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AFOEHL REPORT 89-051EQ0058FEF

COMPLIANCE TESTING OF THE EGLIN AFB ASPHALT CONCRETE BATCH PLANT EGLIN AFB FL

JAMES A. GARRISON, Major, USAF, BSC

JUNE 1989

Final Report

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AF Occupational and Environmental Health Laboratory (AFSC)
Human Systems Division
Brooks Air Force Base, Texas 78235-5501

NOTICES

The Public Affairs Office has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nations.

This report has been reviewed and is approved for publication.

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JAMES C. ROCK, Colonel, USAF, BSC
Commander

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At the request of HQ AFSC/SGPB, stationary source compliance testing for particulate emissions was conducted on the Eglin AFB Asphalt Concrete Batch Plant, Bldg 572. Testing was requested to determine particulate emissions compliance status with regards to State of Florida Administrative Code, Rules 17-2 (Air Pollution) and 17-4 (Permits) and State of Florida Environmental Regulation Permit No. A046-122393. Testing involved using two types of aggregate, A red clay type material with a high percentage of fines and a coarser white sand. Results indicate that Emission rates for each type of aggregate were well below state emission limits imposed by Rule 17-2 and Permit No. A046-122393.

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I. INTRODUCTION

On 5-11 Mar 1989, a stationary source sampling survey for particulate emissions was conducted at the base asphalt concrete batch plant, Bldg 572, Eglin AFB FL by the Air Quality Function, Consultant Services Division, Air Force Occupational and Environmental Health Laboratory (AFOEHL). This survey was requested by HQ AFSC/SGPB to determine particulate emissions compliance status with regards to State of Florida Administrative Code (FAC), Rules 17-2 (Air Pollution) and 17-4 (Permits) and State of Florida, Department of Environmental Regulation (DER) Operation Permit No. A046-122393. Personnel involved with on-site testing are listed in Appendix A.

II. DISCUSSION

A. Background

On 27 Oct 1988, representatives from DER inspected the asphalt plant and determined that visible emissions exceeded the state opacity standard of 20% as defined in Rule 17-2.610(2) FAC and the base was issued a warning. Subsequently, work was performed on the scrubber to enhance its performance. To demonstrate and maintain compliance with applicable emissions standards, Eglin AFB requested that AFOEHL conduct particulate emission testing on the asphalt plant exhaust stack in accordance with the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60), Appendix A, Reference Method 5 (Determination of Particulate Emissions from Stationary Sources). AFOEHL was not requested to perform Reference Method 9 (Visual Determination of the Opacity of Emissions from Stationary Sources).

B. Site Description

The asphalt concrete batch plant was manufactured by the Barber-Greene Company and rated at 65 tons of dry aggregate per hour. However, the plant is permitted by DER to operate at only 40 tons of dry aggregate per hour. The plant consists of aggregate storage and handling, aggregate rotary dryer, dry aggregate screens and storage, weigh hopper and asphalt mixing. Figure 1 provides an overall view of the plant and Figure 2 provides a schematic of the plant showing the major operational components.

Air pollution control consists of a dry cyclone separator followed by an orifice type wet scrubber. Particulate emissions from the aggregate rotary dryer are ducted to the separator and wet scrubber. Particulate emissions from the screens and hot bins are ducted to the blower which drives the wet scrubber. A close-up view of the scrubber is provided in Figure 3. The major parts of the wet scrubber are the fan, contactor and separator. A schematic of the scrubber showing these components is presented in Figure 4. Particulate-laden air is blown into the contactor at high speed by the scrubber fan. In the contactor, the gas stream passes through a fine water mist where particulates are wetted and then through an orifice plate where turbulence is introduced into the gas stream which completes the wetting process. In the separator, water droplets and wetted particulates are separated from the gas stream by centrifugal action and drain to the bottom of the separator. Water and sludge are drained out of the separator to a settling pond.

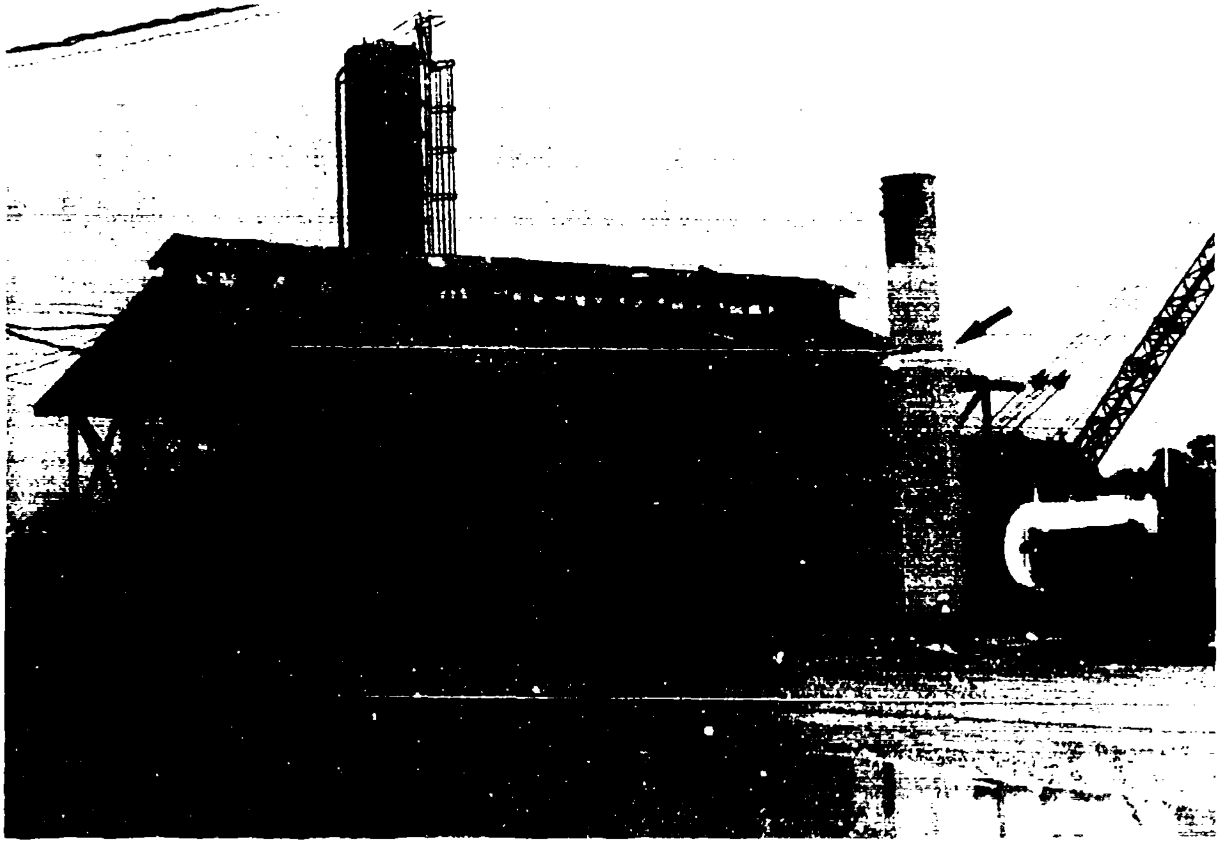

Figure 1: Overall View of Asphalt Plant
(Wet Scrubber and Stack Indicated by Arrow)

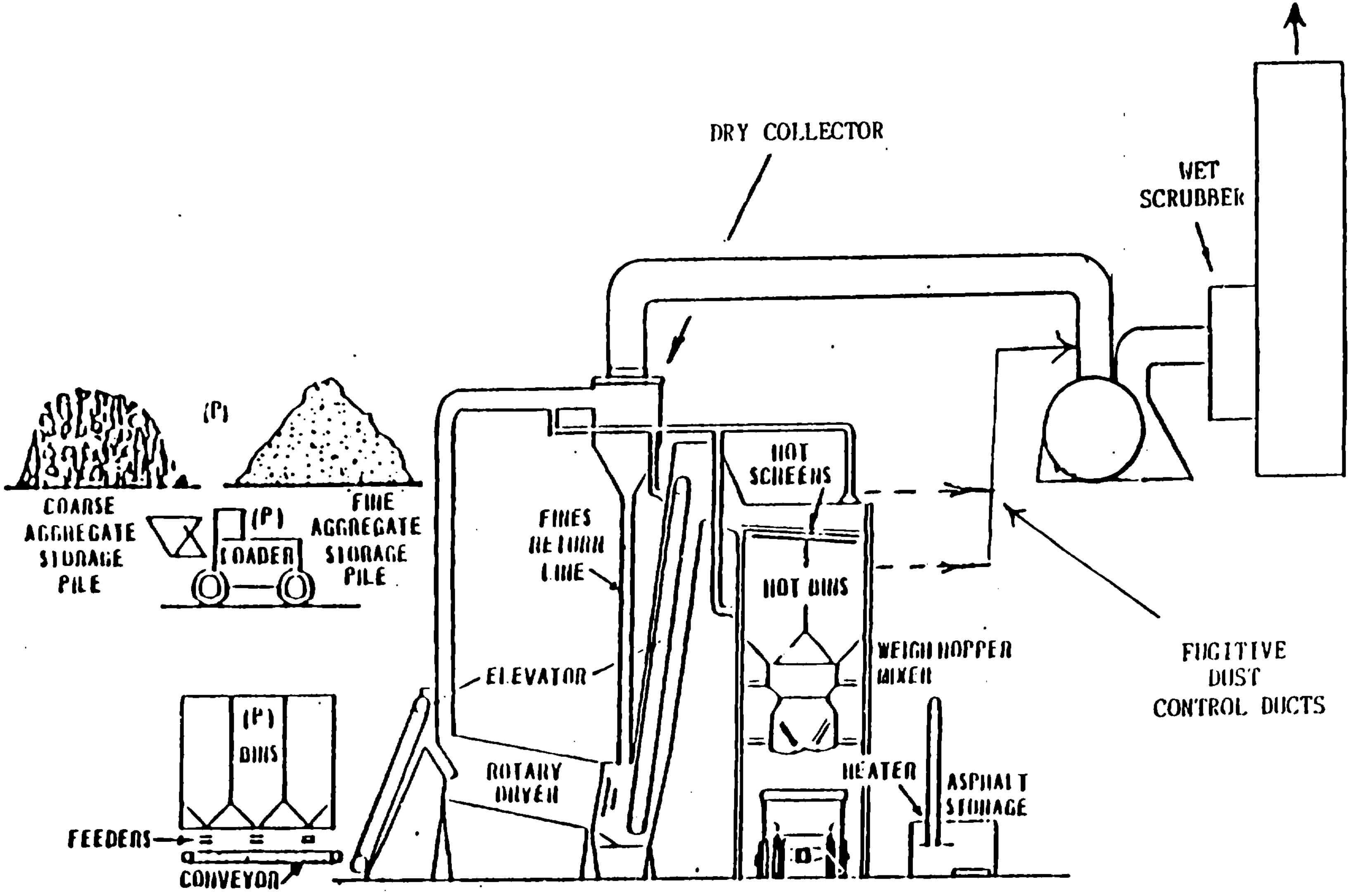

Figure 2: Asphalt Plant Schematic

Figure 3: View of Wet Scrubber
(Arrows indicate: 1: Contactor, 2: Separator and 3: Stack)

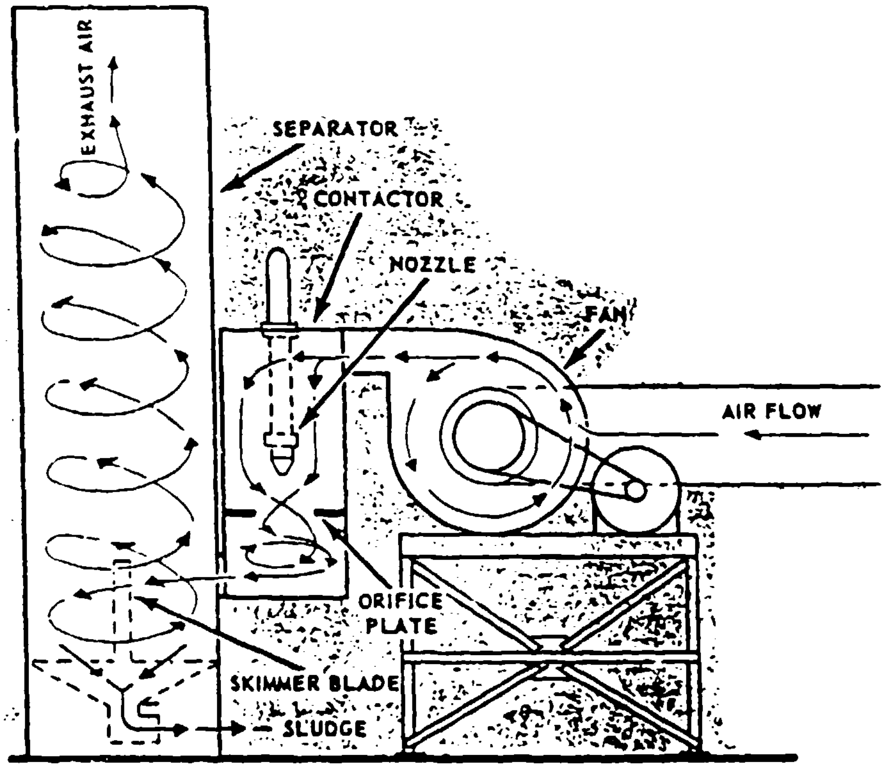

Figure 4: Wet Scrubber Schematic

C. Applicable Standards

Standards of performance and source sampling and monitoring requirements are defined under FAC Rule 17-2. Rule 17-2.610 and Operating Permit No. A046-122393 state that visible emissions shall not exceed 20% opacity under normal operating conditions and particulate emissions shall not exceed 31.23 pounds per hour at the maximum allowable operating rate of 40 tons of dry aggregate per hour. This emission limitation is established in Rule 17-2.610 using Table 610-1 and the following emission equation:

$$E = 17.31 \times P^{0.16}$$

where: E = Emissions in pounds per hour
P = Process weight in tons per hour

Rule 17-2.700 requires that particulate emissions testing be accomplished in accordance with Reference Method (EPA Method) 5 specified in 40 CFR 60, Appendix A. EPA Method 5 also includes EPA Methods 1-4. The applicable Florida Administrative Codes are provided in Appendix B.

D. Sampling Methods and Procedures

Two complete Method 5 compliance tests were conducted, each consisting of three complete and separate determinations of the total air pollutant emissions rate through the stack. One test evaluated the use of a red clay type aggregate with a high percentage of fines and the second the use of a coarser white sand. An attempt was made to operate the plant at the permitted process weight of 40 tons of dry aggregate per hour. The plant was operated to coincide with each sample run, i.e., production of asphalt and testing began and ended at essentially the same time (within 2-3 minutes of each other). Asphalt produced during each sampling run was put in dump trucks and weighed to determine the process weight.

FAC 17-2 requires that all emissions tests be conducted in accordance with the procedures and analysis methods specified in 40 CFR 60, Appendix A, Methods 1-5. Therefore, test methods, equipment, sample train preparations, sampling and recovery, calibration requirements and quality assurance were done in accordance with the methods and procedures outlined in 40 CFR 60, Appendix A.

Sampling ports were already in place on the scrubber stack and located 0.74 stack diameters upstream from the stack exit and 1.6 stack diameters downstream from any disturbance (straightening vanes). The 1.6 duct diameter downstream distance does not meet EPA Method 1 requirements; however, cyclonic flow evaluation showed that the average flow angle at the sampling port location averaged 8 degrees which indicated an acceptable flow condition. Based on a 42 inch inside stack diameter, port location and type of sample (particulate), a total of 24 traverse points were determined for emission evaluation. The sampling time for each sampling run was 60 minutes; therefore, the sampling time per traverse point was 2.5 minutes. Illustrations showing port locations and sampling points are provided in Appendix C.

Prior to each emissions test, a preliminary velocity pressure and temperature traverse was accomplished to size the sampling nozzle. At the same time, cyclonic flow was determined. For acceptable flow conditions to exist in a stack, the average of the absolute value of the flow angles taken at each traverse point must be less than or equal to 20 degrees. The resulting flow angle averaged 8 degrees, indicating that acceptable flow condition existed in the scrubber stack.

During each sample run, a flue gas sample for ORSAT analysis (measures oxygen, and carbon dioxide for stack gas molecular weight determination and emissions correction) was taken. ORSAT sampling and analysis equipment are shown in Figures 5 and 6. Flue gas moisture content, also needed for determination of gas molecular weight, was obtained during particulate sampling.

Particulate samples were collected using the sampling train shown in Figure 7. The train consisted of a buttonhook probe nozzle, heated stainless steel probe, heated glass filter, impingers and pumping and metering device. The nozzle was sized prior to each sample run so that the gas stream could be sampled isokinetically; in other words, the velocity at the nozzle tip was the same as the stack gas velocity at each point sampled. Flue gas velocity pressure was measured at the nozzle tip using a Type-S pitot tube connected to a 10 inch inclined-vertical manometer. Type K thermocouples were used to measure flue gas as well as sampling train temperatures. The probe was heated to minimize moisture condensation. The heated filter was used to collect particulate materials. The impinger train (first, third and fourth impingers: modified Greenburg-Smith type, second impinger: standard Greenburg-Smith design) was used as a condenser to collect stack gas moisture. The pumping and metering system was used to control and monitor the sample gas flow rate. Field data sheets for each particulate emissions test are provided in Appendixes C and D. Equipment calibration data is presented in Appendix E.

Particulate emissions calculations were done using "Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators" (EPA-340/1-85-018) developed by the EPA Office of Air Quality Planning and Standards, Research Triangle Park NC. This is our standard method for calculating emissions data. Emissions calculations from the EPA programs are found in Appendix F.

III. CONCLUSIONS

Process weight during compliance testing using the red clay aggregate averaged 38.2 tons per hour and the white sand averaged 36.5 tons per hour. These weights are documented on the field data sheets provided in Appendixes C and D. Using the emission equation discussed above in paragraph IIC, the emissions limitations for the red clay and white sand tests are 31 and 30.8 pounds per hour, respectively. The average particulate emission rate determined from emissions testing for the clay and sand were 10.6 and 9.8 pounds per hour, respectively. The results of both compliance tests indicate that particulate emissions from the asphalt plant are well below state emissions limits imposed by FAC Rule 17-2 and Operation Permit No. A046-122393.

