8/2/95	4·25	5.7	3.9	13.2	15 6	566	176	-0 6	4.1	3.6	3.2	0.14	0.05
8/2/95	4:30	5.6	3.8	13.5	15 8	566	175	-0 6	4.2	3.9	3 6	0.14	0.05
8/2/95	4:35	5.5	3.8	13.6	15.8	566	176	-0 4	4.1	4.3	3.7	0.14	0.05
8/2/95	4·40	5.5	3.7	13.6	15.9	566	176	-0.4	4.3	4.6	3.9	0.14	0.05
8/2/95	4·45	5.4	3.7	13.7	16.0	565	176	-0 2	4.3	5.1	4.5	0.14	0.05
8/2/95	4:50	5.6	3.8	13.5	15.7	565	175	-0 4	4.2	4.9	4 3	0.14	0.05
8/2/95	4.55	5.5	3.8	13.5	15.8	565	176	-0 5	4 2	5.5	4.5	0.14	0.05
8/2/95	5·00	5.6	3.8	13.4	15.7	565	177	-0.6	4.2	4.9	4.1	0.14	0.05
8/2/95	5.05	5.4	3.7	13.6	15.9	565	175	-0 5	4.1	5.7	4 5	0.14	0.05
8/2/95	5:10	5.5	3.7	13.6	15.8	565	177	-0 4	4 1	7 4	5.7	0.14	0.05
8/2/95	5:15	5.6	3.8	13.4	15.7	565	176	-0.4	3 9	5.7	4.7	0.14	0.05
8/2/95	5:20	5.8	4.0	13.1	15.5	566	177	-0 5	3.9	5.9	4.8	0.14	0.05
8/2/95	5:25	6.0	4.1	12.9	15 4	569	177	-0.5	3.4	4.9	4.1	0.14	0.05
8/2/95	5·30	5.9	4.0	13.0	15.4	571	176	-0.6	3.2	4 4	3.8	0.14	0.05
8/2/95	5:35	6.2	4.2	12.7	15.3	571	178	-0.8	2.9	3.4	3.1	0.14	0.05
8/2/95	5:40	5.9	4.0	13.0	15.5	570	177	-0.8	2.7	3.2	3.0	0.14	0.05
8/2/95	5:45	5.8	4.0	13.2	15.6	570	177	-0.9	2 6	3.1	2.8	0.14	0.05
8/2/95	5·50	5 7	3.9	13.4	15.7	570	176	-0.9	2 6	3.3	3.1	0.14	0.05
8/2/95	5·55	5.5	3.8	13.5	15.8	570	177	-0 8	2 4	3.8	3.3	0.14	0.05
8/2/95	6 00	5.7	3.9	13.2	15 6	570	178	-0 7	2.5	3.8	3.4	0.14	0.05
8/2/95	6 05	5.9	4 0	13 0	15 5	570	177	-0.8	2 3	3 2	2.9	0.14	0.05
8/2/95	6 10	5.8	4.0	13.1	15.5	571	176	-0 9	2.2	3.1	3.0	0.14	0.05
8/2/95	6 15	5 7	3.9	13 3	15 6	571	176	-0.9	2 1	3 2	3 0	0 14	0.05

Cleveland (Southerly) Ohio
Continuous Monitor Data
August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/2/95	6:20	5.6	3.8	13.4	15.7	571	176	-1.0	2.2	3.2	2.9	0.1	0.0
8/2/95	6 25	5.5	3.8	13.6	15.8	571	177	-0 9	2 2	3.7	3.2	0.1	0 0
8/2/95	6 30	5.5	3.8	13.5	15 8	571	176	-1.0	2.2	4.1	3.5	0.1	0 0
8/2/95	6:35	5.8	4.0	13.2	15.6	571	177	-1 0	2.1	3.2	2 9	0.1	0.0
8/2/95	6 40	5.6	3.8	13.5	15.8	571	177	-1 0	2.1	4.1	3.4	0.1	0 0
8/2/95	6.45	5.7	3.9	13.3	15 6	572	177	-1.0	2.1	3.7	3.4	0.1	0.0
8/2/95	6·50	6.1	4.1	12.8	15.3	573	178	-1 1	2.0	2.7	2.6	0.1	0.0
8/2/95	6 55	5.7	3.8	13.3	15.7	573	178	-0 8	2.0	3.0	2.9	0.1	0.0
8/2/95	7·00	5.5	3.8	13.6	15.8	572	177	-0.8	2.0	3.5	3 3	0.1	0 0
8/2/95	7.05	5.6	3.8	13.4	15.7	573	177	-0.7	2.1	3.2	3 0	0.1	0.0
8/2/95	7:10	5.7	3.9	13.3	15 7	573	177	-0.8	2.1	3.2	3.1	0.1	0.0
8/2/95	7:15	5.7	3.9	13.3	15.7	573	177	-1.0	2.2	2.5	2.6	0.1	0.0
8/2/95	7 20	5.6	3.8	13.4	15.7	573	177	-1 2	2 3	2.8	2.8	0.1	0.0
8/2/95	7.25	4.8	3.3	14.5	16.5	573	177	-1.0	2.4	5.5	4 3	0.1	0.0
8/2/95	7.30	4.9	3.3	14.2	16.3	574	177	-0.9	2.7	4.1	3.8	0.14	0 05
8/2/95	7:35	5.2	3.5	13.8	16.0	575	178	-1.0	2.9	2.5	3.2	0.14	0 05
8/2/95	7:40	5.5	3.7	13.3	15.7	577	178	-1.1	2.9	1.9	2.8	0.14	0.05
8/2/95	7:45	5.7	3.1	13.1	16.7	579	177	-1.2	1.9	1.7	2.6	0.14	0.05
8/2/95	7·50	5.5	3.7	13.4	15.8	579	178	-0.9	4.3	1.7	2.4	0.14	0.05
8/2/95	7 55	5.1	3.5	13.9	16.1	579	178	-1.1	5.1	1.3	2.4	0.14	0.05
8/2/95	8 00	4.7	3.2	14.4	16.5	579	176	-1.2	4.1	1.1	2.5	0.14	0.05
8/2/95	8:05	3.8	2.5	15.7	17.3	578	174	-1.1	4.0	2.0	2.9	0.14	0.05
8/2/95	8:10	3.4	2.3	16.1	17.7	576	175	-0.8	4 3	6.6	5.9	0.14	0.05
8/2/95	8.15	3.4	2.2	16.1	17.7	574	175	-0.8	4.6	10.7	8.5	0.14	0.05
8/2/95	8 20	3.5	2.3	15.9	17.5	573	174	-0.8	4.9	12.6	9.9	0.14	0.05
8/2/95	8 25	3.7	2.5	15.6	17.3	573	173	-0.7	4.9	15.0	11.4	0.14	0.05
8/2/95	8:30	3.9	2.6	15.4	17.2	572	171	-0.8	4.3	19.7	14.4	0.14	0.05
8/2/95	8:35		2.8		16.9	570	168	-0.7	4.2	15.1	15.2	0.14	0.05
8/2/95	8:40		3.1		16.5	572	168	-0.4	3.8	14.8	11.5	0.14	0.05
8/2/95	8.45		3.2		16.3	573	167	0.0	3.5	10.8	8.7	0.14	0.05
8/2/95	8:50		3.4		16.0	573	167	0.0	3.2	8.5	7.3	0.14	0.05
8/2/95	8.55		3.5		16.0	574	167		3.4		6.4	0.14	0.05
8/2/95	9:00		3.6		15.9	574	168		3.3		5.3	0.14	0.05
8/2/95	9:05		3.6		15.9	575	167		3.3		4.6	0.14	0.05
8/2/95	9:10		3.6		15.9	575	168		2.5		4.1	0.14	0.05
8/2/95	9:15					578	168					0.14	0.05
8/2/95	9:20					579	168					0.14	0.05
8/2/95	9:25	5 0		13.9		578	167			2.1		0.14	0.05
8/2/95	9:30	5.1		14.0		579	166	2.6		2 5		0.14	0 05
8/2/95	9:35	4.9		14.1		579	165	2.6		2.7		0.14	0.05
8/2/95	9·40	4.9		14.1		579	168	2.4		3.1	0 9	0.14	0.05
8/2/95	9:45	5.0	3.4	14.0	15.9	579	168	2.3		2.9	0.9	0.14	0.05
8/2/95	9:50	5.0	3.4	14.0	16.1	579	169	2.2		2.7	0.7	0.14	0.05
8/2/95	9:55	5.0	3.4	14.0	16.2	579	168	2.2		2.9	0.8	0.14	0.05
8/2/95	10.00	5.0	3.4	14.1	16.2	578	168	2.1		2.9	0.9	0.14	0.05
8/2/95	10.05	4.9	3.4	14.2	16.2	579	167	2.1		3.0	0.9	0.14	0.05
8/2/95	10:10	5.0	3.4	14 1	16.2	579	167	2.0		2.8	1.0	0.14	0.05
8/2/95	10·15	4.9	3.4	14.1	16.2	579	170	2.0		3.0	0.8	0.14	0.05
8/2/95	10 20	4.9	3.4	14.1	16 2	579	170	2.1		3 0	0.7	0.14	0 05
8/2/95	10 25	4 9	3.4	14 1	16 2	579	170	2 0	2.5	3.0	0.6	0.14	0 05
8/2/95	10 30	4.9	3 4	14.1	16.2	579	171	2 0	2.5	3.1	0 6	0.14	0.05
8/2/95	10 35	4.9	3.3	14.2	16 3	578	171	2 0	2.4	3.4	0.8	0.14	0.05
8/2/95	10 40	4.9	3.3	14 2	16.3	578	170	2.1	2 4	5.0	0 9	0.14	0 05
8/2/95	10.45	5.1	3.5	13 9	16.1	578	170	2.1	2.5	4.0	0 6	0.14	0 05
8/2/95	10 50	5 3	3 6	13.7	15 9	579	171	2.1	2.4	3.0	0.7	0.14	0.05
8/2/95	10 55	5.3	3.6	13 6	15.9	579	170	2 0	2 3	2 9	0 6	0.14	0.05

Cleveland (Southerly) Ohio
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August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/2/95	11 00	5.4	3.7	13.6	15.9	580	169	2.0	2 4	2.2	0.5	0.1	0 0
8/2/95	11.05	5.2	3.5	13.8	16.0	580	169	2.0	2.7	2.4	0.5	0.1	0.0
8/2/95	11·10	5.2	3.6	13.8	15.9	580	168	2.1	2.5	2.4	0.5	0.1	0.0
8/2/95	11·15	5.1	3.5	13.9	16.0	580	169	2 1	2.6	2.2	0.3	0.1	0.0
8/2/95	11.20	5.1	3.5	13.9	16.0	580	169	2.1	2.5	2.2	0.3	0.1	0.0
8/2/95	11.25	5.1	3.5	13.9	16.0	580	168	2.2	2.3	2.0	0.3	0.1	0.0
8/2/95	11.30	5.0	3.5	14.0	16.1	580	168	2.1	2 3	1.9	0.4	0.1	0 0
8/2/95	11:35	4.9	3.4	14.1	16.2	580	168	2.1	2.4	2.1	0.3	0.1	0.0
8/2/95	11.40	5.0	3.4	14.1	16.2	580	168	2.1	2.2	2.1	0.2	0.1	0.0
8/2/95	11·45	4.9	3.4	14.2	16.2	580	167	2.2	2.2	2 5	0.3	0.1	0.0
8/2/95	11:50	4.9	3.4	14.1	16.2	580	169	2.2	2.2	2.6	0.1	0.1	0.0
8/2/95	11:55	4.9	3.4	14.1	16.2	580	170	2.2	2.1	2.7	0.2	0.1	0.0
8/2/95	12:00	5.0	3.4	14.1	16.2	579	170	2.2	2 0	2.6	0.3	0.1	0.0
8/2/95	12 05	5.1	3.5	13.8	16.0	580	170	2.2	2.0	2.0	0.2	0.1	0.0
8/2/95	12:10	5.2	3.5	13.8	16.0	581	170	2.2	2.3	1.3	0.2	0.14	0.05
8/2/95	12:15	5.2	3 6	13.8	16.0	581	170	2.2	2.5	1.6	0.2	0.14	0.05
8/2/95	12 20	5.4	3.7	13.5	15.8	582	171	2.3	2.4	1.3	0.2	0.14	0.05
8/2/95	12:25	5.1	3.5	13.9	16.0	582	169	2.4	2.3	1.6	0.2	0.14	0.05
8/2/95	12:30	5.3	3.6	13.7	15.9	582	171	2 3	2.4	1.8	0.2	0.14	0.05
8/2/95	12:35	5.5	3.8	13.4	15.7	582	172	2.5	2.2	1.2	0.1	0.14	0.05
8/2/95	12:40	5.4	3.7	13.5	15.8	582	172	2.4	2.2	1.2	0.0	0.14	0.05
8/2/95	12:45	5.4	3.7	13.5	15.8	583	172	2.4	2.0	1.2	0.5	0.14	0.05
8/2/95	12.50	5.3	3.7	13.6	15.9	583	172	2.4	2.1	1.4	0.5	0.14	0.05
8/2/95	12.55	5.4	3.7	13.6	15.8	583	171	2.4	2.2	1.6	0.5	0.14	0.05
8/2/95	13·00	5.4	3.7	13.5	15.8	583	172	2 3	2.2	1.5	0.4	0.14	0.05
8/2/95	13 05	5.3	3.7	13.6	15.9	583	172	2.3	2.0	1.3	0.5	0.14	0.05
8/2/95	13.10	5.1	3.5	13.9	16.1	583	171	2.4	2.0	1.8	0.5	0.14	0.05
8/2/95	13·15	5.2	3.6	13.9	16.0	582	172	2.4	2.0	2.1	0.5	0.14	0.05
8/2/95	13 20	4.9	3.4	14.1	16.2	582	174	2.6	2.1	2.4	0.4	0.14	0.05
8/2/95	13.25	5.2	3.5	13.8	16.0	582	174	2.5	2.2	2.3	0.4	0.14	0.05
8/2/95	13·30	5.5	3.8	13.5	15.7	582	173	2.5	2.1	2.2	0.5	0.14	0.05
8/2/95	13·35	5.4	3.7	13.5	15.8	583	173	2.4	2.1	2.0	0.5	0.14	0.05
8/2/95	13·40	5.6	3.8	13.3	15.6	583	173	2.4	2.3	2.0	0.3	0.14	0.05
8/2/95	13.45	5.7	4.0	13.1	15.5	584	172	2.4	2.3	1.5	0.5	0.14	0.05
8/2/95	13:50	5.8	4.0	13.0	15.4	584	174	2.3	2.4	1.1	0.4	0.14	0.05
8/2/95	13·55	5.6	3.8	13.3	15.7	583	175	2.4	2.2	1.2	0.3	0.14	0.05
8/2/95	14:00	5.6	3.8	13.3	15.7	582	175	2.4	2.0	1.2	0.3	0.14	0.05
8/2/95	14 05	5.9	4.1	12.9	15.4	584	174	2 4	1.9	1.3	0.4	0.14	0.05
8/2/95	14·10	5.9	4.0	12.9	15.4	585	174	2.4	1.8	0.8	0.4	0.14	0.05
8/2/95	14:15	5.7	3.9	13.1	15.6	585	174	2 5	1.8	1.1	0.5	0.14	0.05
8/2/95	14·20	5.6	3.8	13.3	15.7	585	175	2.4	1.8	1.1	0.5	0.14	0.05
8/2/95	14 25	5.5	3.8	13.4	15.7	585	173	2.4	1.9	1.2	0.6	0.14	0.05
8/2/95	14 30	5.6	3.9	13.2	15.6	585	175	2 4	2.1	1.2	0.6	0.14	0 05
8/2/95	14:35	5.8	4.0	13.0	15.5	585	177	2 4		1.2	0.7	0.14	0.05
8/2/95	14.40	5.7	3.9	13.1	15.5	585	177	2.4		1.1	0.4	0.14	0.05
8/2/95	14:45		4.0		15.4	586	177			0.9	0.4	0.14	0.05
8/2/95	14·50					586	177				0.5	0.14	0.05
8/2/95	14:55					585	176				0.5	0.14	0.05
8/2/95	15 00					580	177				0.4	0.14	0 05
8/2/95	15 05					584	176					0.14	0 05
8/2/95	15 10					583	176					0.14	0.05
8/2/95	15 15					582	176					0.14	0 05
8/2/95	15 20	5.8		12.9		581	176					0.14	0 05
8/2/95	15 25	5.7	4.1	13.1	15.5	582	180	1 9		1 6		0.14	0.05
8/2/95	15 30	5.6	4.1	13.2	15.5	582	179	1.8		1 5	0.6	0.14	0 05
8/2/95	15 35	5.6	4.1	13 2	15 5	583	178	1.6		1.6	0.4	0.14	0 05

