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FINE PARTICLE EMISSIONS INFORMATION SYSTEM REFERENCE MANUAL

Industrial Environmental Research Laboratory
Office of Research and Development
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

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FINE PARTICLE EMISSIONS INFORMATION SYSTEM REFERENCE MANUAL

by

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PREFACE

This document was prepared for EPA/IERL-RTP under Contract No. 68-02-1324, Task 47. The task officer was Mr. Gary L. Johnson.

The work was performed in the Environmental and Materials Sciences Division of Midwest Research Institute. Dr. L. J. Shannon served as project manager and Mr. M. P. Schrag, Head, Environmental Systems Section was the project leader.

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Approved for:

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Environmental and Materials
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1.0 Introduction

The Fine Particle Emissions Information System (FPEIS) is a computerized information system containing data on primary fine particle emissions to the atmosphere from stationary point sources and includes data on control device performance. The purpose of the system is to provide a centralized source of fine particle measurement information for use by engineers and scientists engaged in fine particle control technology development.

The contents of the FPEIS may include source test data with particle size distributions; chemical, physical, and bioassay testing results from analyses of particulate samples; and design and performance data on any particle control systems applied. Also included are process descriptions of the sources, and descriptions of the sampling equipment and techniques employed. These data and information items are classified and arranged so as to ensure some compatibility with other EPA data bases, i.e., NEDS (the Source Classification Codes)1/ and the SAROAD/SOTDAT chemical identification systems.2/

A uniform protocol for units and terminology has been developed along with standard input forms and definition of each data element for the system. These standards and definitions will allow all data in the system to be stored or retrieved on a common basis.

1/ "Guide for Compiling a Comprehensive Emission Inventory," EPA No. APTD-1135, NTIS No. PB212-231, March 1973.

2/ "SOTDAT Final Report," EPA No. 450/3-75-070, July 1975.

The FPEIS has been implemented at the EPA National Computer Center (NCC) at Research Triangle Park, on the UNIVAC 1110 computer using SYSTEM 2000, a flexible data base management system. SYSTEM 2000, developed by MRI Systems, Inc., of Austin, Texas (no relation to Midwest Research Institute), will provide users with a virtually unlimited potential for data analysis. Features of SYSTEM 2000 include sorting, comparing, and retrieving information from the FPEIS in a variety of arrangements.

This document constitutes a basic Reference Manual for the FPEIS. This report presents a detailed description of the FPEIS data base with definition of all data types and elements included, a list of available information request procedures, sample data input forms, output format capabilities, and an index to the references and literature sources used to compile the FPEIS data base, in order of unique test series number. A companion document, the FPEIS User Guide (EPA-600/2-76-172), contains detailed instructions for submitting new data to the FPEIS as well as specific procedures to be used for retrieving information from the data base.

These manuals are designed with discrete segments for major sections and subsections. As changes, additions, and expansions of the system and the informational capabilities are made, the manuals will be updated as appropriate.

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FPEIS DATA BASE DESCRIPTION

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2.0 Introduction

The FPEIS contains industrial source emission test data and novel, pilot or prototype control device evaluation data. It attempts to describe completely the aerosol from the point of its generation to the point at which it leaves the control device. General categories of information include source characteristics, control system descriptions, test characteristics, particulate mass train results, physical, biological, and chemical proper- of the particulates, particulate size measurement equipment/method, and particulate size distribution data. Each category of information includes a number of related data elements, each of which is a unique variable essential for the description of the source tested.

The discussion in this section is to introduce a potential FPEIS user to the data base. This section includes a narrative description of the structure, organization, and format of the FPEIS. Specific definition of each data element is contained in Section 3 while encoding instructions are given in Section 2 of the User Guide.[1/]

1/ Fine Particle Emissions Information System User Guide, EPA-600/2-76-172, June 1976.

2.1 FPEIS Structure

The structure of the FPEIS data base includes data elements sufficient to provide information and data for source tests where fine particle measurements were made. A data element is defined as a computer variable corresponding to a particular source test data item. The completeness of information for any given source test within the data base is limited only by the availability of such information as contained in the test report or original reference from which the FPEIS input was derived.

The organization of the FPEIS is shown in Figure 2.1-1. The input data to the FPEIS have generally been derived from source test reports, published papers, or FPEIS Data Input Forms as standard practice. Each report or paper may have test data on one or more source/control device combinations. (An uncontrolled source is defined as a combination of source and no control devices.) All the data pertaining to a source/control device combination obtained at a certain time are given a unique test series number. For example, all data obtained on the Union Electric Meramec plant, Boiler Unit 1, as a part of "Refuse Firing Demonstration Study" were given five test series numbers. They are Test Series Nos. 19, 28, 29, 30, and 31, which were tests conducted during December 1973, November 1974, March 1975, May 1975, and November 1975, respectively. During each test, coal only and/or coal-plus-refuse was burned and the boiler was operated at various power loads. The test series numbers have been assigned a master file number.

Each test series consists of a number of subsets or subseries, which represent all the data pertaining to a given combination of source and control device operating parameters. The subseries ties different test runs together and gives a complete description of the aerosol for the various operating conditions of the source and control device.

The test run, which is the fundamental unit of the FPEIS system, is defined as "any test measurement of a specific source/control device combination for a specific length of time, with specific particle size measuring equipment/method." For example, one size distribution measurement using the diffusion battery/condensation nuclei counter constitutes a run. Another size distribution measurement using an optical particle counter made at about the same time, with the source and control device operating parameters unchanged, constitutes another run. The mass train results such as those using EPA Method 5 are not treated as a test run but are included at the subseries level.

The test run as defined above has both advantages and disadvantages. The disadvantages stem from the fact that the test run data being obtained by a single particle size measuring equipment/method may not cover the entire size spectrum of the aerosol. Therefore, it may be necessary to group several test runs representing data from different instruments to obtain a complete size distribution. On the other hand, this approach has flexibility, in that the data obtained by each instrument can be assessed. For example, if one makes six optical particle counter runs within the time of one impactor run, one can average all the optical particle counter runs and compare the average with the impactor run, or treat the six runs of the optical particle counter separately, getting a time resolution for the optical data.

An advantage of the test run, as defined, is that it simplifies data coding and verification. Furthermore, editing the data obtained by different instruments is also simplified. As an example, the cut points of an impactor which are found to be off by a factor or two can, at a later date, be changed very easily.

Groups of test runs are contained within a test subseries. A test subseries is defined as a group of test runs, utilizing the same or different particle size measurement techniques at a specified location and under the same or common source/collector operating characteristics. Significant changes in source or collector operation as part of the test protocol define a new subseries. As samples of different subseries, a planned change in the air to cloth ratio for a fabric filter under test; a change in source feed material; or charging cycle, melting cycle, lancing, and pouring for an arc furnace would each define a different subseries. Similarly, a change in measurement location, i.e., inlet or outlet of a collector also defines a new subseries. Associated with each test subseries are the relevant data for source operating characteristics, control device operating parameters, test characteristics, sampling conditions and any other information and data which describe the situation existing during the period of the test subseries. Supplemental information may be included where available, such as subsequent chemical analysis or biological testing of the collected particulate on a total mass basis or as a function of particle size. Additionally, provisions are also made for narrative comments which can be used to provide supplementary information, not elsewhere classified. Test subseries are numbered on a sequential, arbitrary basis by the encoder when the data are compiled for entry into the system. This arrangement allows grouping of simultaneous test runs into a common data set.