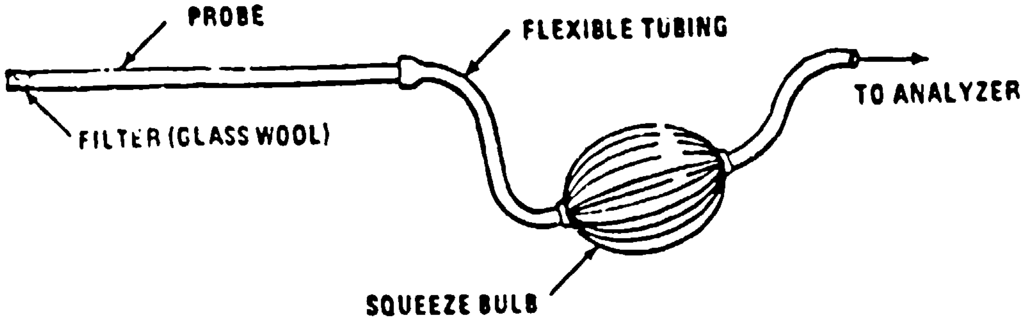

Figure 5: ORSAT Sampling Train

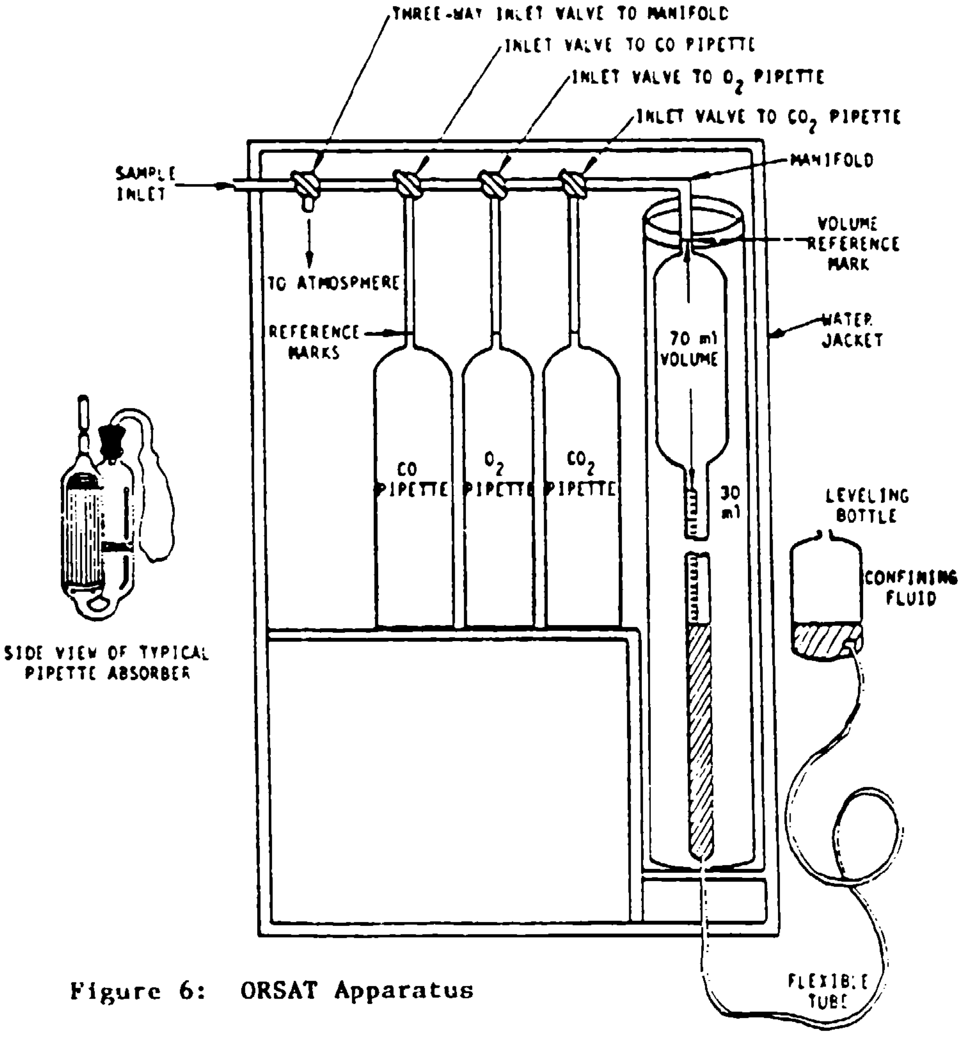

Figure 6: ORSAT Apparatus

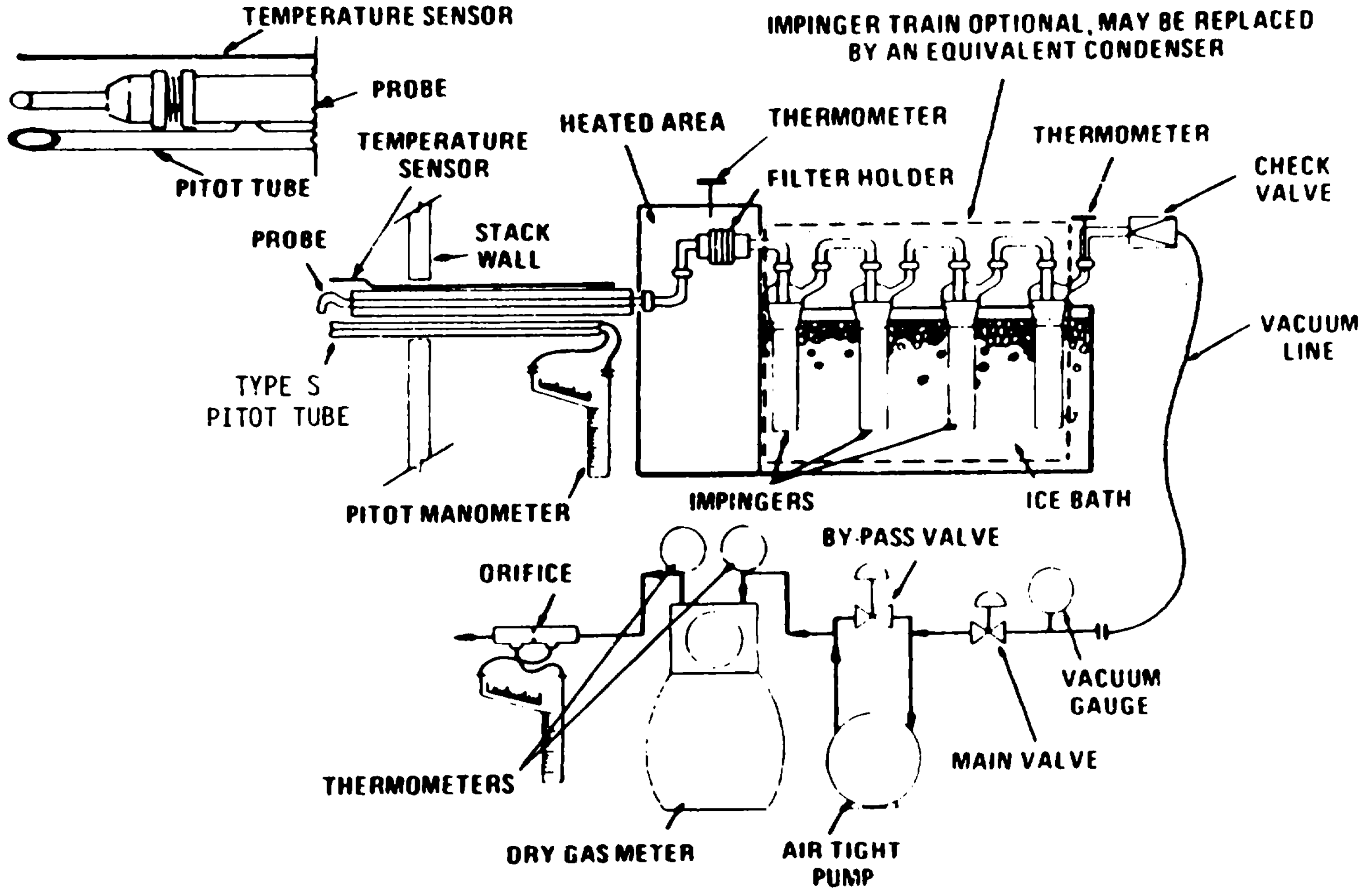

Figure 7: Particulate Sampling Train

Table 1 provides asphalt plant operating parameters, stack conditions at time of testing and emissions results.

IV. RECOMMENDATIONS

The Eglin AFB asphalt plant is well below state standards with respect to particulate emissions and no further testing is required at this time. AFOEHL will remain active in providing consultant and testing services to Eglin AFB with respect to the asphalt plant.

Table 1: Emissions Survey Results

DATE	RUN #	AGGREGATE	PROCESS WEIGHT (tons/hour)	STACK TEMP (deg F)	STACK GAS MOISTURE (%)	STACK GAS FLOWRATE (dscfm)	EMISSIONS RATE (lb/hr)
8 MAR 89	1	RED CLAY	39.0	131	15.3	6961	10.4
8 MAR 89	2	RED CLAY	35.5	131	14.4	7087	11.2
8 MAR 89	3	RED CLAY	40.0	132	15.4	6508	10.2
			AVG = 38.2				AVG = 10.6
9 MAR 89	1	SAND	36.0	140	17.5	6236	8.4
9 MAR 89	2	SAND	35.5	135	17.0	8055	9.0
9 MAR 89	3	SAND	38.0	141	17.6	9161	12.0
			AVG = 36.5				AVG = 9.8

REFERENCES

1. "Standards of Performance for New Stationary Sources", Title 40, Part 60, Code of Federal Regulations, July 1, 1987.

2. Quality Assurance Handbook for Air Pollution Measurement Systems - Volume III, Stationary Source Specific Methods, U.S. Environmental Protection Agency, EPA-600/4-77-027-b, Research Triangle Park, North Carolina, December 1984.

3. Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators. U.S. Environmental Protection Agency, EPA-340/1-85-018, Research Triangle Park, North Carolina, May 1987.

APPENDIX A
Personnel Information

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1. AFOEHL Test Team

Maj James Garrison, Chief, Air Quality Function
Capt Paul Scott, Consultant, Air Resources Meteorologist
Capt Ronald Vaughn, Consultant, Air Quality Engineer
1Lt Charles Attebery, Consultant, Air Quality Engineer

AFOEHL/ECQ
Brooks AFB TX 78235-5501

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2. Eglin AFB On-site Representatives

Lt Col Jerry Morford Mr Jeff Drum	HQ 3200 SPTW/DEV AUTOVON 872-4435 Commercial (904) 882-4435
Lt Col John Pontier	AFSC Regional Hospital Eglin/SGPB AUTOVON 872-5787 Commercial (904) 882-5787
Mr Clarence Steward Mr Ronnie Bush	3202 CES/DEMGE AUTOVON 872-4277 Commercial (904) 882-4277

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APPENDIX B
State Regulations

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FLORIDA AIR POLLUTION RULES

(Official Compilation of Rules and Regulations of the State of Florida, Title 17 — Department of Environmental Regulation, Chapter 17-2 — Air Pollution; Adopted effective January 18, 1972; Amended effective December 28, 1972; November 21, 1973; February 8, 1974; April 9, 1974; December 28, 1974; June 30, 1975; June 10, 1976; July 20, 1976; March 2, 1977; May 10, 1977; December 1, 1977; January 3, 1978; June 8, 1978; October 1, 1978; December 4, 1978; January 10, 1979; March 14, 1979; July 19, 1979; November 20, 1979; June 24, 1980; July 13, 1980; September 17, 1980; January 8, 1981; January 12, 1981; April 7, 1981; August 26, 1981; November 1, 1981; January 12, 1982; February 24, 1982; May 26, 1982; November 25, 1982; January 9, 1983; March 31, 1983; July 21, 1983; January 12, 1984; January 19, 1984; February 28, 1984; May 10, 1984; May 25, 1984; July 20, 1984; September 21, 1984; April 10, 1985; April 23, 1985; May 1, 1985; July 9, 1985; August 14, 1985; Recodified effective November 14, 1985; Amended effective April 17, 1986; May 6, 1986; May 28, 1986; October 20, 1986; May 30, 1988)

PART I DEFINITIONS

17-2.100 Definitions. The following words and phrases when used in this chapter shall, unless content clearly indicates otherwise, have the following meanings:

(1) "Acid Mist" — Liquid drops of any size of any acid including but not limited to sulfuric acid and sulfur trioxide, hydrochloric acid and nitric acid as measured by test methods approved by the Department.

(2) "Actual Emissions" — The actual rate of emission of a pollutant from a source as determined in accordance with the following provisions:

(a) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the source actually emitted the pollutant during a two year period which precedes the particular date and which is representative of the normal operation of the source.

The Department may allow the use of a different time period upon a determination that it is more representative of the normal operation of the source. Actual emissions shall be calculated using the source's actual operating hours, production rates and types of materials processed, stored, or combusted during the selected time period.

(b) The Department may presume that source specific federally enforceable allowable emissions for a source are equivalent to the actual emissions of the source.

(c) For a source which has not completed start-up and testing on a particular date, actual emissions shall equal the potential emissions of the source on that date.

(3) "Administrator" — The Administrator of the United States Environmental Protection Agency or the Administrator's designee.

(4) "Adverse Impact on Visibility" — An impairment to visibility which interferes with the management, protection, preservation, or enjoyment of the visitor's visual experience of a Federal Class I area. This determination shall be made on a case-by-case basis, utilizing EPA-approved methods of visibility impairment analysis, if available, and taking into account such factors as the geographic extent, intensity, duration, frequency, and time of visibility impairments, and how these factors correlate with the times of visitor use of the Federal Class I area and the frequency and timing of natural conditions that reduce visibility.

(5) "Affected Pollutant" — In a nonattainment area or area of influence the pollutant for which the area is designated nonattainment is the affected pollutant except in the case of ozone nonattainment areas where the affected pollutant is volatile organic compounds (VOC).

(6) "Air Curtain Incinerator" — A portable or stationary combustion device that directs a plane of high velocity forced draft air through a manifold head into a pit with vertical walls in such a manner as to maintain a curtain of air over the surface of the pit and a recirculating motion of air under the curtain.

(7) "Air Dried Coating" — Coatings which are dried by the use of air or forced warm air at temperatures up to 194°F (90°C).

(8) "Air Pollutant" — Any substance (particulate, liquid, gaseous, organic or

inorganic) which if released, allowed to escape, or emitted, whether intentionally or unintentionally, into the outdoor atmosphere may result in or contribute to air pollution.

(9) "Air Pollution" — The presence in the outdoor atmosphere of the state of any one or more substances or pollutants in quantities which are or may be harmful or injurious to human health or welfare, animal or plant life, or property, or unreasonably interfere with the enjoyment of life or property, including outdoor recreation.

(10)(a) "Destructive Control Device" — Any device intended and designed for the reduction of VOC pollutant emissions from a stationary air pollution source which alters the chemical composition of the pollutant flowing through the device.

(b) "Non-Destructive Control Device" — Any device intended and designed for the reduction of VOC pollutant emissions from a stationary air pollution source which does not alter the chemical composition of the pollutant flowing through the device.

(11) "Air Pollution Control Trust Fund" or "Air Trust Fund" shall mean the trust fund established in the Department under the authority of Section 320.03(6), Florida Statutes, for purposes of air pollution control.

(12) "Air Pollution Episode" — Any occurrence of elevated levels of pollutants in the atmosphere which require hasty and unusual abatement action.

(13) "Air Quality Control Region" — Any air quality control region designated pursuant to Section 107 of the Clean Air Act. The boundaries of the air quality control regions in Florida are set forth in 40 CFR Sections 81.49, 81.68, 81.91, 81.95, 81.96 and 81.97. A copy of the above referenced documents is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., and may be inspected at the Department's Tallahassee office.

(14) "Allowable Emissions" — The emission rate calculated using the maximum rated capacity of the source, as limited or modified by any state or federally enforceable restrictions on the operating rate or hours of operation, or both, and the most stringent state or federal emission limiting standard applicable to the source; or the maximum allowable emission rate specified by any state or federally enforceable permit conditions.

(15) "Application Area" — The area where a coating is applied by spraying, dipping, or flowcoating techniques.

(16) "Ambient Air Quality Standard" or "Ambient Standard" — A restriction established to limit the quantity or concentration of an air pollutant that may be allowed to exist in the ambient air for any specific period of time.

(a) "National Ambient Air Quality Standard" means an ambient standard established by EPA as listed in 40 CFR 50.

(b) "Primary Standard" means an ambient standard established to protect public health.

(c) "Secondary Standard" means an ambient standard established to protect the public welfare including the protection of animal and plant life, property, visibility and atmospheric clarity, and the enjoyment of life and property.

(d) "State Ambient Air Quality Standard" means an ambient standard established or adopted by the Department.

(17) "Area of Influence" — An area which is outside the boundary of a nonattainment or air quality maintenance area but within the locus of all points that are fifty kilometers outside of the boundary of the nonattainment or air quality maintenance area.

(18) "Asphalt" — A dark brown to black cementitious material (solid, semisolid or liquid in consistency) in which the predominating constituents are bitumens which occur in nature as such or which are obtained as a residue in refining petroleum.

(19) "Base Emission Limit (BEL)" — The maximum emission offset that any source may possess or be eligible to provide to another source. BEL shall be determined in accordance with applicable provisions of Rule 17-2.510(6).

(20) "Baseline Area" — The area (and every part thereof) designated as a prevention of significant deterioration (PSD) area under Rule 17-2.450 of this chapter in which the facility or modification establishing the baseline date would construct or in which the emissions of the facility (or the significant net increase in emissions for a modification) would have a predicted air quality impact equal to or greater than one microgram per cubic meter (annual average) of the pollutant for which the baseline date is established.

(21) "Baseline Concentration" — The ambient concentration level, or set of levels, that is predicted to occur at each point within a baseline area for conditions existing at the time of the applicable baseline date. The concentration is comprised of the predicted impact of the baseline emissions, using an appropriate air quality model and meteorological data that are generally representative of the baseline area, plus a representative background concentration. A baseline concentration is determined for each pollutant for which a baseline date is established and for each averaging time for which a maximum allowable increase is established in Rule 17-2.310, F.A.C.

For the annual average, the baseline concentration is the average concentration that is predicted to occur at each point within the area for each calendar year modeled.

For shorter term averages, the baseline concentration is the set of all such short-term concentrations predicted to occur at each point within the area for each calendar year modeled.

(22) "Baseline Date" — The baseline date for each pollutant for which maximum allowable increases have been established under Rule 17-2.310 is the earliest date after August 7, 1977, that a facility or a modification subject to new source review under either 40 C.F.R. 52.21 or Rule 17-2.500 submits a complete application for permit under such regulations, provided that:

(a) On the date the complete application is filed, the area in which the facility or modification would be constructed is designated as an attainment or unclassifiable area under Section 107(d)(1) of the Clean Air Act (if the application is filed under 40 C.F.R. 52.21), or as a PSD area under Rule 17-2.450 of this chapter (if the application is filed under Rule 17-2.500) for the pollutant; and

(b) In the case of a facility, the emissions of the pollutant, would be equal to or greater than the significant emission rates in Table 500-2, or, in the case of modification, there would be a significant net emission increase of the pollutant.

(23) "Baseline Emissions" — The emissions of each pollutant for which maximum allowable increases have been established under Section 17-2.310 that are used to predict baseline concentration. Baseline emissions are quantified as specified in Section 17-2.500(4).

(24) "Batch Process" — A process which takes in the basic raw materials at

the beginning of a cycle and processes them in accordance with a predetermined scheme during which no more basic raw materials are added to the process. Two variations include:

(a) Processes where some of the reactants (materials) are added at the beginning with the remainder added as the reaction progresses.

(b) Processes where once the materials are added, one or more products are continuously removed as the reaction progresses.

Such processes include, but are not limited to, production of super phosphate, basic oxygen furnaces, and cement batch plants.

(25) "Best Available Control Technology" or "BACT" — An emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant.

If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice or operation.

Each BACT determination shall include applicable test methods or shall provide for determining compliance with the standard(s) by means which achieve equivalent results.

(26) "Black Liquor Oxidation System" — The vessels used to oxidize, with air or oxygen, the black liquor, and associated storage tank(s).

(27) "Black Liquor Solids" — The dry weight of the solids which enter the kraft recovery furnace in the black liquor.

(28) "Brown Stock Washer System" — Brown stock washers and associated knotters, vacuum pumps, and filtrate tanks used to wash the pulp following the digester system.

(29) "Bulk Gasoline Plant" — A gasoline storage and distribution facility which receive gasoline from bulk terminals by trailer transport, stores it in tanks, and subsequently dispenses it via account trucks to farms, businesses, and service stations, and which has an annual average daily throughput of less than 20,000 gallons (75,700 liters) but more than 2,000 gallons (7,570 liters) calculated on the basis of days of actual operation.

(30) "Bulk Gasoline Terminal" — A gasoline storage facility which receives gasoline from its supply sources primarily by pipeline, ship, or barge, and delivers gasoline to bulk gasoline plants or to commercial or retail accounts primarily by tank truck, and has an annual large daily throughput of equal to or more than 20,000 gallons (75,700 liters) of gasoline calculated on the basis of days of actual operation.

(31) "Calciner" — A device used to calcine lime mud, consisting primarily of calcium carbonate, into quicklime (calcium oxide), by using a fluidized bed to burn or reburn the lime mud in suspension.

(32) "Capacity Factor" — The ratio of the average load on or output of a machine or unit operation to the permitted capacity rating of the machine or unit operation for a normal operation period or cycle. The "capacity factor" shall be expressed as a percent of rating.

(33) "Capture System" — The equipment including hoods, ducts, fans, etc., used to contain, capture, or transport a pollutant to a control device.

(34) "Carbon Absorption System" — A device containing absorbent material (e.g., activated carbon, aluminum, silica gel); an inlet and outlet for exhaust gases; and a system to regenerate the saturated absorbent. The carbon absorption system must provide for the proper disposal or reuse of all VOC absorbed.

(35) "Carbonaceous Fuel" — Solid materials composed primarily of vegetative matter such as tree bark, wood waste, bagasse, and/or the combustible fraction of municipal wastes.

(36) "Carbonaceous Fuel Burning Equipment" — A firebox, furnace or combustion device which burns carbonaceous and fossil fuels for the primary purpose of producing steam or to heat other liquids or gases. The term includes bagasse burners, bark burners, and waste wood burners, but does not include teepee or conical wood burners or incinerators.