Cleveland (Southerly) Ohio
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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/2/95	15 40	5.4	4.0	13.4	15.6	583	178	1.5		1.8	0.4	0.1	0.0
8/2/95	15.45	5.7	4.2	13.0	15.3	583	177	1.4		1.8	0.3	0.1	0.0
8/2/95	15:50	5.5	4.1	13.3	15.5	583	176	1.5	2.0	1.7	0.3	0.1	0.0
8/2/95	15.55	5.6	4.1	13.2	15.5	583	178	1.4	1.9	1.8	0 2	0.1	0.0
8/2/95	16.00	5.6	4.1	13.2	15.5	583	177	1.4	1.7	1.6	0.3	0.1	0.0
8/2/95	16:05	5.5	4.0	13.4	15.6	583	177	1.5	1.7	1.8	0.3	0.1	0.0
8/2/95	16 10	5.4	4.0	13.4	15.6	583	176	1.5	1.8	1.8	0 3	0.1	0.0
8/2/95	16:15	5.6	4.1	13.2	15.5	583	176	1.4	1.7	1.9	0.4	0.1	0.0
8/2/95	16:20	5.6	4.1	13.2	15.5	583	176	1.4	1.7	1.8	0.2	0.1	0 0
8/2/95	16 25	5.4	3.9	13.5	15.7	583	176	1.6	1.8	2.2	0.2	0.1	0.0
8/2/95	16:30	5.6	4.1	13 2	15.5	583	176	1.6	1.9	2.1	0.3	0.1	0.0
8/2/95	16:35	5.9	4.3	12.8	15.2	584	176	1.7	2.0	1.7	0.0	0.1	0.0
8/2/95	16:40	5.9	4.3	12.8	15.2	584	178	1.7	2.1	1.7	-0.2	0.1	0 0
8/2/95	16.45	5.9	4.3	12.9	15.2	584	176	1.7	2.1	1.6	-0.2	0.1	0.0
8/2/95	16:50	6.1	4.4	12.6	15.1	586	177	1.6	2.3	1.5	-0.3	0.14	0.05
8/2/95	16:55	6.2	4.5	12.5	15.0	586	177	1.6	2.4	1.2	-0.5	0.14	0.05
8/2/95	17:00	5.6	4.1	13.2	15.5	586	178	1 6	2.5	1.3	-0.4	0.14	0.05
8/2/95	17:05	5.5	4.0	13.4	15.6	586	178	1.5	2.0	1.4	-0.4	0.14	0.05
8/2/95	17:10	5.5	4.0	13.4	15 6	587	177	1.6	2.1	1.5	-0.4	0.14	0.05
8/2/95	17:15	5.5	4.0	13.4	15.6	587	178	1.7	2.3	1.6	-0.3	0.14	0.05
8/2/95	17:20	5.6	4.1	13 2	15.5	587	177	1.9	2.4	1.4	-0.5	0.14	0.05
8/2/95	17:25	5.5	4.0	13.3	15.6	587	179	1.8	2.3	1.5	-0.4	0.14	0.05
8/2/95	17:30	5.8	4.2	13.0	15.3	587	179	1.6	2.1	1.3	-0.5	0 14	0.05
8/2/95	17:35	6.4	4.6	12.2	14.8	588	178	1.4	2.0	1.1	-0.7	0.14	0.05
8/2/95	17:40	6.1	4.4	12.6	15.0	591	177	1.4	1.9	0.8	-0.9	0.14	0.05
8/2/95	17:45	5.6	4.1	13.3	15.5	593	175	1.5	2.1	1.2	-0.8	0.14	0.05
8/2/95	17.50	5.6	4.1	13.3	15.5	593	175	1.6	2.1	1.1	-0.8	0.14	0.05
8/2/95	17:55	5.8	4.3	13.1	15.3	593	176	1.5	2.1	1.0	-0.8	0.14	0.05
8/2/95	18.00	5.3	3.9	13.7	15.7	593	175	1.6	2.0	1.1	-0.9	0 14	0.05
8/2/95	18:05	5.1	3.8	13.9	15.9	591	175	1.6	2.0	1.7	-0.5	0 14	0.05
8/2/95	18:10	5.0	3.6	14.1	16.0	591	175	1.7	2.2	2.2	-0.2	0.14	0.05
8/2/95	18:15	5.2	3.8	13.7	15.8	589	176	1.7	3.2	2.1	-0.3	0.14	0.05
8/2/95	18.20	5.5	4.1	13.3	15.5	590	175	1.7	2.9	1.7	-0.6	0.14	0.05
8/2/95	18:25	5.7	4.2	13.2	15.4	591	176	1.7	3.0	1.4	-0.8	0.14	0.05
8/2/95	18:30	5.4	4.0	13.5	15.6	591	175	1.7	2.7	1.6	-0.7	0.14	0.05
8/2/95	18:35	5.5	4 0	13.4	15.5	590	175	1.6	2.5	1.7	-0.5	0.14	0.05
8/2/95	18 40	5.5	4.1	13.4	15.5	590	174	1.6	2.3	1.7	-0.3	0.14	0.05
8/2/95	18:45	5.7	4.2	13.2	15.4	591	175	1.6	2.6	1.5	-0.5	0.14	0.05
8/2/95	18:50	5.4	3.9	13.6	15.7	591	175	1.7	2.4	1.9	-0.3	0.14	0.05
8/2/95	18 55	5.5	4.0	13.4	15.6	591	175	1.7	2.7	1.9	-0.3	0.14	0.05
8/2/95	19.00	5 8	4.3	13.0	15.3	592	175	1.6	2.6	1.6	-0.5	0.14	0.05
8/2/95	19 05	5.6	4.2	13.3	15.4	592	174	1.7	2.7	1.7	-0.3	0.14	0.05
8/2/95	19 10	5.6	4.1	13.3	15.4	592	175	1.7	3.0	1.7	-0.2	0.14	0.05
8/2/95	19.15	5.8	4.2	13.1	15.3	592	175	1.8	3.2	1.6	-0.3	0.14	0.05
8/2/95	19:20	5.7	4.2	13.2	15.4	593	175	1.8	3 2	1.5	-0.4	0.14	0.05
8/2/95	19:25	5.5	4.1	13.4	15.5	593	174	1.8	3.1	1.6	-0.2	0.14	0.05
8/2/95	19:30	5.6	4.1	13.3	15.5	593	175	1.8	3.4	1.5	-0.4	0.14	0.05
8/2/95	19.35	5.6	4.1	13.3	15 5	593	175	1.8	3.3	1.7	-0.4	0.14	0.05
8/2/95	19 40	5.6	4.1	13.3	15.5	593	175	1.8	3 4	1.6	-0.4	0.14	0.05
8/2/95	19:45	5.6	4.1	13.3	15.5	593	175	1.8	3.5	1.6	-0 4	0.14	0.05
8/2/95	19 50	5.6	4.1	13.3	15.5	592	174	1 9	3.5	1.7	-0.3	0.14	0.05
8/2/95	19:55	5.7	4.2	13.2	15.4	593	175	1 9	3.6	1.5	-0.4	0.14	0.05
8/2/95	20 00	5.6	4.1	13.3	15 4	593	175	2.0	3 8	1.4	-0.4	0.14	0.05
8/2/95	20 05	5.6	4.1	13.3	15.4	593	174	2.1	3.6	1.1	-0.5	0 14	0.05
8/2/95	20 10	5.6	4.1	13.3	15.4	593	175	2.0	3.6	1 1	-0 4	0.14	0 05
8/2/95	20:15	5.5	4.0	13.4	15.6	593	176	1.8	3.4	1.2	-0.5	0.14	0.05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/2/95	20 20	5.1	3.8	13.9	15 9	592	175	1.8	3 1	1.6	-0.5	0.1	0.0
8/2/95	20·25	5.2	3.8	13.8	15.8	592	174	1.7	3.1	2.0	-0.1	0.1	0.0
8/2/95	20·30	5.3	3.9	13.7	15.7	591	174	1.7	3.1	2 1	-0.2	0.1	0.0
8/2/95	20·35	5.4	4.0	13.5	15 6	592	174	1.7	3.1	1.9	-0.2	0.1	0.0
8/2/95	20·40	5.5	4.0	13.4	15.6	592	174	1.6	3 1	1.5	-0.4	0.1	0.0
8/2/95	20 45	5.4	3.9	13.6	15.7	592	175	1.6	3.2	1.6	-0.5	0.1	0 0
8/2/95	20·50	5.4	4.0	13.5	15.6	592	173	1.6	3.2	1.7	-0.4	0.1	0.0
8/2/95	20.55	5.5	4.0	13.5	15.6	591	173	1.6	3.3	1.8	-0.2	0.1	0.0
8/2/95	21:00	5.6	4.2	13.2	15.4	592	174	1.5	3.4	1.7	-0.3	0.1	0.0
8/2/95	21 05	5.7	4.2	13.2	15.4	592	173	1.5	3.4	1.1	-0.6	0.1	0.0
8/2/95	21:10	5.5	4.1	13.4	15 5	592	174	1.5	3.3	1.1	-0.5	0.1	0.0
8/2/95	21.15	5.5	4.1	13.4	15.5	592	174	1.5	3.4	1.2	-0.5	0.1	0.0
8/2/95	21:20	5.5	4.1	13.4	15.5	592	174	1.4		1.0	-0.4	0.1	0.0
8/2/95	21.25					590	174			0.7		0.1	0.0
8/2/95	21:30					592	172					0.13	0 05
8/2/95	21.35					592	173					0.13	0.05
8/2/95	21:40					591	175					0.13	0 05
8/2/95	21:45					592	175					0.13	0.05
8/2/95	21 50					592	175					0.13	0.05
8/2/95	21:55					591	174					0.13	0.05
8/2/95	22.00					592						0.13	0.05
8/2/95	22:05					592						0.13	0.05
8/2/95	22.10		3.9		15.6		174		2.2		-0.3	0.13	0.05
8/2/95	22:15		3.9		15.7		174		2.2		0.0	0.13	0.05
8/2/95	22:20		4.0		15.5		175		2.2		-0.3	0.13	0.05
8/2/95	22:25	5.9	4.2	12.9	15.2	593	173	2.5	2.1	0.9	-0.5	0.13	0.05
8/2/95	22:30	6.0	4.3	12.9	15.2	594	173	2.6	1.9	0.8	-0.4	0.13	0.05
8/2/95	22:35	5.8	4.2	13.1	15.3	594	174	2.6	1.8	0.5	-0.5	0.13	0.05
8/2/95	22:40	5.7	4.1	13.3	15.4	593	173	2.7	1.7	0.6	-0.4	0.13	0.05
8/2/95	22:45	5.7	4.1	13.2	15.4	593	173	2.8	1.4	0.7	-0.5	0.13	0.05
8/2/95	22.50	5.5	4.0	13.4	15.5	593	172	2.8	1.4	0.8	-0.3	0.13	0.05
8/2/95	22:55	5.5	3.9	13.5	15.6	593	172	3.0	1.3	0.8	-0.4	0.13	0.05
8/2/95	23 00	5.4	3.9	13.6	15.7	593	173	3.0	1.1	1.3	-0.1	0.13	0.05
8/2/95	23:05	5.3	3.8	13.7	15.7	593	171	3.0	1.1	0.8	-0.3	0.13	0.05
8/2/95	23:10	5.3	3.8	13.8	15.8	592	172	3.0	1.4	1.1	0.1	0.13	0.05
8/2/95	23:15	5.5	3.9	13.5	15.6	592	171	2.9	1.2	1.0	0.1	0.13	0.05
8/2/95	23 20	5.7	4.1	13.2	15.4	592	172	2.9	0.9	0.7	-0.3	0.13	0.05
8/2/95	23:25	5.5	3.9	13.5	15.6	592	171	2.9	1.0	0.8	-0.4	0.13	0.05
8/2/95	23:30	5.3	3.8	13.7	15.7	592	171	2.9	0.9	1.0	-0.3	0.13	0.05
8/2/95	23 35	5.5	4.0	13.4	15.6	592	171	2.9	0.8	1.1	-0.3	0.13	0.05
8/2/95	23 40	5.4	3.9	13.6	15.7	592	172	2.8	0 8	1.2	0.1	0.13	0.05
8/2/95	23·45	5.7	4.1	13.3	15.4	592	172	2.7	0.7	0.9	-0.1	0.13	0.05
8/2/95	23:50	5.8	4.1	13.1	15.3	592	171	2.6	0.7	0.7	-0.4	0.13	0.05
8/2/95	23·55	5.7	4.1	13.2	15.4	592	173	2.6	0.8	0.7	-0.5	0.13	0.05
8/3/95	0.00	5.6	4.0	13.4	15.5	592	172	2.7	0.7	0.8	-0.5	0.13	0.05
8/3/95	0 05	5.7	4.1	13.3	15.5	592	172	2.7	0.8	0.7	-0.6	0.13	0.05
8/3/95	0 10	5.4	3.9	13.6	15 7	592	172	2.8	0.8	1.1	-0 3	0.13	0.05
8/3/95	0.15	5.5	4.0	13.5	15.6	592	172	2.7	0.8	1.1	-0.2	0.13	0.05
8/3/95	0·20	5.7	4.1	13.3	15.5	592	171	6.4	0.9	0.9	-0.5	0.13	0.05
8/3/95	0 25	5 9	4.2	13.0	15.3	593	171	4 7	0.9	0.6	-0.6	0 13	0.05
8/3/95	0·30	5.8	4.1	13.1	15.4	593	171	3 5	0.8	0.5	-0.6	0.13	0.05
8/3/95	0 35	5.6	4 0	13.4	15.6	593	172	3.0	0.9	0.6	-0.6	0.13	0.05
8/3/95	0:40	5.6	4.0	13.3	15.5	592	171	2 7	0.8	0.6	-0.7	0.13	0.05
8/3/95	0 45	5.7	4.1	13.2	15.4	593	172	2.6	0.8	0.5	-0.7	0.13	0.05
8/3/95	0.50	5.4	3.9	13.6	15 7	592	172	2.6	0.7	0.6	-0.7	0.13	0.05
8/3/95	0 55	5.3	3.8	13.7	15 8	592	170	2.6	0.7	0 9	-0 5	0.13	0 05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/3/95	1 00	5.3	3.8	13.8	15.8	592	171	2.6	0.7	0.8	-0.4	0.1	0.0
8/3/95	1 05	5.1	3.7	13.9	15.9	591	170	2.5	0 8	1.7	0.1	0.1	0.0
8/3/95	1·10	4.8	3.4	14.3	16.2	590	170	2.6	0.7	2.6	0.8	0.1	0.0
8/3/95	1.15	5.3	3.8	13.7	15.8	589	171	2.5	0.7	2.2	0.5	0.1	0.0
8/3/95	1.20	5.7	4.1	13.1	15.4	590	170	2.4	0.6	1.2	-0.2	0.1	0.0
8/3/95	1:25	5.8	4 2	13.1	15.3	591	170	2.3	0.6	0.9	-0.4	0.1	0.0
8/3/95	1:30	5.4	3.9	13.6	15.7	591	169	2.3	0.5	1.0	-0.1	0.1	0.0
8/3/95	1:35	5.4	3.8	13.7	15.7	591	170	2.3	0.6	1.4	0.1	0.1	0.0
8/3/95	1.40	5.4	3.8	13.7	15.8	591	170	2.4	0.6	1.8	0.2	0.1	0.0
8/3/95	1 45	5.1	3.6	14.2	16.1	587	170	2.5	0.7	4.7	2.3	0.1	0.0
8/3/95	1.50	5.1	3.6	14.1	16.1	585	169	2.5	0.7	6.5	3.1	0.1	0.0
8/3/95	1 55	5.1	3.7	14.1	16.0	584	169	2.5	0.7	7.1	3.8	0.1	0.0
8/3/95	2 00	5.2	3.7	14.0	16.0	583	169	2.4	0.6	7.2	3 7	0.1	0.0
8/3/95	2 05	5.1	3.7	14.2	16.1	583	169	2.5	0.7	8.1	4 4	0.1	0.0
8/3/95	2 10	5.2	3.7	14.0	16.0	583	170	2.4	0.6	7.8	4.3	0.13	0.05
8/3/95	2.15	5.1	3.7	14.1	16.0	583	170	2.4	0.6	8.7	4.9	0.13	0.05
8/3/95	2.20	5.1	3.7	14.1	16.0	582	168	2.4	0.6	9.2	5.3	0.13	0.05
8/3/95	2·25	5 3	3.8	13.9	15.9	582	169	2.4	0.5	8.2	4.4	0.13	0.05
8/3/95	2 30	5.1	3.7	14.1	16.0	582	168	2.4	0.5	8.4	4.6	0.13	0.05
8/3/95	2 35	5.1	3.7	14.1	16.0	582	168	2.4	0.6	8.8	4 7	0.13	0.05
8/3/95	2 40	5.3	3.8	13.9	15.9	582	169	2.3	0.6	9.0	4.8	0 13	0.05
8/3/95	2.45	5.2	3.7	14.0	16.0	582	170	2.6	0.7	8.7	4.5	0.13	0.05
8/3/95	2:50	5.3	3.9	13.8	15.8	582	169	2.4	0.6	7.6	3.8	0.13	0.05
8/3/95	2:55	5.3	3.8	13.9	15.9	582	168	2.4	0.5	6.8	3.2	0.13	0.05
8/3/95	3.00	5.0	3.6	14.3	16.1	582	168	2.4	0.6	8.9	4.7	0.13	0.05
8/3/95	3 05	5.1	3.7	14.1	16.0	582	168	2.3	0.6	9.5	5.0	0.13	0.05
8/3/95	3:10	5.2	3.7	14.0	16.0	582	168	2.3	0.6	8.0	4.0	0.13	0.05
8/3/95	3:15	4.9	3.5	14.4	16.2	581	168	2.4	0.7	11.0	6.0	0.13	0.05
8/3/95	3 20	5.0	3.6	14.2	16.1	581	169	2.3	0.7	11.7	6.5	0.13	0.05
8/3/95	3 25	5.1	3.7	14.1	16.0	581	169	2.4	0.6	10.9	6.1	0.13	0.05
8/3/95	3:30	5.3	3.8	13.9	15.8	581	168	2.3	0.7	9.0	4.9	0.13	0.05
8/3/95	3 35	5.1	3.6	14.2	16.1	581	168	2.4	0.7	10.4	5.9	0.13	0.05
8/3/95	3 40	5.2	3.8	14.0	15.9	581	167	2.3	0.7	9.8	5.5	0.13	0.05
8/3/95	3:45	5.1	3.6	14.2	16.1	581	168	2.4	0.7	10.2	5.6	0.13	0.05
8/3/95	3 50	5.2	3.7	14.1	16.0	581	167	2.3	0.7	10.4	5.7	0.13	0.05
8/3/95	3:55	5.1	3.6	14.2	16.1	581	167	2.4	0.6	10.7	5.9	0.13	0.05
8/3/95	4 00	5.0	3.6	14.3	16 2	580	167	2.4	0.6	11.7	6.7	0.13	0.05
8/3/95	4:05	5.1	3.7	14.1	16.0	580	167	2.3	0.6	11 7	6.5	0.13	0.05
8/3/95	4:10	5.1	3.7	14.1	16.0	580	168	2.4	0.7	12.0	6.8	0.13	0.05
8/3/95	4 15	5.3	3.8	13.9	15.9	580	168	2.3	0.6	10.5	5.9	0.13	0.05
8/3/95	4.20	5.0	3.6	14.3	16.2	580	168	2.3	0.7	11.7	6.6	0.13	0.05
8/3/95	4 25	5.0	3.6	14.3	16.1	580	167	2.3	0.7	12.7	7.4	0.13	0.05
8/3/95	4 30	4.9	3.6	14.3	16 2	580	167	2.3	0.7	12.5	7.4	0.13	0.05
8/3/95	4:35	5.0	3.6	14.2	16.1	580	166	2.4	0.7	13.2	7.7	0.13	0.05
8/3/95	4 40	4.9	3.6	14.3	16.2	580	167	2.5	0.7	14 0	8.3	0.13	0.05
8/3/95	4 45	5.1	3.6	14.2	16.1	579	168	2.3	0.7	12.8	7.4	0.13	0.05
8/3/95	4 50	5.0	3.6	14.3	16.2	580	168	2.3	0.7	12.6	7.3	0.13	0.05
8/3/95	4·55	4 9	3.5	14.3	16.2	579	167	2.4	0.7	13.3	7.9	0.13	0.05
8/3/95	5 00	5.0	3.6	14.3	16.2	579	167	2.2	0.8	13.2	7.8	0.13	0.05
8/3/95	5 05	5.0	3.6	14.3	16.2	579	167	2.2	0.8	13.4	8.1	0.13	0.05
8/3/95	5 10	4.9	3.5	14.4	16.2	579	166	2.2	0.8	14.5	8.8	0 13	0.05
8/3/95	5 15	4.7	3.4	14.6	16 4	579	167	2.2	0.9	17 2	10.3	0.13	0.05
8/3/95	5 20	4.7	3.4	14 6	16.3	578	167	2.4	0.8	18.6	11.6	0.13	0.05
8/3/95	5 25	5.0	3.6	14.3	16.1	578	167	2.2	0.9	16 8	10.2	0.13	0.05
8/3/95	5 30	4.9	3.5	14.4	16.3	578	167	2.4	0.9	18 9	11.6	0.13	0 05
8/3/95	5 35	5 1	3.7	14 1	16.0	578	166	2.3	0.9	16.1	9.7	0 13	0.05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/3/95	5:40	5.0	3.6	14.2	16.1	578	167	2.3	0.9	15.4	9.1	0.1	0.0
8/3/95	5.45	5.0	3.6	14.3	16.2	578	166	2.3	1.0	16.3	9.7	0.1	0.0
8/3/95	5:50	4.9	3.5	14.4	16.2	578	165	2.3	0.9	15.9	9.4	0.1	0.0
8/3/95	5.55	4.9	3.5	14.4	16.2	578	166	2 3	1.0	17.1	10.3	0.1	0.0
8/3/95	6 00	4.9	3.5	14.5	16.3	578	166	2.3	1.0	17.8	10.8	0.1	0.0
8/3/95	6·05	4.8	3 5	14.5	16.3	577	165	2.3	0.9	19.8	12.2	0.1	0.0
8/3/95	6:10	4.7	3.4	14.6	16.4	577	167	2.4	1.0	21.6	13.7	0.1	0.0
8/3/95	6:15	4.9	3.5	14.3	16.2	577	167	2.3	1.0	18.6	11.5	0.1	0.0
8/3/95	6·20	4.9	3.5	14.4	16.3	577	167	2.4	1.0	19.4	11.8	0.1	0.0
8/3/95	6.25	4.9	3.5	14.4	16.3	577	166	2.2	1.4	19.6	12.1	0.1	0.0
8/3/95	6:30	4.9	3.5	14.4	16.3	577	166	2.3	0.7	21.1	13.3	0.1	0.0
8/3/95	6:35	4.9	3.5	14.4	16.2	577	165	2.4	0.8	20.7	13.2	0.1	0.0
8/3/95	6 40	5.1	3.7	14.1	16.0	578	165	2.3	1.0	18.1	11.2	0.1	0.0
8/3/95	6 45					578	166		1.9			0.1	0.0
8/3/95	6 50					575	164					0.13	0.05
8/3/95	6:55					573	165					0.13	0.05
8/3/95	7.00					574	166					0.13	0.05
8/3/95	7·05					577	161					0.13	0.05
8/3/95	7:10					577	164					0.13	0.05
8/3/95	7.15	5.3	3.7	13.7	15.8	577	166			6.1		0.13	0.05
8/3/95	7.20	5.5	3.9	13.4	15.6	581	167	3.3		4.1		0.13	0 05
8/3/95	7:25	5.5	3.9	13.5	15.6	585	166	2 8		3 8		0.13	0.05
8/3/95	7 30	5.5	3.9	13.4	15.6	587	166	2.7		3.4		0.13	0.05
8/3/95	7:35	5.4	3.8	13.6	15.7	587	165	2.7		3.4		0.13	0.05
8/3/95	7.40	5.2	3.7	13.8	15.8	587	166	2.7		4.2		0.13	0.05
8/3/95	7:45	5.2	3.7	13.8	15.8	587	167	2.7		5.2		0.13	0.05
8/3/95	7:50	5.0	3.5	14.1	16.1	584	167	2.9		16.8	22.6	0.13	0.05
8/3/95	7 55	5.2	3.6	14.1	16.1	578	169	3.3		41.0	26.3	0.13	0.05
8/3/95	8:00	5.9	4.1	13.2	15.4	576	169	3.1	2.3	31.1	19.8	0.13	0.05
8/3/95	8.05	6.5	4.5	12.5	14.9	576	168	2.9	2.3	20.7	12.3	0.13	0.05
8/3/95	8:10	6.8	4.7	12.0	14.6	577	169	2.5	2.0	14.0	7.4	0.13	0.05
8/3/95	8:15	6.8	4.7	12.2	14.7	577	168	2.7	2.0	12.6	6.3	0.13	0.05
8/3/95	8.20	7.0	4.8	11.9	14.5	577	170	2.4	1.8	11.6	5.5	0.13	0.05
8/3/95	8 25	6.9	4.8	12.0	14.6	578	170	2.3	1.7	10.2	4.4	0.13	0.05
8/3/95	8·30	6.9	4.7	12.1	14.7	578	170	2.3	1.7	7.8	2.9	0.13	0.05
8/3/95	8:35	6.8	4.7	12.2	14.7	578	171	2.2	1.7	7.9	2.9	0.13	0.05
8/3/95	8:40	7.1	4.9	11.8	14.5	579	172	2.1	1.7	6 9	2.3	0.13	0.05
8/3/95	8:45	7.0	4.8	11.9	14.6	580	173	2.1	1.6	6.0	1.7	0.13	0.05
8/3/95	8:50	7.0	4.8	11.9	14.6	581	173	2.1	1.6	5.5	1.3	0.13	0.05
8/3/95	8.55	7.0	4.8	11.9	14.6	581	174	2.1	1.6	6.0	1.6	0.13	0.05
8/3/95	9.00	7.1	4 9	11.8	14.5	582	175	2.2	1.7	5.1	1.0	0.13	0.05
8/3/95	9.05	6.9	4.8	12.0	14.6	582	175	2.1	1.8	4.2	0.4	0.13	0 05
8/3/95	9.10	6.9	4.8	12.1	14.7	582	175	2.2	1.8	5.8	1.3	0.13	0.05
8/3/95	9:15	6.5	4.5	12.7	15.1	581	175	2.3	1.9	5.6	1.2	0.13	0.05
8/3/95	9·20	6.1	4.3	13.2	15.4	580	173	2.4	1.7	6.5	2.0	0.13	0.05
8/3/95	9:25	6.1	4.2	13.2	15.5	579	175	2.5	·1.8	7.1	2.3	0.13	0.05
8/3/95	9.30	5.9	4.1	13.5	15.6	578	174	2.6	1.9	9.1	3.7	0.13	0.05
8/3/95	9 35	5.8	4.1	13.6	15.7	578	174	2.5	1.7	9.9	4.0	0.13	0.05
8/3/95	9 40	5.5	3.9	13.9	15.9	577	173	2.7	1.9	12.6	5.9	0.13	0.05
8/3/95	9:45	5.3	3 7	14.2	16.1	575	173	2 8	1.9	18.9	10.1	0.13	0.05
8/3/95	9 50	5 3	3.7	14.2	16.1	574	173	3 0	2.1	22.2	12.3	0.13	0.05
8/3/95	9.55	5.2	3.7	14 3	16.2	573	174	3.0	2.0	30.1	17.7	0.13	0.05
8/3/95	10:00	5.2	3.7	14 3	16.2	572	174	3.0	2.0	31.3	18.6	0 13	0.05
8/3/95	10·05	4.8	3.4	15.0	16.6	570	173	3.5	2.1	58.8	37.4	0 13	0.05
8/3/95	10.10	4.5	3.2	15.3	16.9	567	172	3 7	2.4	120.7	97.8	0 13	0.05
8/3/95	10 15	4.5	3 1	15.3	16 9	565	173	4 0	2.3	185.6	126.5	0 13	0.05

Cleveland (Southerly) Ohio
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August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/3/95	10·20	4 5	3.2	15.2	16.8	564	172	4.3	2.4	230.3	159.0	0.1	0.0
8/3/95	10 25	4.8	3.4	14.9	16.6	561	171	4.2	2.3	208.2	143.8	0.1	0.0
8/3/95	10:30	4.8	3.4	14.9	16.6	560	170	4.3	2 4	209.9	143.8	0.1	0.0
8/3/95	10:35	4.8	3.4	14.9	16.6	561	170	4.5	2.4	242.3	167.6	0.1	0.0
8/3/95	10:40	4.9	3.5	14.7	16.4	560	170	4.5	2.4	254.9	176.0	0.1	0.0
8/3/95	10.45	5.0	3.5	14.7	16.4	560	170	4.7	2.5	290.0	200.5	0.1	0.0
8/3/95	10:50	5.3	3.7	14.3	16.1	561	169	4.4	2.5	220.3	152.2	0.1	0.0
8/3/95	10:55	5.4	3.8	14.1	16.1	562	170	4.2	2.4	165.3	112.9	0.1	0.0
8/3/95	11:00	5.3	3.7	14.2	16.1	562	169	4.3	2.5	172.7	118.3	0.1	0.0
8/3/95	11:05	5.2	3.6	14.5	16.3	562	169	4 6	2.6	194.4	133.3	0.1	0.0
8/3/95	11:10	4.8	3.4	15.0	16.6	559	168	4.8	2.8	281.6	193.3	0.1	0.0
8/3/95	11:15	4.4	3.1	15.5	17.0	553	167	5.4	3.3	460.3	325.1	0.1	0.0
8/3/95	11 20	4.1	2.8	15 9	17.3	551	166	6.0	3.6	866.4	542.5	0.1	0.0
8/3/95	11 25	3.7	2.5	16.3	17.7	543	172	7.5	4.2	957.1	683.0	0.1	0.0
8/3/95	11:30	3.9	2.5	16.1	17.6	533	179	7.9	4.2	976.4	675.5	0.13	0.05
8/3/95	11:35	3.6	2.4	16.4	17.8	529	175	11.3	6.3	1736.0	1100.4	0.13	0.05
8/3/95	11:40	3.5	2.3	16.5	17.9	529	177	16.9	9.8	1858.3	1191.2	0.13	0.05
8/3/95	11:45	3.6	2.4	16.3	17.8	526	176	19.8	11.5	1949.5	1255.6	0.13	0.05
8/3/95	11.50	3.7	2.4	16.2	17.7	524	174	22.4	13.1	2033.4	1314.7	0.13	0.05
8/3/95	11:55	3.8	2.5	16.1	17.6	521	172	25.7	15.5	2178.3	1413.8	0.13	0.05
8/3/95	12:00	3.8	2.5	16.2	17.6	519	171	29.1	17.3	2257.7	1467.8	0.13	0.05
8/3/95	12.05	3.8	2.5	16.1	17.6	515	169	35.5	20.4	2468.9	1610.8	0.13	0.05
8/3/95	12.10	3.9	2.6	15.8	17.5	519	169	35.3	21.7	2581.7	1683.8	0.13	0.05
8/3/95	12.15	4.3	2.8	15.3	17.1	519	168	34.4	21.1	2535.7	1659.1	0.13	0.05
8/3/95	12:20	5.2	3.6	14.0	16.0	529	164	22.2	13.5	2393.5	1609.1	0.13	0.05
8/3/95	12:25	6.2	4.2	12.8	15.2	535	165	15.5	9.3	1753.2	1176.9	0.13	0.05
8/3/95	12:30	7.5	5.1	11.2	14.2	540	165	13.9	7.7	1326.3	873.4	0.13	0.05
8/3/95	12.35	9.4	6.3	8.7	12.6	549	168	16.4	9.2	1741.0	1100.4	0.13	0.05
8/3/95	12:40	10.5	7.4	7.5	11.3	580	164	12.9	8.5	1416.5	936.5	0.13	0.05
8/3/95	12:45	9.6	6.9	8.9	12.2	593	166	6.4	4.1	310.0	218.2	0.13	0.05
8/3/95	12:50	8.4	6.1	10.3	13.1	594	165	2.5	1.4	44.7	36.5	0.13	0.05
8/3/95	12:55	7.2	5.1	11.9	14.3	590	164	2.1	1.2	32.5	28.2	0.13	0.05
8/3/95	13.00	6.3	4.5	13.0	15.1	586	165	2.3	1.3	21.5	14.2	0.13	0.05
8/3/95	13·05	5.8	4.2	13 6	15.5	584	167	2.3	1.4	26.2	17.6	0.13	0.05
8/3/95	13·10	5.4	4.0	14.0	15.8	581	167	2.5	1.4	41.3	28.6	0.13	0.05
8/3/95	13.15	5.7	4.2	13.4	15.3	585	168	2.1	1.3	19.6	12.8	0.13	0.05
8/3/95	13:20	6.0	4.0	13.0	15.5	588	169	1.9		10.9	6.4	0.13	0.05
8/3/95	13:25	6.4	4.5	12.4	14.7	593	169	1.7		3.7	1.2	0.13	0.05
8/3/95	13:30	6.3	4.6	12.5	14.7	596	170	1.6		2.4	0.5	0.13	0.05
8/3/95	13:35	5.9	4.3	13.0	15.1	597	170	1.7		2.2	0.3	0.13	0.05
8/3/95	13 40	5.2	3.8	13.9	15.7	597	170	1.7		2.5	0.4	0.13	0.05
8/3/95	13 45	4.7	3.4	14.5	16.1	595	169	1.8		4.8	1.8	0.13	0.05
8/3/95	13.50					593	170					0.13	0.05
8/3/95	13:55					591	171					0.13	0.05
8/3/95	14 00					592	171					0.13	0.05
8/3/95	14.05					592	171					0.13	0.05
8/3/95	14·10					588	171					0.13	0.05
8/3/95	14:15					586	172					0.13	0.05
8/3/95	14.20					586	172					0.13	0.05
8/3/95	14 25					586	172					0.13	0.05
8/3/95	14.30					586	172					0.13	0.05
8/3/95	14 35					584	171					0 13	0.05
8/3/95	14 40					589	172					0 13	0.05
8/3/95	14 45					590	171					0.13	0.05
8/3/95	14 50					591	171				0.6	0.13	0.05
8/3/95	14 55					591	172				0.5	0 13	0.05

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DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/3/95	15·00					592	171				0.6	0.1	0.0
8/3/95	15.05					591	172				0.7	0.1	0.0
8/3/95	15:10					592	171				1.0	0.1	0.0
8/3/95	15 15					593	173				0 9	0 1	0.0
8/3/95	15:20					593	172				0.7	0.1	0 0
8/3/95	15.25		3.9		15.6	594	173				1.6	0.1	0.0
8/3/95	15:30		3.8		15.7	595	173				2.1	0.1	0.0
8/3/95	15·35		3.7		15.8	594	172				2.0	0.1	0.0
8/3/95	15:40	4.8	3.5	14.3	16.0	593	171			5.7	1.7	0.1	0.0
8/3/95	15.45	4.7	3.4	14.4	16.1	593	171			9.9	5.6	0.1	0.0
8/3/95	15:50	4.4	3.1	14.8	16.4	592	172			15.0	9.3	0.1	0.0
8/3/95	15·55	4.2	2.9	15.1	16.6	590	172			16.0	10.2	0.1	0.0
8/3/95	16 00	4.3	3.0	14 9	16.5	590	171	3.6	2.5	15.8	9.9	0.1	0.0
8/3/95	16:05	4.6	3.3	14.5	16.2	588	170	3 7	2.4	14.5	9.1	0.1	0.0
8/3/95	16 10	5.4	3.8	13.5	15.5	587	171	3.4	2 1	9.0	5.4	0.13	0.05
8/3/95	16:15	5.8	4.1	13.0	15.1	588	170	3 3	2.0	5.3	2.9	0.13	0.05
8/3/95	16:20	5.8	4.1	12.9	15.1	590	170	3.2	1.9	3.5	1.9	0.13	0.05
8/3/95	16:25	5.8	4.1	12.9	15.1	591	170	3 1	1.7	2.9	1.4	0.13	0.05
8/3/95	16:30	5.7	4.0	13.1	15.3	592	170	3.1	1.6	2.7	1.2	0.13	0.05
8/3/95	16:35	5.5	3.9	13.3	15.4	593	170	3 0	1.7	2.3	1.0	0.13	0.05
8/3/95	16:40	5.4	3.9	13.5	15.5	594	170	3 1	1.7	2.3	1.0	0.13	0.05
8/3/95	16·45	5.3	3.8	13.6	15.6	594	170	3.1	1.7	2.6	1.1	0.13	0.05
8/3/95	16:50	5.3	3.7	13.7	15 6	593	171	3.1	1.6	2.8	1.1	0.13	0.05
8/3/95	16:55	5.1	3.6	13.8	15.8	593	172	3.1	1.6	3.3	1.5	0.13	0.05
8/3/95	17:00	5.2	3.7	13.7	15.7	594	170	3.1	1.6	3.0	1.2	0.13	0.05
8/3/95	17:05	5.1	3.6	13.8	15.8	593	172	3.1	1.6	3.3	1.4	0.13	0.05
8/3/95	17:10	5.1	3.6	13.8	15.8	593	172	3.0	1.6	3.1	1.5	0.13	0.05
8/3/95	17:15	5.1	3.6	13.9	15.8	593	171	3.0	1.7	3.6	1.9	0.13	0.05
8/3/95	17:20	5.0	3.5	14.0	15.9	593	172	3.1	1.8	4.2	2.3	0.13	0.05
8/3/95	17:25	5.1	3.6	13.9	15.8	593	172	3.1	1.8	4.2	2.3	0.13	0.05
8/3/95	17:30	5.1	3.6	13.8	15.8	592	172	3.1	1.7	4.6	2.5	0.13	0.05
8/3/95	17 35	5.1	3.6	13.8	15.7	592	171	3.1	1.7	4.6	2.6	0.13	0.05
8/3/95	17:40	5.3	3.7	13.6	15.6	592	171	3 1	1.7	3.8	2.0	0.13	0 05
8/3/95	17:45	5.5	3.9	13.4	15.5	593	171	2.9	1.7	2.8	1.3	0.13	0.05
8/3/95	17.50	5.2	3.7	13.7	15.7	595	171	2.9	1.7	3.2	1.7	0.13	0.05
8/3/95	17.55	5.2	3.7	13.8	15 7	595	171	2.9	1.8	3.3	1.7	0.13	0.05
8/3/95	18.00	5.0	3.5	14.0	15.9	595	171	3.0	1.8	4.0	2.1	0.13	0.05
8/3/95	18:05	4.9	3.5	14.1	16 0	594	171	3.0	1.9	4.5	2.5	0.13	0.05
8/3/95	18:10	5.0	3.6	14.0	15 8	595	171	3.0	1.9	4.5	2.7	0.13	0.05
8/3/95	18:15	5.0	3.6	13.9	15.8	594	170	3.0	1.9	4.8	2.5	0.13	0.05
8/3/95	18.20	5.0	3.6	14.0	15.8	595	170	3.0	1.8	4.7	2.3	0.13	0.05
8/3/95	18:25	4.9	3.5	14.0	15.9	594	170	3.1	1.8	5.1	2.8	0.13	0.05
8/3/95	18 30	4.9	3.5	14.1	15.9	594	170	3 0	1.7	5 7	3.3	0.13	0.05
8/3/95	18:35	4.9	3.5	14.1	15.9	594	170	3.1	1.9	6.3	3.7	0.13	0.05
8/3/95	18 40	4.9	3.5	14.1	15 9	594	170	3.1	1.9	6.8	4.0	0.13	0.05
8/3/95	18:45	5.1	3.6	13.9	15.8	594	170	3 0	1.8	5.7	3.3	0.13	0 05
8/3/95	18:50	5.2	3.7	13 8	15.7	594	169	3.0	1.8	4.8	2.7	0.13	0.05
8/3/95	18 55	5 2	3.7	13.8	15.7	594	170	2 9	1.8	4.2	2.1	0.13	0.05
8/3/95	19:00	5.1	3.6	13.9	15.8	595	169	2.9	1.9	4.7	2.6	0.13	0.05
8/3/95	19 05	4.9	3.5	14.1	16.0	595	170	2.9	2.0	4.7	2.5	0.13	0.05
8/3/95	19 10	4 9	3.5	14.1	15 9	594	169	2 9	2.2	4.9	2.8	0.13	0.05
8/3/95	19·15	4.9	3.5	14.1	15.9	594	169	3 0	2 3	5.6	3.1	0.13	0.05
8/3/95	19.20	4.9	3.5	14.2	16 0	593	171	3.0	2.4	5.8	3.2	0.13	0.05
8/3/95	19 25	4.9	3.5	14.1	16.0	593	170	3 0	2.5	6.1	3.5	0.13	0.05
8/3/95	19 30	5.1	3.7	13.8	15.7	594	169	2.9	2.6	5.2	2.9	0.13	0.05
8/3/95	19 35	5 3	3.8	13.4	15 5	594	170	2.9	2 6	4.3	2.2	0.13	0.05