Subseries data sets for a source/collector test program are contained within a test series. Again, a test series is defined as all the test runs and subseries for an identifiable testing program. Measurements of the same source/collector combination at two or more calendar dates separated in time will result in different test series just as measurements at other sources within a site or plant or at separate plants will also define a different test series. A test series, then, will usually consist of the information contained in a test report, technical journal, etc., specific to a given source/collector combination. A table of test series and references presently contained in the FPEIS data base is given in Section 5.3.

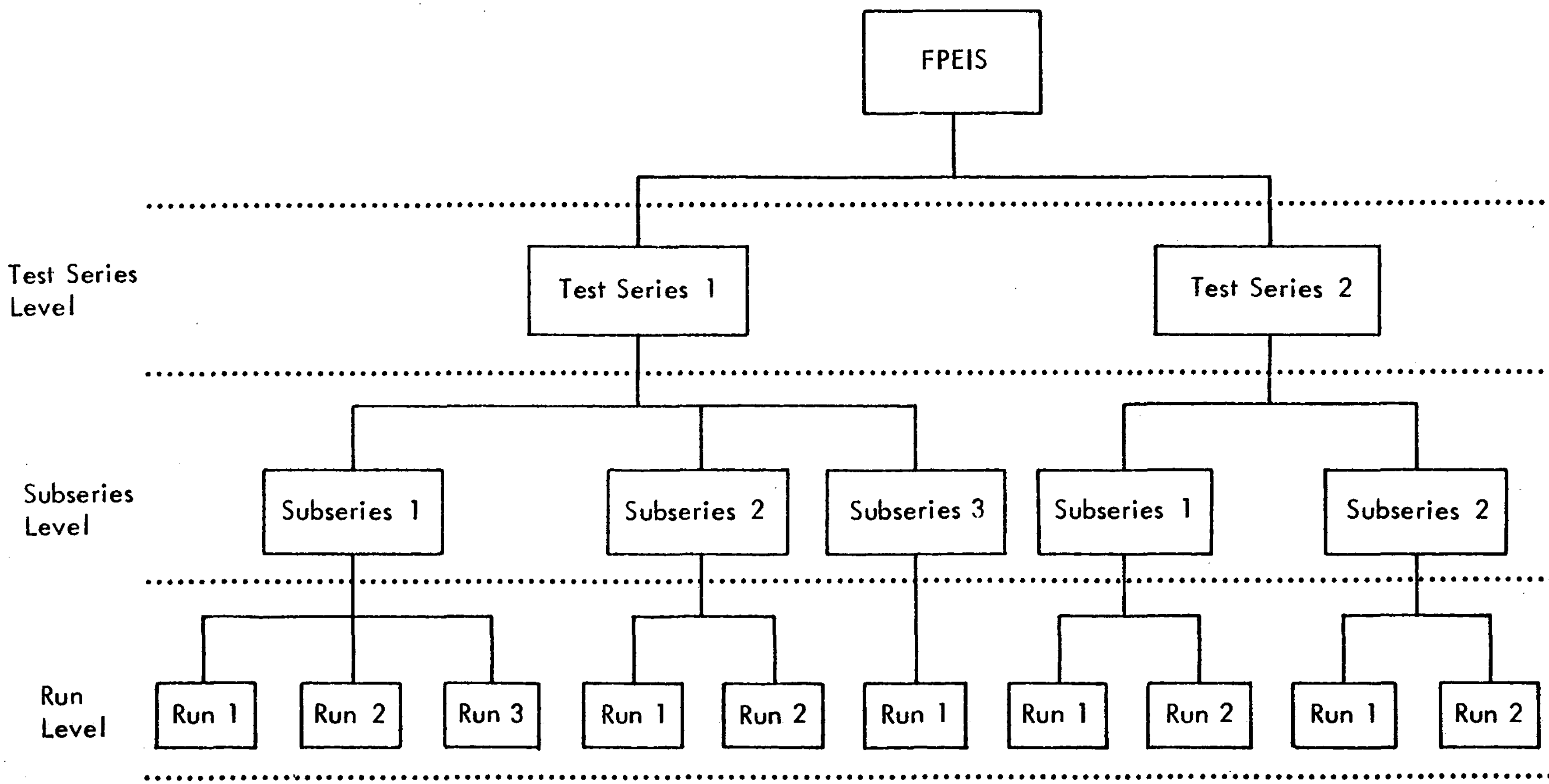

Figure 2.1-1. FPEIS Structure.

2.2 FPEIS Organization

FPEIS data are grouped into five general categories of information. These include: (a) source and test series related information; (b) control device characteristics and design parameters; (c) test characteristics and control device operating parameters; (d) particle size measurement equipment and data; and (e) biological and chemical analyses data.

Each of these categories is described in the following subsections. The relationship between these general categories of information and the data base structure discussed in the previous section is shown in Table 2.2-1.

TABLE 2.2-1. FPEIS DATA ELEMENTS AND THEIR LEVELS

Test Series Level	Subseries Level	Run Level
A. Source Characteristics Source category (SCC I) Type of operation (SCC II) Feed material class (SCC III) Operating mode class (SCC IV) Site and source name Source address (street, city, state, zip code) UTM zone location and coordinates Test series start and finish date Tested by and reference		
B. Test Series Remarks		
C. Control Device(s) Characteristics Generic device type Device class and category Device commercial name Manufacturer Description Design parameter type and value		
	D. Test Characteristics Test date, start, and finish time Source operating mode Source operating rate Percent design capacity Feed material and its composition Sampling location and its description Volume flow rate, velocity temperature and pressure Percent isokinetic sampling Orsat gas analysis and trace gas Composition Control Device(s) Operating Parameter and Value Remarks	
	E. Particulate Mass Train Results Front half and total mass concentration Mass train comments	
	F. Particulate Physical Properties Density Resistivity Others	
	G. Bioassay Data Bioassay test type Test comments	
	H. Chemical Composition Particle boundary diameters Sizing instrument calibrated or calculated SAROAD chemical and analysis method ID Concentration in filter/total Concentration in Ranges 1 through 9	
		I. Measurement particulars Measurement instrument/method name Size range lower and upper boundary Collection surface Dilution factor Measurement start time and period Sample flow rate Sample temperature, pressure, and moisture content Comments
		J. Particulate Size Distribution Particle diameter basis (Aerodynamic or Stokes) Boundary diameter Concentration basis (mass or number) Concentration

2.2.1 Source and Test Series Related Information

This group of data elements identifies the stationary source that was tested, the source location, and literature reference of information for the test series. To enable a general grouping of sources to be made, each source test series has been described in terms of the NEDS Source Classification Codes[1/] that are applicable. The use of the NEDS codes is by specification of the word description, not the associated numeric code. The source location is described by address as well as by Universal Transverse Mercator zone and X-Y coordinates as defined by the U.S. Geological Survey maps with scales less than 1:62,500.[2/]

The name of the testing organization and the reference (report, journal article, etc.) from which the data have been extracted are included. Additionally, remarks or data may be included which may be pertinent to the test series, but for which a specific data type is not available.