(37) "Clean Air Act (CAA)" or "Act" — The Federal Clean Air Act (PL 95-95) as amended on August 7, 1977. The above reference is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., and may be inspected at the Department's Tallahassee office.

(38) "Clear Coat" — A coating which lacks color and opacity or is transparent and uses the undercoat as a reflectant base or undertone color.

(39) "Coating" — The application of a protective film to a surface.

(40) "Coating Application System" — Any operations and equipment which apply, convey, and dry a surface coating, including, but not limited to, spray booths, flow coaters, conveyors, flashoff areas, air dryers and ovens.

(41) "Coating Applicator" — An apparatus used to apply a surface coating to a surface.

(42) "Coating Line" — One or more apparatus or operations which include a coating applicator, flashoff area, and oven wherein a surface coating is applied, dried and/or cured.

(43) "Coil Coating" — The coating of any flat metal sheet or strip that comes in rolls or coils.

(44) "Cold Cleaning" — The batch process of cleaning and removing soils from metal surfaces by brushing, flushing or immersion while maintaining the solvent below its boiling point. Wipe cleaning is not included in this definition.

(45) "Cold Mixed Asphaltic Concrete Patching Material" — A mixture of asphalt cement, stone aggregate, and mineral filler blended together with a small amount of petroleum solvent (diluent). The diluent prevents the material from hardening after the heat of mixing has dissipated, thereby allowing stockpile storage of the material for use in pavement repairs when the use of hot asphaltic concrete is impractical.

(46) "Commence Construction" — As applied to the construction or modification of a facility, means that the owner has all preconstruction permits and approvals required under federal air pollution control laws and regulations and those air pollu-

tion control laws and regulations which are part of the State Implementation Plan (SIP) or which are part of Chapter 17-2 to the extent that the provisions of this chapter specify conditions or requirements for obtaining a state construction permit.

(a) Begun, or caused to begin, a continuous program of actual on-site construction or physical reasonable time; or

(b) Entered into binding agreements or contractual obligations, which cannot be cancelled or modified undertake a program of actual construction or physical modification of the facility to be completed within a reasonable time; or

(c) Begun, or caused to begin, those onsite activities, other than preparatory activities, which mark the initiation of a change in the method of operation of the facility.

(47) "Complete" — In reference to an application for a permit, means that the application contains all of the information necessary for processing the application.

(48) "Condensate" — Hydrocarbon liquid separated from natural gas which condenses due to changes in the temperature and/or pressure and remains liquid at standard conditions.

(49) "Condensate Stripper System" — A column and associated condensers, used to strip, with air or steam, total reduced sulfur (TRS) compounds from contaminated condensate streams.

(50) "Construction" — The act of performing on-site fabrication, erection, installation or modification of a source or facility of a permanent nature, including, but not limited to, installation of foundations or building supports, laying of underground pipe work or electrical conduit; and fabrication or installation of permanent storage structures, component parts of a source or facility, associated support equipment, or utility connections. Land clearing and other site preparation activities are not a part of the construction activities.

(51) "Continuous Monitoring system" — All equipment, required under Section 17-2.710, used to calibrate, sample, condition (if applicable), and analyze air emissions, or used to provide a permanent record of emissions or process parameters.

(52) "Continuous Unloader" — A bulk materials unloading system that is normally installed at wharf or pier side. A typical system is essentially of enclosed construction, providing for dust abatement and weather tightness, utilizing screw conveyors, elevators, conveyor belt arrangements, or similar devices to facilitate basically uninterrupted discharge of materials from vessel cargo holds.

(53) "Conveyorized Degreasing" — The continuous process of cleaning and removing soils from metal surfaces by operating with either cold or vaporized solvents.

(54) "Cross Recovery Furnace" — A furnace used to recover chemicals consisting primarily of sodium and sulfur compounds by burning black liquor which on a quarterly basis contains more than 7 weight percent of the total pulp solids from the neutral sulfite semichemical (NSSC) process and has a green liquor sulfidity of more than 28 percent.

(55) "Crude Oil" — A naturally occurring mixture which consists of hydrocarbons and/or sulfur, nitrogen and/or oxygen derivatives of hydrocarbons and which is liquid at standard conditions.

(56) "Cutback Asphalt" — Asphalt cement which has been liquified by blending with petroleum solvents (diluents). Upon exposure to atmospheric conditions the diluents evaporate, leaving the asphalt cement to perform its function.

(57) "Delivery Vessel" — Tank trucks or trailers equipped with a storage tank and used for the transport of gasoline from sources of supply to stationary storage tanks of gasoline dispensing facilities.

(58) "Department" — The State of Florida Department of Environmental Regulation.

(59) "Digester System" — Each continuous digester or each batch digester used for the cooking of wood in white liquor, and associated flash tank(s), blow tank(s), chip steamer(s) and condenser(s).

(60) "Dry Cleaning Facility" — A facility engaged in the cleaning of fabrics in a nonaqueous solvent by means of one or more washes in solvent, extraction of excess solvent by spinning and drying by tumbling in an airstream. The facility includes but is not limited to: washer, dryer, filter and purification systems; waste disposal systems; holding tanks; pumps and attendant piping and valves.

(61) "Emission" — The discharge or release into the atmosphere of one or more air pollutants.

(62) "Emission Limiting Standard" or "Emission Standard" or "Emission Limitation" or "Performance Standard" — Any restriction established in or pursuant to a regulation adopted by the Department which limits the quantity, rate, concentration or opacity of any pollutant released, allowed to escape or emitted, whether intentionally or unintentionally, into the atmosphere, including any restriction which prescribes equipment, sets fuel specifications, or prescribes operation or maintenance procedures for a source to assure emission reduction or control.

(63) "Emission Offset" or "Offset" — A compensating reduction in the emissions of an affected pollutant from a permitted source to provide an emission allowance for a new or modified source.

(64) "Emission Point" or "Discharge Point" — The point at which an air pollutant first enters the atmosphere.

(65) "Emulsified Asphalt" — An emulsion of asphalt cement and water which contains a small amount of an emulsifying agent; a heterogeneous system containing two normally immiscible phases (asphalt and water) in which the water forms the continuous phase of the emulsion, and minute globules of asphalt form the discontinuous phase.

(66) "End Sealing Compound" — A synthetic rubber compound which when coated on a can end functions as a gasket when the end is assembled on the can.

(67) "Environmental Protection Agency" or "EPA" — The United States Environmental Protection Agency.

(68) "Excess Emissions" — Emissions of pollutants in excess of those allowed by Chapter 17-2, Florida Administrative Code, or by a permit issued pursuant to 17-4, Florida Administrative Code. The term applies only to conditions which occur during startup, shutdown, sootblowing, load changing or malfunction.

(69) "Existing Source" — A source which was in existence, in operation, or under construction, or had received a permit to begin construction prior to January 18, 1972. However, "existing source" for the purposes of Sections 17-2.650(2) and 17-2.510 shall mean any source which is not defined as a new source with respect to a specific rule or provision of any of those sections. For the purpose of Section 17-2.650(1), existing sources are those which were constructed or for which a construction permit was issued prior to July 1, 1979.

(70) "Exterior Base Coating" — A coating applied to the exterior of a can to provide exterior protection to the metal and background for the lithographic or printing operation.

covery furnace designed to evaporate remaining water from and burn the organic content of a spray of finely divided concentrated black liquor droplets while the droplets are in suspension. Such a furnace will have only two levels of air introduction (primary and secondary) and a flat hearth with the smelt spouts located above the hearth.

(128) "New Source" — A source which is not in existence, for which an application for a permit to construct has not been submitted before the effective date of an applicable section or provision, or which has been reclassified as a new source pursuant to any provision of this Chapter.

(129) "New Source Allowance" — An emission allowance as provided in Rule 17-2.510(5) to accommodate the growth in emissions resulting from the operation of new or modified facilities in a nonattainment area.

(130) "Nitric Acid Plant" — Any facility producing weak nitric acid by employing either the pressure or atmospheric pressure process.

(131) "Nonattainment Area" — Any area not meeting ambient air quality standards and designated as a nonattainment area under Rule 17-2.410 of this chapter. Such an area may be designated as a particulate, sulfur dioxide, nitrogen dioxide, carbon monoxide or ozone nonattainment area, depending on which ambient standard has been violated. An area may be designated as nonattainment for more than one air pollutant.

(132) "Objectionable Odor" — Any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance.

(133) "Odor" — A sensation resulting from stimulation of the human olfactory organ.

(134) "Old Design Kraft Recovery Furnace" — Any straight kraft recovery furnace which is not of "membrane wall" construction to minimize air in-leakage.

(135) "Opacity" — A condition which renders material partially or wholly impervious to rays of light causing obstruction of observer's view.

(136) "Open Top Vapor Degreasing" — The batch process of cleaning and removing soils from metal surfaces by condensing hot solvent vapor on the colder metal parts.

(137) "Organic Compounds" — Any substance that contains the element carbon, except carbon oxides and various carbonates.

(a) "Halogenated Organic Compound" — Any organic compound in which one or more hydrogen atoms have been replaced by a halogen atom(s).

(138) "Oven" — A chamber within which heat is used to bake, cure, polymerize, and/or dry a surface coating.

(139) "Overvarnish" — A coating applied directly over ink to reduce the coefficient of friction, to provide a gloss, and to protect the finish against abrasion and corrosion.

(140) "Owner" or "Operator" — Any person or entity who operates, controls or supervises a stationary source.

(141) "Packaging Rotogravure Printing" — Rotogravure printing upon paper, paper board, metal foil, plastic film, and other substrates, which are, in subsequent operations, formed into packing products and labels for articles to be sold.

(142) "Paper Coating" — Coatings put on paper and pressure sensitive tapes regardless of substrate. Related web coating processes on plastic film and decorative coatings on metal foil are included in this definition.

(143) "Particulate Matter"

(a) With respect to concentrations in the atmosphere, particulate matter means any airborne finely divided solid or liquid material.

(b) With respect to emissions, particulate matter means all finely divided solid or liquid material, other than uncombined water, emitted to the atmosphere as measured by applicable reference methods, or an equivalent or alternative method, specified in 40 CFR 60 Appendix A and adopted as part of this rule.

(144) "PPM$_{10}$"

(a) With respect to concentrations in the atmosphere, PM$_{10}$ means particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers as measured by a reference method based on 40 CFR 50 Appendix J and designated in accordance with 40 CFR 53 or by an equivalent method designated in accordance with 40 CFR 53.

(b) With respect to emissions, PM$_{10}$ means finely divided solid or liquid material, with an aerodynamic diameter less than or equal to a nominal 10 micrometers emitted to the atmosphere as measured by an applicable reference method, or an equivalent or alternative method specified in 40 CFR 60 Appendix A and adopted as part of this rule.

(145) "Pentrating Prime Coat" — An application of low viscosity liquid asphalt to an absorbent surface. It is used to prepare an untreated base for an asphalt surface. The prime penetrates the base and plugs the voids, hardens the top, and helps bind to the overlying asphalt course. It also reduces the necessity of maintaining an untreated base course prior to placing the asphalt pavement.

(146) "Petroleum Liquids" — Petroleum, condensate, and any finished or intermediate products manufactured in a petroleum refinery but does not mean No. 2 through No. 6 fuel oils as specified in ASTM D 396-69, gas turbine fuel oils No. 2-GT through No. 4-GT as specified in ASTM D 2880-71, or diesel fuel oils No. 2-D and No. 4-D as specified in ASTM D 975-68.

(147) "Petroleum Refinery" — Any facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, or other products through distillation of crude oils, or through redistillation, cracking, extraction, or reforming of unfinished petroleum derivatives.

(148) "Plant Section" — A part of a plant consisting of one or more unit operations including auxiliary equipment which provides the complete processing of input (raw) materials to produce a marketable product, including but not limited to, granular triple super phosphate, phosphoric acid, run-of-pile triple super phosphate, and diammonium phosphate or one or more unit operations including auxiliary equipment or structures which are used for the functions such as: storage, shipping, loading, unloading, or bagging.

(149) "Portland Cement Plant" — Any facility manufacturing Portland Cement by either the wet or dry process.

(150) "Potential Emissions" or "Potential to Emit" — The maximum capacity of a source or facility to emit pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source or facility to emit a pollutant, including air pollution control equipment and any federally enforceable restrictions on hours of operation or on the type or amount of material

combusted, stored, or processed, shall be treated as part of its design. The potential emissions of a source or facility do not include any secondary emissions that may be associated with the source or the facility.

(151) "Prime Coat" — The first film of coating applied in a multi-coat operation.

(152) "Printed Interior Panels" — Panels whose grain or natural surface is obscured by fillers and basecoats upon which a simulated grain or decorative pattern is printed.

(153) "Process Weight" — The total weight of all materials introduced into any process. Solid fuels and recycled materials are included in the determination of process weights; but uncombined water, liquid and gaseous fuels, combustion air, or excess air are not included.

(154) "Publication Rotogravure" — Rotogravure printing upon paper which is subsequently formed into books, magazines, catalogues, brochures, directories, newspapers supplements and other types of printed materials.

(155) "Quench Area" — A chamber where the hot metal exiting the oven is cooled by either a spray of water or a blast of air followed by water cooling.

(156) "Reasonably Available Control Technology" or "RACT" — The lowest emission limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. It may require technology that has been applied to similar, but not necessarily identical, source categories.

(157) "Reconstruction" — Subject to the conditions set forth in 17-2.530, reconstruction of a source is presumed if the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost of a comparable entirely new source. The concept of reconstruction shall be used only with respect to sources located in a nonattainment area that are major for the pollutant for which the area is nonattainment.

(158) "Redesignation of an Area" — A change in the designation or a redefinition of the boundaries of an area for any of the designations listed under Part IV of this chapter.

(159) "Refinery Fuel Gas" — Any gas which is generated by a petroleum refinery process unit and which is combusted, including any gaseous mixture of natural gas and fuel gas.

(160) "Reid Vapor Pressure" — The absolute vapor pressure of volatile crude oil and volatile non-viscous petroleum liquids except liquified petroleum gases as determined by American Society for Testing and Materials, Part 17, 1973, D-323-72 (reapproved 1977).

(161) "Relocatable Facility" — A facility such as, but not limited to, an asphalt plant, portable power generator, and cement batch plant, which is designated to be physically moved to, and operated on, different sites by being wholly or partially dismantled and reerected in essentially the same configurations. It shall not be operable while in transit.

(162) "Ringelmann Chart" — The Chart published and described in the U.S. Bureau of Mines Information Circulars No. 8333 and No. 7718. The above references are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., and may be inspected at the Department's Tallahassee office.

(163) "Roll Coating" — The application of a coating material to a substrate by means of hard rubber or steel rolls.

(164) "Roll Printing" — The application of words, designs, and pictures to a substrate usually by means of a series of hard rubber or steel rolls each with only partial coverage.

(165) "Rotogravure Coating" — The application of a coating material to a substrate by means of a roll coating technique in which the pattern to be applied is etched on the coating roll. The coating material is picked up in these recessed areas and is transferred to the substrate.

(166) "Rotogravure Printing" — The application of words, designs, and pictures to a substrate by means of a roll printing technique which involves an intaglio or recessed image areas in the form of cells.

(167) "Routine Maintenance of Public Roads" — Those activities necessary to maintain the public highway system in as near original condition as is practical, not to include large scale resurfacing, or reconstruction.

(168) "Rural Ozone Nonattainment Area" — A nonattainment area, designated for the air pollutant, ozone, which does not have an urban place with a population of 200,000 or more based on the most recent U.S. Government census.

(169) "Sand Seal Coat" — A thin asphalt surface treatment designed to seal surface cracks in existing pavements for the purpose of preventing the intrusion of water into the pavement base. The sand seal coat consists of a light application of liquid asphalt covered with fine aggregate.

(170) "Secondary Emissions" — The emissions which occur as a result of the construction or operation of a facility or a modification to a facility, but which are not discharged into the atmosphere from the facility itself. Secondary emissions may include but are not limited to emissions from ships or trains coming to or leaving a new or modified facility and emissions from any off-site support facility which would not otherwise be constructed or increase its emissions except as a result of the construction or operation of the new or modified facility. Secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the facility or modification which causes the secondary emissions.

(171) "Secretary" — The Secretary of the Department.

(172) "Shutdown" — The cessation of the operation of a source for any purpose.

(173) "Significant Impact" — An impact of emissions on ambient air quality in excess of any of the following pollutant-specific concentration values:

(a) Sulfur Dioxide.

1. Maximum three-hour concentration not to be exceeded more than once per year — 25.0 micrograms per cubic meter.

2. Maximum 24-hour concentration not to be exceeded more than once per year — 1.0 microgram per cubic meter for Class I areas; 5.0 micrograms per cubic meter for all other areas.

3. Annual arithmetic mean — 1.0 microgram per cubic meter.

(b) PM or TSP.

1. Maximum 24-hour concentration not to be exceeded more than once per year — 1.0 microgram per cubic meter for Class I areas; 5.0 micrograms per cubic meter for all other areas.

2. Annual arithmetic mean — 1.0 microgram per cubic meter.

(c) Nitrogen Dioxide.

Annual arithmetic mean — 1.0 microgram per cubic meter.

(d) Carbon Monoxide.

1. Maximum one-hour concentration not to be exceeded more than once per year — 2.0 milligrams per cubic meter.

2. Maximum eight-hour concentration not to be exceeded more than once per year — 0.5 milligram per cubic meter.

17-2.610 General Particulate Emission Limiting Standards. The following emission limiting standards shall apply to sources of particulate matter not subject to a particulate emission limit or opacity limit set forth in or established pursuant to any other section of Part VI of this rule.

(1) Process Weight Table.

(a) Applicability. The emission limitations set forth in Section 17-2.610(1)(b), below, shall apply to any source which processes raw materials to produce a finished product through a chemical or physical change except sources which:

1. Burn fuel to produce heat or power by indirect heating where the products of combustion do not come in contact with the process materials.

2. Burn refuse.

3. Salvage materials by burning.

(b) Emission Limit — No person shall cause, let, permit, suffer or allow the emission of particulate matter through a stack or vent, from any air pollutant source subject to this section in total quantities in excess of the amount shown in the following table.

Interpolation of the data in Table 610-1 for the process weight rates up to 30 tons per hour shall be accomplished by the use of the equation: $E = 3.59P^{0.62}$, where P is less than or equal to 30 tons per hour; and interpolation and extrapolation of the data for process weight rates in excess of 30 tons per day/hour shall be accomplished by use of the equation: $E = 17.31P^{0.16}$, where P is greater than 30 tons per hour. Where E = Emissions in pounds per hour, P = Process weight rate in tons per hour.

PROCESS WEIGHT TABLE
TABLE 610-1

Rate (Tons Per Hour)	Emissicn Rate (Pounds Per Hour)
025	0.30
.050	0.55
250	1.53
.50	2.25
2.50	6.34
5	9.73
10	14.99
30	29.83
40	31 23
60	33 33
80	34 90
100	36.17
200	40.41
500	46.79

(2) General Visible Emissions Standard.

(a) No person shall cause, let, permit, suffer or allow to be discharged into the atmosphere any air pollutants from new, or existing sources, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart the opacity of which is equal to or greater than 20 percent. The preceding sentence notwithstanding, the owner or operator of a source subject to the general visible emission standards may request the Department to establish a higher visible emissions standards for that source. The Department shall establish such a standard if it finds:

1. That the source is in compliance with an applicable particulate emission standard while a compliance test is being conducted but fails to comply with the visible emissions standard during the test;

2. That the source and associated air pollution control equipment were operated and maintained in a manner to minimize the opacity emissions during the compliance test;

3. That the source and associated air pollution control equipment were incapable of being adjusted or operated in such a manner to meet the opacity standard.

The Department shall establish an opacity standard for the source at a level at which it will be able, as indicated by the compliance tests, to meet the opacity standard at all times during which the source is meeting the applicable particulate standard.

(b) If the presence of uncombined water is the only reason for failure to meet visible emission standards given in this section, such failure shall not be a violation of this rule.

(3) Unconfined Emissions of Particulate Matter.

(a) No person shall cause, let, permit, suffer or allow the emissions of unconfined particulate matter from any source whatsoever, including, but not limited to, vehicular movement, transportation of materials, construction, alteration, demolition or wrecking, or industrially related activities such as loading, unloading, storing or handling, without taking reasonable precautions to prevent such emission.