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/3/95	19.40	5.3	3.8	13.5	15.5	595	170	2.9	2 6	3.6	1 6	0.1	0.0
8/3/95	19 45	5.3	3.8	13.6	15.6	595	170	2.8	2.7	3.5	1.5	0.1	0.0
8/3/95	19 50	5.4	3.8	13.4	15.4	596	170	2.8	2.8	3.0	1.2	0.1	0.0
8/3/95	19.55	5.3	3.8	13.5	15.5	596	171	2.8	2.9	2.7	1.0	0.1	0.0
8/3/95	20 00	5.3	3.8	13.4	15.5	596	171	2.8	2.9	2.6	1.0	0.1	0.0
8/3/95	20 05	5.2	3.7	13.7	15.6	596	171	2.8	2.9	2.8	0.9	0.1	0.0
8/3/95	20 10	5.2	3.7	13.6	15.6	597	171	2.8	3.0	2.9	1.1	0 1	0.0
8/3/95	20 15	5.2	3.7	13.6	15.6	597	173	2.7	2.9	2.7	0.9	0.1	0.0
8/3/95	20·20	5.2	3.7	13.7	15.6	597	172	2.7	3.0	2.9	1.2	0.1	0.0
8/3/95	20 25	5.1	3.7	13.7	15.7	597	172	2.7	3.0	3.1	1.2	0.1	0.0
8/3/95	20:30	5.2	3.7	13.6	15.6	597	173	2.6	3.1	3.1	1.5	0.1	0.0
8/3/95	20.35	5.4	3.8	13.4	15.5	597	173	2.6	3.2		1.0	0.1	0.0
8/3/95	20 40	5 2	3.7	13.7	15.7	597	172	2.5	3.0		1.3	0.1	0.0
8/3/95	20.45	5.1	3 7	13.7	15.7	597	172	2.5	3.2		1.3	0.1	0.0
8/3/95	20 50	5.3	3.8	13 6	15.6	597	172	2.4	3.6		1.1	0.13	0.05
8/3/95	20 55	5 2	3.7	13 6	15.6	597	173	2.4	3.7		0 9	0.13	0.05
8/3/95	21·00	5 2	3.7	13.7	15.6	597	173	2.4	4.4		1.0	0.13	0.05
8/3/95	21.05	5.1	3.7	13.7	15.7	597	173	2.5	4.7		1.2	0.13	0.05
8/3/95	21:10	5.2	3.7	13.7	15.7	597	172	2.5	5.0		1.3	0.13	0.05
8/3/95	21.15	5.2	3.7	13.6	15.7	597	174	2.4	5.2		0.9	0.13	0.05
8/3/95	21:20	5.1	3.6	13.8	15.8	597	173	2.4	5.3		1.0	0.13	0.05
8/3/95	21:25	5.1	3.7	13.7	15.7	597	174	2.5	5.6		1.3	0.13	0.05
8/3/95	21:30	5.3	3.8	13 5	15.6	597	174	2.5	5.4		1.1	0.13	0.05
8/3/95	21:35	5.1	3.7	13.7	15.7	597	173	2.5	5.5		1.2	0.13	0.05
8/3/95	21 40	5.2	3.7	13.7	15.7	597	173	2.5	5.6		1.4	0.13	0.05
8/3/95	21:45	5.3	3.8	13.6	15.6	597	174	2.4	5.5		1.0	0.13	0.05
8/3/95	21 50	5.2	3.7	13.6	15.6	597	174	2.4	5 5		0.9	0.13	0.05
8/3/95	21 55	5.1	3.7	13.7	15.7	597	173	2.4	5.4		1.0	0.13	0.05
8/3/95	22.00	5.1	3.7	13.8	15.8	597	173	2.4	5.6		1.6	0.13	0.05
8/3/95	22:05	5.1	3.7	13.7	15.7	597	173	2.4	5.7		1.6	0.13	0.05
8/3/95	22:10	5.2	3.7	13.7	15.7	597	173	2.3	5.4		1.3	0.13	0.05
8/3/95	22:15	5.1	3.7	13.7	15.7	597	173	2.3	5.3		1.2	0.13	0.05
8/3/95	22:20	5.2	3.7	13.6	15.6	597	172	2.3	5.0		1.2	0.13	0.05
8/3/95	22·25	5.2		13.6	15.7	597	174	2.3	4.6		1.1	0.13	0.05
8/3/95	22·30	5.2		13.7	15.7	597	173	2.2	4.2		1.2	0.13	0.05
8/3/95	22:35					595	172					0.13	0.05
8/3/95	22 40					595	172					0.13	0.05
8/3/95	22 45					598	173					0 13	0.05
8/3/95	22.50					602	172					0.13	0.05
8/3/95	22:55					602	172					0.13	0.05
8/3/95	23 00					600	172					0.13	0.05
8/3/95	23.05					598	172					0 13	0.05
8/3/95	23:10	4.8	3.5	14.2	16.1	598	172		3 0	6.1		0.13	0.05
8/3/95	23:15	4.8	3.6	14.2	16.1	599	171		3.1	6.2	3.8	0.13	0.05
8/3/95	23 20	4.8	3.6	14.2	16.1	598	169	3.2	2.6	6.5	3.6	0.13	0.05
8/3/95	23.25	4.8	3.6	14.2	16.1	598	170	3.1	2 3	7.1	4.2	0.13	0.05
8/3/95	23·30	4.9	3.6	14.1	16 0	598	169	2.9	2.1	6.6	3.6	0.13	0.05
8/3/95	23:35	4.8	3.6	14.1	16.1	598	170	2.7	2.1	6.6	3.5	0.13	0.05
8/3/95	23·40	4.8	3.6	14.2	16.1	598	170	2.7	2.0	7.1	3.8	0.13	0.05
8/3/95	23 45	4.8	3.6	14.3	16.1	597	169	2.7	1.8	8.2	4.7	0.13	0.05
8/3/95	23.50	4.7	3.5	14.3	16 2	597	169	2.7	1.6	9.7	5.8	0.13	0.05
8/3/95	23:55	4.8	3.6	14 3	16 2	596	169	2.7	1.3	9.4	5.3	0.13	0.05
8/4/95	0·00	4.7	3.5	14.4	16.2	596	168	2.8	1.4	11.7	7.0	0.13	0.05
8/4/95	0 05	4.6	3.5	14.5	16.3	595	168	2.8	1.2	12.5	7 6	0 13	0.05
8/4/95	0:10	4.5	3.4	14.6	16.4	595	168	2.8	1.1	12.0	7.0	0.13	0.05
8/4/95	0.15	4 5	3.4	14.6	16.4	594	167	2.8	1.1	17.1	10.5	0.13	0.05

Cleveland (Southerly) Ohio
Continuous Monitor Data
August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/4/95	0 20	4.4	3.3	14.8	16.5	594	168	3.0	1.3	18.6	11.5	0.1	0.0
8/4/95	0 25	4.4	3.2	14.8	16.5	593	167	3.1	1 3	18.2	11.2	0.1	0.0
8/4/95	0 30	4.7	3.5	14.4	16.2	594	167	3.0	1.3	15.9	9.9	0.1	0 0
8/4/95	0·35	5.0	3.7	14.0	15.9	594	166	2.9	1.2	12.5	7.6	0.1	0.0
8/4/95	0·40	4.9	3.7	14.1	16.0	595	166	2.9	1.3	11.6	7.1	0.1	0.0
8/4/95	0·45	4.8	3.6	14.3	16 1	595	166	2.9	1.2	11.8	7.1	0.1	0.0
8/4/95	0·50	4.6	3.5	14.5	16.3	594	165	2.9	1.1	13.1	8.1	0.1	0.0
8/4/95	0.55	4.7	3.6	14.3	16.1	595	166	3.0	1.1	12.6	7.5	0.1	0.0
8/4/95	1:00	4.7	3.5	14.4	16.2	595	166	3.1	1.1	13.2	7.9	0.1	0 0
8/4/95	1 05	4.6	3.5	14.4	16 2	594	166	3.0	1.2	12.8	7.5	0.1	0.0
8/4/95	1:10	4.6	3.4	14.5	16.3	594	166	3 0	1.2	14.6	8.6	0.1	0.0
8/4/95	1 15	4 6	3.5	14.4	16.2	594	166	2.9	1.0	15.2	9.0	0.1	0.0
8/4/95	1 20	4.6	3.4	14.5	16.3	594	166	2.9	1.2	15.8	9.5	0.1	0.0
8/4/95	1 25	4.5	3.4	14.6	16.4	593	166	3.0	1 2	18.1	11.0	0.1	0.0
8/4/95	1:30	4 6	3.5	14.4	16.2	593	166	2.9	1.2	15.6	9.2	0.13	0.05
8/4/95	1:35	4.7	3.5	14.4	16 2	593	166	2.9	1.2	14.3	8.3	0.13	0.05
8/4/95	1.40	4.6	3.5	14.5	16.3	593	166	2 8	1.2	15.5	9.1	0.13	0.05
8/4/95	1:45	4.6	3.5	14.4	16.2	593	165	2.9	1.3	14.8	8 6	0.13	0.05
8/4/95	1·50	4.6	3.4	14.5	16.3	593	165	2 9	1.2	15.5	9.1	0.13	0.05
8/4/95	1 55	4.5	3.4	14.6	16.4	592	165	2.9	1.0	15.6	9.2	0.13	0.05
8/4/95	2:00	4.5	3.4	14.7	16.4	592	165	2.9	1.1	19.9	12.3	0.13	0.05
8/4/95	2 05	4.5	3.3	14.7	16.4	592	166	2.9	0 9	23.1	14.5	0.13	0.05
8/4/95	2:10	4.4	3.3	14.8	16.5	592	166	2.9	0.8	25.6	16.2	0.13	0.05
8/4/95	2:15	4.5	3.3	14.7	16.4	591	165	3.0	0.8	25.2	15.9	0.13	0.05
8/4/95	2·20	4.3	3.2	14.9	16.6	590	164	3.0	0.9	26.9	17.2	0.13	0.05
8/4/95	2:25	4.2	3.1	15.1	16.7	589	165	3.1	0.8	42.0	27.9	0.13	0.05
8/4/95	2:30	4.3	3.2	15.0	16.6	588	165	3.2	0.9	44.3	29.7	0.13	0.05
8/4/95	2:35	4.4	3.3	14.8	16.5	589	165	3.2	0.8	37.3	24.6	0.13	0.05
8/4/95	2·40	4.8	3.6	14.2	16 1	590	164	2.8	0.4	23.2	14.9	0.13	0.05
8/4/95	2.45	4.8	3.6	14.2	16.0	590	163	2.8	0.5	20.7	13.0	0.13	0.05
8/4/95	2.50	4.8	3.6	14.2	16.1	591	164	2.7	0.4	18.6	11.7	0.13	0.05
8/4/95	2.55	4.9	3.7	14.1	16.0	591	162	2.5	0.2	16.1	9.9	0.13	0.05
8/4/95	3.00	4.7	3.5	14.4	16.2	592	163	2.4	0.2	17.1	10.7	0.13	0.05
8/4/95	3 05	4.6	3.5	14.5	16.3	590	163	12.0	0 2	17.2	10.7	0.13	0.05
8/4/95	3·10	4.5	3.4	14.6	16.4	591	163	6 3	0.1	19.6	12.4	0.13	0.05
8/4/95	3:15	4.4	3.3	14.8	16.5	590	164	3.7	0.2	23.8	15.3	0.13	0.05
8/4/95	3 20	4.5	3.4	14.7	16.4	590	164	2.6	0.2	23.9	15.4	0.13	0.05
8/4/95	3:25	4.5	3.4	14.6	16.4	590	163	2.1	0 1	23.6	15.3	0.13	0.05
8/4/95	3:30	4.5	3.4	14.6	16.4	590	163	1.9	0.1	23 1	14.7	0.13	0.05
8/4/95	3·35	4 4	3.3	14.7	16.4	590	163	1.8	0.0	23.9	15.5	0.13	0.05
8/4/95	3 40	4.5	3.4	14.6	16.4	590	163	1.7	-0.2	22.6	14.6	0.13	0.05
8/4/95	3·45	4.4	3.3	14.7	16.4	589	163	1 5	0 0	25.2	16.3	0.13	0 05
8/4/95	3.50	4.4	3.3	14.8	16.5	589	163	1.5	0.0	26.2	17 0	0.13	0.05
8/4/95	3 55	4.4	3.3	14.7	16.4	589	162	1 5	0 0	26.7	17.4	0.13	0 05
8/4/95	4 00	4.4	3.3	14.8	16 5	589	162	1 4	0.1	27 3	17 8	0.13	0 05
8/4/95	4.05	4.3	3.2	14.9	16.5	588	163	1.5	0.1	32.8	21.5	0.13	0.05
8/4/95	4:10	4.5	3.4	14.7	16.4	589	163	1.3	0 2	27.3	17.7	0.13	0.05
8/4/95	4 15	4.5	3.4	14.7	16.4	588	163	1.3	0.1	25.9	16.7	0.13	0 05
8/4/95	4:20	4.4	3.3	14.7	16 4	588	162	1 3	0.1	28.1	18 2	0.13	0.05
8/4/95	4·25	4.4	3.3	14.8	16 5	589	163	1.2	0 1	26 3	17.0	0.13	0.05
8/4/95	4·30	4.3	3.2	14.9	16.5	588	162	1 3	0 1	28.1	18 2	0.13	0 05
8/4/95	4 35	4.4	3.3	14.7	16.4	588	163	1.3	0.2	27 9	18.0	0.13	0.05
8/4/95	4·40	4.4	3 3	14.7	16.4	588	162	1 2	0.0	25.2	16.0	0.13	0.05
8/4/95	4:45	4.3	3.2	14.9	16.6	588	163	1 3	0.1	29.7	19.3	0.13	0.05
8/4/95	4.50	4 3	3.2	14.9	16.6	588	163	1.4	0.1	33 2	21.6	0 13	0.05
8/4/95	4·55	4.3	3 2	14.9	16 6	587	163	1 4	0 2	33 8	22 1	0.13	0 05

Cleveland (Southerly) Ohio
Continuous Monitor Data
August, 1995

DATE	TIME	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/4/95	5 00	4 3	3.2	14.9	16.6	587	163	1.3	0 2	35.7	23.5	0.1	0.0
8/4/95	5.05	4.4	3.3	14.8	16.5	587	162	1.4	0.0	32.9	21 3	0.1	0.0
8/4/95	5 10	4.3	3.2	14.9	16.6	587	162	1.5	0 0	33.3	21 5	0.1	0.0
8/4/95	5.15	4.4	3.2	14.8	16.5	587	162	1 5	-0.1	34.0	21.9	0.1	0.0
8/4/95	5.20	4 4	3.3	14.7	16.4	586	162	1.5	0 0	30.9	20.0	0.1	0.0
8/4/95	5 25	4.5	3.3	14.6	16.4	583	163	1.4	-0.1	25.8	15.9	0.1	0.0
8/4/95	5·30	4.5	3.4	14 5	16.3	583	163	1.4	-0.2	24.0	14.9	0.1	0.0
8/4/95	5.35	4.6	3.4	14.4	16 3	584	163	1.2	-0.2	20.2	12.1	0.1	0.0
8/4/95	5 40	4.6	3.4	14.5	16.3	584	163	1.4	0.0	21.2	12.8	0.1	0.0
8/4/95	5 45	4.7	3.5	14.3	16.2	585	163	1.3	0.1	20.0	12.2	0.1	0.0
8/4/95	5 50	4.7	3.5	14.3	16.2	585	163	1.3	-0.1	15.8	9.3	0.1	0.0
8/4/95	5 55	4 6	3 4	14.4	16.2	586	163	1.2	0.1	15.8	9.4	0.1	0.0
8/4/95	6·00	4.7	3.5	14.2	16.1	586	164	1.3	0.2	14 0	8.3	0.1	0.0
8/4/95	6 05	4.8	3.6	14.1	16.0	586	163	1.2	0.0	13.0	7.5	0.1	0.0
8/4/95	6 10	4.9	3.7	13.9	15 9	587	164	1.1	0.1	11.0	6.3	0.13	0.05
8/4/95	6.15	5.0	3.7	13.8	15.8	588	164	1.1	0.1	8.4	4.3	0.13	0.05
8/4/95	6 20	4.9	3.6	14.0	16 0	588	165	1.0	0.3	8.3	4.3	0.13	0.05
8/4/95	6·25	4.8	3.6	14.1	16.1	589	165	1.1	0.0	7.4	3.7	0.13	0.05
8/4/95	6.30	4.7	3.5	14.2	16.1	589	164	1.2	0.2	7.8	3.9	0.13	0.05
8/4/95	6:35	4 7	3.5	14.2	16.1	589	164	1.1	0.2	8.1	4.0	0.13	0.05
8/4/95	6 40	4 6	3.4	14.5	16.3	589	164	1.1	0.2	9.0	4.4	0.13	0.05
8/4/95	6 45	4.5	3.4	14.5	16.3	589	165	1.1	0.0	9.6	4.9	0.13	0.05
8/4/95	6.50	4:6	3.4	14.4	16.3	588	165	1.1	0.0	10 2	5.2	0.13	0.05
8/4/95	6·55	4 6	3.4	14.4	16.3	588	166	1.0	0.1	10 1	5 3	0.13	0.05
8/4/95	7 00	4.6	3.4	14.4	16.2	588	165	1.0	0.4	9.3	4.9	0.13	0.05
8/4/95	7 05	4.6	3.4	14.4	16.3	588	165	1.0	0.1	9.8	5.2	0.13	0.05
8/4/95	7 10	4.5	3.3	14.6	16.4	588	165	1.1	0.2	11.5	6.5	0.13	0.05
8/4/95	7:15	4.5	3.3	14.5	16.4	588	166	1.1	0.2	12.6	7.1	0.13	0.05
8/4/95	7:20	4.6	3.4	14.3	16.2	588	165	1.0	0.3	9.8	5 3	0.13	0.05
8/4/95	7 25	4.6	3.4	14.4	16.3	588	165	1.0	0 0	9.7	5.1	0.13	0.05
8/4/95	7.30	4.5	3.3	14.5	16.4	589	164	0.9	0.0	11.0	6.0	0.13	0.05
8/4/95	7:35	4.5	3.4	14.4	16.3	588	164	0.9	0.2	10.3	5.3	0.13	0.05
8/4/95	7:40	4 5	3.3	14.5	16.4	588	165	0.9	0.2	11.2	5.9	0.13	0.05
8/4/95	7.45	4.5	3 3	14.5	16.4	587	165	0.9	0.0	13.3	7.4	0.13	0.05
8/4/95	7.50		3.5		16.1	582	167	0.8	0.1		5.8	0.13	0.05
8/4/95	7:55		3.7		15.9	580	168	0.6	0.1		3.5	0.13	0.05
8/4/95	8 00		3 7		15.8	578	168		0.3		2.5	0.13	0.05
8/4/95	8 05					577	167				2.3	0.13	0.05
8/4/95	8:10					579	169					0.13	0.05
8/4/95	8 15					580	171					0 13	0.05
8/4/95	8:20					581							
8/4/95	8 25					581							

APPENDIX C

HUNTINGTON CONTINUOUS MONITOR DATA

Huntington, West Virginia
Continuous Monitor Data
August 1995

Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/15/95	11:30	9.4	9.7	8.8	8.9	734	105	9.4	4.8	54	52	0.35	0.09
8/15/95	11:35	9.1	9.2	9.5	9.7	785	108	8.3	5.3	98	95	0.35	0.09
8/15/95	11:40	8.4	8.5	10.5	10.6	796	106	6.8	4.7	104	101	0.35	0.09
8/15/95	11:45	9.5	9.6	9.2	9.3	814	107	5.5	4.1	127	123	0.35	0.09
8/15/95	11:50	9.5	9.6	9.2	9.4	823	107	4.6	3.7	128	123	0.35	0.09
8/15/95	11:55	9.7	9.8	9.0	9.2	832	107	3.9	3.3	122	117	0.35	0.09
8/15/95	12:00	9.1	9.3	9.7	9.9	834	105	3.2	3.0	111	105	0.35	0.09
8/15/95	12:05	9.2	9.3	9.7	9.8	849	107	3.0	3.0	105	99	0.35	0.09
8/15/95	12:10	8.0	8.0	11.3	11.4	847	106	2.7	2.9	91	85	0.35	0.09
8/15/95	12:15	8.9	9.0	10.0	10.1	856	110	2.8	2.9	88	81	0.35	0.09
8/15/95	12:20	8.3	8.3	10.8	11.0	861	109	2.3	2.7	78	70	0.35	0.09
8/15/95	12:25	7.0	7.1	12.5	12.6	853	105	1.9	2.6	64	57	0.35	0.09
8/15/95	12:30	7.6	7.6	11.7	11.9	853	107	1.9	2.6	61	55	0.35	0.09
8/15/95	12:35	7.7	7.8	11.5	11.7	858	108	2.0	2.7	58	52	0.35	0.09
8/15/95	12:40	7.2	7.3	12.1	12.2	860	107	2.1	2.9	53	47	0.35	0.09
8/15/95	12:45	6.8	7.0	12.5	12.7	859	106	2.1	2.8	49	43	0.35	0.09
8/15/95	12:50	6.0	6.2	13.5	13.6	850	105	2.1	2.8	43	37	0.35	0.09
8/15/95	12:55	5.9	6.2	13.5	13.7	846	104	2.2	3.0	41	35	0.35	0.09
8/15/95	13:00	5.9	6.1	13.5	13.7	843	104	2.4	3.0	41	35	0.35	0.09
8/15/95	13:05	5.1	5.3	14.5	14.7	836	102	2.3	3.0	38	33	0.35	0.09
8/15/95	13:10	5.2	5.4	14.4	14.6	829	102	2.5	3.1	37	31	0.35	0.09
8/15/95	13:15	6.2	6.4	13.1	13.3	834	105	2.8	3.3	42	37	0.35	0.09
8/15/95	13:20	7.0	7.3	12.1	12.2	844	108	3.1	3.6	46	41	0.35	0.09
8/15/95	13:25	7.5	7.5	11.7	11.8	862	109	3.2	3.7	54	48	0.35	0.09
8/15/95	13:30	7.6	7.7	11.5	11.7	867	109	2.9	3.8	54	48	0.35	0.09
8/15/95	13:35	7.5	7.6	11.7	11.8	871	107	2.7	3.6	55	49	0.35	0.09
8/15/95	13:40	7.4	7.5	11.8	11.9	872	106	2.5	3.6	52	46	0.35	0.09
8/15/95	13:45					851	98	2.3	3.8	37	31	0.35	0.09
8/15/95	13:50	9.0	9.1	9.6	9.9	827	98	2.9	4.5	28	23	0.35	0.09
8/15/95	13:55	8.5	8.6	10.3	10.5	854	110	3.0	4.2	51	46	0.35	0.09
8/15/95	14:00	8.3	8.4	10.6	10.7	869	109	2.6	3.7	59	53	0.35	0.09
8/15/95	14:05	9.0	9.1	9.7	9.9	882	112	2.3	3.5	60	54	0.35	0.09
8/15/95	14:10	8.9	9.0	9.9	10.1	892	114	2.0	3.3	57	50	0.35	0.09
8/15/95	14:15	9.2	9.2	9.6	9.8	903	116	1.9	3.3	51	44	0.35	0.09
8/15/95	14:20	8.6	8.7	10.2	10.4	910	116	1.9	3.2	45	38	0.35	0.09
8/15/95	14:25	8.5	8.5	10.5	10.6	919	116	1.9	3.2	41	34	0.35	0.09
8/15/95	14:30	7.8	7.9	11.2	11.4	924	116	2.1	3.2	37	30	0.35	0.09
8/15/95	14:35	7.5	7.6	11.6	11.7	927	116	2.3	3.4	33	26	0.35	0.09
8/15/95	14:40	6.9	7.1	12.2	12.3	927	115	2.7	3.6	31	24	0.35	0.09
8/15/95	14:45	6.7	6.9	12.4	12.5	924	114	3.2	4.0	30	23	0.35	0.09
8/15/95	14:50	6.7	6.9	12.4	12.5	920	114	3.9	4.4	31	25	0.35	0.09
8/15/95	14:55	7.2	7.4	11.8	11.9	918	114	4.2	4.6	39	33	0.35	0.09
8/15/95	15:00	8.2	8.3	10.6	10.8	922	116	4.3	4.6	52	46	0.35	0.09
8/15/95	15:05	8.2	8.2	10.7	10.9	924	115	4.1	4.6	61	54	0.35	0.09
8/15/95	15:10	8.4	8.5	10.4	10.6	923	115	4.1	4.6	64	58	0.35	0.09
8/15/95	15:15	8.9	9.0	9.8	9.9	927	116	4.2	4.7	71	65	0.35	0.09
8/15/95	15:20	8.6	8.6	10.3	10.5	932	117	4.2	4.8	75	69	0.35	0.09
8/15/95	15:25	7.8	7.9	11.3	11.4	923	115	4.2	4.8	70	64	0.35	0.09
8/15/95	15:30	8.1	8.2	10.8	11.0	919	116	4.2	5.0	66	61	0.35	0.09
8/15/95	15:35	8.0	8.0	11.0	11.1	921	115	4.0	5.1	63	57	0.35	0.09
8/15/95	15:40	7.5	7.5	11.6	11.8	917	114	4.1	5.1	59	53	0.35	0.09
8/15/95	15:45	7.2	7.3	12.0	12.2	913	114	4.3	5.1	55	50	0.35	0.09
8/15/95	15:50	7.1	7.3	12.0	12.1	910	114	4.4	5.3	53	48	0.35	0.09
8/15/95	15:55	7.2	7.3	11.9	12.0	911	114	4.7	5.5	55	49	0.35	0.09
8/15/95	16:00	7.6	7.7	11.4	11.6	911	115	4.8	5.6	58	53	0.35	0.09
8/15/95	16:05	7.8	7.8	11.2	11.4	915	115	4.8	5.8	62	57	0.35	0.09

Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/15/95	16:10	7.3	7.4	11.8	12.0	913	114	4.8	5.8	63	58	0.35	0.09
8/15/95	16:15	7.5	7.6	11.5	11.7	911	114	5.0	5.9	64	59	0.35	0.09
8/15/95	16:20	9.1	9.2	9.4	9.6	928	119	5.0	6.1	76	71	0.35	0.09
8/15/95	16:25	8.5	8.5	10.4	10.5	931	116	5.0	6.0	78	73	0.35	0.09
8/15/95	16:30	8.4	8.4	10.5	10.7	929	115	4.8	6.0	77	72	0.35	0.09
8/15/95	16:35	8.0	8.0	11.0	11.2	923	114	4.7	5.9	73	68	0.35	0.09
8/15/95	16:40	7.9	7.9	11.1	11.3	918	114	4.5	6.0	70	64	0.35	0.09
8/15/95	16:45	7.9	8.0	11.0	11.2	917	114	4.6	5.9	68	62	0.35	0.09
8/15/95	16:50	7.6	7.7	11.4	11.6	915	113	4.3	5.6	63	57	0.35	0.09
8/15/95	16:55	9.3	9.4	9.3	9.4	926	118	4.4	5.7	68	62	0.35	0.09
8/15/95	17:00	8.9	8.9	9.9	10.1	935	116	4.1	5.7	73	67	0.35	0.09
8/15/95	17:05	9.0	9.1	9.7	9.8	940	117	4.0	5.6	69	63	0.35	0.09
8/15/95	17:10	8.6	8.7	10.2	10.3	939	116	4.0	5.7	65	59	0.35	0.09
8/15/95	17:15	8.8	8.9	9.9	10.1	940	117	3.8	5.6	63	56	0.35	0.09
8/15/95	17:20	8.7	8.8	10.0	10.2	941	117	3.8	5.5	62	56	0.35	0.09
8/15/95	17:25	8.5	8.6	10.3	10.4	941	117	3.7	5.5	59	52	0.35	0.09
8/15/95	17:30	9.0	9.1	9.6	9.8	948	118	3.7	5.5	56	50	0.35	0.09
8/15/95	17:35	8.5	8.5	10.3	10.5	948	117	3.7	5.7	53	47	0.35	0.09
8/15/95	17:40	8.6	8.7	10.1	10.3	947	117	3.8	5.7	52	46	0.35	0.09
8/15/95	17:45	8.5	8.6	10.2	10.4	949	117	3.9	5.7	51	45	0.35	0.09
8/15/95	17:50	8.3	8.4	10.5	10.7	948	116	3.9	5.5	51	45	0.35	0.09
8/15/95	17:55	8.3	8.3	10.5	10.7	950	118	3.8	5.5	49	43	0.35	0.09
8/15/95	18:00	8.3	8.3	10.6	10.7	949	118	4.0	5.6	51	45	0.35	0.09
8/15/95	18:05	8.1	8.1	10.8	11.0	947	118	4.0	5.7	52	46	0.35	0.09
8/15/95	18:10					921	106	3.4	5.7	48			
8/15/95	18:15					888	100						
8/15/95	18:20						104						
8/15/95	18:25						106						
8/16/95	7:50						104						
8/16/95	7:55						104						
8/16/95	8:00						105						
8/16/95	8:05						105						
8/16/95	8:10						104						
8/16/95	8:15					539	96						
8/16/95	8:20		8.1		11.4	654	110		8.3	59	59		
8/16/95	8:25	7.0	7.6	12.4	11.9	704	107		6.5	64	65		
8/16/95	8:30	7.5	8.1	11.8	11.6	721	105	7.7	5.0	72	72	0.37	0.09
8/16/95	8:35	8.3	8.7	11.0	10.7	740	106	5.7	4.3	78	79	0.37	0.09
8/16/95	8:40	8.5	9.0	10.8	10.4	756	107	4.1	3.9	73	74	0.37	0.09
8/16/95	8:45	7.8	8.3	11.6	11.4	764	105	2.7	3.1	64	64	0.37	0.09
8/16/95	8:50	7.6	8.2	11.8	11.6	765	105	1.8	2.6	57	57	0.37	0.09
8/16/95	8:55	8.7	9.3	10.4	10.0	783	108	2.0	2.8	59	60	0.37	0.09
8/16/95	9:00	8.6	9.1	10.5	10.3	796	107	1.0	2.4	55	55	0.37	0.09
8/16/95	9:05	8.0	8.4	11.4	11.2	801	106	0.2	2.0	46	46	0.37	0.09
8/16/95	9:10	8.2	8.6	11.1	11.0	809	108	0.0	2.0	43	44	0.37	0.09
8/16/95	9:15	8.4	8.7	10.9	10.8	818	109	-0.2	1.6	40	41	0.37	0.09
8/16/95	9:20	7.9	8.3	11.6	11.4	821	107	0.8	1.4	34	34	0.37	0.09
8/16/95	9:25	6.9	7.3	12.7	12.6	816	105	0.9	1.4	27	27	0.37	0.09
8/16/95	9:30	7.6	8.0	11.9	11.7	825	108	1.5	1.6	27	27	0.37	0.09
8/16/95	9:35	6.9	7.3	12.6	12.5	829	107	1.6	1.7	23	23	0.37	0.09
8/16/95	9:40	6.8	7.2	12.6	12.5	833	107	2.1	1.9	21	22	0.37	0.09
8/16/95	9:45	6.6	6.9	12.9	12.9	835	107	2.0	1.8	19	20	0.37	0.09
8/16/95	9:50	7.3	7.6	12.0	11.9	843	110	2.3	1.9	20	20	0.37	0.09
8/16/95	9:55	7.1	7.4	12.3	12.2	855	111	2.4	2.2	21	21	0.37	0.09
8/16/95	10:00	6.9	7.2	12.6	12.5	860	110	2.7	2.4	22	23	0.37	0.09
8/16/95	10:05	6.8	7.2	12.7	12.6	865	112	3.4	3.0	24	24	0.37	0.09

Huntington, West Virginia
Continuous Monitor Data
August 1995

Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/16/95	10:10	6.1	6.4	13.5	13.4	865	110	4.0	3.6	26	27	0.37	0.09
8/16/95	10:15	5.5	5.7	14.3	14 3	855	108	4.6	4.1	28	28	0.37	0.09
8/16/95	10:20	5.7	6.0	14.0	14.0	845	108	4.9	4.3	32	32	0.37	0.09
8/16/95	10:25	6.3	6.6	13.3	13.2	848	110	5.6	4.8	39	39	0.37	0.09
8/16/95	10:30	7.1	7.4	12.3	12.2	853	111	5.6	5.0	47	48	0.37	0.09
8/16/95	10:35	7.6	8.0	11.7	11.6	858	112	5.4	5.0	54	54	0.37	0.09
8/16/95	10:40	8.3	8.5	10.9	10.8	865	112	5.4	4.9	62	63	0.37	0.09
8/16/95	10:45	8.7	9.0	10.4	10.3	868	112	4.7	4.5	68	68	0.37	0.09
8/16/95	10:50	8.7	9.0	10.5	10.3	872	112	4.4	4.2	65	65	0.37	0.09
8/16/95	10:55	8.6	8.7	10.7	10.7	873	112	4.0	3.9	61	61	0.37	0.09
8/16/95	11:00	8.7	9.0	10.5	10.4	875	112	3.7	3.7	59	60	0.37	0.09
8/16/95	11:05	9.0	9.2	10.1	10.0	882	113	3.6	3.6	58	58	0.37	0.09
8/16/95	11:10	9.0	9.2	10.2	10.0	887	113	3.3	3.4	54	54	0.37	0.09
8/16/95	11:15	8.4	8.5	11.0	11.0	882	110	2.7	3.1	50	50	0.37	0.09
8/16/95	11:20	8 6	8.8	10.7	10.6	882	111	2.8	3.0	46	46	0.37	0.09
8/16/95	11:25	8.6	8.7	10.7	10.7	887	111	2.8	3.0	42	42	0.37	0.09
8/16/95	11:30	8 2	8.3	11.1	11.2	887	110	2.8	3.0	38	38	0.37	0.09
8/16/95	11:35	7 8	8.0	11.6	11.7	885	108	2.8	3.0	35	35	0.37	0.09
8/16/95	11:40	7.8	7.9	11.6	11.6	885	108	2.9	3.2	33	34	0.37	0.09
8/16/95	11:45	7.8	8.0	11.5	11.5	886	110	3.7	3.3	31	31	0.37	0.09
8/16/95	11:50	7.5	7.6	11.9	11.9	888	110	3.8	3.4	29	29	0.37	0.09
8/16/95	11:55	7.7	7.9	11.6	11.7	889	110	3.3	3.3	29	29	0.37	0.09
8/16/95	12:00	7.5	7.6	11.8	11.9	892	110	3.2	3.4	26	27	0.37	0.09
8/16/95	12:05	7.8	7.9	11.5	11.6	897	112	3.3	3.4	27	27	0.37	0.09
8/16/95	12:10	7.9	8.0	11.4	11.4	901	113	3.5	3.6	27	27	0.37	0.09
8/16/95	12:15	7 6	7.7	11.7	11.7	901	112	3.4	3.7	26	26	0.37	0.09
8/16/95	12:20	7.7	7.9	11.6	11.6	900	112	3.5	3.8	27	27	0.37	0.09
8/16/95	12:25	7.4	7.5	12.0	12.0	897	111	3.5	3.8	27	27	0.37	0.09
8/16/95	12:30	7.7	7.9	11.6	11.6	896	112	3.7	3.9	28	28	0.37	0.09
8/16/95	12:35	7.5	7.5	11.9	12.0	898	111	3.5	4.0	26	26	0.37	0.09
8/16/95	12:40	7.3	7.4	12.1	12.1	897	111	3.5	4.0	25	25	0.37	0.09
8/16/95	12:45	7.1	7.2	12.4	12.4	896	110	3.5	4.0	25	25	0.37	0.09
8/16/95	12:50	7.5	7.6	11.8	11.9	897	112	3.6	4.0	26	26	0.37	0.09
8/16/95	12:55	7.6	7.6	11.8	11.8	897	111	3.6	4.0	27	27	0.37	0.09
8/16/95	13:00	7.5	7.6	11.8	11.9	898	111	3.6	4.0	26	27	0.37	0.09
8/16/95	13:05	7.4	7.4	12.0	12.1	898	110	3.7	4.1	26	26	0.37	0.09
8/16/95	13:10	7.6	7.7	11.7	11.7	901	112	3.7	4.2	26	27	0.37	0.09
8/16/95	13:15	7.2	7.3	12.2	12.2	905	112	3.7	4.3	24	25	0.37	0.09
8/16/95	13·20	6.6	6.6	13.0	13.0	895	108	3.8	4.3	24	24	0.37	0.09
8/16/95	13:25	6.4	6.5	13.2	13.2	885	107	3.9	4.3	24	24	0.37	0.09
8/16/95	13:30	7.3	7.4	12.1	12.1	884	110	4.0	4.5	26	26	0.37	0.09
8/16/95	13:35	7.7	7.7	11.6	11.6	896	112	3.8	4.5	27	28	0.37	0.09
8/16/95	13:40	7.1	7 2	12.4	12.4	894	110	3.8	4.6	25	26	0.37	0.09
8/16/95	13:45	6.4	6.5	13.1	13.1	884	107	3.7	4.5	24	25	0.37	0.09
8/16/95	13:50	6.2	6.3	13.4	13.6	872	105	3.6	4.4	23	23	0.37	0.09
8/16/95	13:55	6.2	6.3	13.5	13.6	865	105	3.4	4.3	20	21	0.37	0.09
8/16/95	14:00	6.8	6.9	12.7	12.7	868	107	3.4	4.4	22	22	0.37	0.09
8/16/95	14:05	6.7	6.9	12.8	12.8	869	107	3.5	4.5	21	21	0.37	0.09
8/16/95	14:10	8.3	8.3	10.8	10.9	885	112	3.5	4.5	25	25	0.37	0.09
8/16/95	14·15	8.0	8.0	11.3	11.4	896	113	3.2	4.5	23	23	0.37	0.09
8/16/95	14:20	7 7	7 7	11.6	11.7	903	113	3.5	4.6	21	21	0.37	0.09
8/16/95	14:25	7.6	7 6	11.8	11.8	906	114	3.6	4.8	20	20	0.37	0.09
8/16/95	14:30	8.0	8.0	11.2	11.3	914	115	3.6	4.9	20	20	0.37	0.09
8/16/95	14·35	7 9	7.9	11.3	11.4	922	116	3.7	4.8	19	19	0.37	0.09
8/16/95	14·40	6 5	6 5	13.0	13.0	914	111	3.8	4.9	18	18	0.37	0.09
8/16/95	14:45	6.0	6 0	13 6	13.7	899	108	4.0	5.1	17	17	0.37	0.09

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Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/16/95	14:50	8 0	8.1	11.1	11.2	908	115	4.2	5.4	19	20	0.37	0.09
8/16/95	14:55	7.4	7.4	11.9	11.9	922	116	4.6	5 8	21	21	0.37	0.09
8/16/95	15:00	7.6	7.6	11.6	11.7	928	117	4.8	6.1	23	23	0.37	0.09
8/16/95	15:05	7.4	7.4	12.0	12.0	932	117	5 2	6.5	26	26	0.37	0.09
8/16/95	15:10	7.0	7 0	12.4	12.5	927	116	5.7	6.9	27	28	0.37	0.09
8/16/95	15:15	7.2	7.2	12.2	12.2	924	117	6.2	7.5	30	31	0.37	0.09
8/16/95	15:20	7.6	7.6	11.6	11.6	926	117	6.4	7.9	36	36	0.37	0.09
8/16/95	15:25	7.8	7.7	11.5	11.5	924	116	6.5	8.2	43	43	0.37	0.09
8/16/95	15:30	8.2	8.2	11.0	11.0	925	117	6.7	8.5	49	49	0.37	0.09
8/16/95	15:35	8.2	8.2	11.0	11.0	927	117	6.8	8.7	52	52	0.37	0.09
8/16/95	15:40	7.2	7.2	12.3	12.3	916	113	6.7	8.5	53	54	0.37	0.09
8/16/95	15:45	6 7	6.8	12.9	12.9	892	109	6.7	8.2	54	54	0.37	0.09
8/16/95	15:50	8.3	8.3	10.9	10.9	893	114	7 1	8.6	58	58	0.37	0.09
8/16/95	15:55	8.1	8.1	11.1	11.2	907	115	6.5	8 6	55	55	0.37	0.09
8/16/95	16:00	7.2	7.2	12.2	12.3	901	112	6.5	8.6	53	53	0.37	0.09
8/16/95	16:05	7.2	7.2	12.3	12.3	891	111	6.6	8 3	55	55	0.37	0.09
8/16/95	16:10	6.9	6.9	12.7	12.7	883	110	6.5	8.0	52	52	0.37	0.09
8/16/95	16:15	7.7	7.6	11.7	11.7	886	113	6.7	8.3	51	51	0.37	0.09
8/16/95	16:20	7.8	7.7	11.5	11.5	895	114	6.1	8.1	47	47	0.37	0.09
8/16/95	16:25	7.4	7.4	12.0	12.0	895	113	6 0	8.1	45	46	0.37	0.09
8/16/95	16:30	7.6	7.5	11.8	11.8	895	114	6.4	8.4	47	47	0.37	0.09
8/16/95	16:35	7.1	7.1	12.4	12.4	890	112	6 3	8.4	46	46	0.37	0.09
8/16/95	16:40	6.8	6.8	12.7	12.7	887	111	6.3	8.4	45	45	0.37	0.09
8/16/95	16:45	6.8	6.8	12.8	12.8	877	109	6.5	8.1	46	46	0.37	0.09
8/16/95	16:50	6.7	6.8	12.8	12.8	872	109	6.4	8.0	44	45	0.37	0.09
8/16/95	16:55	6.1	6.1	13.6	13.7	863	107	5.9	7.7	39	39	0.37	0.09
8/16/95	17:00	6.3	6.3	13.3	13.4	860	108	5.9	7.7	38	38	0.37	0.09
8/16/95	17:05	6.7	6.8	12.8	12.8	862	109	5.9	7.7	38	38	0.37	0.09
8/16/95	17:10	8.4	8.3	10.7	10.8	877	115	6.2	7.9	43	43	0.37	0.09
8/16/95	17:15	8.1	8.0	11.2	11.2	893	114	5.5	7.9	41	42	0.37	0.09
8/16/95	17:20	8.9	8.7	10.1	10.1	907	117	5.6	7.8	42	42	0.37	0.09
8/16/95	17:25	8.8	8.7	10.2	10.2	918	117	5.2	7.4	40	40	0.37	0.09
8/16/95	17:30	9.3	9.2	9.6	9.6	930	119	5.3	7.4	42	42	0.37	0.09
8/16/95	17:35	9.3	9.3	9.6	9.6	937	120	5.6	7.6	44	44	0.37	0.09
8/16/95	17:40	9.3	9.3	9.6	9.6	942	120	5.7	7.6	46	46	0.37	0.09
8/16/95	17:45	9.8	9.7	8.9	9.0	950	121	5.7	7.9	49	49	0.37	0.09
8/16/95	17:50	9.4	9.2	9.6	9.6	954	120	6.0	8.2	52	52	0.37	0.09
8/16/95	17:55	9.3	9.2	9.7	9.7	949	120	6.1	8.1	51	52	0.37	0.09
8/16/95	18:00	9.4	9.3	9.5	9.5	948	120	5.9	8.0	49	49	0.37	0.09
8/16/95	18:05	9.3	9.2	9.6	9.6	951	120	5.8	7.9	48	49	0.37	0.09
8/16/95	18:10	9.2	9.1	9.7	9.7	949	119	5.8	8.1	46	46	0.37	0.09
8/16/95	18:15	9.1	9.0	9.9	9.9	949	119	5.8	8.1	44	44	0.37	0.09
8/16/95	18:20	9.4	9.3	9.6	9.5	950	120	5.7	8.0	42	42	0.37	0.09
8/16/95	18:25	9.5	9.4	9.4	9.4	952	120	5.2	7.9	39	40	0.37	0.09
8/16/95	18:30					927	107	4.3					
8/17/95	7:55						106						
8/17/95	8:00					420	105						
8/17/95	8:05					418	105						
8/17/95	8:10					416	106						
8/17/95	8:15					415	105						
8/17/95	8:20					414	104						
8/17/95	8.25					420	104						
8/17/95	8:30					549	94		0.8				
8/17/95	8:35	9.2	9.5	9.5	9 4	644	107	8.5	4.4	102	114	0 28	0 06
8/17/95	8:40	8.0	8.1	11.2	11.3	713	108	8.3	5.0	112	112	0.28	0.06
8/17/95	8:45	6.5	6.7	13.1	13 2	724	103	6 2	3.5	99	98	0 28	0 06

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Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/17/95	8:50	6.1	6.4	13.5	13.7	727	102	5.8	3.5	85	83	0.28	0.06
8/17/95	8:55	6.1	6.3	13.6	13.7	736	102	5.8	3 8	80	79	0.28	0.06
8/17/95	9:00	6 0	6.2	13.7	13.8	741	103	5.5	3.8	76	74	0.28	0.06
8/17/95	9:05	5.9	6.1	13.8	13.9	747	102	5.4	4.1	73	71	0.28	0.06
8/17/95	9:10	6.4	6.6	13.2	13.3	757	104	6.3	4.8	77	76	0.28	0.06
8/17/95	9:15	7.0	7.2	12.4	12.5	772	106	6.2	5.1	89	87	0.28	0.06
8/17/95	9:20	6.1	6.3	13.6	13 6	770	104	6.2	5.1	80	77	0.28	0.06
8/17/95	9:25	7.2	7.4	12.2	12.3	781	107	6.9	5.7	96	93	0.28	0.06
8/17/95	9:30	7.8	8.0	11.5	11.6	796	109	6.8	6.0	110	106	0.28	0.06
8/17/95	9:35	7.7	7.9	11.6	11.7	803	108	6.8	5.8	114	108	0.28	0.06
8/17/95	9:40	7.0	7.1	12.6	12.7	803	106	5.8	5.2	108	102	0.28	0.06
8/17/95	9:45	6.3	6.5	13.3	13.4	793	104	6.0	4.7	99	93	0.28	0.06
8/17/95	9:50	7.0	7.2	12.6	12 6	794	106	6.5	5.4	106	100	0.28	0.06
8/17/95	9:55	7.6	7.7	11.9	12.0	806	107	5.8	5 3	116	108	0.28	0.06
8/17/95	10:00	7.7	7.9	11.6	11.7	812	108	6.6	5 9	120	111	0.28	0.06
8/17/95	10·05	6.9	6.9	12.8	12.8	815	106	6.6	5.8	113	102	0.28	0.06
8/17/95	10:10	6.8	6.8	12.8	12 8	814	105	6.5	5.9	112	102	0.28	0.06
8/17/95	10:15	6.8	6.8	12.8	12.8	812	105	7.1	6.2	117	106	0.28	0.06
8/17/95	10:20	7.3	7.4	12.2	12.1	818	107	7.7	7.2	127	115	0.28	0.06
8/17/95	10:25	7.6	7.6	11.8	11.8	827	108	7.7	7.2	136	124	0.28	0.06
8/17/95	10:30	7.2	7.2	12.3	12.3	825	106	7.1	6.7	135	121	0.28	0.06
8/17/95	10:35	8.4	8.3	10.9	10.9	834	110	7.8	7.0	153	138	0.28	0.06
8/17/95	10:40	8.0	8.0	11.4	11.4	842	110	6.8	6.8	148	130	0.28	0.06
8/17/95	10:45	7.3	7.3	12.2	12.2	836	107	6.2	5.9	138	121	0.28	0.06
8/17/95	10:50	7.4	7.4	12.1	12.2	833	106	5.9	5.9	137	120	0.28	0.06
8/17/95	10:55	7.0	7.0	12.6	12.7	829	106	5.8	5.7	128	112	0.28	0.06
8/17/95	11:00	6.5	6.6	13.2	13.2	821	104	5.2	5.3	116	100	0.28	0.06
8/17/95	11:05	7.0	7.0	12.6	12 6	823	106	5.8	5.8	118	103	0.28	0.06
8/17/95	11:10	6.7	6.7	12.9	12.9	825	105	5.6	5.8	113	98	0.28	0.06
8/17/95	11:15	6.9	7.0	12.6	12.6	825	105	6.3	6.1	116	102	0.28	0.06
8/17/95	11:20	7.2	7.2	12.3	12.3	831	107	6.0	6.3	120	105	0.28	0.06
8/17/95	11:25	7.9	7.9	11.4	11.4	842	110	7.2	7.0	119	103	0.28	0.06
8/17/95	11:30	7.7	7.6	11.7	11 7	855	109	6.0	6.9	132	110	0.28	0.06
8/17/95	11:35	7.6	7.6	11.8	11.8	850	108	6.8	6.8	135	114	0.28	0.06
8/17/95	11:40	5.8	5.8	14.1	14 1	832	102	4.2	4.9	114	94	0.28	0.06
8/17/95	11:45	5.8	5.9	14.0	14 0	819	102	5.0	5.2	108	93	0.28	0.06
8/17/95	11:50	6.6	6.7	13.0	13.0	817	104	6.2	6.0	119	107	0.28	0.06
8/17/95	11:55	8.2	8.1	11.1	11.1	835	109	7.0	7.1	141	126	0.28	0.06
8/17/95	12:00	7.5	7.4	12.1	12.0	839	107	5.6	6 6	134	116	0.28	0.06
8/17/95	12:05	7.8	7.7	11.6	11.6	844	109	6.3	6.9	137	119	0.28	0.06
8/17/95	12:10	7.7	7.6	11.7	11.8	851	109	6.0	6.8	136	115	0.28	0.06
8/17/95	12:15	7.5	7.5	12.0	12.0	851	109	6.1	6.9	132	111	0.28	0.06
8/17/95	12:20	7.6	7.5	11.9	11.9	853	109	6.4	7.0	130	109	0.28	0.06
8/17/95	12:25	7.8	7.7	11.5	11 6	861	111	6.6	7.1	129	107	0.28	0.06
8/17/95	12:30	7.5	7.4	12.0	12.0	862	110	6.4	7.0	129	105	0.28	0.06
8/17/95	12:35	7.9	7.7	11.5	11.6	863	111	6.7	7 1	135	113	0.28	0.06
8/17/95	12:40	7.5	7.4	11.9	12.0	863	110	6.5	7.2	135	112	0.28	0.06
8/17/95	12:45	7.5	7 4	12 0	12.1	860	109	6.5	7.0	139	117	0.28	0.06
8/17/95	12:50	5 8	5 8	14.0	14.0	842	104	4.3	5.5	119	98	0.28	0.06
8/17/95	12:55	5.7				827	103	4.6				0.28	0.06
8/17/95	13:00					815	101	4.0				0.28	0.06
8/17/95	13:05					806	99					0.28	0.06
8/17/95	13 10					801	101		2.3			0.28	0.06
8/17/95	13·15	4.9	5.7	15 0	14.8	798	101		2.5	75		0.28	0.06
8/17/95	13:20	5.9	6.2	13 8	14.1	805	104		3 3	85	77	0 28	0.06
8/17/95	13:25	5.5	5 6	14.3	14 5	806	103		2.7	81	71	0.28	0.06

Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/17/95	13:30	7.0	7.0	12.5	12.7	818	107		3.9	96	86	0.28	0.06
8/17/95	13:35	7.2	7.2	12.3	12.4	834	109		4 6	102	89	0.28	0.06
8/17/95	13:40	6.7	6.6	12.9	13.1	841	108		4.3	95	86	0.28	0.06
8/17/95	13:45	6.1	6.1	13.5	13.8	839	107		4.2	85	78	0 28	0.06
8/17/95	13:50	5.0	5.1	14.8	15.1	829	105		3.7	73	66	0 28	0.06
8/17/95	13:55	6.1	6.2	13.5	13.7	830	108	8.9	5.0	88	79	0.28	0 06
8/17/95	14:00	7.6	7.5	11.7	11.9	845	111	8.7	5.9	116	104	0.28	0.06
8/17/95	14:05	7.6	7.5	11.8	11.9	856	112	7.6	6.1	121	107	0.28	0.06
8/17/95	14:10	7.1	7.0	12.4	12.6	854	110	6.1	5.6	124	108	0.28	0.06
8/17/95	14:15	8.4	8.2	10.9	11.0	867	115	7 1	6.6	143	126	0.28	0.06
8/17/95	14:20	8.2	8.0	11.1	11.3	875	115	6.2	6.3	150	130	0.28	0.06
8/17/95	14:25	8.5	8.3	10.7	10.8	881	116	6 7	6.6	163	140	0.28	0.06
8/17/95	14:30	8.5	8.3	10.7	10.9	886	116	6.7	6.6	171	146	0 28	0.06
8/17/95	14:35	8.2	8.0	11.1	11.3	884	114	6.6	6.3	173	146	0.28	0.06
8/17/95	14:40	7.7	7.5	11.8	11.9	874	111	6.2	5.6	168	142	0.28	0 06
8/17/95	14:45	9.3	9.1	9.7	9.8	884	115	7.7	6.5	182	158		0 06
8/17/95	14:50	8.9	8.6	10.2	10.4	894	116	7.0	6.6	175	146		0.06
8/17/95	14:55	8.9	8.6	10.2	10.4	900	116	7.0	6.8	175	143		0.06
8/17/95	15:00	8.4	8.2	10.8	11.0	898	114	6.8	6.4	176	143		0.06
8/17/95	15:05	7.2	7.1	12.3	12.5	883	110	5.5	5.4	161	130		0.06
8/17/95	15:10	6.7	6.7	12.9	13.1	863	107	5.0	4.6	147	124		0.06
8/17/95	15:15	6.6	6.6	13.0	13.2	852	108	5.5	4.4	135	115		0 06
8/17/95	15:20	7.3	7.2	12.2	12.4	851	109	6.1	4.7	139	121		0.06
8/17/95	15:25	7.9	7.7	11.4	11.7	858	111	6.5	4.9	148	129		0.06
8/17/95	15:30	9.0	8.8	10.0	10.2	874	116	6.6	5.5	147	127		0.06
8/17/95	15:35	9.0	8.8	10.0	10.2	893	116	5.9	5.4	153	126		0.06
8/17/95	15:40	8.8	8.6	10.3	10.4	899	115	6.9	5.9	150	121		0.06
8/17/95	15:45	9.0	8.8	10.0	10.2	905	116	6.4	5.9	153	122		0.06
8/17/95	15:50	8.7	8.4	10.4	10.6	908	116	6.7	5.9	152	119		0.06
8/17/95	15:55	9.0	8.8	10.0	10.2	913	117	6.6	6.3	153	120		0.06
8/17/95	16:00	9.0	8.8	10.0	10.2	916	117	6.7	6.2	156	123		0.06
8/17/95	16:05	9.1	8.9	9.8	10.0	918	117	6.3	6.3	163	130		0.06
8/17/95	16:10	9.2	9.0	9.7	9.9	917	116	6.3	6.0	173	141		0.06
8/17/95	16:15	8.4	8.2	10.8	11.0	908	113	6.2	6.1	160	130		0.06
8/17/95	16:20	10.0	9.8	8.8	8.9	917	118	7.0	6.7	167	139		0.06
8/17/95	16:25	9.4	9.2	9.4	9 6	924	117	5.9	6.4	182	148		0.06
8/17/95	16:30	9.4	9.2	9.5	9.6	924	117	6.4	6.4	171	138		0.06
8/17/95	16:35	9.4	9.2	9.5	9.7	926	118	6.4	6.4	166	134		0.06
8/17/95	16:40	9.5	9.3	9.3	9.5	927	118	6.4	6 5	166	134		0.06
8/17/95	16:45	9.7	9.5	9.1	9 3	932	119	6.3	6.7	168	136		0.06
8/17/95	16:50	10.0	9.8	8.7	8.9	939	119	6.5	7.0	176	142		0.06
8/17/95	16:55	10.1	9.8	8.6	8.8	942	119	6.3	7.0	181	147		0.06
8/17/95	17:00	9.7	9.6	9.0	9.2	942	119	6.4	7.1	183	147		0.06
8/17/95	17:05	10.0	9.8	8.7	8.9	944	119	6.3	7.3	187	152	0.34	0.06
8/17/95	17:10	9.9	9.7	8.9	9.1	943	118	5.8	7.0	186	152	0.34	0.06
8/17/95	17:15	10.0	9.8	8.7	8.8	945	119	6.3	7.1	185	152	0.34	0.06
8/17/95	17:20	9.9	9.7	8.9	9.1	946	118	6.4	7 4	188	154	0.34	0.06
8/17/95	17:25	10.7	10.5	7.8	8.0	954	121	6.6	7.7	191	158	0.34	0.06
8/17/95	17:30	10.5	10.3	8.1	8.2	957	120	5.8	7 6	206	171	0.34	0 06
8/17/95	17:35	10.3	10 2	8.2	8.4	957	120	6.8	7 4	200	167	0.34	0.06
8/17/95	17:40	10.7	10 5	7.8	8.0	960	121	5 8	7 3	201	167	0.34	0 06
8/17/95	17:45	10.4	10 2	8.2	8.4	959	119	5.8	7.2	201	165	0.34	0 06
8/17/95	17:50	9 9	9.6	8.9	9.1	952	117	5.4	6.7	195	158	0.34	0.06
8/17/95	17:55	7 9	7.7	11.5	11.7	927	110	4.4	5 8	178	144	0.34	0 06
8/17/95	18:00	8.5	8.3	10.7	10 9	911	111	5.0	5.9	167	142	0.34	0 06
8/17/95	18.05	8.7	8.5	10.4	10 6	909	113	5 2	6 0	146	123	0.34	0.06