1/ "Guide for Compiling a Comprehensive Emission Inventory," EPA No. APTD-1135, NTIS No. PB 212-231, March 1974.

2/ "Universal Transverse Mercator Grid," U.S. Department of the Army, Washington, D.C., Publication No. TM5-241-8, July 1958.

2.2.2 Control Device Characteristics and Design Parameters

Definition and description of the control system tested (if any) for the test series as well as pertinent design parameters are contained in this grouping of data elements. These data elements are described with the use of standard nomenclature (see Section 3.1 and 3.2) to characterize the device by category, class, generic type, commercial name and manufacturer. Additional device descriptive material is provided that may be necessary for novel or hybrid control systems. The device descriptive elements are arranged such that maximum flexibility exists for cases where multiple devices are involved. Up to three control devices in series on a given source may be reported.

Control device design parameters are indicated by type and value, where known. A tabulation of suggested minimum specification types are provided as standard nomenclature (see Section 2.1.6 of the User Guide) for the four most common generic device types: Electrostatic Precipitator, Cyclone, Wet Scrubber, and Fabric Filter. The units to be used are also given.

2.2.3 Test Characteristics and Control Device(s) Operating Parameters

Data contained in this group of data elements identify and define the test subseries date and time, sampling location description and specific source operating parameters. Such items as source operating rates, mode, feed material, and composition, and stack gas conditions are also included. Ancillary test results such as mass train, Orsat analysis and physical measurement of the particulate (density, resistivity, etc.) and trace gas analysis can be reported. Additional remarks or data pertinent to the test subseries or test run which may be of use to the FPEIS users are also given.

Control device(s) operating parameters are indicated by type and value, and are described by standard nomenclature with units to be used also given. (See Section 3.1.) As in the case of design parameters (see Section 2.2.2), suggested operating parameters are given for the four most common generic device types: Electrostatic Precipitator, Cyclone, Wet Scrubber, and Fabric Filter. The user may define and include additional parameters as required.

2.2.4 Biological and Chemical Analysis Data

Bioassay and chemical analyses which were performed on collected particulate are included in this data group. Bioassay tests performed are identified by using standard nomenclature (see Section 3.1.7). Comments or results of these tests can be entered in the space provided.

The chemical analysis group utilizes the pollutant chemical coding system for the SAROAD/SOTDAT[1/] data base system as well as a codification of analysis methods from the same system (see Section 2.1.6 of the User Guide). The data are reported in units of concentration as a function of particle size, where available, with the boundary intervals specified for the particle size measurement technique used, and whether on a calibrated or calculated basis. The data are also reported on a total mass concentration basis. Both elements and compounds may be identified and recorded.

A maximum of nine size ranges are available in addition to the category of mass train filter or pooled stages. The mass train filter chemical compositions are results of analyses performed on the particulate collected by the mass sampling train. The pooled stages chemical compositions are for analyses done by pooling collected particulate from several impactor stages when there was insufficient particulate on individual stages for proper analysis.

1/ "SOTDAT Final Report," EPA No. 450/3-75-070, July 1975.

2.2.5 Particle Size Measurement Equipment and Data

This grouping of data elements provides identification of the measurement instrument or method, specific run data and sampling conditions. Measurement instruments are defined in standard nomenclature (see Section 3.1.6, this document) by generic class and type. Space is also provided for an indication of the general size range covered by the equipment and, for impactors, a description of the collection substrate and its specifications. Comments on the measurement are in text form where details of equipment calibration methods or protocol can also be included.

Particle size distribution data are entered as mass fractions or number fractions. The class boundary diameters are given along with whether the diameters are obtained from calibration or from calculations. Designation of aerodynamic or Stokes diameters are also provided. The data are given in terms of mass concentrations per size interval, i.e., micrograms/dry normal cubic meter or number concentrations per size interval, i.e., number/cubic centimeter. By assuming the particles to be spherical and by using a given gas dilution factor and particle density, output may be obtained which includes calculation of surface, mass, and number size distributions.

2.3 Derivation of Particle Size Distribution Equations

Aerosols can be characterized in a number of different ways. The choice depends upon the particular need for characterization. For example, in the field of air pollution one is mainly interested in the concentration and size distribution based on aerosol mass. An FPEIS output option provides concentration and size distributions based on particle mass, surface, or number. Moreover, these distributions are provided on both a differential and a cumulative basis.

Although there are a variety of data reduction techniques in the literature, a simple, general and straightforward procedure has been adopted. Each run consists of several classes or stages. The raw data generally are mass or number concentrations in each class and the upper and lower aerodynamic or Stokes boundary diameters. For example, in the case of impactors, the mass collected on each stage per unit volume of gas sampled and the effective cut-off diameter of each stage are available. The upper boundary for the first stage and lower boundary for the final filter can usually be estimated.

The following equations are used in the data reduction.

$$\text{Diameter midpoints} = (\text{upper boundary} \times \text{lower boundary})^{1/2} \qquad (1)$$

$$\text{Aerodynamic diameter, } D_{ae} = \left[D_p \; \frac{\rho_p \; C_{D_p}}{C_{D_{ae}}} \right]^{1/2} \qquad (2)$$

where D_p = particle diameter (Stokes or sedimentation diameter)

ρ_p = particle density

$C_{D_{p,ae}}$ = Cunningham slip correction factor [Note that the subscript refers to both Stokes (p) and aerodynamic (ae) diameters]

$$= 1 + \frac{2\lambda}{D_{p,ae}} [1.246 + 0.42 \exp(-0.87\ D_{p,ae}/2\lambda]$$

λ = mean free path of gas molecules

$C_{D_{p,ae}} = 1 + 0.162/D_{p,ae}$ for air at NTP ($D_{p,ae}$ is in μm, reference temperature and pressure are 20°C, 760 mm Hg)

Since D_{ae} appears on both sides of Eq. (2), an interative technique is needed to solve this equation.

The equations and definitions used to describe the mass, number and surface concentrations are as follows:

D_{pi} = particle diameter midpoint (μm)

ΔM_i = mass in μg/m³ within the class

$$= \frac{\pi}{6} D_{pi}^{3}\ \rho_p\ \Delta N_i \qquad (3)$$

ΔN_i = number of particles per cubic centimeter within the class (no./cm³)

ΔS_i = surface area of particles within the class (μm²/cm³)

$$= \pi D_{pi}^{2}\ \Delta N_i \qquad (4)$$

The underlying assumption here is that all the particles are spherical which in many cases is not valid. For nonspherical particles, a shape factor will enter Eq. (2) whose value depends upon the definition of the diameter of the nonspherical particle itself.