(b) Any permit issued to a source of unconfined particulate shall specify the reasonable precautions to be taken by that source to control emissions of unconfined particulate matter.

(c) Reasonable precautions may include, but shall not be limited to the following:

1. Paving and maintenance of roads, parking areas and yards.

2. Application of water or chemicals to control emissions from such activities as demolition of buildings, grading roads, construction, and land clearing.

3. Application of asphalt, water, oil, chemicals or other dust suppressants to unpaved roads, yards, open stock piles and similar sources.

4. Removal of particulate matter from roads and other paved areas under the control of the owner or operator of the source to prevent reentrainment, and from buildings or work areas to prevent particulate from becoming airborne.

5. Landscaping or planting of vegetation. vegetation.

6. Use of hoods, fans, filters, and similar equipment to contain, capture and/or vent particulate matter.

7. Confining wet abrasive blasting where possible.

8. Enclosure or covering of conveyor systems.

(d) In determining what constitutes reasonable precautions for a particular source, the Department shall consider the cost of the control technique or work practice, the environmental impacts of the technique or practice, and the degree of reduction of emissions expected from a particular technique or practice.

17-2.620 General Pollutant Emission Limiting Standards.

(1) Volatile organic compounds emissions or organic solvents emissions.

(a) No person shall store, pump, handle, process, load, unload or use in any process or installation volatile organic compounds or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department.

(2) Objectionable Odor Prohibited — No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor.

17.2.630 Best Available Control Technology (BACT).

or 17-2.510, shall limit the emission of particulate matter through the application of Reasonably Available Control Technology (RACT) as specified in Rule 17-2.650(2)(c) or Rule 17-2.600, as expeditiously as possible but not later than the final compliance dates set forth in Rule 17-2.650(2)(f).

2. The following particulate sources located in an area of influence of a particulate air quality maintenance area are exempt from the emission limitations specified in Rule 17-2.650(2)(c).

a. Sources of unconfined particulate matter located more than five kilometers outside the boundary of a particulate air quality maintenance area; and

b. Sources which have an insignificant impact on the air quality maintenance area.

(b) Exemptions.

The following facilities and sources which are located with an air quality maintenance area or area of influence are exempt from the provisions of this section:

1. Any facility with total maximum allowable emissions of particulate matter of less than 15 tons per year and 5 pounds per hour.

2. Any facility whose owner or operator demonstrates to the Department that the impact within the designated air quality maintenance area of the total maximum allowable particulate emissions from such facility will not exceed 1 ug/m^3, annual average and 5 ug/m^3, 24-hour average.

3. Any source which has total allowable emissions of particulate matter of less than one ton per year.

4. Any source of unconfined particulate matter which is located more than five kilometers outside the boundary of a particulate air quality maintenance area.

5. Any source of unconfined particulate matter from open stockpiling of materials, vehicular traffic and other emissions from roads and plant grounds, or construction activities.

6. Any moveable drop transfer point where the discharge point and receiving point of the materials being handled must be moved in relationship to each other, either continuously or intermittently, such that enclosure of the drop transfer point with a device to control emissions of particulate matter is not practicable.

(c) Specific RACT Emission Limiting Standards for Stationary Sources.

The specific particulate emission limiting standards set forth in 17-2.600 have been found to represent the application of RACT for each source category listed in 17-2.600 except for those source categories listed below in 17-2.650(2)(c). For those source categories the following particulate emission standards have been found to represent the application of RACT.

1. Portland Cement Plants.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)1. shall apply to kilns and clinker coolers which are part of a Portland Cement Plant.

b. Emission Limitations

(i) Kilns — No owner or operator of a Portland Cement kiln shall cause, permit, or allow the emission of particulate matter in excess of 0.50 pounds per ton to the kiln (dry basis, excluding fuel), or visible emissions the density of which is greater than Number 1 on the Ringelmann Chart (20 percent opacity).

(ii) Clinker coolers — No owner or operator of a Portland Cement clinker cooler shall cause, permit, or allow the emission of particulate matter in excess of 0.25 pounds per ton of feed to the kiln (dry basis, excluding fuel), or visible emissions the density of which is greater than Number 1 on the Ringelmann Chart (20 percent opacity).

c. Alternate Emission Limitations

(i) Applicability — The alternate emission limitations set forth in 17-2.650(2)(c)1.c.(ii), shall apply to the Portland Cement plant owned and operated by General Portland Inc., Florida Division, ("General Portland") located in Tampa, Florida.

(ii) Emission Limitations

(A) Kiln No. 6 — General Portland shall not cause, permit, or allow the emission of particulate matter from Kiln No. 6 in excess of 95 lbs./hr. as determined by EPA Method 5 nor in excess of 40 lbs./hr. as determined by EPA Method 17, or visible emissions the density of which is greater than Number 1 on the Ringlemann Chart (20 percent opacity) as measured using a certified in-stack transmissometer. When method 17 is used the stack temperature shall not exceed 500° F.

(B) Cooler No. 6 — General Portland shall not cause, permit, or allow the emission of particulate matter from Cooler No. 6 in excess of 45 lbs/hr as determined by EPA Method 5, or visible emissions the density of which is greater than Number 1 on the Ringlemann Chart (20 percent opacity) as determined by EPA Method 9.

(iii) The alternate emission limitations contained in (ii), (A) and (B) shall apply only if the following conditions are met:

(A) Kiln No. 4 and Kiln No. 5 shall permanently cease operation no later than 14 days after final approval of 17-2.650(2)(C)1.c., by EPA.

(B) Cooler No. 4 and Cooler No. 5 shall permanently cease operation no later than 14 days after final approval of 17-2.650(2)(c)1.c., by EPA.

(C) Clinker Handling — General Portland shall cease the storage and transfer of clinker produced from the No. 4 and No. 5 kilns within 180 days after the cessation of kiln operation required by (iii)(A).

(D) Prior to the shutdown of the No. 4 and No. 5 kilns and the No. 4 and No. 5 coolers General Portland shall submit to the Department a detailed plan for demonstrating compliance with the alternate emission limitations. The plan shall include, but not be limited to, recording appropriate operating parameters for the No. 6 kiln and cooler which are indicators of the efficiency of operation of the associated control equipment as described in 17-2.650(2)(g). Upon acceptance by the Department, the plan shall become part of the revised permit.

(E) General Portland shall notify the Department 14 days prior to the cessation of operation of the No. 4 and No. 5 kilns and the No. 4 and No. 5 coolers to afford the Department an opportunity to have representatives present to confirm the closure. The alternative emission limitations set forth in (ii), (A) and (B) shall become effective upon the cessation of the No. 4 and No. 5 kilns and No. 4 and No. 5 coolers.

2. Fossil Fuel Steam Generators.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)2. shall apply to fossil fuel steam generating facilities including one or more boilers which individually or in combination have a heat input greater than or equal to 30 million British thermal units per hour.

b. Emission Limitations.

(i) Particulate Matter — No owner or operator of a fossil fuel steam generator shall cause, permit, or allow the emission of particulate matter in excess of 0.10 pounds per million BTU except as provided for in 17-2.600 and 17-2.250.

(ii) Visible Emission — No owner or operator of a fossil fuel fired steam generator shall allow visible emissions the density of which is greater than Number 1 on the Ringlemann Chart (20 percent opacity) except as provided for in 17-2.250, Excess Emissions, and in 17-2.600(5) for fossil-fuel steam generators with a heat input of greater than 250 million BTU per hour.

3. Carbonaceous Fuel Burners.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c), 3., shall apply to Carbonaceous Fuel Burning Equipment that has a total heat input capacity of 30 million BTU's per hour or greater.

b. Emission Limitations.

(i) Particular Matter — No owner or operator of Carbonaceous fuel burning equipment shall cause, permit, or allow the emission of particulate matter from such equipment in excess of 0.2 pounds per million BTU heat input of Carbonaceous fuel plus 0.1 pounds per million BTU heat input of fossil fuel.

(ii) Visible Emissions — No owner or operator of Carbonaceous fuel burning equipment shall cause, permit, or allow visible emissions the density of which is greater than Number 1.5 on the Ringelmann Chart (30% opacity).

4. Asphalt Concrete Plants.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)4., shall apply to any facility used to manufacture asphalt concrete by heating and drying aggregate and mixing with asphalt cements, excluding unloading and storage of raw materials.

b. Emission Limitations — No owner or operator of an asphalt concrete plant shall cause, permit, or allow the emission of particulate matter in excess of 0.06 gr/dscf, or visible emissions the density of which is greater than Number 1 on the Ringlemann Chart (20 percent opacity).

5. Phosphate Processing Operations.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)5., shall apply to all unit operations and auxiliary equipment which are in integral part of the process used to manufacture the finished products specified in paragraphs (i) through (vi) below, including reactors, driers, coolers, concentrators, screens, elevators, conveyor belts, grinders, and other unit operations, which exist as part of the manufacturing system from the point of introduction of raw materials feed into the process to the point of discharge of the finished product to the storage materials handling system;

(i) Diammonium phosphate (DAP);

(ii) Run of pile triple super phosphate (ROPTSP);

(iii) Granular triple super phosphate (GTSP);

(iv) Normal super phosphate (NSP);

(v) Monoammonium phosphate (MAP); and

(vi) Phosphate animal feed ingredient (AFI).

b. Emission Limitations.

(i) No owner or operator of a phosphate processing facility shall cause, permit or allow total emissions of particulate matter from the affected unit operations and auxiliary equipment in excess of 0.30 pounds per ton of product or visible emissions the density of which is greater than Number 1 on the Ringelmann Chart (20 percent opacity) from the above listed operations (i) through (vi)).

(ii) No owner or operator of a Phosphate rock drier or phosphate rock grinding operation which is not an integral part of the operations described in Sections 5.a., (i), through (vi) shall cause, permit or allow total emissions of particulate matter from the drier or grinder in excess of 0.20 1b/ton of products or visible emissions the density of which is greater than Number 1 on the Ringelmann Chart (20 percent opacity).

(iii) No owner or operator of a concentrator which is part of a phosphate processing facility shall cause, permit or allow total emissions of particulate matter from the concentrator in excess of 15 pounds per hour or visible emissions the density of which is greater than Number 1 on the Ringelmann Chart (20 percent opacity).

(iv) No owner or operator of a Diammonium Phosphate cooler producing less than 50 tons per hour of product shall cause, permit, or allow total emissions of particulate matter in the density of which is greater than Number 1 on the Ringelmann Chart (20 percent opacity).

6. Glass Manufacturing Process.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)6., shall apply to glass melting furnaces producing container glass.

b. Emission limitations — No owner or operator of a glass melting furnace shall cause, permit, or allow emissions of particulate matter in excess of the following standards.

(i) Gas fired furnaces — 1.3 pounds per ton of glass produced.

(ii) Oil fired furnaces — 1.5 pounds per ton of glass produced.

(iii) Visible emissions — Ringlemann 1 (20 percent opacity).

7. Electric Arc Furnaces.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)7., shall apply to all furnaces that heat materials with electric arcs from carbon electrodes, including phosphorus electric arc furnaces.

b. Emission Limitations — No owner or operator of an electric arc furnace shall cause, permit, or allow emissions of particulate matter in excess of the following standards.

(i) Phosphorus electric arc furnaces — 0.035 gr/dscf or any visible emissions (greater than five percent opacity) from a control device, except during tapping periods. No visible emissions greater than Number 3 on the Ringelmann Chart (60 percent opacity), shall be allowed from the shop during the tapping period.

(ii) All other electric arc furnaces — 0.010 gr/dscf or any visible emissions (greater than five percent opacity) from a control device, except during charging and tapping periods. No visible emissions greater than Number 1 on the Ringelmann Chart (20 percent opacity) shall be allowed from the shop during charging periods. No visible emissions greater than Number 2 on the Ringelmann Chart (40 percent opacity) shall be allowed from the shop during tapping periods.

8. Sweat or Pot Furnaces.

a. Applicability — The emission limitations set forth in 17-2.650(2)(c)8., shall apply to indirectly heated furnaces which are temperature controlled for the differential melting of scrap or combined metal clude identification of control device(s) for each source subject to provisions of this section including but not limited to the following appropriate design specifications and other descriptive data:

a. Manufacturer

b. Model name and number

c. Type: scrubber, baghouse, electrostatic precipitator, dry scrubber, etc.

d. Design flow rate (liquid and/or gas)

e. For EFS's: primary and secondary voltage and current

f. Efficiency rating at design capacity

g. Pressure drop

h. Liquid to gas ratio

i. Scrubbing liquor composition

3. Processing or Materials Handling Systems.

a. Appropriate parameters of processing or materials handling systems provide a measure of the rate of operations. The operation and maintenance plan shall include performance parameters which indicate the rate of operation, process weight through-put, the fuel or other energy source, the materials being processed or other physical or chemical characteristics, as applicable. Such parameters may include, but shall not be limited to the following:

(i) Weight per unit time of raw materials input;

(ii) Process temperature or pressure;

(iii) Fuel or fuel mixture;

(iv) Chemical or physical data on product or raw materials;

(v) Air to fuel ratio or percent excess oxygen;

(vi) Electrical power use rate by auxiliary equipment.

b. The plan shall contain inspection and maintenance schedules including periodic assessments of the condition of manholes, ducting, breaching, hoods, conveyor and elevator housing, loading sheds and other equipment, and a schedule for recording of performance parameter data.

4. Fossil Fuel Steam Generators.

The operation and maintenance plan for fossil fuel steam generators may include, but shall not be limited to, the following:

Steam flow

Fuel type (e.g., gas, oil, coal, or mixtures thereof)

Consumption rate for type(s) of fuel(s) burned

Fuel oil temperature (if applicable)

5. Records of inspection, maintenance and performance parameter data shall be retained for a minimum of two years and shall be made available to the Department upon request.

(3) Sulfur Dioxide (Reserved.)

(4) Carbon Monoxide (Reserved.)

17-2.660 Standards of Performance for New Stationary Sources (NSPS).

(1) Definitions and Abbreviations. For the purposes of Section 17-2.660, the definitions contained in 40 CFR 60.2 and Section 111 of the Clean Air Act Amendments of 1977, and the abbreviations contained in 40 CFR 60.3 are adopted by reference, except that the term "Administrator" when used in 40 CFR Part 60 shall mean the Secretary or his authorized representative.

(2) Applicability

(a) The Standards of Performance for New Stationary Sources contained in 40 CFR Part 60 and listed in Table 660-1 are adopted by reference. Each revision to the standards is effective on the date such revision is filed with the Department of State, or on the effective date of the U.S. Environmental Protection Agency regulation, whichever is later.

TABLE 660-1
STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (NSPS)

Section	Subpart	Source	Federal Adoption and Amendment Dates
60.40	D	Fossil-Fuel-Fired Steam Generators for which Construction is Commenced After August 17, 1971	Promulgated 36 FR 24876 (12/23/71); Amended 37 FR 14877 (07/26/72), 38 FR 28564 (10/15/73), 39 FR 20790 (06/14/74), 40 FR 2803 (01/16/75), 40 FR 46250 (10/06/75), 40 FR 59204 (12/22/75), 41 FR 51397 (11/22/76), 42 FR 5936 (01/31/77), 42 FR 37936 (07/25/77), 42 FR 41122 (08/15/77), 42 FR 41424 (08/17/77), 42 FR 61537 (12/05/77), 43 FR 8800 (03/03/78), 43 FR 9276 (03/07/78), 44 FR 3491 (01/17/79), 44 FR 33580 (06/11/79), 44 FR 76786 (12/28/79), 45 FR 8211 (02/06/80), 45 FR 36077 (05/29/80), 45 FR 47146 (07/14/80), 46 FR 55975 (11/13/81), 46 FR 57497 (11/24/81), 47 FR 2314 (01/15/82), 47 FR 54073 (12/01/82).
60.40a	Da	Electric Utility Steam Generators for which Construction is Commenced after September 18, 1978	Promulgated 44 FR 33580 (06/11/79); Amended 45 FR 8211 (02/06/80), 47 FR 54073 (12/01/82).
60.50	E	Incinerators	Promulgated 36 FR 24876 (12/23/71); Amended 39 FR 20790 (06/14/74), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78).
60.60	F	Portland Cement Plants	Promulgated 36 FR 24876 (12/23/71); Amended 39 FR 20790 (06/14/74), 39 FR 39872 (11/12/74), 40 FR 46250 (10/06/75), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78).
60.70	G	Nitric Acid Plants	Promulgated 36 FR 24876 (12/23/71); Amended 38 FR 13562 (05/23/73), 38 FR 28564 (10/15/73), 39 FR 20790 (06/14/74), 40 FR 46250 (10/06/75), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78).
60.80	H	Sulfuric Acid Plants	Promulgated 36 FR 24876 (12/23/71); Amended 38 FR 13562 (05/23/73), 38 FR 28564 (10/15/73), 39 FR 20790 (06/14/74), 40 FR 46250 (10/06/75), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78).

TABLE 880-1
STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (NSPS)

Section	Subpart	Source	Federal Adoption and Amendment Dates
60.90	I	Asphalt Concrete Plants	Promulgated 39 FR 9308 (03/08/74); Amended 40 FR 46250 (10/06/75), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78).
60.100	J	Petroleum Refineries	Promulgated 39 FR 9308 (03/08/74); Amended 40 FR 46250 (10/06/75, 42 FR 32426 (06/24/77), 42 FR 37936 (07/25/77), 42 FR 39389 (08/04/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78), 43 FR 10866 (03/15/78), 44 FR 13480 (03/12/79), 44 FR 61542 (10/25/79), 45 FR 79452 (12/01/80).
60.110	K	Storage Vessels for Petroleum Liquids Constructed after June 11, 1973, and Prior to May 19, 1978	Promulgated 39 FR 9308 (03/08/74); Amended 39 FR 20790 (06/14/74), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78), 45 FR 23374 (04/04/80).
60.110a	Ka	Storage Vessels for Petroleum Liquids Constructed after May 18, 1978	Promulgated 45 FR 23374 (04/04/80); Amended 45 FR 83228 (12/18/80), 47 FR 54258 (12/01/82), 47 FR 54259 (12/01/82).
60.120	L	Secondary Lead Smelters	Promulgated 39 FR 9308 (03/08/74); Amended 39 FR 13776 (04/17/74), 40 FR 46250 (10/06/75), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78).
60.130	M	Secondary Brass & Bronze Ingot Production Plants	Promulgated 39 FR 9308 (03/08/74); Amended 40 FR 46250 (10/06/75), 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78), 49 FR 43616 (10/30/84).
60.140	N	Iron and Steel Plants	Promulgated 39 FR 9308 (03/08/74); Amended 42 FR 37936 (07/25/77), 42 FR 41424 (08/17/77), 43 FR 8800 (03/03/78), 43 FR 15600 (04/13/78).

TABLE 660-1
STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (NSPS)

Section	Subpart	Source	Federal Adoption and Amendment Dates
60.630	KKK	Equipment Leaks of VOC from Onshore Natural Gas Processing Plants	Promulgated 50 FR 26124 (06/24/85).
60.640	LLL	Onshore Natural Gas Processing SO_2 Emissions	Promulgated 50 FR 40160 (10/01/85).
60.670	OOO	Nonmetallic Mineral Processing Plants	Promulgated 50 FR 31337 (08/01/85).
60.680	PPP	Wool Fiberglass Insulation Manufacturing	Promulgated 50 FR 7700 (02/25/85).

(b) This section shall apply to all affected facilities, the construction or modification of which is commenced after the effective date of any Standard of Performance listed in Rule 17-2.660 (2)(a), FAC, above except that any emissions limiting standard contained in Part VI which is more stringent than one contained in a Standard of Performance, or which regulates emissions of pollutants or sources of emissions not regulated by an applicable Standard of Performance, shall apply.

(3) General Provisions

(a) The provisions of 40 CFR 60.7, Notification and Record Keeping, are adopted by reference.

(b) The provisions of 40 CFR 60.8, Performance Tests, are adopted by reference except that Section 60.8(b) is modified to read as follows: Performance tests shall be conducted and data reduced in accordance with the test methods and procedures contained in each applicable subpart.

(c) The provisions of 40 CFR 60.11, Compliance with Standards and Maintenance Requirements, are adopted by reference.

(d) The provisions of 40 CFR 60.12, Circumvention, are adopted by reference.

(e) The provisions of 40 CFR 60.13, Monitoring Requirements, are adopted by reference.

(f) The provisions of 40 CFR 60.14, Modification, are adopted by reference.

(g) The provisions of 40 CFR 60.15, Reconstruction, are adopted by reference.