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Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/17/95	18:10	10.5	10.4	8.0	8.1	926	119	5.7	6.6	150	127	0.34	0.06
8/17/95	18:15	10.9	10.6	7.6	7.8	950	122	4.8	6.7	164	133	0.34	0.06
8/17/95	18:20	9.5	9.4	9 3	9.5	951	118	4.6	6.5	166	128	0.34	0.06
8/17/95	18:25					950	118	5.1				0.34	0.06
8/17/95	18:30					946	117					0.34	0.06
8/17/95	18:35					952	120					0.34	0.06
8/17/95	18:40					957	121					0.34	0.06
8/17/95	18:45					946	116		5.0			0.34	0.06
8/17/95	18:50	9.3		9.4		942	117		4.3	142		0.34	0.06
8/17/95	18:55	9.2		9.6		940	117	5.2	4.2	143		0.34	0.06
8/17/95	19:00	8.3	8.0	10.9	11.7	930	113	5.1	3.5	140	114	0.34	0.06
8/17/95	19:05	9.0	9.3	9.9	10.1	926	116	5.5	4.0	135	116	0.34	0.06
8/17/95	19:10	10.2	10.5	8.5	8.7	940	119	5.2	4.1	155	134	0.34	0.06
8/17/95	19:15	9.4	9.7	9.4	9.6	942	117	4.9	3.8	149	125	0.34	0.06
8/17/95	19:20	8.8	9.0	10.3	10.5	934	114	4.5	3.7	142	118	0.34	0.06
8/17/95	19:25	8.5	8.7	10.6	10.8	927	113	5.1	3.7	129	107	0.34	0.06
8/17/95	19:30	8.3	8.4	10.9	11.1	922	113	4.8	3.2	122	101	0.34	0.06
8/17/95	19:35	8.5	8.6	10.6	10.8	920	114	5.2	3.4	117	97	0.34	0.06
8/17/95	19:40	8.0	8.2	11.2	11.4	916	114	5.0	3.1	109	90	0.34	0.06
8/17/95	19:45	8.7	8.9	10.3	10.5	918	115	5.1	3.2	115	97	0.34	0.06
8/17/95	19:50	8.7	8.9	10.3	10.5	921	116	5.6	3.0	113	95	0.34	0.06
8/17/95	19:55	7.7	7.8	11.6	11.9	916	113	5.3	2.9	109	90	0.34	0.06
8/17/95	20:00	7.4	7.6	12.0	12.2	904	113	5.6	3.0	102	85	0.34	0.06
8/17/95	20:05	9.6	9.9	9.2	9.3	923	120	6.7	4.1	114	99	0.34	0.06
8/17/95	20:10	9 4	9.7	9.4	9.6	937	120	6.3	4.1	131	110	0.34	0.06
8/17/95	20:15	9.0	9.2	10.0	10.2	939	118	6.5	3.9	138	116	0.34	0.06
8/17/95	20:20	9.5	9.8	9.3	9.5	940	119	6.3	4.2	145	124	0.34	0.06
8/17/95	20:25	9.5	9.8	9.3	9.4	943	119	6 2	3.9	152	129	0.34	0.06
8/17/95	20:30	9.5	9.8	9.3	9.4	943	119	6.1	4.0	149	126	0.34	0.06
8/17/95	20:35	10.3	10.7	8.2	8.4	951	121	6.1	4.1	165	143	0.34	0.06
8/17/95	20:40	10.3	10.6	8.4	8.6	956	121	6.5	4.2	172	146	0.34	0.06
8/17/95	20:45	10.3	10.6	8.4	8.5	959	121	6.4	4.4	174	148	0.34	0.06
8/17/95	20:50	10.3	10.6	8.4	8.6	959	121	6.5	4.3	177	149	0.34	0.06
8/17/95	20:55	10.3	10.7	8.3	8.5	960	122	6.2	4.0	179	151	0.34	0.06
8/17/95	21:00	10.2	10.5	8.5	8.7	960	121	5.9	3.6	176	148	0.34	0.06
8/17/95	21:05	10.1	10.5	8.6	8.8	957	120	5.6	3.7	173	146	0.34	0.06
8/17/95	21:10	9.9	10.3	8.8	9.0	956	120	6.0	3.6	170	143	0.34	0.06
8/17/95	21:15	9.8	10.2	8.9	9.1	954	120	5.8	3.7	161	135	0.34	0.06
8/17/95	21:20	9.4	9.8	9.4	9.6	950	118	5.7	3.5	152	126	0.34	0.06
8/17/95	21:25	9.9	10.2	8.9	9.0	949	119	5.3	3.3	154	131	0.34	0.06
8/17/95	21:30	10.0	10.4	8.8	8.9	949	119	5.5	3.5	155	132	0.34	0.06
8/17/95	21:35	9.7	10.0	9.1	9.3	949	118	5.6	3.3	155	131	0.34	0.06
8/17/95	21:40	10.0	10.4	8.7	8.9	951	119	5.4	2 8	153	128	0.34	0.06
8/17/95	21:45	9.4	9.6	9.5	9 7	950	118	4.7	2 6	140	114	0.34	0.06
8/17/95	21:50	8.4	8.5	10.7	11.0	948	118	5.9	3 8	112	88	0.34	0.06
8/17/95	21·55	8.5	8.7	10.5	10.7	944	118	6.5	4.2	107	87	0.34	0.06
8/17/95	22:00	9.2	9.4	9.7	9 9	943	119	6.6	3.8	123	105	0.34	0.06
8/17/95	22.05	9.4	9.8	9.4	9.6	943	118	5 6	3.2	136	118	0.34	0.06
8/17/95	22:10	10.0	10.3	8.8	9 0	945	119	5.0	3 0	150	131	0.34	0.06
8/17/95	22.15	10.1		8.7		947	118	5.1	2 6	158			
8/17/95	22:20	10 6		8.0		950	119	4.5	2 3	165			
8/17/95	22:25	10 4		8.3		953	118	4.1	2.1	163			
8/17/95	22:30					954	117	5.2					
8/17/95	22 35					954	117						
8/18/95	8:00					535	96	0.9					
8/18/95	8·05					534	98	0 4					

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Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/18/95	8:10					531	100	0 1					
8/18/95	8:15					529	103	0.1					
8/18/95	8:20					527	103	0.4					
8/18/95	8:25					525	103	0.4					
8/18/95	8:30					530	102	0 0					
8/18/95	8:35					603	89	0.5					
8/18/95	8:40					634	88	0 2					
8/18/95	8:45					660	88	-0.6					
8/18/95	8:50					675	87	-1.0					
8/18/95	8:55	6.6	13.4	12.8	5 5	708	98	8.6					
8/18/95	9:00	8.7	9.0	10.2	10.4	790	101	18.1					
8/18/95	9:05	8.8	9 3	9.5	9.6	813	105	2.3					
8/18/95	9:10	8.3	8.7	10.1	10.3	830	106	1.4					
8/18/95	9:15	7.2	7.4	11.6	11.9	839	105	1.9					
8/18/95	9:20	5.2	5.5	14.3	14.5	833	104	5.6					
8/18/95	9:25	7.7	8.1	10.8	11.0	837	105	0.9					
8/18/95	9:30	8.2	8.5	10.2	10.3	854	107	0.5					
8/18/95	9:35	7.2	7.5	11.5	11.7	853	103	0.2					
8/18/95	9:40	8.0	8.4	10.5	10.7	878	110	0.6	1 6	7	3		
8/18/95	9:45	6.3	6.7	12.5	12.8	878	108	1.1	1.6	6	3	0.27	0.05
8/18/95	9:50	6.3	6.7	12.6	12.9	865	108	1.5	1.9	5	2	0.27	0.05
8/18/95	9:55	6.0	6.4	12.9	13.2	858	107	1.4	1.9	11	2	0.27	0.05
8/18/95	10:00	5.6	6.0	13.4	13.6	848	106	1.5	2.2	4	2	0.27	0.05
8/18/95	10:05	6.8	7.2	12.0	12.2	858	110	1.4	2.0	8	2	0.27	0.05
8/18/95	10:10	6.1	6.5	12.8	13.1	861	108	1.5	2.0	5	3	0.27	0.05
8/18/95	10:15	6.1	6.5	12.8	13.1	859	108	1.5	2.1	4	2	0.27	0.05
8/18/95	10:20	6.3	6.6	12.7	13.0	863	109	1.4	2.2	4	2	0.27	0.05
8/18/95	10:25	6.2	6.6	12.8	13.1	868	109	1.2	1.9	14	2	0.27	0.05
8/18/95	10:30	6.3	6.8	12.6	12.8	872	110	1 2	1.9	3	1	0.27	0.05
8/18/95	10:35	6.4	6.8	12.5	12.7	876	110	1.2	1.9	4	2	0.27	0.05
8/18/95	10:40	6.3	6.7	12.6	12.9	878	110	1 2	1.8	4	1	0.27	0.05
8/18/95	10:45	6.5	6.8	12.4	12.7	881	111	1.3	1.9	2	1	0.27	0.05
8/18/95	10:50	6.3	6.7	12.6	12.8	880	110	1.4	1.9	3	1	0.27	0.05
8/18/95	10:55	6.4	6.8	12.5	12.8	881	111	1.1	1.8	3	1	0.27	0.05
8/18/95	11:00	6.4	6.8	12.4	12.7	883	111	1.0	1.8	2	1	0.27	0.05
8/18/95	11:05	6.4	6.8	12.4	12.7	885	111	1.0	1.8	2	1	0.27	0.05
8/18/95	11:10	6.4	6.8	12.4	12.7	888	111	0.9	1.7	2	1	0.27	0.05
8/18/95	11:15	6.5	6.9	12.3	12.6	890	112	0.9	1 8	2	1	0.27	0.05
8/18/95	11:20	6.6	7.0	12.2	12.5	896	112	0.9	1.9	3	2	0.27	0.05
8/18/95	11:25	6.5	6.9	12.4	12.6	899	113	1.1	2 0	3	2	0.27	0.05
8/18/95	11:30	6.5	6.9	12.3	12.6	900	113	1 2	2.2	7	2	0.27	0.05
8/18/95	11:35	6.6	6.9	12.3	12.5	903	113	1 3	2.2	3	2	0.27	0.05
8/18/95	11:40	6.4	6.8	12.4	12.7	902	113	1.3	2.2	4	3	0.27	0.05
8/18/95	11:45	6.4	6.8	12.5	12.8	901	113	1.3	2.3	6	3	0.27	0.05
8/18/95	11:50	6.5	6.9	12.4	12.6	901	113	1 4	2.4	6	3	0.27	0.05
8/18/95	11:55	6.4	6.8	12.5	12.8	901	113	1.7	2.6	4	3	0.27	0.05
8/18/95	12.00	6.1	6.5	12.8	13.1	897	112	1 8	2.7	4	4	0.27	0.05
8/18/95	12:05	6.3	6.7	12.6	12.8	894	113	2.0	2.8	5	4	0.27	0.05
8/18/95	12:10		6.9		12.5	899	113			5	4		
8/18/95	12:15					910	114						
8/18/95	12:20					912	114						
8/18/95	12:25					919	116						
8/18/95	12:30					905	110		1.6				
8/18/95	12:35					877	105		1.6				
8/18/95	12.40	8.0	7.1	13.1	10 8	859	109	8 3	1.5		22		
8/18/95	12:45	5 6	5 4	13.6	12 9	865	110	5 3	2.6		8		

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Date	Time	CO_2		O_2		Temperature		THC		CO		Moisture	
		Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet	Scrubber Inlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	O_2 (%)	O_2 (%)	°F	°F	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	H_2O (%)	H_2O (%)
8/18/95	12:50	4.8	4.6	14.6	14.0	851	105	4.3	2.5		7		
8/18/95	12:55	3.7	3.5	16.1	15.6	846	108	9.6	6.5		14		
8/18/95	13:00	6.0	5.8	13.1	12.5	861	113·	6.6	4.6	8	12		0.10
8/18/95	13.05	6.1	5.9	12.9	12.4	868	112	5.2	3.4	11	8		0.10
8/18/95	13:10	5.1	4.9	14.3	13.8	872	113	9 2	6.6	17	15		0.10
8/18/95	13:15	4 2	4.1	15.5	15.0	861	112	15.4	11.6	36	34		0.10
8/18/95	13:20	5.9	5.7	13.6	13.0	862	114	16 0	11.3	74	72		0.10
8/18/95	13:25	7.1	6.8	12.2	11.7	875	115	14.2	10.5	135	132	0.25	0.10
8/18/95	13:30	7.7	7.3	11.5	11.0	885	116	12.3	9.4	181	175	0.25	0.10
8/18/95	13:35	10.0	9.5	8.6	8.3	909	122	9.1	8 0	218	209	0 25	0.10
8/18/95	13:40	11.2	10.4	6.9	6.7	945	124	4.0	3.1	166	152	0.25	0.10
8/18/95	13:45	9.2	8.6	9.6	9.2	952	124	6.3	5.5	166	143	0.25	0.10
8/18/95	13:50	8.4	7.7	10.4	10.0	943	121	4.9	3.7	105	85	0.25	0.10
8/18/95	13.55	5 6	5.2	13.7	13.3	905	109	3.5	2.5	75	58	0.25	0.10
8/18/95	14:00	3.3	3.2	16.3	15 8	842	99	1.4	0.6	54	44	0.25	0.10
8/18/95	14.05	5.5	5.3	13.6	13.0	825	106	1.9	0.7	20	13	0.25	0.10
8/18/95	14:10	7.6	7.1	10.9	10.5	862	114	1.7	0.8	11	5	0.25	0.10
8/18/95	14:15	7.2	6.8	11.5	11.1	896	119	3.6	2.4	17	9	0.25	0.10
8/18/95	14:20	6.9	6.6	11.8	11.4	899	119	2.4	1.5	13	5	0 25	0.10
8/18/95	14:25	6.9	6.5	11.9	11 5	898	119	2.2	1.3	11	4	0.25	0.10
8/18/95	14:30	7.0	6.6	11.8	11.3	902	119	2.2	1.3	11	3	0.25	0.10
8/18/95	14:35	6.9	6.6	11.8	11.4	906	119	2.0	1.2	9	3	0.25	0.10
8/18/95	14:40	6.9	6.5	11.9	11.5	908	118	1.9	1.2	9	2	0.25	0.10
8/18/95	14·45	6.4	6.0	12.5	12.0	905	117	2.7	1.8	9	3	0.25	0.10
8/18/95	14:50	7.2	6.8	11.5	11.1	906	118	2.8	2.0	20	14	0.25	0.10
8/18/95	14:55	7.0	6.6	12.3	11.8	905	118	6.1	4.4	73	67	0.25	0.10
8/18/95	15:00	9.0	8.4	10.0	9.6	900	117	5.0	3.6	107	100	0.25	0.10
8/18/95	15·05	8.8	8.3	10.3	9.8	899	109	4.4	2.9	135	110	0.25	0.10
8/18/95	15.10	9.4	8.7	9.5	9.2	926	120	5.1	4.1	139	126	0.25	0.10
8/18/95	15:15	7.3	6.8	12.1	11.7	922	117	5.9	4.6	112	96	0 25	0.10
8/18/95	15:20	6.7	6.3	12.7	12.2	913	117	7.1	5.5	95	80	0.25	0.10
8/18/95	15:25	6.8	6.4	12.6	12.1	905	115	6.8	5.4	99	86	0 25	0.10
8/18/95	15:30	7.6	7.1	11.6	11.2	905	117	6.6	5.1	119	105	0.25	0.10
8/18/95	15:35	7.9	7.4	11.4	10.9	904	117	6.2	4 6	134	121	0.25	0.10
8/18/95	15:40	8 4	7.7	10.8	10 4	907	117	5.9	4 4	144	129	0.25	0.10
8/18/95	15:45	8 7	8.1	10.5	10.1	905	117	5.2	3.8	152	136	0.25	0.10
8/18/95	15:50	8.8	8.2	10.3	9.9	912	118	4.8	3.5	146	129	0.25	0.10
8/18/95	15:55	7.9	7.4	11.4	11.0	913	118	5.2	3 8	126	106	0 25	0.10
8/18/95	16.00	7.2	6.8	12.2	11.8	911	117	6.0	4.4	107	88	0.25	0.10
8/18/95	16·05	6.7	6.4	12.7	12.2	907	117	6.6	4.9	98	81	0.25	0.10
8/18/95	16:10	6.7	6.3	12.7	12.2	903	116	7.4	5.6	98	82	0.25	0.10
8/18/95	16:15	7.1	6.8	12.2	11 8	899	116	7.1	5 4	111	96	0 25	0.10
8/18/95	16:20		7.5		10.7	900	116				118		
8/18/95	16:25					904	116						
8/18/95	16:30					895	110						
8/18/95	16:35					881	108						
8/18/95	16.40					874	111						
8/18/95	16:45					870	111						
8/18/95	16:50					865	110						
8/18/95	16·55					858	109						
8/18/95	17 00				•	860							
8/18/95	17:05					857							

APPENDIX D

HOPEWELL CONTINUOUS MONITOR DATA

Hopewell, .aia
Continuous Monitor Data
December 1995

Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/5/95	11:20	16 0	16.4	10.1	21.4	21.6	12.5	878	841	163	106.0	65.4	68.0	-4	706	693	0.285	0.248	0.043
12/5/95	11:25	12.4	12.3	12.2	15.7	16.0	16.9	878	845	162	57.5	25 9	26.6	14	6	3	0.285	0.248	0 043
12/5/95	11.30	0 3	2 8	1.3	2.8	7.7	8.2	888	847	162	53.0	49.0	23.2	1679	1668	1277	0 285	0.248	0.043
12/5/95	11:35	6.7	7.6	3.6	9.3	11.8	16.4	902	855	163	107.0	43.3	21.8	565	1249	451	0.285	0.248	0 043
12/5/95	11·40	9.6	8 0	3 8	11.6	11.3	16.2	918	861	164	209.5	40.1	19.2	724	1165	490	0.285	0.248	0.043
12/5/95	11:45	9.3	8.4	3.9	9.5	10.9	16.0	936	869	164	154.8	34.3	17.7	1920	1220	499	0.285	0.248	0.043
12/5/95	11:50	9.3	8 8	4.0	9.5	11.9	15.8	957	879	164	174.0	45.6	15.7	2054	861	484	0.285	0 248	0 043
12/5/95	11:55	9.1	4.1	4.0	9.8	5.4	15.8	976	890	162	164.6	22.1	13.6	1965	522	495	0.285	0.248	0.043
12/5/95	12:00	8 9	2.2	4.1	9.9	3.4	15.8	974	901	161	70.3	10.1	11.6	1951	1423	486	0 285	0.248	0 043
12/5/95	12:05	8.8	8.3	1.5	10.1	11.1	7.1	991	910	161	60.3	23.3	4 9	2014	1301	977	0.285	0 248	0 043
12/5/95	12·10	8 6	8 2	3 7	10.3	11.2	5 2	1002	916	161	78.2	20.1	21.8	2015	1005	994	0.285	0.248	0 043
12/5/95	12:15	8.2	8.2	6.7	10.8	11 2	14.4	1008	924	162	54.5	17.4	25.0	1834	970	189	0.285	0.248	0.043
12/5/95	12.20	8.4	8.1	4.2	10.7	11.3	15.6	1014	928	162	138.0	15.7	8 4	1924	954	463	0.285	0.248	0.043
12/5/95	12:25	8.4	8.1	4.1	10.7	11.4	15.7	1019	935	163	9 0	15.6	7.6	1953	894	424	0.285	0 248	0.043
12/5/95	12:30	8.3	8.0	4 2	10.9	11.5	15.7	1020	936	164	106.1	14.7	7.1	1944	1005	639	0.285	0.248	0.043
12/5/95	12:35	7.9	7.7	4.2	11.4	11.9	15.7	1011	935	164	138.0	14.9	7.4	1903	1206	844	0 285	0 248	0 043
12/5/95	12:40	7.6	7.5	4.1	11.7	12.2	15.8	1010	933	164	145.4	16.3	8.4	2071	1327	909	0.285	0.248	0 043
12/5/95	12.45	7.4	7.3	4.0	12.1	12.3	15.9	1005	930	164	131.0	17.2	8.7	2098	1352	912	0.285	0.248	0 043
12/5/95	12:50	7 3	7.3	4.0	12.0	12.4	16.0	998	929	164	140.8	17.1	8.7	2062	1395	926	0 285	0 248	0.043
12/5/95	12.55	7 3	7.2	3.9	12.1	12 4	16.0	997	929	165	91.6	17.3	8 9	2055	1438	931	0.285	0.248	0 043
12/5/95	13 00	7.0	7.0	3.9	12.4	12.7	16.1	988	923	165	157.1	18.7	9.3	2110	1458	937	0.285	0 248	0.043
12/5/95	13 05	6 9	6.9	3.8	12.5	12 8	16.2	984	919	164	165.5	20.4	10.1	2129	1508	976	0 285	0.248	0.043
12/5/95	13.10	6.8	6.8	3.8	12.7	12 9	16.3	974	915	164	178.4	20.8	10.6	2139	1584	1045	0 285	0 248	0 043
12/5/95	13.15	6.8	6.8	3.8	12.6	12 9	16 3	973	913	165	178.7	22.3	10 9	2222	1639	1029	0 285	0 248	0 043
12/5/95	13:20	6 8	6.8	3 7	12.7	12.9	16.3	966	909	165	194.4	24.1	11.0	2244	1641	1031	0.285	0.248	0 043
12/5/95	13:25	6.6	6.6	3.7	12.8	13.1	16 4	959	906	164	204.5	23.8	11.4	2191	1661	1073	0.285	0 248	0 043
12/5/95	13:30	6 5	6.5	3 7	13.0	13 2	16.4	961	903	164	202.3	26.6	12.5	2255	1770	1132	0.285	0.248	0.043
12/5/95	13.35	6 4	6.4	3.7	13.1	13.2	16.4	954	901	164	208.2	27.6	12.8	2257	1759	1103	0 285	0.248	0.043
12/5/95	13:40	6.5	6.4	3.6	13.0	13.2	16.4	954	900	163	188.1	28.7	12.7	2175	1690	1113	0.285	0.248	0 043
12/5/95	13·45	6.5	6 4	3.6	13.0	13.2	16.4	952	898	163	142.5	28.1	12.9	2188	1761	1139	0.285	0.248	0.043
12/5/95	13.50	6.5	6.5	3.7	13.0	13.2	16.3	951	897	164	209.7	26.8	13.1	2185	1731	1103	0.285	0.248	0.043
12/5/95	13:55	6 6	6.6	3.7	12.9	13 1	16.3	953	898	163	121.3	29 0	13 0	2231	1720	1105	0 285	0.248	0.043
12/5/95	14:00	5.2	6.5	3.7	14.8	13.1	16.3	950	899	163	77.9	28.4	12 6	1821	1762	1153			0.043
12/5/95	14:05	2 6	6 5	3 6	17 8	13.1	16.4	949	903	163	12 0	28 8	13 0	915	1781	1166			0.043
12/5/95	14:10	2.6	6.5	3.7	17.8	13.1	16.3	949	902	163	3.8	29.3	13.4	897	1743	1133			
12/5/95	14.15	5.4	6.6	3.7	14.2	13.0	16.3	951	898	163	161.2	29.8	12.6	1674	1714	1134			