The differential size distributions are calculated in the following way:

$$\Delta \log D_{ae_i} = \log_{10} \left[\frac{D_{ae} \text{ upper boundary of class } i}{D_{ae} \text{ lower boundary of class } i} \right] \tag{5}$$

$$(\Delta X/\Delta \log D_{ae})_i = \frac{\Delta X_i}{\Delta \log D_{ae_i}} \tag{6}$$

where X is mass, surface or number concentration.

The distributions $\Delta M/\Delta \log D_{ae}$, $\Delta S/\Delta \log D_{ae}$ or $\Delta N/\Delta \log D_{ae}$ are usually displayed on a semi-log graph with the distribution function as the ordinate and $\log D_{ae}$ as the abscissa.

The cumulative size distributions are calculated by summing mass, surface or number concentrations in the classes below the class of interest, and dividing it by the total concentration.

$$\text{cum \% less } x_i = \left(\sum_{k=i+1}^{j} \Delta X_k / \sum_{k=1}^{j} \Delta K_k \right) 100 \tag{7}$$

where X = mass, surface or number

x = particle diameter

j = number of classes + 1

i = class number of interest.

Note that particle sizes decrease with increasing class number.

SECTION 3

FPEIS DATA DEFINITIONS AND PROTOCOL

CONTENTS

SECTION 3

LIST OF TABLES

3.0 Introduction

This section provides definitions for all data elements contained in the FPEIS. Specific data input instructions and encoding criteria are given in the User Guide.[1/]

For certain data elements defined, standard nomenclature is specified. For example, on page 3.1.1-1 the Source Classification Codes from the NEDS System[2/] are used for source description related information (word descriptions, not numeric codes). Other standard nomenclature for data are discussed in detail in Section 3.2. All FPEIS data are reported in metric units. While every attempt has been made to conform to SI (International System of Units),[3/] for clarity other metric units have been used in some places. These nomenclature specifications or protocol, and units have been developed in an attempt to standardize and categorize the input information and data to the FPEIS. For example, this standardization will allow a user who wants to receive an output from the FPEIS to be able to (a) specify a particular device class, if desired; or (b) be able to compare different devices within a device class knowing that the data are given in common, standardized terminology and units.

1/ "Fine Particle Emissions Information System User Guide," EPA-600/276-172, June 1976.

2/ "Guide for Compiling a Comprehensive Emission Inventory," EPA No. APTD-1135, NTIS No. PB 212-231, March 1973.

3/ "Standard Metric Practice Guide," ASTM No. E-380-74, American Society for Testing and Materials, November 1974.

The standard nomenclature and protocol as discussed above provide a system which is extremely flexible, yet standardized. Establishing of these parameters in this manner will allow expansion, modification, and additional capabilities for these particular portions of the FPEIS as the system grows so that users may obtain the widest possible spectrum of information and data in a common format.

3.1 Data Elements and Definitions

Data element definitions are grouped in the following subsections generally as discussed in Section 2.2. These definitions identify the particular data element and give an example of a typical value. Data elements which require the use of FPEIS standard nomenclature are identified in Section 3.2.

3.1.1 Source Description

Source Category	Source identifier. Example: EXTCOMB BOILER
Type of Operation	Specific operation which was tested. Example: ELECTRIC GENERATION
Feed Material Class	Specific type of material used as fuel feed. Example: BITUMINOUS COAL
Operating Mode Class	Size and characteristics of operation. Example: LARGER THAN 100 MBTU PULV DRY
Site Name	Complete and unique name of company (and, if applicable, plant or station). Example: UNION ELECTRIC MERAMEC STATION
Source Name	Specific source tested within the site designated in the previous data element. Example: MERAMEC UNIT 1
UTM-X	UTM horizontal coordinate as shown on USGS maps with scales less than 1:62,500. Example: 473.0
UTM-Y	UTM vertical coordinate as shown on USGS maps with scales less than 1:62,500. Example: 3921
Zone Location	Universal Transverse Mercator Coordinates (UTM) zone location as found on United States Geological Survey (USGS) maps showing UTM Coordinates. Example: 12 (FOR ROCKY MOUNTAIN STATES)
Address	Street number and street name, abbreviated if necessary. Example: 1234 RIVER RD

City	City name, abbreviated if necessary. Example: ST. LOUIS
Zip Code	Five digit number designating postal area. Example: 63102
Test Series Number	Numerical identifier for specific test series. Each test series will be assigned an identifier from a master file listing by the data base administrator as received. Example: 14
Test Series Reference	Reference of the report from which the data have been extracted. Example: EPA 650/2-74-031, APRIL 1974
Name of Testing Group	Complete and uniquely identifiable name of testing group. Example: MIDWEST RESEARCH INSTITUTE
Series Start Date	Start date for the series in the format month/day/year. example: 05/12/75
Series Finish Date	Finish date for the test series in the format month/day/year. Example: 05/23/75

3.1.2 Test Series Remarks

Test Series Remarks	Any comments or data not elsewhere reported, which are specifically related to the test series. Included in these remarks are physical and/or chemical properties which may have been measured, such as corrosiveness or solubility, which are not included elsewhere. This space may indicate a subjective judgment of the value of the data, measurement technique, etc., which may have a bearing on the general usefulness of a given test run, subseries or test series and the reliability of the data.

3.1.3 Control Device Characteristics and Design Parameters

Device Category	A specific definition of the generic device. Standard nomenclature will be used. For the appropriate generic device, only its name or combination of words are used. Example: CONTINUOUSLY CLEANED REVERSE AIR, HI PRESSURE AIR
Device Class	A designation of the state of development of the control device using standard nomenclature. Example: PILOT SCALE
Generic Device Type	General classification of control device in operation during test. The generic device types will use standard nomenclature. Example: FABRIC FILTER
Device Commercial Name	Commercial or given name of the device. Example: STEAM-HYDRO SCRUBBER
Manufacturer	Complete name of manufacturer. Example: RESEARCH COTTRELL
Device Description	One line qualifier to allow insertion of additional information for unusual or hybrid devices not completely described previously. Example: ATOMIZED SPRAY IS SUBJECTED TO ELECTRICAL FIELD FOR CHARGING OF DROPLETS
Design Specification Type	Descriptive word for design specification, as appropriate for generic device type. Additional specification types required for more complete characterization of the device may be included. Example: DESIGN VOLUME
Design Specification Value	The numerical value and units corresponding to the design specification type. Example: 20,000 DNM^3/MIN