(4) Appendices

(a) The provisions of 40 CFR 60 Appendix A, Reference Methods, are adopted by reference.

(b) The provisions of 40 CFR 60 Appendix B, Performance Specifications, are adopted by reference.

(c) The provisions of 40 CFR 60 Appendix C, Determination of Emission Rate Change, are adopted by reference.

(d) The provisions of 40 CFR 60 Appendix D, Required Emission Inventory Information, are adopted by reference.

17-2.670 National Emission Standards for Hazardous Air Pollutants.

(1) Definitions and Abbreviations

For purposes of Section 17-2.670, the definitions contained in 40 CFR 61.01 and Section 112 of the Clean Air Act Amendments of 1977, and abbreviations contained in 40 CFR 61.03 are adopted by reference, except that the term "Administrator" when used in 40 CFR Part 61 shall mean the Secretary or his authorized representative.

(2) Applicability

(a) The requirements of this Section are applicable to all of the sources of hazardous air pollutants, which contain an affected facility.

(b) The National Emission Standards for Hazardous Air Pollutants contained in 40 CFR Part 61 and listed in Table 670-1 are adopted by reference. Each revision to the standards is effective on the date such revision is filed with the Department of State, or on the effective date of the U.S. Environmental Protection Agency regulation, whichever is later.

(3) General Provisions.

(a) The provisions of 40 CFR 61.05, Prohibited Activities, are adopted by reference.

(b) The provisions of 40 CFR 61.10(a), Source Reporting and Waiver Request, are adopted by reference.

(c) The provisions of 40 CFR 61.12, Emission Tests and Monitoring, are adopted by reference.

(d) The provisions of 40 CFR 61.13, Waiver of Emission Tests, are adopted by reference.

(e) The provisions of 40 CFR 61.14, Source Test and Analytical Methods, are adoped by reference.

(f) The provisions of 40 CFR 61.17, Circumvention, are adopted by reference.

(g) The provisions of 40 CFR 61, Appendix A, National Emission Standards for Hazardous Air Pollutants Compliance Status Information, except Section II, Waiver Requests, are adopted by reference.

(h) The provisions of 40 CFR 61, Appendix B, Test Methods, are adopted by reference.

PART VII SOURCE SAMPLING AND MONITORING

17-2.700 Stationary Point Source Emissions Test Procedures.

(1) General Provisions:

(a) Introduction. This section, along with sections 17-2.650(1), 17-2.660 and 17-2.670, establishes the test procedures that shall be used to determine the compliance of air pollutant sources with emission limiting standards specified in or established pursuant to any provisions of this chapter.

(b) General Test Requirements. The focal point of a compliance test is the stack or duct which vents process and/or combustion gases and entrained air pollutants from a source into the ambient air.

1. For mass emission limitations, a compliance test shall consist of three complete and separate determinations of the total air pollutant emission rate through the test section of the stack or duct; and three complete and separate determinations of any applicable process variables corresponding to the three distinct time periods during which the stack emission rate was measured provided that three complete and separate determinations shall not be required if the Department determines that the process variables are not subject to variation during a compliance test, or if a determination is not necessary in order to calculate the source's emission rate. The three required test runs shall be completed within one consecutive five day period. In the event that a sample is lost or one of the three runs must be discontinued because of circumstances beyond the control of the owner or operator and a valid third run cannot be obtained within the five day period allowed for the test, the Secretary or his designee may accept the results of the two complete runs as proof of compliance, provided that the arithmetic mean of the results of the two complete runs is 20% below the allowable emission limiting standards.

2. (Reserved.)

3. The indicated emission rate or concentration shall be the arithmetic averaged of the emission rate or concentration determined by each of the three separate test runs unless otherwise specified in a particular test method, applicability table (Table 1, Section 17-2.700), or other provision of this rule.

4. The terms stack and duct are used interchangeably in this section.

(c) EPA Methods Adopted by Reference.

1. The EPA Test Methods that are adopted by reference in Subsection 17-2.700(6)(b), are adopted in their entirety except for those provisions referring to approval of alternative procedures by the Administrator. For the purposes of this section such alternative procedures may only be approved by the Secretary or his designee in accordance with Section 17-2.700(3).

2. Cross references within Section 17-2.700 (6)(a), DER Text Methods, to the unmodified sections of the EPA test methods refer to the EPA test method number and Section number (e.g., EPA Method 7, Section 3.2). For sources not subject to Section 17-2.660 (Standards of Performance for New Stationary Pollutants) and which have submitted a complete application for a permit to construct prior to December 1, 1980, DER methods 1, 2, and 3 may be substituted for EPA methods 1, 2, and 3 when any EPA test method (4 thru 20) is specified for the test procedure except as noted in Table I.

(d) Applicable Test Procedures. This subsection, along with Rules 17-2.660 and 17-2.670, identifies the DER and EPA test methods that are applicable for conducting compliance tests for all air pollution sources for which an emission limiting standard is specified in or established pursuant to this chapter and establishes required sampling times, minimum sample volumes and special test requirements, as applicable, for each category of sources.

1. Required Sampling Time.

a. Unless otherwise specified in Table I, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes.

b. Opacity Compliance Tests. When either EPA Method 9 or DER Method 9 is specified (in Table I) as the applicable opacity test method, the required minimum period of observation for a compliance test shall be sixty (60) minutes for major sources, and thirty (30) minutes for minor sources not subject to a multiple valued opacity standard. The opacity test observation period shall include the period during which the highest opacity emissions can reasonably be expected to occur. Exceptions to these requirements are as follows:

(i) For batch, cyclical processes, or other operations which are normally completed within less than the minimum observation period and do not reoccur within that time, the period of observation shall be equal to the duration of the batch cycle or operation completion time and shall not be less than twelve (12) minutes. If the unit is subject to a multiple valued opacity standard, the observer shall verify that no emissions discharged from the unit are visible to the human eye during the balance of the required observation period that began with the first opacity observation of the test.

(ii) The observation period for special opacity tests that are conducted to provide data to establish a surrogate standard pursuant to Rule 17-2.700(2)(c), Waiver of Compliance Test Requirement, shall be established on a case-by-case basis as necessary to properly establish the relationship between a proposed surrogate standard and an existing mass emission limiting standard.

(iii) The minimum observation period for opacity tests conducted by employees or agents of the Department to verify the day-to-day continuing compliance of a unit or activity with an applicable opacity standard shall be twelve minutes.

2. Minimum Sample Volume. Unless otherwise specified in the following table the minimum sample volume per run shall be 25 dry standard cubic feet.

3. Required Flow Rate Range. For DER Method 5 particulate sampling, acid mist/sulfur dioxide, and flouride sampling which uses Greenburg Smith type impingers, the sampling nozzle and sampling time shall be selected such that the average sampling rate will be between 0.5 and 1.0 actual cubic feet per minute, and the required minimum sampling volume will be obtained.

4. Calibration. Calibration of the sampling train equipment shall be conducted in accordance with the schedule shown in Table II.

5. EPA Method 5. When EPA Method 5 is cited in Table I the following modification is allowed; the heated filter may be separated from the impingers by a flexible tube.

6. Alternate Test Procedures Not Subject to Prior Approval. A visible emission test indicating no visible emissions (5 percent opacity) may be submitted in lieu of a particulate stack test for materials handling sources subject to Section 17-2.650(2)(c)11., where the source is equipped with a bag house.

TABLE 700-1
APPLICABLE TEST PROCEDURES FOR POINT SOURCE COMPLIANCE TESTS

Emission Limiting Standard	Type Source	Pollutant	Test Methods	Min. Sampling Volume	Special Conditions
17-2.630 and 17-2.600(5)(a)	Source subject to 40 CFR 60 or 40 CFR 61 (NSPS and NESHAPS).	Pollutant for which a standard has been established pursuant to 40 CFR 60 or 40 CFR 61.	As specified in 40 CFR 60 or 40 CFR 61 (NSPS and NESHAPS).	As specified in the applicable test method.	As specified in the BACT determination.
		Pollutants for which no standard has been established pursuant to 40 CFR 60 or 40 CFR 61.	As specified in the BACT determination.	25 dscf or as specified in the BACT determination.	As specified in the BACT determination.
BACT	All other sources subject to 17-2.630.	Pollutants requiring a BACT determination.	As specified in the BACT determination.	25 dscf or as specified in the BACT determination.	As specified in the BACT determination.
17-2.610(2)	General	Visible Emissions	EPA Method 9		
17-2.610(1)	Process Weight Table Sources: Sources controlled by: 1. Scrubber a. Citrus Plants	Particulate	EPA Method 5	32 dscf	Acetone Wash
	b. Others	Particulate	EPA Method 5		Acetone Wash

Emission Limiting Standard	Type Source	Pollutant	Test Methods	Min. Sampling Volume	Special Conditions
17-2.650(1)(f)18. (continued)	3. Add-on Control Device a. Single-Bed Carbon Adsorbers		Equipment Specifications per "RACT Compliance for Carbon Adsorbers," Task No. 119, or Stack Test per EPA 450/2-79-041, Attachment 3		
	b. Multiple-Bed Adsorption and Others		Equipment Specifications per Manufacturer's Specifications, or Stack Test per EPA 450/2-79-041, Attachment 3		
17-2.650(1)(f)19.	Gasoline Tank Trucks	Volatile Organic Compounds	EPA 450/2-78-051, Appendix A		Subsection 17-2.700(6)(c)(2)d.(i)
17-2.650(2)(c)1.	Portland Cement Plants	Particulate	EPA Method 5	30 dscf	
		Visible Emission			A transmissometer shall be used to determine compliance with the visible emission standard. The transmissometer shall be calibrated in accordance with 17-2.710.
17-2.650(2)(c)2.	Fossil Fuel Steam Generators Heat Input Capacity Equal to or Greater than 30 MMBTU	Particulate	EPA Method 17		EPA Method 5 may be used with the filter temperature at no more than 320°F. For EPA Method 17, stack temperature shall be less than 375°F. The owner or operator may use EPA Method to demonstrate compliance. EPA Method 3 with Orsat analysis shall be used when oxygen based F factor computed according to EPA Method 19 is used in lieu of heat input. Use Acetone wash with Method 5 or 17.
		Visible Emission	EPA Method 9		A transmissometer may be used and calibrated in accordance with 17-2.710.
17-2.650(2)(c)3.	Carbonaceous Fuel Burners Heat Input Capacity Equal to or greater than 30 MMBTU	Particulate	EPA Method 5	30 dscf	For EPA Method 5, the filter temperature may not exceed 320°F.
		Visible Emission	EPA Method 9		
17-2.650(2)(c)4.	Asphalt Concrete Plant	Particulate	EPA Method 5	30 dscf	
		Visible Emission	EPA Method 9		

TABLE 700-2
CALIBRATION SCHEDULE

ITEM	MINIMUM CALIBRATION FREQUENCY	REFERENCE INSTRUMENT	TOLERANCE
Thermometers Liquid in glass	Annually	ASTM Hg in glass ref. thermometer or equivalent or thermometric points.	± 2%
Bimetallic	Quarterly	Calib. liq. in glass thermometer	5°F
Thermocouple	Annually	ASTM Hg in glass ref. thermometer. NBS calibrated reference thermocouple and potentiometer	5°F
Barometer	Monthly	Hg barometer, or NOAA station	± 1% scale
Pitot Tube	1. When required 2. When damaged	By construction or Measurements or wind tunnel D greater than 16" and standard pitot tube	See EPA Method 2 Fig. 2-2 & 2-3.
Probe Nozzles	1. Before each test or 2. When nicked, dented, corroded	Micrometer	± 0.001" mean of at least three readings. Maximum deviation between readings .004"
Dry Gas Meter and Orifice Meter	1. Full Scale when received When 5% change observed annually 2. One Point Semiannually	Spirometer of Calibrated wet test or dry gas test meter	2%
	3. Check after each test series	Comparison check	5%

(5) Determination of Process Variables

(a) The owner or operator of an air pollution source for which compliance tests are required shall install, operate, and maintain equipment and/or instruments necessary to determine process variables, such as process weight input or heat input, when such data is needed in conjunction with emissions data to determine the compliance of the source with applicable emission limiting standards.

(b) Equipment and/or instruments used to directly or indirectly determine such process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value.

(6) Designated Test Procedures

(a) DER Test Procedures

1. DER Method 1. Sample and velocity traverses for stationary sources. The provisions of EPA Method 1 (40 CFR 60), Appendix A) are adopted by reference except for the following:

a. 1 by 2 Matrix for Rectangular Stacks, EPA Method 1, Section 2.3.2.

The tester shall use the following criterion: For rectangular stacks, divide the cross-section into as many rectangular areas as traverse points, such that the length to width of the elemental areas is between one and two, and locate the traverse points at the centroid of each equal area.

b. Verification of Absence of Cyclonic Flow.

For a stack with cyclonic or swirling flow conditions, use Section 2.4 of EPA Method 1 except that the average value of alpha must be lower than or equal to 20 degrees for acceptable overall flow conditions.

2. DER Method 2.

Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube). The provisions of EPA Method 2 (40 CFR 60, Appendix A) are adopted by reference.

3. DER Method 3. Gas Analysis For Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight. The provisions of EPA Method 3 (40 CFR 60, Appendix A) are adopted by reference with the following exceptions:

a. Molecular Weights Assigned by Test Condition, EPA Method 3 Section 1.2. The tester may choose to assign the following values for dry molecular weight

(i) A value of 30.0, dry molecular weight, for processes burning any combination of natural gas, oil, coal or carbonaceous fuel.

(ii) A value of 29.0, dry molecular weight, for processes emitting essentially air.

b. Calculations Correcting Concentrations to 50% Excess Air (EA), EPA Method 3, Section 1.2. When a correction of pollutant emission concentration to 50% excess air is required by applicable parts of this subsection or by Rule 17-2.600, the following equation shall be used:

$$Cs_{50} = \frac{Cs\,(100 + \%\,EA)}{150}$$

Equation 3-1A

where: Cs_{50} is the pollutant concentration at 50% excess air:

Cs is the pollutant concentration compared at standard conditions on a dry basis:

% EA is calculated by equation 3-1:

% EA =

$$\frac{\%\,O_2 - 0.5\%\,CO \times 100}{0.264\%\,N_2(\%\,O_2 - 0.5\%\,CO)}$$

Equation 3-1

4. DER Method 4. This section is reserved.

5. Particulate Emissions

a. DER Method 5. Determination of Particulate Emissions From Stationary Sources (By Liquid Impingement).

(i) Principle. A sample of the flue gas is withdrawn isokinetically from a source and particulate matter is collected by a series of impingers followed by a filter. The weight of particulate matter is determined gravimetrically after removal of uncombined water from the impinger solution, probe/glassware washing and filter.

(ii) Apparatus.

(a) Sampling Train. A schematic of the sampling train is shown in Figure 5-1. The sampling train consists of the following components:

i. The probe nozzle shall be stainless steel (316), glass, or quartz with a sharp, tapered leading edge. The angle of the taper shall be less than or equal to 30° and the taper shall be on the outside to preserve a constant internal diameter. The nozzle shall be of a button-hook or elbow design. If stainless steel is used, the nozzle shall be constructed from seamless tubing.

ii. The probe liner shall be borosilicate or quartz glass, Teflon, Incoloy 825 or stainless steel 316. Probe heating is not required. At the option of the tester a flexible hose between the probe and first impinger may be used. The hose shall be no more than two times the probe length or 25 feet long, whichever dimension is shorter. The flexible hose shall be made of Tygon, Teflon, or polyethylene or other nonreactive material with a smooth internal surface.

iii. The pitot tube shall be Type S, as described in EPA Method 2, Section 2.1. The pitot tube shall be attached to the probe to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (Figure 5-2) during sampling. The Type S pitot tube shall have a known coefficient as provided in EPA Method 2, Section 4.

iv. Differential Pressure Guage. Two inclined manometers or equivalent devices as described in EPA Method 2, Section 2.2 shall be used. One manometer shall be used for velocity (delta P) readings and the other for orifice differential readings (delta P).

v. Filter holders shall be borosilicate glass or stainless steel (316) with a glass or stainless steel (316) frit filter support and a silicone rubber, Teflon, or Viton gasket. The holder shall provide a positive seal against leakage from the outside or around the filter. The filter shall be connected to the exit of the dry trap and entrance to the silica gel impinger.

vi. Condenser. The following system shall be used to determine the stack gas moisture content: Four impingers connected as shown in Figure 5-1 with leak free, noncontaminating fittings. The filter is connected between the third and fourth impingers. The first, third and fourth impingers shall be of the Greenburg-Smith design, modified by replacing the tip with 1.3 cm (½ in.) I.D. glass tubing extending to 1.3 cm (½ in.) from the bottom of the flask. The second impinger shall be an unmodified Greenburg-Smith design. The first and second impingers shall contain measured quantities of water, the third shall be empty, and the fourth shall contain a measured quantity of silica gel. A thermometer capable of measuring the and copied at the Department's Tallahassee Office).

1. EPA Method 1 — Sample and Velocity Traverses for Stationary Sources — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78); amended 48 FR 45034 (09/30/83).

2. EPA Method 2 — Determination of Stack Gas Velocity and Volumetric Flow Rate — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78).

3. EPA Method 3 — Gas Analysis for Carbon Dioxide, Excess Air, and Dry Molecular Weight — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78); amended 48 FR 49458 (10/25/83).

4. EPA Method 4 — Determination of Moisture Content in Stack Gases — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78); amended 48 FR 55670 (12/14/83).

5. EPA Method 5 — Determination of Particulate Emissions from Stationary Sources — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78); amended 45 FR 66752 (10/07/80); amended 48 FR 55670 (12/14/83).

6. EPA Method 6 — Determination of Sulfur Dioxide Emissions from Stationary Sources — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78); amended 48 FR 39010 (08/26/83); amended 47 FR 54073 (12/01/83); amended 49 FR 26522 (06/27/84).

a. EPA Method 6A — Determination of Sulfur Dioxide, Moisture, and Carbon Dioxide Emissions From Fossil Fuel Combustion Sources — 47 FR 54073 (12/01/82); amended 49 FR 09684 (3/14/84).

b EPA Method 6B — Determination of Sulfur Dioxide and Carbon Dioxide Daily Average Emissions From Fossil Fuel Combustion Sources — 47 FR 54073 (12/01/82); amended 49 FR 09684 (3/14/84).

7. EPA Method 7 — Determination of Nitrogen Oxide Emissions from Stationary Sources — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78); amended 49 FR 26522 (06/27/84).

a. EPA Method 7A — Determination of Nitrogen Oxide Emissions from Stationary Sources — Ion Chromatographic Method — 48 FR 55072 (12/08/83).

b Reserved.

8 EPA Method 8 — Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources — 42 FR 41754 (08/18/77); amended 43 FR 11984 (03/23/78).

9. EPA Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources — 39 FR 39872 (11/12/74); amended 46 FR 53144 (10/28/81).

10. EPA Method 10 — Determination of Carbon Monoxide Emissions from Stationary Sources — 39 FR 09319 (09/08/78).

11. EPA Method 11 — Determination of Hydrogen Sulfide Content of Fuel Gas Streams in Petroleum Refineries — 43 FR 01494 (09/10/78).

12. EPA Method 12 — Determination of Inorganic Lead Emissions from Stationary Sources. Promulgated April 16, 1982, Federal Register.

13. EPA Method 13A and 13B.

a. EPA Method 13A — Determination of Total Fluoride Emissions from Stationary Sources — SPADNS — I Zirconium Lake Method — 45 FR 41852 (06/20/80); amended 45 FR 85016 (12/24/80).

b. EPA Method 13B — Determination of Total Fluoride Emissions from stationary Sources — Specific Ion Electrode Method — 45 FR 41852 (06/20/80); amended 45 FR 85016 (12/24/80).

14. EPA Method 14 — Determination of Fluoride Emissions from Potroom Roof Monitors of Primary Aluminum Plants — 45 FR 44202 (06/30/80).

15. EPA Method 15 — Determination of Hydrogen Sulfide, Carbonyl Sulfide and Carbon Disulfide Emission from Stationary Sources — 43 FR 10866 (03/15/78).

16. EPA Method 16 and 16A.

a. EPA Method 16 — Semicontinuous Determination of Sulfur Emissions from Stationary Sources — 40 CFR 60, Appendix A, July 1, 1983.

b. EPA Method 16A — Determination of Total Reduced Sulfur Emissions From Stationary Sources (Impinger Technique) — 50 FR 09579 (03/08/85).