Hopewell, Virginia
Continuous Monitor Data
December 1995

Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/5/95	14·20	6.5	6.7	3.7	12 9	13.0	16.3	954	897	163	218 4	28 2	12.5	2129	1727	1146			
12/5/95	14:25	6 6	6.6	3.7	12.8	13.0	16.2	954	901	162	134.3	27.3	12.7	2234	1715	1121			
12/5/95	14 30	7 0	6.8	3.8	12 4	12.8	16.2	979	902	163	222.0	29.6	11.1	2398	1757	1137			
12/5/95	14·35	7.4	7 5	4.0	12.0	11.8	15.8	989	936	165	150.4	17.7	8.7	2356	1521	974			
12/5/95	14.40	9.1	8.8	4.2	9.6	10.0	15.5	929	947	175	141.3	27.4	11.2	2668	1905	1099			
12/5/95	14.45	9 1	9.0	4.3	9.9	10.0	15.5	909	948	177	134.7	30.1	13.9	2396	1809	1108			
12/5/95	14:50	9.8	9.6	4.4	9.1	9.2	15.3	907	952	179	155.1	1.0	13.8	2605	2048	1146			
12/5/95	14 55	10.2	9.9	4.5	8.6	8.8	15.2	903	954	181	160.5	7.6	13.4	2626	2095	1140			
12/5/95	15:00	10.4	10.1	4.8	8.4	8.6	14.9	902	955	185	145.2	24.3	13.2	2572	1744	1090			
12/5/95	15 05	10 7	10.3	4.8	8.2	8.4	14.8	900	957	186	160.2	28.5	13.3	2508	1694	1076			
12/5/95	15:10	10.7	10.3	4.8	8.2	8.4	14.8	896	957	187	151.9	28.0	15.1	2457	1689	1061			
12/5/95	15.15	10 6	10.2	4.8	8.3	8.5	14.9	889	955	187	153.6	27.0	16.5	2406	1700	1053			
12/5/95	15:20	10.5	10.0	4.8	8.4	8.7	14.9	881	954	187	141.2	31.3	17.5	2291	1625	1029			
12/5/95	15:25	7.2	7.5	4.8	12.7	12.0	14.9	877	955	187	76.5	20.4	18.4	1585	1350	968			
12/5/95	15:30	3.7	0 0	4 8	16.6	21.1	14 9	873	959	187	4.3	2.5	19.1	784	-1	997			
12/5/95	15:35	7.3	8.1	4.8	12.0	11 1	14.9	868	946	188	122.8	39.6	20.8	1628	1269	981			
12/5/95	15.40	10.9	10.5	4.8	7.9	8.2	14.9	863	938	188	193.7	43.7	28.6	2789	1426	1168			
12/5/95	15:45	11.1	10.6	4.8	7.5	8.1	14.8	860	934	188	265 9	66.9	35.6	3279	1495	1214			
12/5/95	15·50	11.7	10 7	4.9	6.8	7.9	14.7	868	935	187	247.7	53.5	37.5	3521	1646	1395			
12/5/95	15·55	11 8	10.7	4 9	6.6	7.9	14.7	871	928	187	352.0	67.5	50 8	4024	1658	1425			
12/5/95	16:00	12 0	10.3	4.8	6 2	8.3	14.9	867	911	188	387.7	13.2	50.0	3740	1942	1649			
12/5/95	16.05	12 4	11.8	5 5	5.8	6.0	13.8	874	979	189	291.9	26.6	10.8	2584	949	874			0 039
12/5/95	16:10	13 0	11 6	5.4	5.0	6.4	14.0	874	988	189	497.0	20.0	12.4	2637	1213	1223	0 426	0 364	0.039
12/5/95	16·15	13.0	11.7	5 5	4.9	6.2	13.9	876	1003	189	512 3	18.4	11.4	2847	1026	1116	0.426	0.364	0.039
12/5/95	16:20	13.2	11 9	5 5	4 7	5.9	13.8	874	1012	189	538.3	17 0	11.0	2876	1063	1178	0 426	0.364	0.039
12/5/95	16:25	13.3	12.2	5.6	4.5	5.7	13.7	872	1020	189	534.8	17.6	12.8	3183	987	1248	0 426	0 364	0 039
12/5/95	16:30	13.5	12.4	5.7	4.3	5.4	13.6	875	1026	190	679.4	16.3	11.6	3269	1000	1301	0.426	0.364	0.039
12/5/95	16:35	13.5	12.5	5.7	4.2	5.3	13.6	874	1034	190	622.8	15.2	12.4	3457	1061	1345	0.426	0 364	0 039
12/5/95	16·40	13.6	12.6	5.8	4.1	5.0	13.5	878	1044	190	554.5	17.5	12.1	3515	1046	1396	0.426	0.364	0.039
12/5/95	16:45	13.3	12.6	5.7	4 5	5.2	13.6	877	1038	190	557.2	30.6	22.8	3543	1519	1943	0.426	0.364	0 039
12/5/95	16.50	13.3	12 6	5 6	4.6	5.2	13.7	873	1030	191	530.1	36.8	32 2	3550	2006	2384	0.426	0 364	0 039
12/5/95	16.55	13 4	12.6	5.6	4.5	5.2	13.8	872	1028	192	440.4	43.1	36.5	3652	2894	2309	0.426	0 364	0.039
12/5/95	17·00	13.5	12.8	5.7	4.5	5.0	13.7	875	1021	192	799.4	42.3	35.4	3652	2970	2146	0.426	0 364	0.039
12/5/95	17.05	13.0	12.8	5.7	5 1	5.0	13.6	875	1027	192	549.4	47.2	37.0	3586	2956	2239	0.426	0.364	0.039
12/5/95	17·10	13 5	12.8	5.7	4.4	5.0	13.6	876	1024	193	779.8	49.4	35.5	3728	2898	2218	0.426	0 364	0.039
12/5/95	17·15	13.6	12.9	5 8	4.2	4.9	13.5	877	1023	193	862.5	38.8	34 8	3684	2991	2253	0 426	0.364	0.039

Hopewell, [illegible]ia
Continuous Monitor Data
December 1995

Date	Time	CO2			O2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/5/95	17:20	13.6	13.0	5.8	4.3	4.9	13.5	880	1022	193	973.3	43.3	32.9	3639	3006	2177	0.426	0.364	0.039
12/5/95	17:25	14.2	13.4	6.1	3.5	4.5	13.2	896	1028	192	685.3	33.9	24.3	3431	2652	2025	0.426	0.364	0.039
12/5/95	17:30	13.8	12.9	6.0	4.1	5.1	13.4	924	1031	188	517.5	20.2	12.7	2863	1606	1314	0.426	0.364	0.039
12/5/95	17:35	13.4	12.6	5.8	4.6	5.5	13.6	929	1035	186	424.1	16.7	11.8	2809	1715	1313	0.426	0.364	0.039
12/5/95	17:40	13.0	12.4	5.7	5.0	5.8	13.7	935	1037	186	500.9	18.5	12.5	2748	1640	1281	0.426	0.364	0.039
12/5/95	17:45	13.4	12.6	5.8	4.5	5.6	13.6	949	1044	186	397.8	13.8	8.0	2895	1512	1197	0.426	0.364	0.039
12/5/95	17:50	13.8	13.0	5.9	4.0	5.1	13.5	960	1049	188	439.1	14.4	6.5	3120	1423	1069	0.426	0.364	0.039
12/5/95	17:55	14.1	13.3	6.0	3.7	4.8	13.4	973	1058	189	370.6	12.6	5.3	3306	1333	1054	0.426	0.364	0.039
12/5/95	18:00	14.2	13.6	6.1	3.5	4.4	13.2	984	1067	190	450.1	12.4	4.9	3618	1226	956	0.426	0.364	0.039
12/5/95	18:05	14.3	13.8	6.2	3.3	4.3	13.1	994	1078	191	393.6	11.5	4.3	3678	1135	856	0.426	0.364	0.039
12/5/95	18:10	14.1	13.7	6.2	3.6	4.4	13.1	1011	1088	191	320.3	10.0	4.0	3537	806	644	0.426	0.364	0.039
12/5/95	18:15	13.9	13.5	6.2	3.9	4.7	13.2	1021	1096	191	252.6	10.6	3.8	3145	627	487	0.426	0.364	0.039
12/5/95	18:20	12.8	12.1	6.0	5.4	6.4	13.5	1055	1104	185	97.9	7.1	3.3	1609	364	308	0.426	0.364	0.039
12/5/95	18:25	13.4	12.3	6.0	4.8	6.2	13.4	1080	1108	188	76.6	6.1	3.0	1071	231	179	0.426	0.364	0.039
12/5/95	18:30	13.7	12.5	6.2	4.5	6.0	13.3	1099	1116	189	64.2	5.1	2.2	1014	171	136			0.039
12/5/95	18:35	10.0	10.2	5.3	9.3	9.1	14.3	1121	1126	191	50.6	5.8	3.8	946	131	88			0.039
12/5/95	18:40	4.7	5.2	5.2	16.7	16.9	16.6	1136	1139	192	30.9	5.1	4.9	-8	-6	1			
12/5/95	18:45	11.6	12.1	11.7	15.7	15.7	15.0	1124	1135	187	97.7	2.6	1.9	-8	-8	1			
12/5/95	18:50	6.7	7.3	6.7	9.3	9.6	10.3	1092	1117	176	356.1	1.3	0.3	926	1750	1111			
12/5/95	18:55	-0.1	-0.1	0.0	0.1	-0.1	0.0	1070	1104	176	68.2	6.9	4.7	1660	3316	2407			
12/5/95	19:00	-0.1	-0.1	-0.1	0.2	0.0	0.1	1055	1096	177	2.2	87.6	93.0	948	1892	1843			
12/5/95	19:05	3.4	2.9	1.1	6.1	5.8	7.6	1041	1084	177	59.4	70.8	73.5	815	1176	936			
12/5/95	19:10	7.8	7.3	2.7	12.9	12.3	17.2	1031	1073	176	64.7	25.4	26.5	893	585	3			
12/5/95	19:15	9.1	7.3	2.7	13.1	12.3	17.2	1019	1067	176	49.8	-1.1	-1.0	708	579	4			
12/5/95	19:20	11.5	7.1	2.6	14.8	12.5	17.3	999	1063	175	58.6	1.0	0.6	-1	665	4			
12/5/95	19:25	2.1	7.0	2.6	2.3	12.6	17.3	991	1051	175	221.1	1.0	0.6	1451	727	4			
12/5/95	19:30	-0.1	6.9	2.5	0.1	12.7	17.4	979	1046	174	233.1	1.0	0.6	987	724	4			
12/5/95	19:35	5.4	3.2	2.5	9.6	16.5	17.4	975	1043	174	63.5	9.7	0.7	1126	347	4			
12/5/95	19:40	6.8	13.8	2.5	12.6	18.5	17.5	954	1035	174	82.5	27.7	0.6	1330	-5	4			
12/5/95	19:45	2.8	1.0	2.4	17.5	5.2	17.5	944	1032	172	58.6	74.2	0.5	522	1433	4			
12/5/95	19:50	6.5	-0.1	2.3	12.9	0.0	17.6	934	1020	171	107.4	34.8	0.5	1420	3384	4			
12/5/95	19:55	6.0	-0.1	2.3	13.5	0.0	17.6	908	1008	171	106.3	2.1	0.5	1311	1882	6			
12/5/95	20:00	5.6	-0.1	0.4	14.0	0.0	20.4	883	994	169	117.1	1.9	6.4	1368	1919	69			
12/5/95	20:05	5.3	1.5	9.5	14.3	14.8	21.1	865	979	169	146.8	1.6	79.7	1535	592	-2			
12/5/95	20:10	5.0	4.3	6.4	14.6	15.6	9.1	834	963	169	164.0	41.8	34.5	1701	1821	572			
12/5/95	20:15	6.3	6.4	0.0	13.3	13.1	0.5	807	951	182	129.0	31.2	-0.1	905	1459	1760			

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	CO_2 (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/5/95	20:20	7.8	7.9	1.5	11.7	11.2	19.0	820	971	184	107.0	21.2	5.3	643	950	189			
12/5/95	20:25	8.2	8.1	4.0	11.2	10.8	15.8	825	999	183	96.4	15.3	4.3	597	771	473	0.397	0 331	0.039
12/5/95	20:30	8.7	8.5	4.1	10.5	10.3	15.6	829	1012	184	91.9	12.5	3.5	639	490	455	0.397	0 331	0.039
12/5/95	20:35	9 0	8.7	4.2	10.1	10.0	15.5	832	1018	183	99.6	12.9	3.5	773	619	461	0.397	0.331	0.039
12/5/95	20:40	9.3	9.0	4 3	9.5	9.7	15.4	829	1023	183	122.2	13.6	4.4	955	655	533	0.397	0.331	0.039
12/5/95	20:45	9.6	9.1	4.4	9.2	9.4	15.3	830	1026	183	158.6	14.0	6.7	1253	733	632	0.397	0.331	0.039
12/5/95	20:50	9.9	9.3	4.4	8.8	9.2	15.2	826	1029	184	187.0	15.6	7.5	1385	756	705	0.397	0 331	0.039
12/5/95	20.55	10.1	9.4	4.5	8.5	8.9	15.1	825	1030	184	269.9	17.3	9.6	1666	905	814	0.397	0.331	0.039
12/5/95	21:00	10.4	9.7	4.6	8.0	8.5	15.0	830	1032	184	352.4	21.4	10.0	1775	983	875	0 397	0.331	0.039
12/5/95	21 05	10.6	9.9	4 6	7.7	8.2	14.9	833	1036	184	218.9	20.3	13.1	2079	1270	1049	0.397	0.331	0 039
12/5/95	21:10	11 3	10.3	4.9	6.8	7.7	14.6	854	1039	184	404.2	22.2	12.5	2322	1228	1118	0 397	0.331	0 039
12/5/95	21.15	11.6	10.6	4.9	6.4	7.3	14.5	857	1043	184	430.8	19.7	13.4	2707	1365	1291	0.397	0 331	0.039
12/5/95	21:20	11.9	11.0	5 1	6.1	6.9	14.4	862	1051	185	394.2	23.3	13.3	3043	1397	1374	0.397	0.331	0.039
12/5/95	21·25	12 0	11.2	5 1	5 8	6.6	14.3	863	1056	185	504.9	16.6	14.3	3373	1472	1579	0.397	0 331	0.039
12/5/95	21:30	11 4	10.4	5.1	6.6	7.6	14.4	872	1054	182	502.8	34.4	16.7	2920	1516	1509	0.397	0.331	0.039
12/5/95	21:35	11 5	9.7	4.9	6 6	8.8	14.7	890	1015	178	262.5	60.8	33.7	2202	1734	1486	0.397	0.331	0.039
12/5/95	21:40	10.7	8.7	5.0	7.9	10.4	14.8	934	965	168	90.9	23.4	11.2	708	790	743	0 397	0.331	0.039
12/5/95	21:45	11.2	9 0	5 1	7.2	10.0	14.6	958	953	169	83.1	26.9	10.9	792	837	801			
12/5/95	21.50	10.4	8.6	4.4	8 2	10.5	15.5	979	954	165	69 8	21.2	9 9	708	770	627			
12/5/95	21:55	10.6	8.8	5.5	7.7	10 4	14.2	993	956	164	73 9	20 3	19.9	789	858	904			
12/5/95	22:00			5.8			13.9			164		20.5	17.6		798	962			
12/5/95	22:05			5.9			13.9			164		14.3	14.2		759	997			
12/5/95	22:10			6.2			13.5			164		13.0	11.1		490	867			
12/5/95	22:15			6.3			13.3			165		11.2	8.8		521	746			
12/5/95	22:20	12.2	9 8		6 3	9.2		1180	1075		68.0	9.9	7.3	1685	491		0.310	0 246	0 043
12/5/95	22.25	12 0	9.2		6.7	10 0		1180	1083		43.8	5.4	2.9	1417	563		0 310	0 246	0 043
12/5/95	22·30	11 3	5.3	6 1	7.4	14 7	13.8	1191	1088	168	38.8	7.1	2.8	1391	241	450	0.310	0.246	0.043
12/5/95	22.35	10.7	8.2	5.8	8.2	11 1	14.2	1179	1086	167	35.9	6.3	3.0	1380	594	489	0.310	0.246	0.043
12/5/95	22.40	10.5	7.9	5.7	8.5	11.5	14.3	1169	1081	168	41.2	6.1	3.0	1468	611	501	0.310	0.246	0.043
12/5/95	22:45	9.7	7 2	5 2	9.3	12.3	14 8	1142	1068	168	47.0	6 7	3.8	1569	728	603	0.310	0.246	0.043
12/5/95	22:50	9.1	6.7	5 0	10.1	12.9	15.1	1120	1054	168	47.2	7 3	4.7	1789	766	709	0 310	0.246	0.043
12/5/95	22 55	8 6	6 2	4.6	10.7	13.4	15.5	1093	1036	168	50.0	8.2	5.8	2002	964	893	0.310	0.246	0.043
12/5/95	23.00	8.7	6.3	4.6	10 6	13.3	15.5	1075	1020	170	52.5	8.1	5.9	2165	1017	921	0.310	0.246	0 043
12/5/95	23.05	8.5	6 1	4.3	10.8	13.5	15.8	1053	1005	171	56.0	8.5	6.8	2255	1282	1051	0.310	0.246	0.043
12/5/95	23·10	8 6	6.1	4.4	10.7	13.5	15.7	1041	994	172	54.4	10.9	7.0	2312	963	970	0.310	0.246	0.043
12/5/95	23:15	8.5	5.9	4 3	10 7	13.8	15.8	1029	983	171	55.2	11 6	7.6	2328	922	1058	0 310	0.246	0.043

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/5/95	23:20	8.6	6.1	4.4	10.7	13.4	15.7	1023	976	172	59.7	8.2	7.4	2360	1126	1004	0.310	0.246	0.043
12/5/95	23·25	8.6	5 8	4.4	10.6	13.7	15.7	1020	972	171	57.9	11.9	7.7	2246	797	1031	0.310	0.246	0.043
12/5/95	23·30	8.6	5 8	4.4	10.5	13.7	15.7	1017	968	172	50.9	12.2	7.9	2295	699	1005	0.310	0.246	0.043
12/5/95	23.35	8.9	5.8	4.4	10.3	13.7	15.6	1020	966	171	58.7	11.2	7.5	2154	626	984	0 310	0.246	0.043
12/5/95	23:40	8.9	6.0	4.5	10.2	13.5	15.5	1020	966	171	53.1	10.2	7.6	2137	659	938	0 310	0.246	0 043
12/5/95	23·45	9.0	5 9	4.6	10.1	13.5	15.5	1024	967	170	58.2	11.2	7.4	2125	532	945	0.310	0 246	0 043
12/5/95	23:50	8.7	5.7	4.6	10.4	13.8	15.5	1017	966	169	52.7	11.7	7.8	2024	431	922	0.310	0.246	0 043
12/5/95	23:55	8.8	5.7	4.6	10 4	13.9	15.5	1017	964	168	57.9	11.8	8 0	2014	373	934	0.310	0 246	0.043
12/6/95	0 00	9.0	5.7	4.6	10.1	13.8	15.4	1022	966	169	50.3	10.4	7 4	1989	324	904	0.310	0 246	0.043
12/6/95	0:05	9.1	6.5	4 7	10.0	12.9	15.3	1027	969	169	56 7	2 6	7.0	2001	799	883	0.310	0 246	0.043
12/6/95	0:10	9 2	6.2	4.8	9.7	13.2	15.2	1029	971	169	51.6	6.3	6.8	1972	581	864	0.310	0 246	0 043
12/6/95	0.15	9.4	6.0	4.9	9.5	13.5	15.1	1044	976	169	49.2	9.3	6.4	2000	272	835	0.310	·0.246	0.043
12/6/95	0·20	9.6	6.0	4 9	9.2	13.4	15.1	1043	980	171	48.4	7.5	6.0	1919	222	805	0.310	0 246	0.043
12/6/95	0:25	9.6	6.8	5.0	9.1	12.5	15.0	1053	983	170	46.7	1.9	5.8	1885	548	770	0.310	0 246	0 043
12/6/95	0.30	9.7	6.9	5.0	9.0	12.5	15.0	1055	987	171	45.1	2.6	5.5	1858	546	751	0.310	0.246	0.043
12/6/95	0:35	9.5	6.9	5.1	9.2	12.5	14.9	1062	992	169	42.8	1.6	5.6	1818	523	732	0.310	0.246	0.043
12/6/95	0 40	9.7	6.8	5.0	9.1	12.6	14.9	1066	995	169	43.3	2.2	5.2	1756	510	720	0.310	0.246	0.043
12/6/95	0:45	9.7	6 8	5.1	9.1	12.6	14.9	1072	999	169	42.9	4.3	5.2	1766	469	688	0 310	0.246	0 043
12/6/95	0.50	9.9	6 8	5.0	9 0	12.6	14.9	1074	1001	169	45.4	4.0	5.1	1695	445	694	0 310	0.246	0.043
12/6/95	0·55	9.8	6.7	5.1	9.1	12.6	14.9	1078	1004	170	40.4	2.7	5.0	1760	410	660	0.310	0.246	0.043
12/6/95	1.00	9.7	6 3	5.1	9.2	13.1	14.9	1068	1005	170	49.1	5.6	5.0	1691	224	682	0.310	0.246	0.043
12/6/95	1 05	9.5	6.0	5 2	9.5	13 5	14 8	1069	1007	169	43.0	6.5	5.0	1692	119	653	0 310	0.246	0.043
12/6/95	1:10	9 3	6.3	5.0	9 7	13.1	15.0	1068	1009	168	47.5	3.0	5.1	1633	348	676	0.310	0.246	0.043
12/6/95	1·15	8.9	6.2	4.9	10 3	13 2	15.1	1067	1007	167	46.6	1.7	5.5	1710	471	691	0.310	0 246	0 043
12/6/95	1:20	8.7	6.0	4.7	10.5	13.5	15.3	1056	1003	167	51.4	2.8	5 8	1722	448	745	0.310	0 246	0.043
12/6/95	1.25	8 5	5.5	4.7	10.7	14 1	15.4	1050	1000	167	53.6	7.6	6.4	1837	240	775	0.310	0.246	0.043
12/6/95	1.30	8 7	5 2	4 6	10.5	14.5	15.5	1056	997	167	44.8	9.2	6.3	1866	126	832	0.310	0 246	0.043
12/6/95	1 35	8.7	5.1	4.6	10.4	14.5	15.4	1057	996	167	51.2	9 4	6.4	2024	89	846	0.310	0 246	0 043
12/6/95	1·40	8.7	5.4	4 6	10.5	14.2	15.5	1045	993	167	47.5	8.0	6.7	2002	251	890	0.310	0 246	0 043
12/6/95	1:45	8.6	5 1	4.5	10.6	14.6	15.5	1046	990	167	51.7	10.4	7.3	2175	136	929	0.310	0.246	0.043
12/6/95	1:50	8.6	4 9	4.4	10.6	14.8	15.6	1043	986	167	56.6	11.1	7.4	2186	87	1003	0.310	0.246	0 043
12/6/95	1.55	8.6	5.0	4 5	10.6	14.7	15.6	1037	982	168	53.7	9.8	7.7	2236	123	977	0.310	0 246	0.043
12/6/95	2:00	8.8	5.0	4.5	10.3	14.6	15.5	1045	982	167	49.9	10.4	6.8	2080	89	939	0.310	0.246	0.043
12/6/95	2:05	8 8	5.0	4.6	10.3	14 6	15.4	1039	983	168	54.1	9.7	6 7	2086	50	880	0.310	0.246	0 043
12/6/95	2:10	9.0	5.1	4 7	10.1	14.5	15.4	1052	986	168	48.4	9 9	6.2	2089	53	870	0.310	0.246	0 043
12/6/95	2:15	9.0	5.3	4.7	10 0	14.2	15.3	1052	987	168	50.7	7 9	6.1	2025	143	832	0.310	0.246	0 043

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	2.20	9.1	5.2	4.7	9 9	14.4	15.4	1053	989	168	50.3	9.1	5.8	1977	64	819	0.310	0.246	0.043
12/6/95	2 25	9 0	5.1	4.7	10.0	14.5	15.4	1050	990	168	44.6	9.8	6.1	1983	41	827	0.310	0 246	0 043
12/6/95	2:30	9 0	5.5	4.7	10.0	14.1	15.4	1054	990	168	53.1	7.4	6 0	1999	170	827	0.310	0.246	0.043
12/6/95	2:35	8.9	5 2	4.7	10.0	14.4	15.4	1051	990	168	47.1	8.5	6.1	1989	73	836	0.310	0.246	0.043
12/6/95	2.40	8.8	5.1	4 7	10.1	14.4	15.3	1054	991	167	43.7	9.2	6.2	1983	58	842	0.310	0 246	0.043
12/6/95	2:45	8.7	6.0	4.6	10.1	13.6	15.4	1054	992	168	43.3	2.5	6 0	1978	378	825	0.310	0.246	0.043
12/6/95	2:50	8.6	6.0	4.6	10.3	13.5	15.4	1050	991	167	33.3	1.9	6.4	1985	435	834	0.310	0.246	0.043
12/6/95	2:55	8.7	5.7	4.5	10.3	13.9	15.5	1046	989	167	52.5	4.5	6.7	2033	327	870	0.310	0.246	0.043
12/6/95	3 00	8.6	5 3	4.5	10.5	14.4	15.5	1042	986	168	41 6	7.7	6.9	2098	108	881	0.310	0.246	0.043
12/6/95	3 05	8 6	5 0	4 4	10.4	14 6	15.6	1038	984	167	49.6	7.6	7 1	2054	67	903	0.310	0 246	0 043
12/6/95	3:10	8.5	5.8	4.5	10.6	13.8	15.6	1034	981	167	51.4	1.8	7 2	2137	452	903	0.310	0.246	0.043
12/6/95	3.15	8.5	5 5	4 4	10.6	14.1	15.7	1027	978	167	50.4	4.6	7.8	2132	372	963	0.310	0.246	0 043
12/6/95	3:20	8.3	5.1	4 4	10.9	14.6	15.7	1020	974	166	51.3	9.4	8.5	2166	141	962	0.310	0.246	0.043
12/6/95	3:25	8.4	5.1	4.3	10.7	14.6	15.7	1022	970	167	60.1	10.4	8.5	2130	132	1009	0.310	0.246	0 043
12/6/95	3:30	8.2	5 0	4 3	10 9	14.7	15.7	1014	966	167	61.3	11.4	9.0	2258	126	1006	0.310	0.246	0.043
12/6/95	3.35	8 3	5.1	4.3	10.8	14.6	15.8	1006	962	167	53.4	10.0	9.4	2200	218	1073	0.310	0.246	0 043
12/6/95	3.40	8.2	5.7	4.3	11.0	13.9	15.7	1003	959	167	58.9	0.8	9.9	2307	629	1048	0.310	0.246	0 043
12/6/95	3:45	8.4	5.3	4.3	10.7	14.3	15.7	1006	959	166	65.5	9.1	9.7	2256	350	1096	0.310	0 246	0 043
12/6/95	3 50	8 2	5.0	4.4	10.8	14.7	15.6	1005	958	165	60.3	13.7	10 0	2316	128	1083	0.310	0.246	0.043
12/6/95	3·55	8.4	5.1	4 4	10.7	14 5	15.6	1008	958	165	59.4	11.5	9 2	2104	193	1040	0 310	0 246	0 043
12/6/95	4 00	8.3	5 1	4 4	10.7	14.5	15.6	1007	958	166	54.9	12.5	9.5	2209	151	1010	0.310	0.246	0.043
12/6/95	4 05	8 4	5 1	4.4	10.6	14 6	15.6	1010	958	165	58.7	14.5	9.2	2146	92	1043	0.310	0.246	0.043
12/6/95	4:10	8.4	5.1	4.4	10.6	14.6	15.6	1010	958	165	57.7	14.4	8.9	2201	79	1008	0.310	0.246	0.043
12/6/95	4:15	8 5	5 3	4.5	10.4	14.3	15.5	1017	961	166	52.0	12.5	8 4	2140	101	1011	0.310	0 246	0.043
12/6/95	4.20	8 6	5.3	4.6	10.3	14.4	15.4	1022	964	165	54.8	12.3	8.0	2147	84	953	0.310	0 246	0.043
12/6/95	4 25	8.6	5.4	4 6	10.3	14.3	15.4	1028	967	165	53.5	12.6	7.4	2050	63	911	0.310	0.246	0.043
12/6/95	4:30	8.7	6.1	4.7	10.1	13.3	15.3	1029	971	165	40.2	4.5	7.3	2050	483	905	0.310	0 246	0.043
12/6/95	4:35	8.7	6.2	4.7	10.2	13.2	15.3	1032	972	165	50.1	2.2	7.0	1994	523	876	0.310	0.246	0.043
12/6/95	4:40	8.8	6.1	4.7	10.0	13 2	15.3	1034	974	165	48.6	2.9	6.9	2002	530	890	0 310	0.246	0 043
12/6/95	4:45	8.9	6.1	4.7	10.1	13.3	15.3	1036	976	165	50.8	3.1	7.1	2088	511	871	0.310	0 246	0.043
12/6/95	4:50	9.0	6.1	4.7	9.9	13.2	15.3	1038	978	165	47.6	3.0	6 9	2082	461	900	0 310	0.246	0.043
12/6/95	4:55	9.0	6.2	4.7	10.0	13 2	15.3	1042	979	165	46.2	3.6	6 7	2067	408	836	0 310	0.246	0 043
12/6/95	5:00	9.0	6.2	4 7	9.9	13.2	15.3	1040	979	165	47.8	1.8	6.6	2069	485	864	0.310	0.246	0.043
12/6/95	5 05	9 0	6 2	4.7	9.8	13.2	15.3	1043	982	166	47.3	2.5	6.2	2021	431	789	0 310	0.246	0 043
12/6/95	5.10	9.2	6.3	4.8	9.6	13.1	15.2	1046	985	166	43.8	2.0	6.2	1962	450	799	0 310	0.246	0 043
12/6/95	5 15	9 0	6.1	4.8	9.8	13.3	15.2	1053	987	166	51.0	4.2	6 4	2051	372	781	0 310	0 246	0.043