3.1.4 Test Characteristics and Control Device Operating Parameters

Subseries Number	Sequential, nonzero number assigned to the group of run numbers comprising the subseries, to be assigned by the data encoder. Example: 14
Subseries Test Date	Date of test in format month/day/year. Example: 05/15/75
Subseries Start Time	Start time of subseries based on 24 hr local standard time. Example: 1230 (NOTE: NO COLONS)
Subseries Stop Time	Stop time of subseries based on 24 hr local standard time. Example: 1610 (NOTE: NO COLONS)
Sample Location	Location of sampling train for this run relative to the control device, either inlet (I) or outlet (O). Example: I (FOR INLET)
Sampling Location Description	A brief description of the sample train location relative to significant flow disturbances. Example: TEN DUCT DIAMETERS DOWNSTREAM FROM 90 DEGREE BEND
Source Operating Mode	Brief description of source operation at time of run. Most sources will be steady-state, but for sources with cyclic operations or specific disturbances, this information is required. In the case of an arc furnace such description may include "oxygen-lancing," "charging," "pouring," etc. Example: OXYGEN-LANCING

% Design Capacity	An estimate of the source operation rate as a percent of design capacity. Full load or production rate is defined as 100%. Example: 95
Source Operating Rate	Operating rate of source per unit time. Example: 10 MG/HR
Source Feed Material	Specific type of fuel or feed material used during run. Example: PULVERIZED BITUMINOUS COAL
Feed Material Composition	Percentage data of feed material for appropriate constituents. Example: 4.1% S, 10.2% ASH
Volumetric Flow Rate	Stack gas flow rate (from EPA Method 1) in units of DNm^3/S. Example: 20
Gas Velocity at Sampling Location	Velocity of gas stream at the sampling location for this run in units of meters per second. Example: 20.4
Gas Temperature at Sampling Location	Temperature of gas stream at the sampling location for this run in °C. Example: 61
Pressure at Sampling Location	Stack pressure at the sampling location for this run in mm Hg gauge. Example: 740
Moisture Content	Percent moisture by volume (as from EPA Method 4). Example: 17.4
Percent Isokinetic Sampling	100 Times the ratio of the average velocity of the gas entering the sampling nozzle to velocity of the flue gas streams at the sampling point. Example: 98.7

Gas Composition	Percent of CO_2, O_2, CO, and N_2 by volume dry (as from EPA Method 3). % CO_2 + O_2 + % CO + % N_2 = 100%. Example: 12 (FOR CO_2), 6 (FOR O_2), 0.5 (FOR CO), 81.5 (FOR N_2).
Trace Gases in PPM	Chemical symbol and measured concentrations for trace gases measured during test run in parts per million (ppm). Example: SO_2 - 300, NO_2 - 50, Cl - 200
Typical Operating Parameter Type	Descriptive word for typical operating parameter as appropriate for generic device type operation. Additional operating parameter types may be included as required for more complete description of device operational characteristics. Example: RAPPING FREQUENCY
Typical Operating Parameter Value	The numerical value and units corresponding to the typical operating parameter. Example: 2 PER MINUTE

3.1.5 Subseries Remarks, Mass Train Results and Physical Properties

Subseries Remarks	Any comments or data not elsewhere reported, which are specifically related to the subseries. Example: GAS VELOCITY DECREASED SLIGHTLY WHEN DUCT BY-PASS VENT WAS CLOSED
Mass Train-Total Mass Concentration	The measured value for particulate concentration from EPA Method 5 in units of $\mu g/DNm^3$. Example: 4.250 E + 03
Mass Train-Front Half Mass Concentration	The measured value for particulate concentration for the front half of the EPA Method 5 train (particulate filter and probe wash) in units of $\mu g/DNm^3$. Example: 1.240 E + 02
Mass Train Comments	Any comments or data not elsewhere reported which are specifically related to the mass train data. Example: MASS CONCENTRATION UNUSUALLY LOW DUE TO UNEXPLAINED TRAIN LEAKAGE BETWEEN FILTER AND METER
Density	The particle density, in units of g/cm^3. Example: 1
Density Determination	An indication of whether the density value was determined experimentally or assumed. (1 = measured, 0 = assumed). Example: 1
Resistivity	The resistivity of the particle in units of ohm-centimeter. Example: $4.11 \times 10^{+11}$
Resistivity Determination	An indication of whether the resistivity value was determined experimentally or assumed. (1 = measured, 0 = assumed.) Example: 1

Other Physical Properties	Space for adding text comments regarding other physical properties of the particulate which may have been measured such as solubility. Example: SOLUBILITY OF PARTICULATE IN WATER IS 0.4 G/ML

3.1.6 Particulate Bioassay Data

Bioassay Test Type	Indication of biological testing, if done, with the collected particulate. Example: NEONATAL-MOUSE
Bioassay Test Remarks	Results of the indicated test as above. Example: SKIN PAINTING INDICATED NO CHANGE DUE TO PARTICULATE USED

3.1.7 Particulate Chemical Composition

Particle Boundary Diameter	The boundary diameter or cut point for each interval or stage used by the sampling equipment or method. Up to nine intervals may be designated The diameter is in units of μm. Example: 3.5
Designation of Boundary Determination	Indication of the basis of whether the boundary diameter is calculated from theory or based on calibration. (1 = calibrated, 0 = calculated.) Example: 1
SAROAD Chemical ID	The element or compound number from the SAROAD System of the specific chemical(s) for which analysis was performed.
Analysis Method	The identification letter of the specific analysis method used. Standard nomenclature is used. Example: B (FOR CHEMILUMINESCENCE)
Mass Train Filter or Pooled Stages	The total concentration of the chemical listed as measured for particulate from the mass train filter, <u>or</u> the concentration of the chemical as measured for particulate combined from two or more stages. Units are $\mu g/DNm^3$. Example: 47.3
Chemical Concentration (Stage)	Concentration of the chemical listed from analysis of the particulate for the indicated stage or interval. Units are $\mu g/DNm^3$. Example: 2.1 + 1

3.1.8 Measurement Particulars

Run Number	Unique number assigned to each run within the test series. Example: 02
Measurement Instrument/Method Name	Particulate size measuring equipment (including model type, if applicable). Example: UW MARK III IMPACTOR
Size Range Lower Limit	Lower limit of the size range for the equipment/method specified in units of micrometers (μm). Example: 0.40
Size Range Upper Limit	Upper limit of the size range for the equipment specified in units of micrometers (μm). Example: 10.00
Sampling Start Time	Start time of run based on 24 hr local standard time. Example: 1345 (NOTE: NO COLONS)
Collection Surface/Substrate and its Specifications	Identification of the collection surface or substrate and a brief description of its specifications, i.e., model number, type, manufacturer. Example: GLASS FIBER FILTER, GELMAN, TYPE A
Comments on the Measurement	Additional text comments or data regarding the run. Example: SUBSTRATE ON STAGE 1 SHOWED WEIGHT LOSS OF 0.05 μG.
Sampling Duration	The length of time for the measurement in minutes. Example: 45
Sampling Flow Rate	Sampling flow rate for this run in m^3/min. Example: 4.5
Dilution Factor	Dilution factor used for sampling methods which require dilution (i.e., diffusion battery). Example: 1.0 (FOR NO DILUTION)