17. EPA Method 17 — Determination of Particulate Emissions from Stationary Sources (In-Stack Filter Method) — 43 FR 07568 (02/23/78).

18. Reserved.

19 EPA Method 19 — Determination of Sulfur Dioxide Removal Efficiency and Particulate, Sulfur Dioxide and Nitrogen Oxides Emission Rates from Electric Utility Steam Generators — 44 FR 33580 (06/11/79).

20. EPA Method 20 — Determination of Nitrogen Oxides, Sulfur Dioxide, and Oxygen Emissions from Stationary Gas Turbines — 44 FR 52792 (09/10/79); amended 47 FR 30480 (07/14/82).

21. Reserved.

22. Reserved.

23. Reserved.

24. EPA Method 24 — Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings — 45 FR 65956 (10/03/80).

25. EPA Method 25 — Determination of Total Gaseous Non-methane Organic Emissions as Carbon — 45 FR 65956 (10/03/80).

a. Reserved.

b. Reserved.

(c) Supplementary Test Procedures. The following test procedures are adopted by reference. Copies of these documents are available from the sources set forth below. Copies may also be inspected at the Department's Tallahassee Office.

1. ASTM Methods — Standard Methods published by American Society for Testing and Materials are available from the Society at 1916 Race Street, Philadelphia, 19103.

a. ASTM D 322-67, 1972. Standard Method of Test for Dilution of Gasoline Engine Crankcase Oils.

b. ASTM D 396-76. Standard Specification for Fuel Oils, superceding ASTM D 396-69.

c. ASTM D 2880-76. Standard Specification for Gas Turbine Fuel Oils, superceding ASTM D 2880-71.

d. ASTM D 975-77. Standard Specification for Diesel Fuel Oils, superceding ASTM D 975-68.

e. ASTM D 323-72. Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method).

f. ASTM D 97-66.Standard Test Method for Pour Point of Petroleum Oils.

2. EPA Reports — EPA occasionally publishes test methods and emission control guidelines in a report format. These documents are available from the National Technical Information Services, 5286 Port Royal Road, Springfield, Virginia 22216, and may be inspected at the Department's Tallahassee Office.

a. Petroleum Liquid Storage.

(i) Control of Volatile Organic Emis-

APPENDIX C
Red Clay Field Data Sheets

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DETERMINATION OF MINIMUM NUMBER OF TRAVERSE POINTS

Stack ID: ASPHALT PLANT Stack diameter at ports: 42"

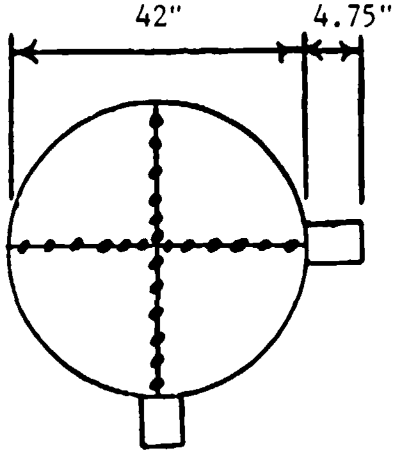
Distance A: 31" (duct diameters) 0.74

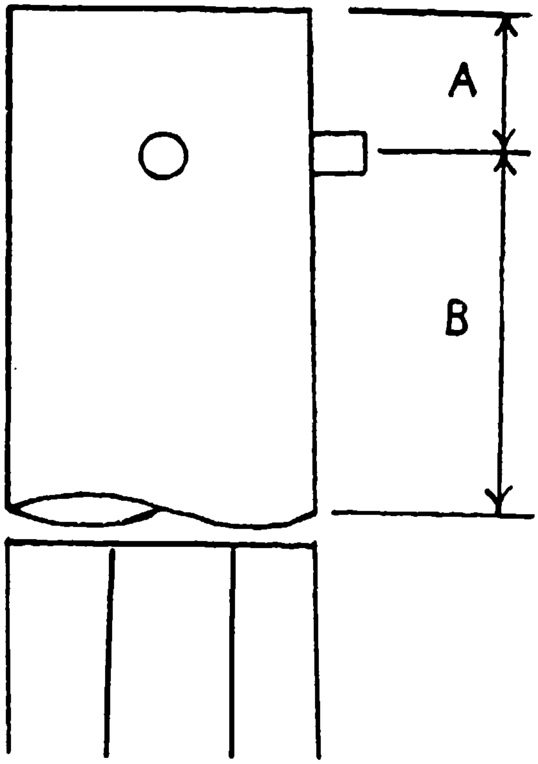
Recommended number of traverse points as determined by distance A: 24

Distance B: 69" (duct diameters) 1.6

Recommended number of traverse points as determined by distance B: 24

Number of traverse points used: 24





PRELIMINARY SURVEY DATA SHEET NO. 1

(*Stack Geometry*)

BASE Eglin AFB	PLANT Asphalt
DATE 3 March 89	SAMPLING TEAM OEHL/ECQ
SOURCE TYPE AND MAKE Asphalt Plant	
SOURCE NUMBER	INSIDE STACK DIAMETER 42 Inches
RELATED CAPACITY	TYPE FUEL oil
DISTANCE FROM OUTSIDE OF NIPPLE TO INSIDE DIAMETER 4.75 Inches	
NUMBER OF TRAVERSES 2	NUMBER OF POINTS/TRAVERSE 12

LOCATION OF SAMPLING POINTS ALONG TRAVERSE

POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)
1			5.8
2			7.6
3			9.7
4			12.2
5			15.3
6			19.7
7			31.8
8			36.3
9			39.3
10			41.8
11			43.9
12			45.8

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PRELIMINARY SURVEY DATA SHEET NO. 2

(Velocity and Temperature Traverse)

BASE Eglin	**DATE** 7 March
BOILER NUMBER Asphalt Plant	
INSIDE STACK DIAMETER 42	Inches
STATION PRESSURE 30.130	In Hg
STACK STATIC PRESSURE .055	In H20
SAMPLING TEAM OEHL/ECQ	

TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	~~√Vp~~ α	STACK TEMPERATURE (°F)
1	.07	5 6	140
2	.07	5 6	142
3	.075	4 6	143
4	.09	10 9	145
5	.09	5 6	146
6	.08	0 2	144
7	.08	6 5	144
8	.075	12 10	144
9	.07	14 13	143
10	.065	10 13	144
11	.06	12 14	144
12	.055	15 14	144
		AVG = 8°	
		$\overline{FPS}$ = 17	
		$\overline{T}$ = 144	
		θ .425	
	AVERAGE		

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PARTICULATE SAMPLING DATA SHEET

~~2.07~~ ΔH = 1.91

RUN NUMBER: ONE

DATE: 8 March 89

PLANT: Asphalt

BASE: Eglin

SAMPLE BOX NUMBER:

METER BOX NUMBER:

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

TYPE OF SAND
RED CLAY & SAND
Asphalt:
39 tons (69 min)

START 0910
START 0911 Asphalt

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Pre Pitot check good
Pre leak good at 16 in Hg

static P = .055

AMBIENT TEMP: 44 °F

STATION PRESS: 30.130 in Hg

HEATER BOX TEMP: 248±25 °F

PROBE HEATER SETTING: 190

PROBE LENGTH: in

NOZZLE ~~AREA (A)~~ Diameter: .375 sq ft

Cp: .84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A 1	0	2.5	115		.060	0.87	142.580	52		51	265	44
2	2.5	3.0	130		.080	1.13		54		51	268	43
3	5.0	3.5	137		.085	1.19		56		52	262	45
4	7.5	4.0	136		.095	1.33		58		53	260	44
5	10.0	4.0	136		.090	1.27		62		53	261	44
6	12.5	5.0	135		.090	1.27		64		55	258	46
7	15.0	5.0	135		.080	1.13		65		54	263	47
8	17.5	5.0	136		.075	1.06		66		55	260	48
9	20.0	4.5	137		.065	0.92		67		56	259	50
10	22.5	4.5	136		.060	0.85		67		56	264	51
11	25.0	4.0	136		.050	0.71		68		57	255	52
12	27.5	4.0	133		.050	0.71		68		57	260	52
STOP 0940	30.0											

OEHL FORM 18

Page 2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER ONE

DATE 8 March 89

PLANT Asphalt

BASE Eglin

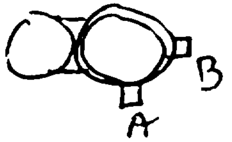
SAMPLE BOX NUMBER cont

METER BOX NUMBER ↓

Qw/Qm

Co

SCHEMATIC OF STACK CROSS SECTION



START 0948

EQUATIONS

$$°R = °F + 460$$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Post leak check at 10 in Hg good

AMBIENT TEMP cont °F

STATION PRESS cont in Hg

HEATER BOX TEMP cont °F

PROBE HEATER SETTING cont

PROBE LENGTH cont in

NOZZLE AREA (A) cont sq ft

Cp cont

DRY GAS FRACTION (Fd) cont

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP		VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP			SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
			(°F)	(Ts) (°R)				IN (°F)	AVG (Tm) (°R)	OUT (°F)		
B 1	0	3.0	124		.035	0.050	158.025	61		58	264	48
2	2.5	4.5	129		.050	0.77		65		59	263	48
3	5.0	4.5	134		.050	0.71		66		59	261	47
4	7.5	4.5	130		.050	0.72		67		60	260	46
5	10.0	5.0	130		.055	0.79		68		60	262	47
6	12.5	6.5	130		.070	1.01		69		60	263	47
7	15.0	9.5	129		.100	1.45		70		61	262	47
8	17.5	9.5	129		.095	1.38		71		61	265	48
9	20.0	9.5	130		.080	1.16		72		61	259	48
10	22.5	9.0	128		.070	1.02		73		62	260	49
11	25.0	7.5	128		.060	0.87		73		62	261	50
12	27.5	7.5	128		.060	0.87	173.530	73		62	263	49
STOP 1018	30.0											

$\overline{T_m} = 61$ $\overline{T_s} = 131$ $\overline{\Delta H} = 0.99$ $\overline{\sqrt{P_s T_s}} = 6.33$ Tot FT^3 = 30.95

OEHL FORM 18 MAY 78

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EGLIN AFB	**DATE** 8 MAR 84	**RUN NUMBER** ONE
BUILDING NUMBER Asphalt Plant	**SOURCE NUMBER**	

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.6302	.2883	0.3419
ACETONE WASHINGS *(Probe, Front Half Filter)*	96.1533	96.1341	0.0192
BACK HALF *(If needed)*			
	Total Weight of Particulates Collected		0.3611 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 *(H_2O)*	285	200	85.0
IMPINGER 2 *(H_2O)*	226	200.	26.0
IMPINGER 3 *(Dry)*	2	0	2.0
IMPINGER 4 *(Silica Gel)*	209.0	200.0	9.0
	Total Weight of Water Collected		122.0 gm

III. GASES *(Dry)*

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	3.0	3.0	2.8		2.9
VOL % O_2	15.0	15.0	15.2		15.1
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

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PARTICULATE SAMPLING DATA SHEET

2H0 1.91

RUN NUMBER TWO

DATE 8 March 89

PLANT Asphalt

BASE Eglin

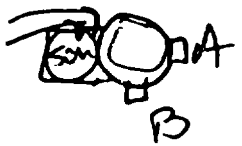
SAMPLE BOX NUMBER 2

METER BOX NUMBER 2

Qw/Qm

Co

SCHEMATIC OF STACK CROSS SECTION



START TIME 1151

Asphalt 1152

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Pitot leak check good

Pre leak check at 15 in Hg good

AMBIENT TEMP 46 °F

STATION PRESS 30.13 in Hg

HEATER BOX TEMP 190 °F

PROBE HEATER SETTING 248±25

PROBE LENGTH 72 in

NOZZLE AREA (A) .375 sq ft

Cp .84

DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A.1	0	0.5	125		.040	0.61	173.821	60		58	258	47
.2	7.5	1.0	132		.050	0.76		62		59	260	47
.3	5.0	1.0	128		.050	0.76		63		59	262	49
.4	7.5	1.0	130		.050	0.76		66		60	263	46
.5	10.0	1.0	130		.050	0.76		67		61	267	47
6	12.5	3.0	130		.065	0.99		68		61	264	47
7	15.0	4.0	130		.090	1.38		69		60	263	48
8	17.5	5.0	131		.100	1.53		71		61	257	49
9	20.0	5.0	131		.090	1.38		72		62	261	50
10	22.5	5.0	131		.080	1.23		72		62	265	51
11	25.0	4.5	131		.070	1.08		73		62	261	51
12	27.5	4.5	131		.060	0.92	190.606	73		62	260	53
	30.0											
STOP 1221												

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PARTICULATE SAMPLING DATA SHEET

RUN NUMBER TWO	SCHEMATIC OF STACK CROSS SECTION #1 Asphalt 35.5 tons (63 min) Rel Clay E Sand	EQUATIONS $°R = °F + 460$ $H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$ Post leak check at 10 in Hg good	AMBIENT TEMP Const °F
DATE 8 March 89			STATION PRESS In Hg
PLANT Asphalt			HEATER BOX TEMP °F
BASE Eglin			PROBE HEATER SETTING
SAMPLE BOX NUMBER			PROBE LENGTH in
METER BOX NUMBER			NOZZLE AREA (A) sq ft
Qw/Qm			Cp
Cc	START TIME 1226		DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1	0	5.0	126		.070	1.08	196.606	66		63	259	52
2	2.5	6.0	131		.080	1.22		68		63	263	52
3	5.0	6.5	[illegible]		.085	1.30		70		63	262	52
4	7.5	7.5	133		.090	1.38		72		64	257	54
5	10.0	8.0	133		.095	1.46		73		64	261	56
6	12.5	8.0	134		.085	1.30		74		64	262	57
7	15.0	8.0	128		.085	1.32		75		65	261	53
8	17.5	8.0	133		.080	1.23		76		65	253	61
9	20.0	8.0	132		.070	1.08		76		66	261	62
10	22.5	7.5	132		.060	0.93		77		66	251	64
11	25.0	7.0	132		.050	0.77		77		66	261	64
12	27.5	6.0	132		.040	0.62		76		67	258	63
STOP	30.0						201.333					
TIME 1256												

$\overline{T}_m = 67$ $\overline{T}_s = 131$ $\overline{\Delta H} = 1.08$ $\overline{\sqrt{\Delta P\, T_S}} = 6.385$ TOT FT^3 = 33.512

OEHL FORM MAY 78 18

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EGLIN AFB	**DATE** 8 MAR 89	**RUN NUMBER** TWO
BUILDING NUMBER ASPHALT PLANT	**SOURCE NUMBER**	

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.6750	.2876	0.3874
ACETONE WASHINGS *(Probe, Front Half Filter)*	97.5141	97.4900	0.0241
BACK HALF *(If needed)*			
	Total Weight of Particulates Collected		0.4115 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 *(H20)*	271.0	200.0	71-0
IMPINGER 2 *(H20)*	237.0	200-0	37.0
IMPINGER 3 *(Dry)*	3.0	0.0	3.0
IMPINGER 4 *(Silica Gel)*	211.4	200.0	11.4
	Total Weight of Water Collected		122.4 gm

III. GASES *(Dry)*

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	2.6	2.4	2.4		2.5
VOL % O_2	17.0	16.8	16.8		16.9
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

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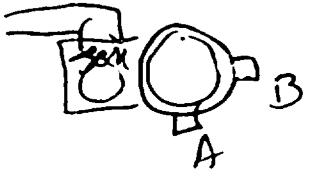
PARTICULATE SAMPLING DATA SHEET ΔH@ 1.91

RUN NUMBER: THREE
DATE: 8 March 89
PLANT: Asphalt
BASE: Eglin AFB
SAMPLE BOX NUMBER: 2
METER BOX NUMBER: 2
Qw/Qm:
Co:

SCHEMATIC OF STACK CROSS SECTION



start time 1340

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Pitot check good

Preleak good at 15 in Hg

AMBIENT TEMP: 49 °F
STATION PRESS: 30.13 in Hg
HEATER BOX TEMP: 190 °F
PROBE HEATER SETTING: 248±25
PROBE LENGTH: 72 in
NOZZLE AREA (A): .375 sq ft
Cp: .84
DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A 1	0	2.0	124		.050	0.77	208.725	65		65	256	57
2	2.5	4.0	129		.075	1.15		67		65	256	50
3	5.0	5.0	132		.085	1.30		69		65	257	50
4	7.5	5.0	132		.090	1.38		72		66	255	51
5	10.0	6.0	132		.100	1.54		73		66	255	54
6	12.5	6.0	135		.08	1.23		75		66	252	54
7	15.0	6.0	131		.08	1.24		76		66	257	56
8	17.5	6.0	132		.07	1.08		77		67	260	58
9	20.0	5.5	132		.06	0.93		78		68	255	60
10	22.5	5.0	132		.05	0.77		78		68	255	61
11	25.0	4.0	132		.04	0.62		78		69	261	62
12	27.5	4.0	133		.035	0.54		77		69	263	62
	30.0											
stop time	1410											

Page 2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: THREE

DATE: 8 March 89

PLANT: Asphalt

BASE: Eglin

SAMPLE BOX NUMBER: Cont-

METER BOX NUMBER:

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION:
#asphalt 40 (68 minutes)

red clay & sand

EQUATIONS

$$°R = °F + 460$$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Post leak check at
13 in Hg good

start time 1414

AMBIENT TEMP: Const. °F

STATION PRESS: in Hg

HEATER BOX TEMP: °F

PROBE HEATER SETTING:

PROBE LENGTH: in

NOZZLE AREA (A): sq ft

Cp:

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	Vac ~~STATIC PRESSURE~~ (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1	0	4.0	127		.03	0.47	225.314	74		69	262	57
2	2.5	4.0	131		.03	0.46		74		69	263	58
3	5.0	5.0	131		.04	0.62		74		69	260	57
4	7.5	5.0	132		.04	0.62		75		69	257	57
5	10.0	5.0	132		.04	0.62		76		70	261	58
6	12.5	6.0	132		.05	0.77		76		70	262	58
7	15.0	11.0	133		.085	1.32		77		70	267	59
8	17.5	11.0	133		.085	1.32		78		70	259	58
9	20.0	11.0	133		.080	1.24		79		70	258	58
10	22.5	11.0	133		.070	1.09		80		71	261	60
11	25.0	10.0	134		.055	0.85		80		71	261	61
12	27.5	8.5	133		.05	0.78	240.220	80		71	262	62
	30.0											
stop time	1444											

$\overline{T_m} = 72$ $\overline{T_s} = 132$ $\overline{\Delta H} = 0.95$ $\overline{\sqrt{P} \, T_s} = 5.929$ TOT FT^3 = 31.495

OEHL FORM MAY 78 18

AII OLLUTION PARTICULATE ANALYTICA ATA

BASE EGLIN AFB	DATE 8 MAR 89	RUN NUMBER THREE

BUILDING NUMBER ASPHALT PLANT	SOURCE NUMBER

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.6368	0.2825	0.3543
ACETONE WASHINGS (Probe, Front Half Filter)	96.4165	96.3949	00216
BACK HALF (If needed)			
	Total Weight of Particulates Collected		0.3759 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	270.0	200.0	70.0
IMPINGER 2 (H20)	230.0	200.0	30.0
IMPINGER 3 (Dry)	8.5	0.0	8.5
IMPINGER 4 (Silica Gel)	213.9	200.0	13.9
	Total Weight of Water Collected		122.4 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	2,2	2.2	2.0		2.1
VOL % O_2	17.4	17.2	17.2		17.3
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

BLANK ANALYTICAL DATA FORM

Plant EGLIN AFB ASPHALT PLANT

Sample location WET SCRUBBER

Relative humidity ________

Liquid level marked and container sealed ✓

Density of acetone (ρ_a) .78 g/ml

Blank volume (V_a) 100 ml

Date and time of wt 16 MAR 89 1000 hrs Gross wt 99.1905 mg

Date and time of wt 17 MAR 89 1000 hrs Gross wt 99.1905 mg

Average gross wt 99.1905 mg

Tare wt 99.1905 mg

Weight of blank (m_{ab}) 0.0000 mg

$$C_a = \frac{m_{ab}}{V_a \rho_a} = \frac{(0.0000)}{(100)\ (0.78)} = 0.000 \text{ mg/g}$$

Note: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Filters

Filter number ________

Date and time of wt ________ Gross wt ________ mg

Date and time of wt ________ Gross wt ________ mg

Average gross wt ________ mg

Tare wt ________ mg

Difference wt ________ mg

Note: Average difference must be less than ±5 mg or 2% of total sample weight whichever is greater.