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	5:20	9.1	5.7	4 7	9.8	13.8	15.3	1053	988	166	38.7	6.4	6.1	1932	167	799	0.310	0 246	0 043
12/6/95	5:25	8.9	5.6	4.8	10.0	14.0	15.2	1048	988	166	49.0	8.9	6.3	1967	94	751	0.310	0.246	0.043
12/6/95	5:30	9.0	5.6	4.7	9.8	14 0	15.3	1053	989	165	47.7	7.3	6.1	1955	110	782	0.310	0.246	0.043
12/6/95	5:35	9.0	5.4	4.7	9.9	14 2	15.2	1053	990	166	47.7	9.6	6.1	2008	47	747	0.310	0.246	0 043
12/6/95	5:40	9.0	5 4	4.6	9.9	14.3	15.4	1048	988	166	41.8	8.0	6.2	1962	67	782	0.310	0 246	0 043
12/6/95	5:45	8.8	5.2	4.6	10.1	14.4	15.4	1045	986	167	52.7	9.4	6.5	2049	39	769	0 310	0 246	0.043
12/6/95	5:50	8.7	5.8	4.5	10.3	13.8	15.5	1039	984	166	40.4	5 8	6.8	2008	321	811	0 310	0.246	0.043
12/6/95	5 55	8.6	5.4	4.5	10 5	14.2	15.5	1033	980	166	55.4	8 2	7.1	2136	178	816	0 310	0.246	0.043
12/6/95	6·00	8.6	5 2	4 5	10 5	14.5	15 5	1032	978	166	49.0	10.6	7.3	2094	65	861	0.310	0 246	0.043
12/6/95	6 05	8.6	5.1	4.5	10.4	14.6	15.5	1030	977	165	50.8	10.1	7.5	2160	41	868	0 310	0.246	0 043
12/6/95	6:10	8 6	5.0	4.5	10.5	14.7	15.6	1026	976	165	53.1	11.1	7.5	2085	45	881	0.310	0.246	0 043
12/6/95	6.15	8.5	5 8	4.5	10.5	13.8	15.6	1022	973	165	55.3	3.2	8.2	2253	421	917	0 310	0.246	0.043
12/6/95	6:20	8.5	6.0	4.4	10.5	13.6	15.6	1022	972	165	55.3	2.5	8.3	2231	492	926	0.310	0.246	0.043
12/6/95	6:25	8.5	5.9	4.4	10.6	13.7	15.6	1020	970	165	52.7	3.0	8.3	2218	506	923	0.310	0.246	0.043
12/6/95	6:30	8 5	6.0	4.5	10.5	13.6	15.5	1022	970	164	47.3	3.2	7.9	2198	456	882	0.310	0.246	0.043
12/6/95	6:35	8.6	5.8	4.4	10.4	13 7	15.6	1023	970	165	58.9	4.2	7.9	2166	423	862	0.310	0 246	0.043
12/6/95	6:40	8.7	5.6	4.5	10.3	14.1	15.5	1024	971	165	50.5	7.4	7.7	2189	169	864	0.310	0.246	0 043
12/6/95	6·45	8.8	5 2	4 5	10.2	14.4	15.5	1025	972	165	53.5	8.7	7.3	2182	50	849	0.310	0.246	0.043
12/6/95	6.50	8.8	5.4	4.6	10.2	14.2	15.4	1032	974	165	49.7	7.8	7.4	2239	70	853	0.310	0.246	0.043
12/6/95	6:55	8.8	5.6	4.6	10.1	14.0	15.5	1030	974	165	48.4	6.1	7.2	2196	181	858	0.310	0.246	0.043
12/6/95	7:00	8.7	5 3	4.6	10.2	14.3	15.4	1031	974	164	55.0	10.1	7.4	2181	53	813	0.310	0.246	0.043
12/6/95	7 05	8.7	5.2	4.5	10.2	14 5	15.5	1026	972	164	43.2	9.4	7.4	2133	40	839	0.310	0.246	0.043
12/6/95	7·10	8 6	5.2	4.6	10.4	14.5	15.5	1026	970	164	57.7	11.6	7.9	2262	38	864	0.310	0.246	0.043
12/6/95	7:15	8 7	5.2	4.5	10 3	14.5	15.5	1023	970	164	40.7	10 9	7 8	2199	70	911	0 310	0.246	0.043
12/6/95	7:20	8 6	5.4	4.6	10.4	14.2	15.5	1024	970	165	58.0	10 4	7.7	2209	121	852	0.310	0.246	0.043
12/6/95	7:25	8 9	5.3	4 6	10.0	14.3	15.5	1035	972	166	40.5	10.2	7.2	2201	60	874	0.310	0 246	0.043
12/6/95	7:30	8.9	5.2	4 6	10.0	14 4	15.4	1043	976	166	59.7	12.6	6.9	2263	22	840	0.310	0.246	0.043
12/6/95	7:35	9.2	5.3	4.7	9 6	14.2	15.3	1058	982	166	27.8	8.9	6.1	2166	37	838	0.310	0.246	0.043
12/6/95	7·40	9 4	5.4	4.9	9.3	14.2	15.1	1076	991	166	48.1	9.6	5.2	2212	15	772	0.310	0.246	0.043
12/6/95	7.45	10.0	5 6	5.1	8.7	14.0	14.8	1105	1005	166	31.3	7.0	3.8	1961	-3	661	0.310	0.246	0.043
12/6/95	7:50	10.3	6.0	5 4	8.3	13.5	14.5	1131	1023	165	30.2	7.1	2.9	1824	22	533	0.310	0 246	0 043
12/6/95	7.55	10 8	6.1	5.5	7.8	13.4	14.4	1162	1041	165	35.8	5.2	2.2	1607	-1	447	0.310	0.246	0.043
12/6/95	8·00	10 8	6.0	5.6	7.7	13.5	14.3	1175	1056	166	31.0	5.0	1.9	1503	-4	369	0.310	0.246	0.043
12/6/95	8 05	10.7	6.4	5.5	8 0	13.1	14.5	1185	1064	166	33.5	6.0	1.6	1458	32	348	0.310	0.246	0 043
12/6/95	8.10	10.1	6 2	5.3	8.6	13.4	14.7	1171	1064	166	35.1	3.6	1.7	1477	40	359	0.310	0 246	0 043
12/6/95	8:15	9.5	5.7	4.9	9.4	14.0	15.2	1153	1057	166	23.7	2.4	2.2	1563	35	423	0 310	0.246	0.043

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%)	CO_2 (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	8·20	9.0	5 6	4.6	10.1	14.1	15.5	1130	1046	166	30.0	2.8	2.6	1680	102	488	0.310	0.246	0.043
12/6/95	8:25	8.7	5.1	4.5	10.5	14.6	15.7	1116	1035	167	41.0	2.8	3.1	1818	26	553	0.310	0 246	0.043
12/6/95	8:30	8.8	5.2	4.5	10.3	14.6	15.7	1106	1028	167	18.8	3.1	3.3	1888	22	590	0.310	0.246	0.043
12/6/95	8:35	8 5	5.7	4.4	10 6	14.0	15.7	1098	1021	167	42.6	0.8	3.5	2109	289	638	0.310	0.246	0 043
12/6/95	8.40	8.3	5.6	4.3	10.9	14.2	15.8	1082	1013	167	40.2	1.7	4.1	2286	345	704	0 310	0.246	0.043
12/6/95	8:45	8.2	5.6	4.3	11.0	14.2	15 9	1077	1006	167	45.1	1.0	4 4	2373	361	751	0.310	0.246	0.043
12/6/95	8·50	8.2	5.6	4.3	11.0	14.2	15.9	1072	1000	167	49.5	1.2	4.7	2448	377	764	0.310	0.246	0.043
12/6/95	8.55	8.2	5.5	4.3	10.9	14.2	15.9	1070	996	167	42 0	2.8	4.9	2404	340	781	0.310	0.246	0 043
12/6/95	9:00	8.5	5.7	4.4	10.5	14.0	15.8	1067	994	168	46 4	0.5	4.6	2331	332	740	0.310	0.246	0 043
12/6/95	9:05	8.6	5.4	4.4	10.5	14.4	15.7	1073	996	168	25.2	4.5	4.3	2290	138	679	0 310	0.246	0.043
12/6/95	9:10	8.3	5.1	4 4	10.8	14.7	15.8	1068	994	167	48.5	6.8	4 5	2322	62	698	0.310	0.246	0 043
12/6/95	9:15	8.3	5.1	4 4	10.8	14.6	15.8	1072	994	166	46.8	5.3	4.4	2302	70	700	0.310	0.246	0.043
12/6/95	9·20			4.3			15.8			165		8.3	4 5		-2	712	0.310	0.246	0 043
12/6/95	9 25			4.3			15.9			165		7.4	4.8		358	799	0.310	0.246	0 043
12/6/95	9:30			4.3			15.9			165		3.7	5.1		780	975	0.310	0.246	0.043
12/6/95	9 35			4.2			16.0			165		7.2	5.5		411	1012			0.043
12/6/95	9 40			4.2			16.0			166		4.8	5 4		-7	1027			0.043
12/6/95	9.45			4.0			16.2			166		2.4	6.3		-7	1124			0.043
12/6/95	9:50	7 6	0.5	4.0	11.4	19.9	16.3	1020	966	165	65.0	2.5	7.1	2454	-6	1178			0.043
12/6/95	9:55	7 1	4.4		11.9	15.6		1014	965		61.7			2785					
12/6/95	10:00	6 9	4.4		12.1	15.6		999	956		65.5			2874					
12/6/95	10.05	6.7	4.7		12.3	15.1		986	946		76.2			2926					
12/6/95	10:10	5.9	4.9	4.4	13.7	15.3	16.8	978	939	164	88.7	18.8	6.6	2379	468	1076			
12/6/95	10:15	12 2	12.3	12.7	16.2	16.3	15.7	954	928	162	118.2	38.3	31.0	-10	-5	6			
12/6/95	10:20	11.0	10.5	11.2	13.8	13.9	15.0	938	914	161	101.7	74.0	74.7	460	483	431			
12/6/95	10:25	0.3	0.5	0.3	1.8	0.7	1.2	925	904	159	4.6	39.1	38.9	2558	2592	2101			
12/6/95	10.30	0.0	0.0	0.0	0.4	0.0	0.2	917	895	158	2.2	10.6	10.6	2829	2821	2067			
12/6/95	10.35	0.0	0.4	0.8	10.6	8.5	7.4	910	891	158	0.7	14.1	13.7	844	941	982			
12/6/95	10:40	0 0	3.6	3.4	21.0	16.5	17.1	910	880	157	339.9	65.3	42.6	0	1453	1698			
12/6/95	10:45	2.3	3.6	3.4	18.0	16.5	17.1	908	875	157	127.5	74.8	42.6	1184	1612	1859			
12/6/95	10·50	5 8	2.6	3.4	13.9	17 8	17.0	904	866	157	177.6	55.6	43.9	3237	1274	1896			
12/6/95	10:55	5.5	0.0	3.3	14.2	20.7	17.1	896	860	155	199.1	16.1	50 1	3418	1	2012			
12/6/95	11.00	5.1	2.0	3.2	14.6	18 1	17.2	876	849	154	203.1	13.1	53.2	3233	972	1949			
12/6/95	11.05	5.1	2.5	3 0	14.7	17.9	17.4	872	842	154	205.9	205.2	48.8	3276	1457	1952			
12/6/95	11:10	5.2	4.3	2.4	14.5	15.7	18.3	871	840	153	214.4	357.8	49.5	3466	2482	1316			
12/6/95	11:15	5 0	4.1	3 3	14.7	15.9	17.2	865	834	152	226.1	161.8	79.6	3719	2355	2361			

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	11:20	4.8	2.7	3.1	15.0	12.0	17.4	849	822	150	245.7	141.2	94.1	3884	2139	2462			
12/6/95	11.25	4.7	3 8	3.1	15.1	16.1	17.5	837	811	150	259.8	210.7	107.0	3972	2051	2516			
12/6/95	11:30	4.5	3.8	3.1	15.3	16.2	17.5	827	801	149	263.2	216.0	108.7	3932	2345	2516			
12/6/95	11:35	4.6	2 2	3.1	15 2	18.3	17.5	820	794	148	271.6	144.8	111.1	3996	1519	2515			
12/6/95	11:40	4.5	3.0	3.0	15.2	17.2	17.5	817	787	148	277.0	213.2	115.7	4187	2076	1383			
12/6/95	11:45	4.4	3 7	2.9	15.4	16.3	17 6	802	774	146	293.8	280.9	26.4	4293	3186	1396			
12/6/95	11:50	4.3	3.1	2 8	15.5	17.0	17.7	787	761	146	306.1	273.4	13.8	4275	2619	1416			
12/6/95	11:55	3.7	3.5	2.7	16.3	16.4	17.8	785	749	146	320.8	328 0	15.0	3837	3437	1475			
12/6/95	12:00	3.4	4 0	2.4	16.6	15.9	18.0	764	730	145	362.5	419.9	17.1	4335	4057	1379			
12/6/95	12.05	3.1	3.6	2.2	16.9	16.3	18.2	740	705	144	426.2	499.7	19.7	4416	4018	967			
12/6/95	12:10	2.9	1 9	1.9	17.1	18.4	18.5	699	673	143	497.1	430.4	22.0	4405	2428	589			
12/6/95	12:15	2.8	2.4	1.8	17.3	17.7	18.6	672	647	141	525 5	566.4	20.7	3979	3223	241			
12/6/95	12:20	2.6	2 3	1.7	17.4	17.9	18.8	660	627	140	490.4	544.0	18.3	3528	2820	321			
12/6/95	12:25	2.7	2.4	1.7	17.3	17.9	18.8	649	613	141	480.9	360.6	17.6	3310	2544	972			
12/6/95	12·30	3.1	2.6	1.9	16.9	17.5	18.7	652	612	142	458.5	321.4	17.9	3392	2795	950			
12/6/95	12:35	3.6	3.1	2 0	16.2	17.0	18.4	656	612	144	526.9	579.2	18.5	3650	2865	993			
12/6/95	12:40	4.3	3.7	2.5	15.0	16.0	17.9	669	619	144	571.4	582.1	19.2	4502	3296	1199			
12/6/95	12.45	5.0	4.4	2.9	13.9	15.1	17.3	693	636	145	511.2	615.4	15 7	5710	4192	1578			
12/6/95	12:50	5.0	5.4	3.6	13.9	13.5	16.3	717	746	145	471.0	345.8	10.9	5929	4245	1668			
12/6/95	12:55	5 0	5 4	3 7	14.1	13.5	16.1	723	809	145	465.6	383.1	7.0	5689	3897	1583			
12/6/95	13 00	4.6	5.1	3.6	14.6	14.0	16.3	689	828	145	463.7	276.6	7.6	5027	3461	1480		0.279	
12/6/95	13.05	4.5	4.9	3.5	14.9	14.3	16.4	652	837	144	463.9	303.2	8.7	4591	3210	1410	0.254	0.279	
12/6/95	13.10	4.6	5.0	3.6	14.6	14.1	16.4	659	845	143	471.2	285.5	8.8	4642	3317	1422	0 254	0 279	
12/6/95	13.15	5.3	5.4	3.9	13.7	13.5	16.0	687	860	144	430.4	226 5	56.5	5295	3290	1495	0.254	0.279	0 050
12/6/95	13:20	6 1	6.1	4.2	12 6	12.6	15.6	722	883	144	368.9	131 5	40.0	5534	3221	1409	0.254	0.279	0.050
12/6/95	13:25	6.5	6.5	4.4	12.0	12.2	15.3	739	904	144	333.4	74.7	29.6	5595	2891	1316	0 254	0.279	0.050
12/6/95	13:30	6.9	6.9	4.6	11.7	11.8	15.1	759	920	144	293 6	65.1	22.6	5300	3121	1216	0 254	0 279	0.050
12/6/95	13:35	8.2	7.7	5.1	10.0	10.8	14.5	790	938	145	257.3	46.7	19 6	4041	2322	1004	0.254	0.279	0.050
12/6/95	13:40	8.4	7.9	5.4	10.0	10.6	14.2	813	959	148	225.6	70.7	16.4	2968	1712	759	0.254	0.279	0.050
12/6/95	13:45	7.5	7.4	5 0	11.1	11.4	14.7	801	962	148	206 7	41.6	16.1	3117	1753	811	0.254	0.279	0.050
12/6/95	13·50	10.0	9.2	6.4	7.9	8.9	13.1	877	992	149	235.6	23 4	20.2	2452	1396	671	0.254	0.279	0.050
12/6/95	13:55	10.0	9.2	6 5	8.1	9.0	13.0	913	1021	151	214.6	27.5	17 9	2062	1031	543	0 254	0.279	0.050
12/6/95	14:00	10 2	9 4	6.6	7.8	8.8	12.9	950	1048	153	157.0	21.2	13.5	2238	1125	487	0.254	0.279	0 050
12/6/95	14 05	11 8	12 4	11 5	16.2	15.6	16.9	979	1072	154	134.4	9.5	9 1	96	563	236	0.254	0 279	
12/6/95	14:10	9.5	9.6	9.7	12.8	12.5	13.8	996	1089	155	353.4	-10.9	7.1	11	79	63			
12/6/95	14:15	0.0	0.0	0.1	0.3	-0 1	0.2	987	1095	155	177.8	-15.6	7 1	292	2806	2293			

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	14:20	0.0	0.0	0.1	0.0	0 0	0.0	1004	1095	156	277.0	10.4	22.1	627	4502	2536			
12/6/95	14:25	0.0	0.0	0.0	0.1	-0.1	0.0	1030	1107	157	238.0	45.0	44.4	734	4209	2332			
12/6/95	14:30	5.8	4.9	4.2	6.9	7.5	8.9	1038	1127	159	206.4	21.9	14.8	202	816	848			
12/6/95	14:35	8.8	8.7	5.9	10.3	10.0	13.9	1040	1133	159	240.4	24.7	5.1	228	284	301			
12/6/95	14·40	8.3	8.3	5.5	10.7	10.6	14.3	1040	1135	161	243.4	20.3	5 0	228	187	233			
12/6/95	14·45	8.0	8.0	5.3	11.1	11.1	14.5	1037	1138	161	154.7	32.9	4.8	225	214	220			0.050
12/6/95	14:50	7.5	5.7	5.2	11.5	13.4	14.8	1034	1139	160	189.1	14.6	4.7	240	346	325			0.050
12/6/95	14:55	6.6	6.8	4.9	12.5	12 4	14.9	1030	1155	159	169.6	7.2	4.2	295	422	208	0.199	0.181	0.050
12/6/95	15:00	5.6	5.9	4.6	13.7	13.4	15.3	1009	1156	156	360.1	11.2	4.4	298	597	299	0.199	0.181	0.050
12/6/95	15:05	4.7	5.5	4.3	14.8	13.8	15.7	980	1161	153	310.0	17.4	5.8	284	1050	547	0.199	0 181	0.050
12/6/95	15:10	4 3	5.4	4.1	15.2	13.9	15.8	943	1125	153	338.7	21.0	8.5	296	1403	835	0.199	0.181	0.050
12/6/95	15:15	4 2	5.5	4.2	15.4	13.7	15.8	922	1139	154	341.1	19.0	10.3	319	1514	968	0.199	0.181	0.050
12/6/95	15:20	4.4	5.4	4.1	15.0	13.9	15.9	909	1136	156	294.9	18.6	6.6	341	1503	756	0.199	0.181	0.050
12/6/95	15:25	4.1	4.7	3.8	15.4	14.8	16.1	897	1111	153	214.0	16.8	6.4	340	1706	846	0.199	0.181	0.050
12/6/95	15:30	4.0	4.6	3.8	15.5	15.0	16.2	884	1093	150	261.2	24.3	7.3	337	1806	979	0.199	0.181	0.050
12/6/95	15 35	4.2	4.7	3.8	15.2	14.8	16.2	883	1089	150	325.3	18.3	6.5	350	1817	959	0.199	0.181	0.050
12/6/95	15 40	5.4	5.8	4.2	13.7	13.3	15.7	899	1114	159	307.4	11.9	3.8	372	1180	518	0.199	0.181	0.050
12/6/95	15:45	6 6	7.6	4.5	12.4	10.8	15.2	921	1144	168	278.0	12.6	3.0	381	167	98	0.199	0.181	0.050
12/6/95	15:50	6.2	6.7	4.6	12.8	12.1	15.2	926	1151	162	328.2	10.7	3.2	370	319	203	0.199	0.181	0.050
12/6/95	15:55	6.1	6.6	4.6	13.0	12.3	15.2	933	1156	160	289 9	12.4	3.3	373	369	235	0.199	0 181	0 050
12/6/95	16:00	6.7	7.5	4.6	12.2	10.9	15.1	934	1169	167	307.9	9.1	3.1	388	205	136	0.199	0.181	0.050
12/6/95	16.05	6.6	7.0	4.7	12 3	11.8	15.0	939	1172	164	303.9	12 0	3 4	378	250	151	0 199	0.181	0.050
12/6/95	16:10	5.8	6 1	4.4	13.2	13.0	15.4	936	1166	160	307.2	10.1	4.0	409	702	333	0.199	0.181	0.050
12/6/95	16:15	5.3	5.8	4.4	13.8	13.4	15.4	922	1155	158	300.4	8.2	4.7	425	874	476	0.199	0.181	0.050
12/6/95	16.20	4.4	4.9	4.0	14.8	14.4	15.9	893	1132	155	310.5	13.0	6.7	488	1764	1127	0 199	0.181	0.050
12/6/95	16.25	4.8	5 2	4.1	14.4	14.1	15.8	872	1126	155	295.1	12.2	5 9	491	1700	925	0.199	0 181	0 050
12/6/95	16.30	4.9	5 3	4 1	14.2	13.9	15.8	859	1125	155	321.6	17.4	5.7	505	1750	910	0.199	0.181	0.050
12/6/95	16:35	5 0	5.3	4.1	14.1	13.9	15.7	857	1124	154	287.6	13.8	5.5	530	1868	988	0.199	0.181	0.050
12/6/95	16 40	4.5	5 2	4.1	14.6	14.0	15.8	841	1126	153	319.1	17.6	6.9	595	2150	1218	0.199	0.181	0.050
12/6/95	16.45	3.9	4.8	3.8	15.3	14.4	16.0	808	1127	152	302.5	23.5	10.5	620	2806	1693	0.199	0.181	0.050
12/6/95	16.50	3 4	4.5	3.7	15.9	14.7	16.2	775	1128	150	271.6	33.5	17.8	528	3230	2095	0.199	0.181	0.050
12/6/95	16:55	3 2	4.3	3.6	16.1	14.9	16.4	747	1106	149	227.0	44.8	22.9	467	3683	2273	0 199	0.181	0.050
12/6/95	17.00	2 6	4.2	3.5	17.2	15.1	16.4	691	1088	148	312.0	51.3	28 3	351	3662	2369	0.199	0 181	0.050
12/6/95	17.05	2 8	3.9	3 2	17.6	15.4	16.8	652	1075	147	407.0	64.0	42.7	347	3431	2240	0.199	0.181	0 050
12/6/95	17 10	1.5	2.7	2.2	19.1	16.9	17.9	627	1053	145	432.3	74 8	57.4	269	2425	1591	0.199	0 181	0.050
12/6/95	17·15	1.3	2.3	2.0	19.3	17.5	18.1	624	1026	143	460 3	23.5	66 8	257	2463	1493	0 199	0.181	0.050

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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	17:20	1.3	2.3	2.0	19.3	17.6	18.1	630	1004	142	457.3	13.9	65.2	239	2386	1330	0.199	0 181	0.050
12/6/95	17:25	3.1	4.1	3.2	16.6	15.2	16.8	635	1044	143	438.0	10.9	55.6	377	3674	2286	0.199	0.181	0.050
12/6/95	17·30	1.8	1.9	1.6	13.9	12.8	14.0	854	950	147	331.1	6.9	45.3	170	1640	970	0.199	0.181	0.050
12/6/95	17·35	0.0	0.0	0.0	0.0	-0.1	0.0	945	943	150	66.0	28.5	41.5	742	4401	2472			
12/6/95	17 40	0 0	0 0	0 0	0.0	-0.1	0.0	993	964	153	11 4	57.2	57.2	304	2895	2338			
12/6/95	17·45	0 0	0.0	0.0	0.1	0.0	0.0	1001	973	155	61 0	6.9	8.4	218	2150	1804			
12/6/95	17·50	12.2	12.4	12.7	16.4	16.4	15.7	1011	973	157	353.7	-1.1	0.9	28	294	297			
12/6/95	17:55	10.0	1.7	1 3	11.8	19.7	19.7	983	971	157	162.4	-1.4	0.9	71	-18	-4			
12/6/95	18 00	13 2	0 0	0 1	17.3	21 1	20 9	1047	988	159	169.2	-1.6	0.8	-2	-18	-4			
12/6/95	18.05	5 3	0 0	0.1	6.1	21 1	20.9	1122	1033	162	120.7	-1 7	0.8	136	-18	-4			
12/6/95	18 10	0 1	0 0	0.1	0.1	21 1	20.9	1166	1066	165	52.7	12.0	9 1	364	-17	-4			
12/6/95	18·15	0.0	0.0	0.1	1 0	21.1	20.9	1198	1097	166	0.2	85 9	78 6	884	-10	-4			
12/6/95	18·20	0.0	0 3	0.5	20.8	2 8	4.5	1238	1135	168	-1.0	64.5	64.6	71	2607	1938			
12/6/95	18.25	0.0	0.0	0.1	20.8	-0.1	0.6	1286	1168	170	6.6	20.5	23.5	-2	3284	2434			
12/6/95	18.30	0 0	0 0	0.1	20.8	0.0	0.5	1329	1214	171	394.2	-0.2	1.6	-2	1868	1908			
12/6/95	18:35	0.0	9.6	9 3	20.8	12.8	11.7	1338	1223	174	200.1	-0.4	1.4	-2	719	752			
12/6/95	18:40	8.5	10.6	8.3	10.2	9.9	13.3	1326	1221	175	59.6	5.9	3.9	92	91	53			0 053
12/6/95	18:45	12 6	10.6	6.7	5.7	8.1	13.2	1322	776	176	92.5	15.6	4.4	144	110	83			0.053
12/6/95	18.50	13.0	10.6	5.3	4.9	8.1	14.9	1330	-415	176	190.7	9.8	4.5	139	320	239	0.340	0.297	0 053
12/6/95	18.55	7 3	6.0	4 2	11 9	13.6	16.2	1146	-415	173	136.0	11.8	6.5	2464	918	684	0.340	0 297	0.053
12/6/95	19 00	7.2	6.0		12.4	13.7		1130	1037		177.0			2489			0.340	0 297	0.053
12/6/95	19.05	6.8	5.7	3.9	12.7	13.9	16.6	1096	1049	168	171 1	15.8	10.6	2769	1696	1306	0.340	0.297	0.053
12/6/95	19·10	6 3	5 5	3.7	13 2	14.2	16.8	1057	1023	168	166.8	20.1	14 4	3021	1911	1345	0.340	0.297	0 053
12/6/95	19·15	6.3	5 5	3 6	13.2	14.2	16.8	1036	1001	170	181.9	21.0	14.4	3267	2016	1405	0.340	0.297	0 053
12/6/95	19:20	6 4	5.5	3 7	13.1	14.2	16.8	1016	976	171	177.5	25.3	15.5	3359	2034	1381	0.340	0.297	0.053
12/6/95	19:25	6.2	5 4	3.6	13.4	14.3	17.0	996	955	170	186.9	28.9	19.5	3553	2240	1494	0 340	0.297	0.053
12/6/95	19.30	6.1	5 4	3 6	13.4	14.2	16.9	981	942	169	162.7	30.0	19.1	3339	2119	1406	0.340	0.297	0.053
12/6/95	19:35	6.2	5.6	3.6	13.2	14.0	16.8	978	933	169	206.5	31.9	19 1	3259	2140	1403	0 340	0.297	0.053
12/6/95	19:40	6 4	5.7	3.7	13.1	13.8	16.7	974	927	168	220.6	32.8	19.6	3173	2116	1383	0.340	0.297	0.053
12/6/95	19·45	6.5	5 9	3.8	12.9	13.6	16.6	969	923	168	198.6	32.2	18.6	3037	2030	1321	0.340	0 297	0.053
12/6/95	19:50	6.7	6.1	3 9	12.7	13.3	16.5	972	922	167	197 1	31.9	18.0	2963	1974	1289	0.340	0.297	0 053
12/6/95	19:55	6.9	6.3	4.0	12.3	13.1	16.3	978	924	166	169.6	32.4	17.0	2860	1964	1278	0.340	0.297	0.053
12/6/95	20.00	7.1	6.5	4.1	12.2	12.9	16.2	982	923	166	257.8	30.5	16.6	2701	1905	1242	0.340	0 297	0.053
12/6/95	20.05	7 1	6.5	4.1	12 2	12 9	16.2	983	925	166	154.6	30.3	17.1	2723	1891	1230	0 340	0 297	0.053
12/6/95	20:10	7.6	7.1	4 4	11.5	12 2	15.9	986	929	165	199.1	28 4	15.3	2652	1810	1200	0.340	0.297	0.053
12/6/95	20·15	8 6	8.3	5.1	10 4	10.8	15.0	1018	953	165	170.9	21.2	10.2	2550	1566	1056	0.340	0 297	0 053