Sampling Train Temperature	Temperature maintained at the sampling train for the duration of the run in °C. Example: 42
Pressure at Sample Train Location	The absolute pressure of the gas at the inlet to the sample train in units of mm Hg. Example: 750
Percent Moisture	The percent water vapor by volume in the gas sampled by the instrument. Example: 72.5

3.1.9 Particulate Size Distribution Data

Particle Diameter Basis	Indication of the type of diameter specific for this measurement - 1 = aerodynamic, 0 = Stokes. Example: 1 (FOR AERODYNAMIC)
Concentration Basis	Indication of the type of measurement/calculations used in obtaining concentration for this measurement - mass or numer (mass = 1; number = 0). Example: 1 (FOR MASS)
Upper Diameter Boundary	The upper diameter boundary point in units of micrometers (μm) for the specific basis used for particle measurement. Example: 20.00
Diameter Boundary	The class interval boundary point (particle diameter) for the specific basis used for measurements. Units are micrometers (μm). Example: 13.770
Calibration/Calculation	Indication of whether the data are based on calibrated or calculated diameter boundary. (1 = calibration, 0 = calculation.) Example: 0 (FOR CALCULATION)
Mass or Number Data	The mass <u>or</u> number measured for the indicated stage in units of $\mu g/DNm^3$ or number/cm^3. Example: 2.980 + 6

3.2 Standard Nomenclature

Computerized information systems require that some standardization of data be present in order for specific data selection to be made. Computers search for and select data by comparing the selected value to a known value. When alphanumeric characters are used, such as in the name of a control device, the known value and the selected value must match exactly. For example, if a search is made for the value "ESP," all entries in the data base whose value is "ESP" will be selected; however, entries having the value "ELECTROSTATIC PRECIPITATOR" will not, although it is technically correct.

To ensure that uniform selection criteria are possible, the FPEIS uses standard nomenclature for certain data elements. The permitted values for these data elements are given in the FPEIS User Guide (Section 2.1.6). Whenever data from one of these data elements is requested, it is essential that correct spelling be used or the request will fail.

Data elements in the FPEIS data base which require the use of standard nomenclature are given in Table 3.2-1.

TABLE 3.2-1. DATA ELEMENTS REQUIRING STANDARD NOMENCLATURE

Source Description:

Source Category
Type of Operation
Feed Material Class
Operating Mode Class
State

Control Device Characteristics and Design Parameters:

Device Category
Device Class
Generic Device Type
Design Specification

Test Characteristics and Control Device Operating Parameters:

Sampling Location
Typical Operating Parameter Type

Particulate Bioassay Data:

Bioassay Test Type

Particulate Chemical Composition:

SAROAD Chemical ID
Analysis Method

Measurement Particulars:

Measurement Instrument/Method Name

3.3 Use of Metric Units

It is EPA policy to use metric units in all publications. Consistent with this policy, the FPEIS uses metric units throughout. Every attempt has been made to use SI (International System of Units) protocol; however, some data elements are given in the metric equivalent of their English units for clarity. For example, the SI unit for pressure is the pascal (Pa). The FPEIS reports pressure in units of millimeters of mercury (mm Hg) which is analogous to the more common inches of mercury (in. Hg).

The specific units in which a particular data element should be encoded are given in the FPEIS User Guide (Section 2.1.6).

SECTION 4

USER REQUEST COMMAND ABSTRACTS

CONTENTS

4.0 Introduction

A user feature of the FPEIS is a catalog of pre-defined user request procedures, called System Request Commands (SRC). Each SRC defines a particular task to be performed, and each SRC is identified by a unique number which may be referenced by the user to request a specific task. The detailed instructions on the use of the System Request Commands are given in Section 5 of the FPEIS User Guide.

This section contains an abstract of each SRC available. Additional abstracts will be added as new SRC's are defined and developed in the future.

<u>SRC Number</u>: C3000

<u>Title</u>: FPEIS SUMMARY REPORT - COMPLETE

This SRC results in a complete listing of the contents of the FPEIS data base in standard report format. The data are ordered by Test Series Number. The listing will involve several thousand pages of computer output. A sample output for only one test series is given on the following pages.

FINE PARTICULATE EMISSIONS INFORMATION SYSTEM
FPEIS SUMMARY REPORT

TEST SERIES NO: 19 TEST SERIES AT SITE FROM 12/04/73 TO 12/14/73 BY: MIDWEST RESEARCH INST., KANSAS CITY, MO.
REFERENCE: SHANNON, L.J., ET AL., EPA-650/2-74-073, AUG. 74

SOURCE CHARACTERISTICS

NEDS SCC CATEGORY:	EXTCOMB BOILER	SITE NAME	MERAMEC PLANT
OPERATION CLASS:	ELECTRIC GENERATN	SOURCE NAME	BOILER UNIT 1
FEED MATERIAL CLASS:	SOLID WASTE/COAL	ADDRESS	8200 FINE ROAD
OPERATION MODE CLASS:	G.T. 100MMBTU/HR		ST. LOUIS MO 63120
		UTM ZONE AND X-Y COORDS:	15 725.0 475.0

CONTROL DEVICE(S) CHARACTERISTICS

UNIT 1
DEVICE GENERIC TYPE: ESP
CATEGORY: PARALLER PLATE ESP
CLASS: CONVENTIONAL
DESCRIPTION: 2-UNITS IN PARALLEL WITH COMMON INLET DUCT AND SEPARATE OUT-LET DUCTS.

COMMERCIAL NAME: ELECTROSTATIC PRECIPITATOR
MANUFACTURER: RESEARCH COTTRELL

CONTROL DEVICE(S) DESIGN PARAMETERS - -

1) ELECTRODE AREA	5174.5 M2
2) CORONA WIRE DIA.	2.8 MM
3) PLATE TO PLATE SPACING	238 MM

TEST SERIES REMARKS

IMPACTOR CUT POINTS COMPUTED FROM RANZ AND WONG THEORY

TEST SERIES NO: 19 SUBSERIES NO: 1 INLET TEST DATE: 12/04/73 FROM 08:30 TO 11:00 HOUR

TEST CHARACTERISTICS--------------------------------

SOURCE OPERATING MODE: COAL+REFUSE BURNING SOURCE OPERATING RATE: 120 MW PCT DESIGN CAPACITY:100.
FEED MATERIAL: ORIENT 6 COAL AND MUN. REFUSE FEED MATERIAL COMPOSITION: 9% REFUSE