Remarks ________

Signature of analyst ________

Signature of reviewer ________

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APPENDIX D
White Sand Field Data Sheets

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1 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 1

DATE: 9 MAR 89

PLANT: ASPHALT PLANT

BASE: EGLIN

SAMPLE BOX NUMBER:

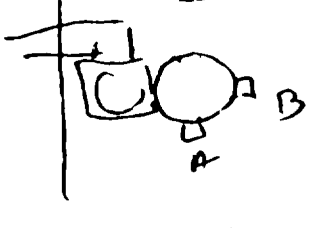
METER BOX NUMBER: NUTECH #2

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

WHITE SAND



36 tons (54 m)

START 0514

Asphalt 0814

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Pitot good

Preleak at 15in good

AMBIENT TEMP: 62 °F

STATION PRESS: 30.245 in Hg

HEATER BOX TEMP: 190 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 6' in

NOZZLE AREA (A): 0.375 sq ft

Cp: 0.84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1 A	0	3.0	125		.060	.91	240.700	58		57	224	46
2	2.5	4.0	130		.082	1.29		59		58	252	48
3	5.0	4.0	135		.090	1.36		63		59	253	46
4	7.5	4.5	135		.090	1.36		65		58	256	46
5	10.0	5.0	139		.085	1.29		66		59	257	46
6	12.5	5.0	139		.080	1.21		70		60	256	49
7	15.0	5.0	141		.070	1.06		72		62	259	51
8	17.5	5.0	142		.065	0.98		73		63	260	52
9	20.0	5.0	142		.060	0.91		75		64	256	54
10	22.5	4.5	143		.050	0.76		76		65	261	55
11	25.0	4.5	143		.045	0.68		76		65	262	56
12	27.5	4.0	142		.040	0.61	256.625	77		66	252	56
	30.0											
STOP TIME	0844											

OEHL FORM 18 MAY 78

PARTICULATE SAMPLING DATA SHEET

2 of 2

RUN NUMBER 1	SCHEMATIC OF STACK CROSS SECTION	EQUATIONS	AMBIENT TEMP cont °F
DATE 9 MAR 89			STATION PRESS 30.245 in Hg
PLANT			HEATER BOX TEMP °F
BASE			PROBE HEATER SETTING
SAMPLE BOX NUMBER			PROBE LENGTH in
METER BOX NUMBER			NOZZLE AREA (A) sq ft
Qw/Qm			Cp
Co			DRY GAS FRACTION (Fd)

$$^{\circ}R = ^{\circ}F + 460$$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Post leak good at 10 in Hg

START 0849

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
B 1	0	3.0	131		.03	0.46	256.625	73		69	248	56
2	2.5	5.0	135		.045	0.69		77		70	246	56
3	5.0	5.0	136		.045	0.69		78		71	245	56
4	7.5	6.0	142		.050	0.77		80		71	247	57
5	10.0	6.0	143		.045	0.69		81		72	241	58
6	12.5	6.0	143		.050	0.77		82		73	248	59
7	15.0	7.0	144		.060	0.92		83		74	245	61
8	17.5	7.5	144		.070	1.08		84		74	244	62
9	20.0	7.5	144		.060	0.92		85		76	245	63
10	22.5	6.0	144		.045	0.69		86		76	239	66
11	25.0	6.0	144		.045	0.69		86		77	234	67
12	27.5	6.0	145		.045	0.69	[illegible]	86		77	236	67
	30.0						270.930					

STOP 0919

$T_M = 71$ $T_S = 140$ $\Delta H = 0.89$ TPSTS = 5.875 TOT FT^3 = [illegible]

OEHL FORM MAY 78 18

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EGLIN	**DATE** 9 MAR 89	**RUN NUMBER** 1
BUILDING NUMBER BLDG 571 ASPHALT PLT.	**SOURCE NUMBER**	

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.5886	0.2890	0.2996
ACETONE WASHINGS *(Probe, Front Half Filter)*	100.3505	100.3391	0.0114
* BACK HALF *(If needed)* ACETONE BLANK 100 ml	99.1905	99.1905	0.0000
	Total Weight of Particulates Collected		0.3110 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 *(H20)*	286	200.0	86.0
IMPINGER 2 *(H20)*	237	200.0	37.0
IMPINGER 3 *(Dry)*	4.5	0.0	4.5
IMPINGER 4 *(Silica Gel)*	210.4	200.0	10.4
	Total Weight of Water Collected		137.9 gm

III. GASES *(Dry)*

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	2.8	2.6	2.6		2.7
VOL % O_2	16.2	16.4	16.4		16.3
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

1 of 2

PARTICULATE SAMPLING DATA SHEET

ΔH@ = 1.91

RUN NUMBER 2

DATE 9 Mar 89

PLANT ASPHALT PLANT

BASE EGLIN

SAMPLE BOX NUMBER

METER BOX NUMBER NUTECH #2

Qw/Qm

Co

SCHEMATIC OF STACK CROSS SECTION

WHITE SAND

(35.5 Ton / 63 MIN)

START TIME 0954

EQUATIONS

$^{o}R = {}^{o}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

pitot tube check good

leak check @ 15" Hg good

STATIC = .055

AMBIENT TEMP 62 °F

STATION PRESS 30.245 in Hg

HEATER BOX TEMP °F

PROBE HEATER SETTING

PROBE LENGTH 6' in

NOZZLE AREA (A) 0.375 sq ft

Cp 0.84

DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A 1	0	2.0	109.0	[illegible].33	.05	.82	271.220	85		85	267	58
2	2.5	3.0	129.0		.07	1.12		85		85	268	56
3	5.0	4.0	132		.08	1.27		87		85	267	57
4	7.5	4.0	134		.09	1.49		88		85	267	55
5	10.0	4.5	137		.09	1.49		88		85	268	56
6	12.5	5.0	137		.10	1.58		89		86	268	55
7	15.0	6.0	134		.11	1.75		96		86	269	56
8	17.5	6.0	137		.10	1.58		90		86	266	58
9	20.0	6.0	139		[illegible]	1.42		91		86	267	57
10	22.5	5.5	140		.08	1.26		91		86	265	61
11	25.0	5.0	141		.06	.94		91		86	270	62
12	27.5	4.5	141		.06	.94	287.783	91		86	268	64
	30.0		[illegible]									

STOP TIME 1024

OEHL FORM MAY 78 18

2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER 2

DATE

PLANT

BASE

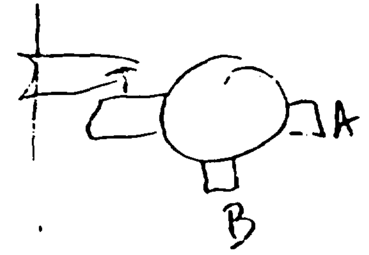
SAMPLE BOX NUMBER

METER BOX NUMBER

Qw/Qm

Co

SCHEMATIC OF STACK CROSS SECTION



TIME START 1028

EQUATIONS

$^{o}R = ^{o}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Post leak check ① 13.5" Hg
~~[illegible]~~
Good

AMBIENT TEMP °F

STATION PRESS in Hg

HEATER BOX TEMP °F

PROBE HEATER SETTING

PROBE LENGTH 6' in

NOZZLE AREA (A) sq ft

Cp

DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
B 1	0	4.0	86		.08	1.38	237.734	86	~~85~~	85	266	60
2	2.5	6.0	137		.12	1.87		89	~~85~~	85	267	58
3	5.0	7.0	139		.12	1.89		91	85	85	269	59
4	7.5	9.0	138		.13	2.06		93		86	268	59
5	10.0	11.8	137		.14	2.21		94		85	253	63
6	12.5	11.5	143		.13	2.04		95		86	265	65
7	15.0	11.5	142		.11	1.73		95		86	264	65
8	17.5	10.0	143		.105	1.65		95		86	264	64
9	20.0	9.5	144		.100	1.57		95		86	267	65
10	22.5	9.0	142		.095	1.49		94		85	265	64
11	25.0	9.0	142		.09	1.42		94		86	269	63
12	27.5	9.0	143		.09	1.41	308.49	94		86	268	63
~~13~~												

TIME STOP 1058

$\overline{T_M}$ = 88.25 $\overline{T_s}$ = 135.13 ΔH = 1.49

TOTAL ft^3 = 37.73 $\sqrt{\Delta P_s}$ = 1.4833

OEHL FORM MAY 78 18

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EGLIN	DATE 9 MAR 89	RUN NUMBER 2
BUILDING NUMBER BLDG 571 ASPHALT PLT	SOURCE NUMBER	

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.5911	0.2929	0.2982
ACETONE WASHINGS (Probe, Front Half Filter)	100.0704	100.0575	0.0129
BACK HALF (If needed)			
	Total Weight of Particulates Collected		0.3111 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	315.4 ~~280.0~~	200.0	115.4
IMPINGER 2 (H20)	230.0 ~~222.0~~	200.0	30.0
IMPINGER 3 (Dry)	5.5 ~~4.5~~	0.0	5.5
IMPINGER 4 (Silica Gel)	214.7	200.0	14.7
	Total Weight of Water Collected		165.6 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	2.4	2.4	2.4		2.4
VOL % O_2	16.8	16.8	16.8		16.8
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

1 of 2

PARTICULATE SAMPLING DATA SHEET

$\Delta H_{@} = 1.91$

RUN NUMBER 3

DATE 9 MAR 89

PLANT ASPHALT PLT

BASE EGLIN

SAMPLE BOX NUMBER Nutech 2

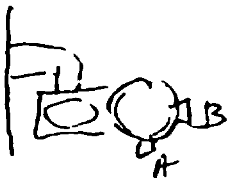
METER BOX NUMBER NUTECH #2

Qw/Qm

Co

SCHEMATIC OF STACK CROSS SECTION

#Asphalt 38 tons (59 min)



start 1203

EQUATIONS

°R = °F + 460

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

AMBIENT TEMP 62 °F

STATION PRESS 30.245 in Hg

HEATER BOX TEMP 248 °F

PROBE HEATER SETTING 190

PROBE LENGTH 6' (72 in)

NOZZLE AREA (A) 0.395 sq ft

Cp 0.84

DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A-1	0	2.0	127		0.100	1.60	308.580	84		84	242	60
2	2.5	2.5	130		0.140	2.22		85		84	239	50
3	5.0	3.0	132		.135	2.14		86		84	235	47
4	7.5	4.0	138		.140	2.21		91		85	239	47
5	10.0	5.0	139		.150	2.36		92		85	246	47
6	12.5	5.0	143		.15	2.35		94		85	245	48
7	15.0	5.0	144		.125	1.96		96		86	245	51
8	17.5	5.0	144		.120	1.89		97		86	246	52
9	20.0	5.0	145		.115	1.81		97		87	239	52
10	22.5	5.0	146		.110	1.73		97		87	235	53
11	25.0	5.0	144		.100	1.57		98		87	242	59
12	27.5	5.0	143		.100	1.56		98		88	250	54
STOP 1233												

OEHL FORM MAY 78 18

Page 2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER THREE

DATE 9 March

PLANT Asphalt

BASE Eglin

SAMPLE BOX NUMBER

METER BOX NUMBER

Qw/Qm

Co

SCHEMATIC OF STACK CROSS SECTION

3/8

start 1237

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Post leak ck at 14 in Hg good

Static = .655

AMBIENT TEMP Cont from page 1 °F

STATION PRESS in Hg

HEATER BOX TEMP °F

PROBE HEATER SETTING

PROBE LENGTH in

NOZZLE AREA (A) sq ft

Cp

DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
B 1	0	6.0	140		.115	1.82	329.870	92		89	243	56
2	2.5	7.0	140		.115	1.82		94		89	245	51
3	5.0	8.0	141		.120	1.90		96		89	242	51
4	7.5	8.0	141		.120	1.90		98		89	244	51
5	10.0	8.5	143		.120	1.90		98		89	241	52
6	12.5	9.5	143		.140	2.21		99		89	245	52
7	15.0	11.5	146		.150	2.36		100		90	243	53
8	17.5	11.5	140		.140	2.23		100		90	242	54
9	20.0	11.5	143		.130	2.06		101		90	245	55
10	22.5	11.5	146		.130	2.05		100		91	240	57
11	25.0	11.5	145		.120	1.90		100		91	239	57
12	27.5		144		.110	1.74	351.335	100		91	243	57
STOP 1307												

$\bar{T}_M = 92$ $\bar{T}_S = 141$ $\overline{\Delta H} = 1.97$ $\sqrt{P_S T_S} = 8.6442$ TOT FT^3 = 42.75

OEHL FORM MAY 78 18

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE: EGLIN

DATE: 9 MAR 89

RUN NUMBER: 3

BUILDING NUMBER: BLDG 571 ASPHALT PLT

SOURCE NUMBER:

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.6838	0.2883	0.3955
ACETONE WASHINGS *(Probe, Front Half Filter)*	98.8078	98.7921	0.0157
BACK HALF *(If needed)*			
	Total Weight of Particulates Collected		0.4112 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 *(H20)*	36[illegible].6	200.0	163.6
IMPINGER 2 *(H20)*	215.0	200.0	15.0
IMPINGER 3 *(Dry)*	1.0	0.0	1.0
IMPINGER 4 *(Silica Gel)*	209.5	200.0	9.5
	Total Weight of Water Collected		188.5 gm

III. GASES *(Dry)*

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	2.4	2.4	2.4		2.4
VOL % O_2	16.8	16.8	16.8		16.8
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE

BLANK ANALYTICAL DATA FORM

Plant EGLIN AFB ASPHALT PLANT

Sample location WET SCRUBBER

Relative humidity

Liquid level marked and container sealed ✓

Density of acetone (ρ_a) .78 g/ml

Blank volume (V_a) 100 ml

Date and time of wt 16 MAR 89 1000 hrs Gross wt 99.1905 mg

Date and time of wt 17 MAR 89 1000 hrs Gross wt 99.1905 mg

Average gross wt 99.1905 mg

Tare wt 99.1905 mg

Weight of blank (m_{ab}) 0.0000 mg

$$C_a = \frac{m_{ab}}{V_a \rho_a} = \frac{(0.0000)}{(100)\ (0.78)} = 0.000 \text{ mg/g}$$

Note: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Filters Filter number

Date and time of wt Gross wt mg

Date and time of wt Gross wt mg

Average gross wt mg

Tare wt mg

Difference wt mg

Note: Average difference must be less than ±5 mg or 2% of total sample weight whichever is greater.

Remarks

Signature of analyst

Signature of reviewer

APPENDIX E
ment Calibration Data

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NOZZLE CALIBRATION DATA FORM

Date 5 MAR 89 Calibrated by MAJ GARRISON

Nozzle identification number	Nozzle Diameter[a]			ΔD,[b] mm (in.)	D_{avg}[c]
	D_1, mm (in.)	D_2, mm (in.)	D_3, mm (in.)		
	.375	.375	.376	.001	.375

where:

[a] $D_{1,2,3,}$ = three different nozzles diameters, mm (in.); each diameter must be within (0.025 mm) 0.001 in.

[b] ΔD = maximum difference between any two diameters, mm (in.), $\Delta D \leq (0.10\ \text{mm})\ 0.004$ in.

[c] D_{avg} = average of D_1, D_2, and D_3.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test numbers ________ Date 22 Mar 89 Meter box number Nutech 2 Plant Post Eglin

Barometric pressure, P_b = 29.520 in. Hg Dry gas meter number Nutech 2 Pretest Y 1.002

Orifice manometer setting, (ΔH), in. H_2O	Gas volume		Temperature				Time (θ), min	Vacuum setting, in. Hg	Y_i	Y_i
	Wet test meter (V_w), ft^3	Dry gas meter (V_d), ft^3	Wet test meter (t_w), °F	Dry gas meter						$\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6} \right) (t_w + 460)}$
				Inlet (t_{d_i}), °F	Outlet (t_{d_o}), °F	Average[a] (t_d), °F				
.90	10	9.594	76 78 -77	[illegible] 84 81.5	75 77 76.0	78.75	18.67	10.0	1.043	$\frac{(10)(29.52)(538.75)}{(9.594)(29.52 + \frac{.9}{13.6})(537)}$
.90	10	9.626	78 78 -78	84 86 85.0	77 79 78.0	81.50	18.71	10.0	1.043	$\frac{(10)(29.52)(541.5)}{(9.626)(29.586)(538)}$
.90	10	9.671	77 76 -76.5	86 87 86.5	79 80 79.5	83.00	18.75	10.0	1.044	$\frac{(10)(29.52)(543)}{(9.671)(29.586)(536.5)}$
									Y = 1.043	

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

V_w = Gas volume passing through the wet test meter, ft^3. Y=1.002

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F. .9519 ⟷ 1.0521

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y $\pm 0.05Y$

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

Quality Assurance Handbook M5-2.4A

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number KELLY AFB POST TEST Date 13 JAN 89 Meter box number NUTECH #2 Plant POST KELLY AFB PRE EGLIN AFB ~~[illegible]~~

Barometric pressure, P_b = 29.560 in. Hg Dry gas meter number ______ Pretest Y 1.002

Orifice manometer setting, (ΔH), in. H_2O	Gas volume		Temperature				Time (θ), min	Vacuum setting, in. Hg	Y_i	Y_i
	Wet test meter (V_w), ft^3	Dry gas meter (V_d), ft^3	Wet test meter (t_w), °F	Dry gas meter Inlet (t_{d_i}), °F	Dry gas meter Outlet (t_{d_o}), °F	Dry gas meter Average (t_d),[a] ~~°F~~ °K				$\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
2.0	10	88.015 77.932 10.083	76 76 536°K	83 93	76 80	543	13.40	5.0	0.999	$\frac{(10)(29.56)(543)}{(10.08)(29.71)(536)}$
2.0	10	99.764 89.634 10.130	76 76 536°K	93 95	80 83	547.3	13.40	5.0	1.004	$\frac{(10)(29.56)(547.8)}{(10.13)(29.71)(536)}$
2.0	10	111.160 100.980 10.180	76 76 536°K	95 96	83 85	549.8	13.40	5.0	1.003	$\frac{(10)(29.56)(549.8)}{(10.18)(29.71)(536)}$
									Y = 1.002	

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

Y_{RANGE} = 0.952 - 1.052

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y $\pm 0.05Y$.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 21 Nov 88 Meter box number Nutech #2

Barometric pressure, P_b = 30.02 in. Hg Calibrated by Scott & Vaughn

		Gas volume		Temperature						
					Dry gas meter					
VAC	Orifice manometer setting (ΔH), in. H_2O	Wet test meter (V_w), ft^3	Dry gas meter (V_d), ft^3	Wet test meter (t_w), °F	Inlet (t_{d_i}), °F	Outlet (t_{d_o}), °F	Avg[a] (t_d), °F	Time (θ), min	Y_i	$\Delta H@_i$ in. H_2O
4.0	0.5	5	5.057	75 75 535	77 82	75 77	537.75	12.40	0.9926	1.73
4.0	1.0	5	5.031	76 76 536	84 89	77 80	542.5	9.14	1.0034	1.87
4.0	1.5	10	10.101	77 77 537	90 96	81 84	547.75	15.35	1.0061	1.97
4.0	2.0	10	10.230	78 78 538	97 99	85 87	552.0	13.45	0.9981	2.00
4.0	3.0	10	10.170	78 78 538	100 103	87 89	554.75	10.92	1.0065	1.97
4.0	4.0	10	10.191	78 78 538	103 105	89 91	557.0	9.35	1.0061	1.92
								Avg	1.002	1.91

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$	$\Delta H@_i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5)(30.02)(537.75)}{(5.057)(30.02+\frac{.5}{13.6})(535)}$	$\frac{(.0317)(.5)}{(30.02)(537.75)}\left(\frac{(535)(12.4)}{(5)}\right)^2$
1.0	0.0737	$\frac{(5)(30.02)(542.5)}{(5.031)(30.02+\frac{1}{13.6})(536)}$	$\frac{(.0317)(1.0)}{(30.02)(542.5)}\left[\frac{(536)(9.14)}{5}\right]^2$
1.5	0.110	$\frac{(10)(30.02)(547.75)}{(10.101)(30.02+\frac{1.5}{13.6})(537)}$	$\frac{(.0317)(1.5)}{(30.02)(547.75)}\left[\frac{(537)(15.35)}{10}\right]^2$
2.0	0.147	$\frac{(10)(30.02)(552)}{(10.23)(30.02+\frac{2.0}{13.6})(538)}$	$\frac{(.0317)(2.0)}{(30.02)(552)}\left[\frac{(538)(13.45)}{10}\right]^2$
3.0	0.221	$\frac{(10)(30.02)(554.75)}{(10.17)(30.02+\frac{3}{13.6})(538)}$	$\frac{(.0317)(3.0)}{(30.02)(554.75)}\left[\frac{(538)(10.92)}{10}\right]^2$
4.0	0.294	$\frac{(10)(30.02)(557)}{(10.191)(30.02+\frac{4}{13.6})(538)}$	$\frac{(.0317)(4.0)}{(30.02)(557)}\left[\frac{(538)(9.35)}{10}\right]^2$

---

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

NUTECH #2

Date 3 JAN 89 Thermocouple number INLET/OUTLET

Ambient temperature 26 °C Barometric pressure ______ in. Hg

Calibrator GARRISON SCOTT Reference: mercury-in-glass ASTM 63F

other ____________

Reference point number	Source[a] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[b] ~~%~~ °C *
INLET				
-	HOT WATER BATH	43.5	43	.5
-	ROOM TEMP	26	26	0
OUTLET				
-	HOT WATER BATH	43.5	42	1
-	ROOM TEMP	26	26.5	.5

[a] Type of calibration system used.