Hopewell, Virginia
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Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	20:20	9.5	8 7	5.4	9.1	10.1	14.7	1032	970	166	175.0	16.0	7.8	2233	1298	896	0.340	0.297	0 053
12/6/95	20:25	9.3	8.5	5.3	9.4	10.4	14.7	1033	978	165	192.8	13.7	7.0	1780	1007	716	0.340	0.297	0.053
12/6/95	20:30	8.7	8.1	5.0	10.1	11.0	15.1	1020	973	166	143.9	15.5	7 9	1660	1071	753	0.340	0.297	0.053
12/6/95	20.35	8.2	7.6	4.7	10.7	11.5	15.4	994	960	166	161.4	19.0	8.1	1596	1135	777	0.340	0.297	0.053
12/6/95	20.40	7.9	7.3	4.5	11.2	11.9	15.6	972	944	166	190.5	21.4	10.2	1377	1080	737	0.340	0.297	0 053
12/6/95	20.45	8.9	8.1	4.9	9.8	10.9	15.2	969	939	167	122.9	21.3	9.2	1218	1041	692	0.340	0.297	0 053
12/6/95	20:50	9 4	8 5	5.1	9.2	10.4	14.9	969	937	168	159.3	20.7	10.3	1174	983	670	0.340	0.297	0.053
12/6/95	20.55	9.6	8.6	5 1	8.9	10.3	14.9	967	934	169	130.5	20.4	5.8	1107	953	654	0.340	0.297	0 053
12/6/95	21:00	10.0	8.8	5.3	8 4	9.9	14.8	965	932	170	144.4	22.2	6.2	1191	963	675	0.340	0.297	0 053
12/6/95	21.05	10.8	9.3	5.5	7 4	9.2	14.5	970	934	171	164.1	27.7	8.9	1611	1151	840	0 340	0.297	0.053
12/6/95	21·10	11 6	9.9	5.8	6 4	8.4	14.1	983	941	171	181.0	39.5	19.7	2262	1438	1078	0.340	0.297	0.053
12/6/95	21.15	12.2	10.4	6 1	5 5	7.8	13.7	1001	951	171	179.4	44 2	27.7	2558	1455	1176	0 340	0.297	0.053
12/6/95	21:20	12.6	10.8	6.3	4 9	7 2	13.4	1014	960	171	201.2	56.1	32.4	3126	1692	1508	0.340	0 297	0 053
12/6/95	21 25	13.0	11.1	6.5	4 4	6.8	13.2	1029	969	170	217.1	68.6	54.0	4007	2125	1912	0.340	0.297	0 053
12/6/95	21:30	13 1	11.3	6.6	4.1	6.4	13.0	1040	977	171	250.7	101.0	78.2	5033	2744	2374	0.340	0.297	0.053
12/6/95	21.35	13.3	11.6	6 8	3.7	6.0	12.8	1039	984	172	369.5	119.1	99.4	6405	3463	2533	0 340	0.297	0.053
12/6/95	21.40	13.4	11.7	6 9	3.5	5.7	12.7	1049	995	173	303.0	118.7	112.0	7629	4232	2534	0.340	0.297	0 053
12/6/95	21:45	13.6	11.9	6.9	3 3	5.5	12.6	1055	1007	173	246.1	132.5	118 2	8495	4625	2534	0.340	0.297	0 053
12/6/95	21:50	13.6	12.0	7.0	3.4	5.4	12.5	1062	1018	173	249.1	126 2	120.1	9126	4785	2534	0.340	0.297	0.053
12/6/95	21:55	13.2	11.7	6.9	4 2	6.2	12.7	1064	1018	173	342.1	77.8	73.5	7471	3945	2367	0.340	0.297	0.053
12/6/95	22 00	12.1	10.8	6.5	5.9	7.6	13.4	1060	1006	172	198.2	32.6	12.9	3359	1740	1652	0 340	0 297	0 053
12/6/95	22:05	12.1	10.7	6.5	6.0	7 8	13.5	1056	998	173	183.1	33.1	12.6	3175	1717	1557	0.340	0.297	0 053
12/6/95	22:10	12.5	11 0	6 6	5.4	7.4	13.4	1054	996	173	186.1	38 4	12.5	3620	2014	1733	0 340	0 297	0 053
12/6/95	22:15	12 8	11.3	6.7	5 1	7.1	13.2	1054	997	173	170.1	48.3	27.9	4091	2304	2026	0.340	0.297	0.053
12/6/95	22·20	12 6	11.2	6.7	5 2	7.1	13.2	1047	995	173	184.8	51.3	27.2	4456	2519	2210	0.340	0 297	0 053
12/6/95	22·25	12 8	11.3	6.7	5 0	7.1	13.2	1051	995	175	179.8	51.1	24.8	4397	2402	2134	0.340	0.297	0.053
12/6/95	22:30	12.8	11 3	6.7	5.0	7.0	13.2	1051	997	175	176.5	46.6	18 9	4279	2381	2080	0.340	0.297	0.053
12/6/95	22:35	12.8	11 4	6.8	5.0	7 0	13.1	1050	998	173	166 7	47.1	17.3	4391	2478	2141	0 340	0.297	0 053
12/6/95	22:40	12.8	11.3	6 7	5.0	7.0	13.2	1049	1000	174	131.6	41.2	12 5	4327	2341	2069	0.340	0.297	0.053
12/6/95	22:45	12.8	11 4	6.8	5 0	7.0	13.2	1049	1001	174	137.9	40.1	12.0	4247	2369	2023	0.340	0.297	0.053
12/6/95	22:50	12.8	11 4	6.8	5 0	7.0	13.1	1053	1002	174	155.4	44.9	13.3	4430	2467	2128	0.340	0.297	0.053
12/6/95	22.55	12.9	11 6	6.8	4.9	6.8	13.1	1056	1004	175	135.0	42.8	13.6	4626	2666	2210	0.340	0.297	0.053
12/6/95	23:00	12.9	11.6	6.9	4.9	6.8	13.0	1055	1006	176	161.9	40.9	11.4	4440	2443	2136	0.340	0.297	0.053
12/6/95	23:05	13.0	11.5	6.9	5.0	7 0	13 0	1062	1010	175	148.0	23.0	5 0	3766	1966	1740	0 340	0.297	0.053
12/6/95	23:10	11 8	10 7	6.8	6 4	8.1	13.2	1068	1019	171	105 3	13.7	2 7	2135	1126	1019	0.340	0 297	0.053
12/6/95	23:15	11.8	10.7	6.8	6.5	8.1	13.2	1079	1021	172	138.2	15.5	2 8	2261	1229	1111	0.340	0.297	0.053

Hopewell, ..ia
Continuous Monitor Data
December 1995

Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/6/95	23 20	11.8	10.7	6.8	6.5	8 0	13.2	1086	1023	171	140.4	17.2	2.8	2375	1316	1163	0.340	0.297	0.053
12/6/95	23:25	12.0	10.9	6.9	6.2	7.8	13.1	1103	1028	172	141.0	14.4	2 3	2544	1340	1232	0.340	0.297	0.053
12/6/95	23:30	12.0	10.9	6.9	6.2	7.8	13.0	1124	1037	172	154.6	14.4	1.8	2609	1283	1219	0.340	0.297	0 053
12/6/95	23:35	12.0	11.0	7.0	6.2	7.8	13.0	1149	1051	172	124.7	11.7	1.1	2415	1128	1095	0.340	0.297	0.053
12/6/95	23·40	12.3	11.4	7.2	5.7	7.2	12.6	1175	1074	173	119.1	10.5	0.6	2457	944	965	0.340	0 297	0.053
12/6/95	23·45	12.8	11.9	7.7	5 2	6.6	12.2	1222	1112	175	96.7	7.9	0.9	2216	598	674	0.340	0.297	0.053
12/6/95	23:50	12.2	11.0	7.9	6.3	7.8	11.8	1278	1147	176	46.8	7.0	4.0	1978	415	481	0 340	0.297	0.053
12/6/95	23:55	10.0	10.1	10.3	18.5	19.0	19.0	1329	1194	177	119.8	1.7	3.2	473	-19	32			
12/7/95	0:00	3.8	4.2	4.4	7.5	7.1	7.8	1363	1216	171	240.2	1.5	-0.1	3853	2112	988			
12/7/95	0.05	-0.1	-0.1	0.1	0.0	-0.1	0.0	1321	1176	168	5.6	0 9	-0.7	8597	4854	2451			
12/7/95	0.10	-0.1	-0.1	0.1	0.0	-0.1	0.1	1339	1179	178	-10.4	85.8	85 8	3797	3599	2423			
12/7/95	0·15	-0 1	-0.1	0.1	0.0	0.0	0 1	1314	1170	178	-12.3	88.5	88.1	1897	1880	1868			
12/7/95	0 20	3.6	2.2	2.9	9.4	9.9	9.0	1282	1151	177	-12.6	47.5	47.5	1056	664	716			
12/7/95	0:25	9.3	7 0	5.5	10.0	12.6	14.8	1316	1130	177	129.6	9.9	7.9	1761	220	487			
12/7/95	0:30	8.8	1.1	5.2	10 6	19.5	15.1	1327	1111	176	122.2	5.5	6.0	2005	141	627			
12/7/95	0:35	8.4	3.2	3.7	11.1	17.0	16.9	1253	1212	175	103.7	3 0	5.9	2053	393	532			
12/7/95	0:40	7.9	0.3	4.6	11.7	20.4	15.7	1214	2502	174	95.2	7.8	9.1	2269	-16	945			
12/7/95	0:45	7.5	6.5	4 4	12.0	13.1	16.0	1188	1179	175	79.6	24.8	11.4	2443	1538	1099			
12/7/95	0.50	7.2	6.0	4.2	12.4	13.6	16.2	1168	1036	173	93.0	18.9	13.7	2746	1510	1246			0.032
12/7/95	0.55	6 3	5.5	4.0	13.3	14 0	16.4	1120	993	173	108.5	26.5	20.4	2924	1871	1394	0.280	0.182	0.032
12/7/95	1.00	6.2	5.3		13.4	14.3		1115	988		108.1	28.2	24.6	3112,	1980	1470	0 280	0.182	0.032
12/7/95	1·05	6 0	5.2	3.5	13.7	14.4	16.7	1097	974	171	113.4	30.9	26.4	3052	1999	1514	0.280	0 182	0 032
12/7/95	1:10	6.1	5.4	3.6	13 5	14.2	16.7	1088	963	171	114.0	35.5	25.5	2997	1991	1489	0 280	0.182	0.032
12/7/95	1·15	5.8	5.2	3.5	13 8	14.3	16 8	1070	951	171	117.8	39.7	29.1	3006	1977	1509	0.280	0.182	0 032
12/7/95	1:20	5.6	5.1	3 4	14 0	14.5	16.9	1051	938	170	129.2	48.9	33.7	3100	2074	1578	0 280	0.182	0.032
12/7/95	1:25	5 8	5.2	3.4	13 7	14.4	16.9	1034	930	171	133.8	50.7	33.2	3291	2181	1611	0.280	0 182	0.032
12/7/95	1·30	5.8	5.2	3.4	13.8	14.3	16.9	1024	922	172	132.3	47 9	34.3	3271	2262	1630	0 280	0.182	0.032
12/7/95	1:35	5.8	5 3	3.4	13.8	14.2	16.9	1019	915	171	137.7	58.2	36.0	3378	2358	1680	0.280	0.182	0.032
12/7/95	1.40	6.0	5.5	3.5	13.4	13.9	16.8	1014	910	171	133.2	53.7	33.5	3360	2300	1642	0.280	0.182	0.032
12/7/95	1:45	6.2	5.7	3.6	13.2	13.7	16.7	1017	908	172	133.6	49.3	31.5	3413	2251	1608	0.280	0.182	0.032
12/7/95	1:50	6.3	5.8	3.6	13.2	13.6	16.6	1003	906	171	127.5	54.4	32.2	3389	2251	1601	0.280	0.182	0 032
12/7/95	1:55	6.3	5.8	3.7	13.1	13.5	16.5	997	904	170	138 1	53.2	31.7	3318	2231	1612	0 280	0.182	0.032
12/7/95	2.00	6 5	5.9	3.8	13.0	13.4	16.5	996	902	170	127.7	49.8	31.2	3249	2145	1612	0.280	0.182	0.032
12/7/95	2.05	6.9	6.4	3 8	12.6	12.9	16.4	993	902	173	127 7	49.0	29 0	2967	2070	1459	0.280	0.182	0 032
12/7/95	2·10	7.6	7.1	4.1	11.7	12.1	16.1	998	905	175	122.9	41.2	24 2	2947	1871	1331	0.280	0.182	0.032
12/7/95	2.15	8.0	7 4	4.2	11.3	11.7	15.8	1005	911	175	112.5	36 2	21 2	2992	1881	1289	0 280	0 182	0.032

Hopewell, Virginia
Continuous Monitor Data
December 1995

Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/7/95	2:20	8.1	7.6	4.3	11.1	11.5	15.7	1006	916	175	109.4	31.9	19.2	2815	1685	1220	0.280	0.182	0.032
12/7/95	2:25	8.3	7.8	4.4	10.8	11.3	15.6	1010	920	176	103.6	28.3	17.0	2736	1696	1170	0.280	0.182	0.032
12/7/95	2:30	8.6	7.9	4.5	10.6	11.1	15.5	1018	925	176	101.9	26.3	15.6	2655	1579	1146	0.280	0.182	0.032
12/7/95	2:35	8.8	8.1	4.6	10.4	10.9	15.4	1025	931	177	98.3	23.5	14.0	2592	1538	1091	0.280	0.182	0.032
12/7/95	2:40	8.8	8.2	4.7	10.2	10.8	15.3	1029	935	176	100.0	21.0	12.9	2587	1354	1038	0.280	0.182	0.032
12/7/95	2:45	9.0	8.4	4.8	10.0	10.6	15.2	1036	942	175	100.6	20.2	12.2	2643	1398	1020	0.280	0.182	0.032
12/7/95	2:50	9.1	8.5	4.9	9.9	10.6	15.1	1041	947	176	95.8	16.5	10.7	2499	1288	939	0.280	0.182	0.032
12/7/95	2:55	9.2	8.5	4.9	9.8	10.5	15.1	1045	954	176	100.3	17.0	10.6	2409	1247	894	0.280	0.182	0.032
12/7/95	3:00	8.1	7.5	4.6	11.3	11.7	15.4	1049	958	170	98.2	19.2	12.9	2349	1218	966	0.280	0.182	0.032
12/7/95	3:05	7.2	6.7	4.2	12.3	12.6	15.8	1044	955	167	102.1	26.3	17.3	2408	1446	1159	0.280	0.182	0.032
12/7/95	3:10	6.9	6.5	4.1	12.6	12.9	16.0	1038	948	167	107.1	26.5	20.1	2576	1580	1252	0.280	0.182	0.032
12/7/95	3:15	6.7	6.3	4.0	12.8	13.1	16.1	1032	942	167	114.8	35.3	22.7	2731	1729	1339	0.280	0.182	0.032
12/7/95	3:20	6.5	6.0	3.9	13.1	13.4	16.3	1026	934	167	114.6	36.4	25.7	2840	1866	1435	0.280	0.182	0.032
12/7/95	3:25	6.2	5.8	3.8	13.4	13.7	16.4	1029	925	166	128.0	47.5	29.5	2904	1994	1529	0.280	0.182	0.032
12/7/95	3:30	6.0	5.7	3.7	13.5	13.8	16.5	1021	915	165	130.0	47.1	32.9	2953	2162	1600	0.280	0.182	0.032
12/7/95	3:35	5.8	5.5	3.6	13.8	14.0	16.7	1006	906	166	137.2	62.4	37.2	3106	2246	1700	0.280	0.182	0.032
12/7/95	3:40	6.1	5.8	3.7	13.4	13.6	16.6	993	896	167	139.9	55.1	35.1	2863	2093	1535	0.280	0.182	0.032
12/7/95	3:45	6.4	6.1	3.8	13.2	13.3	16.4	987	891	168	139.1	56.5	32.8	2772	2010	1418	0.280	0.182	0.032
12/7/95	3:50	6.4	6.1	3.8	13.1	13.2	16.4	982	887	168	134.3	52.6	31.3	2723	1943	1396	0.280	0.182	0.032
12/7/95	3:55	6.6	6.2	3.9	13.0	13.2	16.3	978	885	167	129.0	51.8	29.6	2595	1873	1370	0.280	0.182	0.032
12/7/95	4:00	6.7	6.3	3.9	12.8	13.0	16.3	977	885	167	130.1	51.0	29.2	2525	1854	1332	0.280	0.182	0.032
12/7/95	4:05	6.7	6.3	3.9	12.8	12.9	16.2	976	884	167	128.2	50.3	28.4	2481	1777	1309	0.280	0.182	0.032
12/7/95	4:10	6.7	6.4	4.0	12.8	12.9	16.2	980	883	167	128.2	49.4	29.3	2524	1830	1301	0.280	0.182	0.032
12/7/95	4:15	6.7	6.4	4.0	12.7	12.8	16.2	977	883	167	128.1	51.5	28.9	2522	1762	1300	0.280	0.182	0.032
12/7/95	4:20	6.8	6.4	4.0	12.7	12.8	16.1	975	883	167	128.2	47.4	29.7	2545	1783	1315	0.280	0.182	0.032
12/7/95	4:25	6.9	6.5	4.0	12.6	12.7	16.1	975	883	166	127.5	50.2	28.9	2534	1844	1335	0.280	0.182	0.032
12/7/95	4:30	7.0	6.6	4.1	12.5	12.6	16.1	975	884	166	128.6	48.3	28.8	2519	1770	1336	0.280	0.182	0.032
12/7/95	4:35	7.0	6.7	4.1	12.5	12.6	16.0	978	884	166	125.0	48.0	27.6	2404	1744	1282	0.280	0.182	0.032
12/7/95	4:40	7.0	6.7	4.1	12.5	12.6	16.0	979	884	166	125.3	46.6	28.9	2453	1724	1280	0.280	0.182	0.032
12/7/95	4:45	7.2	6.8	4.2	12.2	12.4	15.9	980	886	167	127.7	47.4	28.1	2572	1785	1303	0.280	0.182	0.032
12/7/95	4:50	7.3	6.9	4.2	12.1	12.3	15.8	982	887	167	126.4	46.5	27.2	2503	1685	1285	0.280	0.182	0.032
12/7/95	4:55	7.3	6.9	4.2	12.0	12.3	15.8	983	888	167	123.4	39.6	26.2	2405	1707	1264	0.280	0.182	0.032
12/7/95	5:00	7.4	7.0	4.3	12.0	12.1	15.8	982	892	167	123.2	42.4	26.0	2412	1647	1280	0.280	0.182	0.032
12/7/95	5:05	7.3	7.0	4.3	12.0	12.2	15.8	982	893	167	126.7	42.4	25.6	2410	1661	1249	0.280	0.182	0.032
12/7/95	5:10	8.0	7.5	4.4	11.3	11.7	15.7	984	896	170	121.5	37.4	23.6	2629	1693	1248	0.280	0.182	0.032
12/7/95	5:15	8.5	7.9	4.6	10.7	11.2	15.4	987	902	171	125.9	35.1	21.0	2765	1710	1266	0.280	0.182	0.032

Hopewell, [illegible]nia
Continuous Monitor Data
December 1995

Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/7/95	5.20	8.5	8.0	4.6	10.6	11.1	15.4	992	907	171	118 5	31.5	19 2	2687	1589	1227	0 280	0.182	0 032
12/7/95	5:25	8.7	8.1	4.7	10.4	10.9	15.3	996	912	171	122.1	27.4	17.3	2614	1564	1191	0 280	0.182	0.032
12/7/95	5.30	9 1	8 4	4.9	9.9	10.5	15.2	1003	920	173	114.6	23.8	14.1	2474	1437	1067	0 280	0.182	0 032
12/7/95	5.35	9.6	8.7	4.9	9.3	10.2	15.1	1011	926	175	112.2	20.0	11.3	2356	1284	920	0 280	0.182	0 032
12/7/95	5 40	9.4	8 6	5 0	9.7	10.3	15.0	1017	931	173	118.2	18.5	11.8	2366	1242	922	0.280	0 182	0 032
12/7/95	5:45	9 1	8.4	4 9	10.0	10 6	15.1	1022	936	170	107.0	20.2	12.4	2524	1287	1022	0.280	0.182	0 032
12/7/95	5:50	9.5	8.6	5.0	9.4	10.2	15.0	1029	943	172	110.3	17.7	11.0	2473	1258	956	0.280	0 182	0.032
12/7/95	5:55	10.1	9.0	5.1	8.7	9.8	14.9	1037	949	175	108.1	15.4	8 9	2369	1127	849	0 280	0.182	0.032
12/7/95	6.00	10.7	9.3	5.1	8.2	9.5	14.9	1045	954	178	102.7	13.2	7.7	2282	987	733	0 280	0 182	0 032
12/7/95	6.05	10 8	9 4	5.2	8.0	9.4	14.8	1055	958	178	110 6	12.8	7.3	2218	916	692	0.280	0.182	0.032
12/7/95	6:10	10 8	9.4	5 2	8 0	9.3	14.8	1066	963	180	108.8	12.0	6.8	2148	866	649	0.280	0.182	0.032
12/7/95	6.15	10.6	9.2	5.3	8.4	9.5	14.7	1066	967	176	104.7	12.3	7.3	2133	889	698	0 280	0.182	0.032
12/7/95	6:20	10.3	9.0	5.3	8.6	9.8	14.7	1067	973	175	105.4	12.1	7.5	2208	908	733	0.280	0 182	0 032
12/7/95	6.25	10.2	9.0	5.2	8.7	9.9	14.8	1068	974	175	89.0	11.8	7.4	2163	905	723	0.280	0 182	0.032
12/7/95	6:30	9.9	8.8	5.1	9.0	10.2	14.9	1071	974	175	107.1	12.4	7 8	2197	959	745	0.280	0.182	0.032
12/7/95	6·35	9.7	8.6	5.0	9.3	10.4	15.0	1071	974	175	84.8	12.6	8.3	2221	995	768	0.280	0 182	0.032
12/7/95	6.40	9.8	8.6	5.1	9.1	10.3	15.0	1069	973	176	95 5	12 6	8.1	2242	1016	780	0 280	0 182	0.032
12/7/95	6:45	9.8	8.6	5.1	9 1	10.3	15.0	1069	973	176	86.5	12.7	8.1	2231	1008	774	0 280	0.182	0.032
12/7/95	6·50	9 9	8.6	5.1	9.0	10.4	15.0	1067	975	176	93.3	11.5	7 9	2204	998	771	0.280	0.182	0.032
12/7/95	6·55	10.0	8.6	5 0	9 0	10.3	15.0	1066	975	176	87.1	12.5	7.9	2198	987	757	0 280	0.182	0.032
12/7/95	7:00	9.8	8.6	5.1	9.1	10.4	15.0	1066	977	175	86.3	12.0	7.9	2227	978	769	0.280	0.182	0.032
12/7/95	7.05	9.1	8 0	4.9	10.0	11.1	15.2	1067	977	170	82.6	13.7	9 2	2282	1058	867	0.280	0.182	0.032
12/7/95	7:10	9 0	7.9	4 8	10.0	11.3	15.3	1067	977	171	88.5	13.2	9.4	2303	1137	897	0.280	0.182	0.032
12/7/95	7 15	8.8	7.7	4.7	10.3	11.5	15.3	1068	979	169	80.0	14 8	10 0	2413	1212	945	0.280	0.182	0.032
12/7/95	7.20	8 0	7.0	4.4	11.3	12.3	15.7	1067	976	166	83.1	18.9	13.5	2620	1370	1165	0.280	0.182	0.032
12/7/95	7·25	7.8	6.8	4 3	11.5	12.5	15.8	1060	969	165	87.9	19.8	15.3	2786	1542	1285	0 280	0 182	0.032
12/7/95	7.30	7.5	6.6	4.2	12 0	12.7	16.0	1055	961	165	94.0	27.3	18 7	2998	1743	1414	0.280	0.182	0.032
12/7/95	7:35	7'0	6 3	4 1	12 4	13.1	16.1	1043	948	164	98 3	29 6	22 4	3061	1802	1487	0 280	0.182	0.032
12/7/95	7:40	6.7	5.9	3 9	12.7	13.4	16.3	1031	934	163	109.3	41.2	27.4	3424	2092	1674	0.280	0 182	0 032
12/7/95	7·45	6.2	5.5	3.6	13.3	13.9	16.6	1016	916	161	121.9	46.2	35.7	3611	2354	1858	0.280	0.182	0.032
12/7/95	7:50	10.6	10.8	9.7	18.6	18.3	19.8	993	900	163	37.2	10 6	8.4	845	517	285			
12/7/95	7:55	5.6	5.3	5 3	6.8	6.8	7 5	1260	886	159	2.9	69.5	70.1	3589	1995	945			
12/7/95	8·00	0 0	0.0	0 0	0.1	0.0	0.1	2502	1469	155	1.4	60.9	61.4	5918	4356	2454			
12/7/95	8 05	0 0	0.0	0.0	0.0	0.0	0.0	2502	2502	160	-0 2	15 0	15.0	2217	2174	2258			
12/7/95	8:10	0.0	0.1	0.0	6.1	4.5	3.8	2502	2502	269	396.0	0.9	0.8	1157	1221	1295			
12/7/95	8:15	0.0	0.1	1.2	21.0	17.3	16.5	2502	2502	2502	337.2	0.7	0.6	-84	782	531			

Hopewell, Virginia
Continuous Monitor Data
December 1995

Date	Time	CO_2			O_2			Temperature			Total Hydrocarbons			Carbon Monoxide			Moisture		
		SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet	SCC Inlet	SCC Outlet	Scrubber Outlet
		CO_2 (%)	CO_2 (%) (%)	CO_2 (%) (%)	O2 (%)	O2 (%)	O2 (%)	°F	°F	°F	THC (ppm)	THC (ppm)	THC (ppm)	CO (ppm)	CO (ppm)	CO (ppm)	H_2O IN	H_2O OUT	H_2O Stack
12/7/95	8.20	0.0	0.1	1.1	4.9	20.6	5.1	2502	2502	2502	144.9	0.7	0.5	6440	-20	2296			
12/7/95	8·25	0.0	0.1	0.1	0.2	19.0	0.6	2502	2502	2502	314.6	0.6	0.4	6802	38	2379			
12/7/95	8.30	0 0	0.0	0.1	0.0	0.0	0.5	2502	2502	2502	261.8	0.7	0 4	4113	3185	2446			
12/7/95	8:35	0.0	0.0	0.0	0.0	0 0	0.0	2502	2502	2502	68.4	3.6	0.2	3641	3507	2448			
12/7/95	8·40	-0.1	0.0	0.0	0.0	0.4	0.5	2502	2502	2502	13.8	46.8	53 0	2150	2026	2361			
12/7/95	8:45	-0 1	0.0	0.0	0.1	0.1	0.2	2502	2502	2502	7.5	25.2	74.1	1493	1425	1666			
12/7/95	8:50	1.2	1.3	0.6	4.4	8 4	7.7	2502	2502	2502	4.9	37.5	36.3	2001	1286	1388			
12/7/95	8:55	16 4	15.6	15 4	21.4	20.7	20.9	2502	2502	2502	3.6	19.3	18.4	-88	7	67			
12/7/95	9 00	10 6	7.7	8.0	13.8	15.7	16.6	2502	2502	2502	1.0	0.1	-0 8	-93	-20	8			