CONTROL DEVICE INLET SAMPLING POINT DESCRIPTION: ABOUT 2M FROM BEND (RAD. OF CURV.=2.3M) % ISOKINETIC: 100

PROCESS CONDITIONS: VOL FLOW= 169.0 DNM3/S VELOCITY= 20.4 M/S T= 164 C P= 760 MMHG WATER VAP %VOL= 8.5

GAS COMPOSITION: ORSAT- CO2= 14.50 % CO= .01 % O2= 6.50 % N2= 79.00 %
TRACE GASSES(PPM)-SO2=900, SO3=0, NO=220

CONTROL DEVICE(S) OPERATING PARAMETERS ------------

1) VOLUMETRIC FLOW RATE	230.1 M3/S
2) APPLIED VOLTAGE	32 KV
3) CORONA CURRENT	253 MAMP
4) POWER	8 KW
5) SPARK RATE	115/MIN

PARTICULATE MASSTRAIN RESULTS -----------------

FRONT HALF= 5.210E+05 UG/DNM3 TOTAL= 4.780E+06 COMMENTS: EPA METHOD 5 TRAIN

PARTICULATE PHYSICAL PROPERTIES ------------------

DENSITY= 2.27 GM/CC ASSUMED RESISTIVITY= 2.30E+11 OHM-CM ASSUMED

CHEMICAL COMPOSITION DATA-------------------------

PARTICULATE SAMPLER UNCALIBRATED

SAMPLER STAGE CUT POINTS (UM)

0	1	2	3	4	5	6	7	8	9
15.	7.5	3.8	2.3	1.5	.79	.41	.1		

CHEMICAL CONCENTRATION IN (UM/DNM3)

CHEMICAL NAME ANALYSIS METHOD	MAS TRN /POOLD	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9
1) BERYLLIUM ATOMIC ABSORPTION		2.1 +1	4.6 +0	7.6 +0	4.1 +0	4.7 +0	1.79+0	4.81+0		
2) CADMIUM ATOMIC ABSORPTION		1.8 +2	4.0 +1	1.43+2	8.0 +1	1.17+2	2.22+1	2.83+1		
3) CHROMIUM ATOMIC ABSORPTION		1.21+3	2.19+2	3.99+2	9.40+2	2.68+3	2.24+2	8.63+1		
4) COBALT ATOMIC ABSORPTION		9.2 +1	2.2 +1	2.5 +1	2.4 +1	4.9 +1	3.7 +0	3.3 +0		
5) COPPER ATOMIC ABSORPTION		2.4 +2	1.28+2	2.27+2	1.32+2	4.91+2	1.32+2	1.68+2		

6) LEAD ATOMIC ABSORPTION	4.26+1	1.26+1	1.35+1	2.57+1	1.05+1	9.14-1	5.06-1
7) MANGANESE ATOMIC ABSORPTION	5.66+2	1.30+2	2.39+2	1.65+2	4.96+2	3.25+1	3.43+1
8) NICKEL ATOMIC ABSORPTION	1.43+3	4. +2	7.31+2	6. +2	2.14+3	3.43+1	6.87+1
9) TELLURIUM ATOMIC ABSORPTION	1.1 +1	1.9 +0	1.9 +0	2.6 +0	5.5 +0	8.64-1	2.04+0
10) THALLIUM ATOMIC ABSORPTION	3.8 +0	1. +0	1.2 +0	1.8 +0	4.1 +0	1.38+0	2.71+0
11) TIN ATOMIC ABSORPTION	1.3 +1	8.1 +0	6.6 +0	3.7 +0	9. +0	2.3 +0	1.63+0
12) VANADIUM ATOMIC ABSORPTION	1.43+3	4.14+2	7.13+2	5.16+2	6.46+2	7.71+1	9.79+1
13) ZINC ATOMIC ABSORPTION	1.35+3	6.89+2	9.66+2	6.80+2	2.32+3	2.29+2	2.03+2
14) CALCIUM ATOMIC ABSORPTION	7.3 +4	1.68+4	2.94+4	1.68+4	6.71+4	4.20+3	6.90+3
15) IRON ATOMIC ABSORPTION	4.26+5	1.26+5	1.35+5	2.57+5	1.05+5	9.14+3	5.06+3

SUBSERIES REMARKS----------------------------------

TEST SERIES NO: 19 SUBSERIES NO: 1 RUN NO: 1 CONTROL DEVICE INLET

MEASUREMENT PARTICULARS------------------------------

MEAS. INST/METHOD: 1 BRINKS BMS-II (UNCALIBRATED) SIZE RANGE: .100 TO 15.000 UM
COLLECTION SURFACE/SUBSTRATE: STAINLESS STEEL
MEAS. START TIME: 830 SAMPLING PERIOD: 15.0 MIN SAMPLING RATE: 1.87 LPM DILUTION FACTOR: 1.0

GAS SAMPLING CONDITIONS: TEMP= 164 C PRESSURE= 760 MMHG WATER VAP %VOL = 9.7

COMMENTS ON THE MEASUREMENT:

PARTICLE SIZE DISTRIBUTION DATA

PARTICLE DENSITY= 2.27 GM/CC

AERODYNAMIC DIA (UM) BNDRY	AERODYNAMIC DIA (UM) MID PT	PARTICLE DIA (UM) BNDRY	PARTICLE DIA (UM) MID PT	DM (UG/DNM3)	DM/DLDAE (UG/DNM3)	DS (UM2/CC)	DS/DLDAE (UM2/CC)	DN (NO./CC)	DN/DLDAE (NO./CC)	CUM M (%)
15.000		9.929								
7.500	10.607	4.951	7.011	2.999E+05	9.962E+05	1.131E+05	3.756E+05	7.321E+02	2.432E+03	
3.807	5.343	2.500	3.519	1.130E+05	3.837E+05	8.489E+04	2.883E+05	2.183E+03	7.413E+03	
2.299	2.958	1.500	1.936	9.343E+04	4.265E+05	1.275E+05	5.822E+05	1.082E+04	4.942E+04	
1.545	1.885	1.000	1.225	4.564E+04	2.644E+05	9.851E+04	5.707E+05	2.091E+04	1.211E+05	
.790	1.105	.500	.707	2.781E+04	9.547E+04	1.039E+05	3.568E+05	6.613E+04	2.270E+05	
.409	.568	.250	.354	8.202E+03	2.869E+04	6.132E+04	2.145E+05	1.562E+05	5.463E+05	
.100	.202	.054	.116	1.854E+04	3.031E+04	4.237E+05	6.926E+05	1.008E+07	1.648E+07	

TOTAL MASS CONC= 6.065E+05 TOTAL SURF CONC= 1.013E+06 TOTAL NUM CONC= 1.034E+07

TEST SERIES NO: 19 SUBSERIES NO: 1 RUN NO: 2 CONTROL DEVICE INLET

MEASUREMENT PARTICULARS------------------------------

MEAS. INST/METHOD: 1 BRINKS BMS-II (UNCALIBRATED) SIZE RANGE: .100 TO 15.000 UM
COLLECTION SURFACE/SUBSTRATE: STAINLESS STEEL
MEAS. START TIME: 1030 SAMPLING PERIOD: 20.0 MIN SAMPLING RATE: 1.87 LPM DILUTION FACTOR: 1.0