[b] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

Quality Assurance Handbook M5-2.5

* MUST BE WITHIN 3°C OF REFERENCE

TYPE S PITOT TUBE INSPECTION DATA FORM

#6A

Pitot tube assembly level? ✓ yes ______ no

Pitot tube openings damaged? ______ yes (explain below) ✓ no

α_1 = 1° (<10°), α_2 = 2° (<10°), β_1 = 2° (<5°),
β_2 = 3° (<5°)

γ = 4°, θ = 0°, A = 13/16 (1.1875) ~~cm~~ (in.)

z = A sin γ = 0.0828 ~~cm~~ (in.); <0.32 cm (<1/8 in.), 0.125

w = A sin θ = 0.0 ~~cm~~ (in.); <.08 cm (<1/32 in.) 0.0313

P_A 19/32 (0.5938) ~~cm~~ (in.) P_b 19/32 (0.5938) ~~cm~~ (in.)

D_t = 0.375 cm (in.)

Comments: CONSTRUCTED IAW 40 CFR 60, APP A, METH 2, FIG 2.2. ASSIGNED BASELINE COEFFICIENT = 0.84

Calibration required? ______ yes ✓ no

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 19/20 OCT 88 Thermocouple number IMPINGER D1

Ambient temperature 26 °C Barometric pressure 29.232/ 29.175 in. Hg

Calibrator GARRISON/ SCOTT Reference: mercury-in-glass NBS

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] ~~%~~ °C *
0	ICE BATH	0	0	—
—	ROOM TEMP	25.5	26.1	0.6

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

20 IMPINGER
Date 19OCT 88 Thermocouple number D2
29.232/
Ambient temperature 26° °C Barometric pressure 29.175 in. Hg
Calibrator GARRISON/ SCOTT Reference: mercury-in-glass NBS
other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] ~~%~~ °C *
0	ICE BATH	0	0	—
—	ROOM TEMP	26.0	26.6	0.6

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

IMPINGER

Date 19/20 OCT 88 Thermocouple number D3

Ambient temperature 26 °C Barometric pressure 29.232/ 29.175 in. Hg

Calibrator GARRISON/ SCOTT Reference: mercury-in-glass NBS

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] ~~%~~ °C*
C	ICE BATH	0	0.6	0.6
—	ROOM TEMP	25.8	25.6	0.2

---

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$$

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 19/20 OCT 88 Thermocouple number IMPINGER DY
Ambient temperature 26 °C Barometric pressure 29.232/ 29.175 in. Hg
Calibrator GARRISON/ SCOTT Reference: mercury-in-glass NBS
other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] ~~%~~ °C *
0	ICE BATH	0	0.6	0.6
—	ROOM TEMP	25.5	25.6	0.1

---

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

* MUST BE WITHIN 1°C OF REF

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

IMPINGER

Date 19 Oct 88 Thermocouple number D5

Ambient temperature 26 °C Barometric pressure 29.232/ 29.175 in. Hg

Calibrator GARRISON/ SCOTT Reference: mercury-in-glass NBS

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] * °C *
0	ICE BATH	0	0.6	0.6
—	ROOM TEMP	26	25.5	0.5

---

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 19/20 Oct 88 Thermocouple number IMPINGER D6

Ambient temperature 26 °C Barometric pressure 29.232/29.175 in. Hg

Calibrator GARRISON/SCOTT Reference: mercury-in-glass NBS

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] ~~%~~ °C *
0	ICE BATH	0	0.6	0.6
—	ROOM TEMP	26	25.5	0.5

---

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \le 1.5\%.$$

* MUST BE WITHIN 1°C OF REF

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 19/20 Oct 88 Thermocouple number IMPINGER D7

Ambient temperature 26 °C Barometric pressure 29.232 29.175 in. Hg

Calibrator GARRISON/ SCOTT Reference: mercury-in-glass NBS

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] ~~%~~ °C*
0	ICE BATH	0	0.6	0.6
—	ROOM TEMP	26	25.5	0.5

[a] Every 30°C (50°F) for each reference point.

[b] Type of calibration system used.

[c] $$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$$

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

```
STACK SENSOR CALIBRATION:  19-20 Oct 88

          REFERENCE      TEST
 SENSOR  TEMPERATURE TEMPERATURE
   #       (deg K)     (deg K)
           X axis      Y axis
---------------------------------

   P1       273.30      273.60                 Regression Output:
            371.90      373.60       Constant                             -4.30
            447.00      450.20       Std Err of Y Est                      0.20
                                     R Squared                             1.00
                                     No. of Observations                   3.00
                                     Degrees of Freedom                    1.00

                                     X Coefficient(s)        1.02
                                     Std Err of Coef.        0.00

                                     % Deviation @ 2000 F(1093.3 K) = 1.29%


   P2       273.30      273.60                 Regression Output:
            371.80      373.60       Constant                             -4.27
            447.60      450.80       Std Err of Y Est                      0.11
                                     R Squared                             1.00
                                     No. of Observations                   3.00
                                     Degrees of Freedom                    1.00

                                     X Coefficient(s)        1.02
                                     Std Err of Coef.        0.00

                                     % Deviation @ 2000 F(1093.3 K) = 1.25%


   P3       273.30      274.10                 Regression Output:
            371.90      374.10       Constant                             -2.96
            447.60      450.80       Std Err of Y Est                      0.03
                                     R Squared                             1.00
                                     No. of Observations                   3.00
                                     Degrees of Freedom                    1.00

                                     X Coefficient(s)        1.01
                                     Std Err of Coef.        0.00

                                     % Deviation @ 2000 F(1093.3 K) = 1.11%


   P4       273.30      273.60                 Regression Output:
            371.80      373.60       Constant                             -4.27
            447.60      450.80       Std Err of Y Est                      0.11
                                     R Squared                             1.00
                                     No. of Observations                   3.00
                                     Degrees of Freedom                    1.00

                                     X Coefficient(s)        1.02
                                     Std Err of Coef.        0.00

                                     % Deviation @ 2000 F(1093.3 K) = 1.27%
```

```
P5         273.30      274.10                 Regression Output:
           371.90      373.60          Constant                          -3.03
           447.60      450.80          Std Err of Y Est                   0.37
                                       R Squared                          1.00
                                       No. of Observations                3.00
                                       Degrees of Freedom                 1.00

                                       X Coefficient(s)      1.01
                                       Std Err of Coef.      0.00

                                       % Deviation @ 2000 F(1093.3 K) = 1.08%

P6         273.30      273.30                 Regression Output:
           371.90      373.60          Constant                          -5.03
           447.60      450.80          Std Err of Y Est                   0.09
                                       R Squared                          1.00
                                       No. of Observations                3.00
                                       Degrees of Freedom                 1.00

                                       X Coefficient(s)      1.02
                                       Std Err of Coef.      0.00

                                       % Deviation @ 2000 F(1093.3 K) = 1.37%

P7         273.30      273.30                 Regression Output:
           371.90      373.60          Constant                          -5.03
           447.60      450.80          Std Err of Y Est                   0.09
                                       R Squared                          1.00
                                       No. of Observations                3.00
                                       Degrees of Freedom                 1.00

                                       X Coefficient(s)      1.02
                                       Std Err of Coef.      0.00

                                       % Deviation @ 2000 F(1093.3 K) = 1.37%

P8         273.60      273.60                 Regression Output:
           371.80      373.00          Constant                          -4.75
           449.40      452.40          Std Err of Y Est                   0.39
                                       R Squared                          1.00
                                       No. of Observations                3.00
                                       Degrees of Freedom                 1.00

                                       X Coefficient(s)      1.02
                                       Std Err of Coef.      0.00

                                       % Deviation @ 2000 F(1093.3 K) = 1.25%
```

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APPENDIX F
Emissions Calculations

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```
        XROM "METH 5"
RUN NUMBER
ASPHALT, RED CLAY, R1
                    RUN
METER BOX Y?
          1.0020    RUN
DELTA H?
          0.9900    RUN
BAR PRESS ?
         30.1300    RUN
METER VOL ?
         30.9500    RUN
MTR TEMP F?
         61.0000    RUN
STATIC HOH IN ?
           .0550    RUN
STACK TEMP.
        131.0000    RUN
ML. WATER ?
        122.0000    RUN
SAT % = 15.4


IMP. % HOH = 15.3

% HOH=15.3


% CO2?
          2.9000    RUN
% OXYGEN?
         15.1000    RUN
% CO ?
          0.0000    RUN
MOL WT OTHER?
                    RUN

MWd =29.07
MW WET=27.37


SQRT PSTS ?
          6.3300    RUN
TIME MIN ?
         60.0000    RUN
NOZZLE DIA ?
           .3750    RUN
STK DIA INCH ?
         42.0000    RUN

* VOL MTR STD = 31.726
  STK PRES ABS = 30.13
  VOL HOH GAS = 5.74
  % MOISTURE = 15.33
  MOL DRY GAS = 0.847
  % NITROGEN = 82.00
  MOL WT DRY = 29.07
  MOL WT WET = 27.37
  VELOCITY FPS = 15.83
  STACK AREA = 9.62
  STACK ACFM = 9,137.
* STACK DSCFM = 6,961.
  % ISOKINETIC =  95.34
```

```
        XROM "METH 5"
RUN NUMBER
ASPHALT, RED CLAY, R2
                    RUN
METER BOX Y?
          1.0020    RUN
DELTA H?
          1.0000    RUN
BAR PRESS ?
         30.1300    RUN
METER VOL ?
         33.5120    RUN
MTR TEMP F?
         61.0000    RUN
STATIC HOH IN ?
           .0550    RUN
STACK TEMP.
        131.0000    RUN
ML. WATER ?
        122.4000    RUN


SAT % = 15.4


IMP. % HOH = 14.4

% HOH=14.4


% CO2?
          2.5000    RUN
% OXYGEN?
         16.9000    RUN
% CO ?
          0.0000    RUN

MWd =29.08
MW WET=27.49


SQRT PSTS ?
          6.3850    RUN
TIME MIN ?
         60.0000    RUN
NOZZLE DIA ?
           .3750    RUN
STK DIA INCH ?
         42.0000    RUN

* VOL MTR STD = 34.359
  STK PRES ABS = 30.13
  VOL HOH GAS = 5.76
  % MOISTURE = 14.36
  MOL DRY GAS = 0.856
  % NITROGEN = 80.60
  MOL WT DRY = 29.08
  MOL WT WET = 27.49
  VELOCITY FPS = 15.93
  STACK AREA = 9.62
  STACK ACFM = 9,197.
* STACK DSCFM = 7,087.
  % ISOKINETIC =  101.42
```

```
        XROM "METH 5"
RUN NUMBER
ASPHALT, RED CLAY, R3
                    RUN
METER BOX Y?
          1.0020    RUN
DELTA H?
          0.9500    RUN
BAR PRESS ?
         30.1300    RUN
METER VOL ?
         31.4950    RUN
MTR TEMP F?
         72.0000    RUN
STATIC HOH IN ?
           .0550    RUN
STACK TEMP.
        132.0000    RUN
ML. WATER ?
        122.4000    RUN


SAT % = 15.8


IMP. % HOH = 15.4

% HOH=15.4


% CO2?
          2.1000    RUN
% OXYGEN?
         17.3000    RUN
% CO ?
          0.0000    RUN

MWd =29.03
MW WET=27.33


SQRT PSTS ?
          5.9290    RUN
TIME MIN ?
         60.0000    RUN
NOZZLE DIA ?
           .3750    RUN
STK DIA INCH ?
         42.0000    RUN

* VOL MTR STD = 31.614
  STK PRES ABS = 30.13
  VOL HOH GAS = 5.76
  % MOISTURE = 15.42
  MOL DRY GAS = 0.846
  % NITROGEN = 80.60
  MOL WT DRY = 29.03
  MOL WT WET = 27.33
  VELOCITY FPS = 14.84
  STACK AREA = 9.62
  STACK ACFM = 8,565.
* STACK DSCFM = 6,508.
  % ISOKINETIC =  101.62
```

```
          XROM "MASSFLO"

RUN NUMBER
ASPHALT, RED CLAY, R1
                          RUN

VOL MTR STD ?
          31.7260    RUN
STACK DSCFM ?
       6,961.0000    RUN
FRONT 1/2 MG ?
         361.1000    RUN
BACK 1/2 MG ?
           0.0000    RUN


F  GR/DSCF = 0.1756
F  MG/MMM = 401.9380
F  LB/HR = 10.4800
F  KG/HR = 4.7537

          XROM "MASSFLO"

RUN NUMBER
ASPHALT, RED CLAY, R2
                          RUN

VOL MTR STD ?
          34.3590    RUN
STACK DSCFM ?
       7,087.0000    RUN
FRONT 1/2 MG ?
         411.5000    RUN
BACK 1/2 MG ?
           0.0000    RUN


F  GR/DSCF = 0.1848
F  MG/MMM = 422.9375
F  LB/HR = 11.2272
F  KG/HR = 5.0926

          XROM "MASSFLO"

RUN NUMBER
ASPHALT, RED CLAY, R3
                          RUN

VOL MTR STD ?
          31.6140    RUN
STACK DSCFM ?
       6,508.0000    RUN
FRONT 1/2 MG ?
         375.9000    RUN
BACK 1/2 MG ?
           0.0000    RUN


F  GR/DSCF = 0.1835
F  MG/MMM = 419.8941
F  LB/HR = 10.2357
F  KG/HR = 4.6429
```

```
          XROM "METH 5"
RUN NUMBER
ASPHALT, WHITE SAND, R1
                       RUN
METER BOX Y?
          1.0020    RUN
DELTA H?
          0.8900    RUN
BAR PRESS ?
         30.2450    RUN
METER VOL ?
         30.2300    RUN
MTR TEMP F?
         71.0000    RUN
STATIC HOH IN ?
           .0550    RUN
STACK TEMP.
        140.0000    RUN
ML. WATER ?
        137.9000    RUN


SAT % = 19.4


IMP. % HOH = 17.5

% HOH=17.5


% CO2?
          2.7000    RUN
% OXYGEN?
         16.3000    RUN
% CO ?
          0.0000    RUN
MOL WT OTHER?
                    RUN

MWd =29.08
MW WET=27.14


SQRT PSTS ?
          5.8750    RUN
TIME MIN ?
         60.0000    RUN
NOZZLE DIA ?
           .3750    RUN
STK DIA INCH ?
         42.0000    RUN

* VOL MTR STD = 30.512
  STK PRES ABS = 30.25
  VOL HOH GAS = 6.49
  % MOISTURE = 17.54
  MOL DRY GAS = 0.825
  % NITROGEN = 81.00
  MOL WT DRY = 29.08
  MOL WT WET = 27.14
  VELOCITY FPS = 14.72
  STACK AREA = 9.62
  STACK ACFM = 8.500.
* STACK DSCFM = 6,236.
  % ISOKINETIC =  102.76
```

```
          XROM "METH 5"
RUN NUMBER
ASPHALT, WHITE SAND, R2
                       RUN
METER BOX Y?
          1.0020    RUN
DELTA H?
          1.4900    RUN
BAR PRESS ?
         30.2450    RUN
METER VOL ?
         37.7300    RUN
MTR TEMP F?
         88.0000    RUN
STATIC HOH IN ?
           .0550    RUN
STACK TEMP.
        135.0000    RUN
ML. WATER ?
        165.6000    RUN


SAT % = 17.0


IMP. % HOH = 17.4

% HOH=17.0


% CO2?
          2.4000    RUN
% OXYGEN?
         16.8000    RUN
% CO ?
          0.0000    RUN
MOL WT OTHER?
                    RUN

MWd =29.06
MW WET=27.17


SQRT PSTS ?
          7.4833    RUN
TIME MIN ?
         60.0000    RUN
NOZZLE DIA ?
           .3750    RUN
STK DIA INCH ?
         42.0000    RUN

* VOL MTR STD = 36.955
  STK PRES ABS = 30.25
  VOL HOH GAS = 7.79
  % MOISTURE = 17.03
  MOL DRY GAS = 0.830
  % NITROGEN = 80.80
  MOL WT DRY = 29.06
  MOL WT WET = 27.17
  VELOCITY FPS = 16.74
  STACK AREA = 9.62
  STACK ACFM = 10,820.
* STACK DSCFM = 8,055.
  % ISOKINETIC =  95.97
```

```
          XROM "METH 5"
RUN NUMBER
ASPHALT, WHITE SAND, R3
                       RUN
METER BOX Y?
          1.0020    RUN
DELTA H?
          1.9700    RUN
BAR PRESS ?
         30.2450    RUN
METER VOL ?
         42.7500    RUN
MTR TEMP F?
         92.0000    RUN
STATIC HOH IN ?
           .0550    RUN
STACK TEMP.
        141.0000    RUN
ML. WATER ?
        188.5000    RUN


SAT % = 19.9


IMP. % HOH = 17.6

% HOH=17.6


% CO2?
          2.4000    RUN
% OXYGEN?
         16.8000    RUN
% CO ?
          0.0000    RUN
MOL WT OTHER?
                    RUN

MWd =29.06
MW WET=27.11


SQRT PSTS ?
          8.6442    RUN
TIME MIN ?
         60.0000    RUN
NOZZLE DIA ?
           .3750    RUN
STK DIA INCH ?
         42.0000    RUN

* VOL MTR STD = 41.616
  STK PRES ABS = 30.25
  VOL HOH GAS = 8.87
  % MOISTURE = 17.57
  MOL DRY GAS = 0.824
  % NITROGEN = 80.80
  MOL WT DRY = 29.06
  MOL WT WET = 27.11
  VELOCITY FPS = 21.68
  STACK AREA = 9.62
  STACK ACFM = 12,513.
* STACK DSCFM = 9,151.
  % ISOKINETIC = [illegible]
```

```
          XROM "MASSFLO"

RUN NUMBER
ASPHALT, WHITE SAND, R1
                         RUN


VOL MTR STD ?
            30.5120    RUN
STACK DSCFM ?
        6,236.0000    RUN
FRONT 1/2 MG ?
          311.0000    RUN
BACK 1/2 MG ?
            0.0000    RUN


F  GR/DSCF = 0.1573
F  MG/MMM = 359.9454
F  LB/HR = 8.4076
F  KG/HR = 3.8137

          XROM "MASSFLO"

RUN NUMBER
ASPHALT, WHITE SAND, R2
                         RUN


VOL MTR STD ?
            36.9550    RUN
STACK DSCFM ?
        8,055.0000    RUN
FRONT 1/2 MG ?
          311.1000    RUN
BACK 1/2 MG ?
            0.0000    RUN


F  GR/DSCF = 0.1299
F  MG/MMM = 297.2855
F  LB/HR = 8.9695
F  KG/HR = 4.0686

          XROM "MASSFLO"

RUN NUMBER
ASPHALT, WHITE SAND, R3
                         RUN


VOL MTR STD ?
            41.6160    RUN
STACK DSCFM ?
        9,161.0000    RUN
FRONT 1/2 MG ?
          411.2000    RUN
BACK 1/2 MG ?
            0.0000    RUN


F  GR/DSCF = 0.1525
F  MG/MMM = 348.9311
F  LB/HR = 11.9733
F  KG/HR = 5.4311
```

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