GAS SAMPLING CONDITIONS: TEMP= 158 C PRESSURE= 760 MMHG WATER VAP %VOL = 9.0

COMMENTS ON THE MEASUREMENT:

PARTICLE SIZE DISTRIBUTION DATA

PARTICLE DENSITY= 2.27 GM/CC

AERODYNAMIC DIA (UM) BNDRY	AERODYNAMIC DIA (UM) MID PT	PARTICLE DIA (UM) BNDRY	PARTICLE DIA (UM) MID PT	DM (UG/DNM3)	DM/DLDAE (UG/DNM3)	DS (UM2/CC)	DS/DLDAE (UM2/CC)	DN (NO./CC)	DN/DLDAE (NO./CC)	CUM M (%)
15.000		9.929								
7.500	10.607	4.951	7.011	2.497E+06	8.295E+06	9.413E+05	3.127E+06	6.095E+03	2.025E+04	
3.807	5.343	2.500	3.518	4.783E+05	1.624E+06	3.593E+05	1.220E+06	9.240E+03	3.138E+04	
2.299	2.958	1.500	1.936	1.469E+05	6.706E+05	2.005E+05	9.154E+05	1.702E+04	7.770E+04	
1.545	1.885	1.000	1.225	4.208E+04	2.438E+05	9.082E+04	5.262E+05	1.928E+04	1.117E+05	
.790	1.105	.500	.707	3.455E+03	1.186E+04	1.291E+04	4.432E+04	8.216E+03	2.821E+04	
.409	.568	.250	.354	0.	0.	0.	0.	0.	0.	
.100	.202	.054	.116	8.794E+03	1.438E+04	2.010E+05	3.285E+05	4.782E+06	7.817E+06	

TOTAL MASS CONC= 3.177E+06 TOTAL SURF CONC= 1.806E+06 TOTAL NUM CONC= 4.842E+06

TEST SERIES NO: 19 SUBSERIES NO: 2 OUTLET TEST DATE: 12/04/73 FROM 08:40 TO 11:00 HOUR

TEST CHARACTERISTICS----------------------------------

SOURCE OPERATING MODE: COAL+REFUSE BURNING SOURCE OPERATING RATE: 120 MW PCT DESIGN CAPACITY:100.
FEED MATERIAL: ORIENT 6 COAL AND MUN. REFUSE FEED MATERIAL COMPOSITION: 9% REFUSE

CONTROL DEVICE OUTLET SAMPLING POINT DESCRIPTION: SAMPLING PORTS IMMEDIATELY BEHIND AN ELB % ISOKINETIC: 100

PROCESS CONDITIONS: VOL FLOW= 141.7 DNM3/S VELOCITY= 15.7 M/S T= 166 C P= 760 MMHG WATER VAP %VOL= 8.5

GAS COMPOSITION: ORSAT- CO2= 14.50 % CO= .01 % O2= 6.50 % N2= 79.00 %
TRACE GASSES(PPM)-SO2=900. SO3=0. NO=220

CONTROL DEVICE(S) OPERATING PARAMETERS ------------

1)	VOLUMETRIC FLOW RATE	230.1 M3/S
2)	APPLIED VOLTAGE	32 KV
3)	CORONA CURRENT	253 MAMP
4)	POWER	8 KW
5)	SPARK RATE	108/MIN

PARTICULATE MASSTRAIN RESULTS -----------------

FRONT HALF= 1.340E+04 UG/DNM3 TOTAL= 2.067E+05 COMMENTS:

PARTICULATE PHYSICAL PROPERTIES -------------------

DENSITY= 2.27 GM/CC ASSUMED RESISTIVITY= 2.40E+11 OHM-CM ASSUMED

SUBSERIES REMARKS----------------------------------

TEST SERIES NO: 19 SUBSERIES NO: 2 RUN NO: 1 CONTROL DEVICE OUTLET

MEASUREMENT PARTICULARS------------------------------

MEAS. INST/METHOD: 2 ANDERSEN MODEL IV (UNCALIBRATED) SIZE RANGE: .100 TO 15.000 UM
COLLECTION SURFACE/SUBSTRATE: GLASS FIBER FILTER
MEAS. START TIME: 940 SAMPLING PERIOD: 20.0 MIN SAMPLING RATE: 20.22 LPM DILUTION FACTOR: 1.0

GAS SAMPLING CONDITIONS: TEMP= 166 C PRESSURE= 760 MMHG WATER VAP %VOL = 8.5

COMMENTS ON THE MEASUREMENT:

PARTICLE SIZE DISTRIBUTION DATA

PARTICLE DENSITY= 2.27 GM/CC

AERODYNAMIC DIA (UM)		PARTICLE DIA (UM)		DM (UG/DNM3)	DM/DLDAE (UG/DNM3)	DS (UM2/CC)	DS/DLDAE (UM2/CC)	DN (NO./CC)	DN/DLDAE (NO./CC)	CUM M (%)
BNDRY	MID PT	BNDRY	MID PT							
15.000		9.929								
11.500	13.134	7.606	8.690	1.476E+04	1.279E+05	4.489E+03	3.891E+04	1.892E+01	1.640E+02	
7.180	9.067	4.739	6.003	1.387E+04	6.780E+04	6.107E+03	2.985E+04	5.393E+01	2.636E+02	
4.860	5.907	3.199	3.893	1.582E+04	9.334E+04	1.074E+04	6.337E+04	2.255E+02	1.331E+03	
3.310	4.011	2.171	2.635	9.097E+03	5.454E+04	9.125E+03	5.470E+04	4.183E+02	2.508E+03	
2.120	2.649	1.381	1.731	1.433E+04	7.406E+04	2.188E+04	1.131E+05	2.323E+03	1.201E+04	
1.060	1.499	.679	.968	1.508E+04	5.009E+04	4.117E+04	1.368E+05	1.398E+04	4.644E+04	
.650	.830	.408	.526	4.253E+03	2.002E+04	2.136E+04	1.006E+05	2.456E+04	1.156E+05	
.440	.535	.270	.332	2.397E+03	1.414E+04	1.909E+04	1.126E+05	5.515E+04	3.254E+05	
.100	.210	.054	.120	4.750E+03	7.382E+03	1.044E+05	1.623E+05	2.298E+06	3.571E+06	

TOTAL MASS CONC= 9.436E+04 TOTAL SURF CONC= 2.384E+05 TOTAL NUM CONC= 2.395E+06

TEST SERIES NO: 19 SUBSERIES NO: 2 RUN NO: 2 CONTROL DEVICE OUTLET

MEASUREMENT PARTICULARS------------------------------

MEAS. INST/METHOD: 3 CLIMET MODEL CL-208 OPC (CALIBRATED) SIZE RANGE: .650 TO 1.500 UM
COLLECTION SURFACE/SUBSTRATE:
MEAS. START TIME: 930 SAMPLING PERIOD: 1.0 MIN SAMPLING RATE: 7.08 LPM DILUTION FACTOR: 1.0

GAS SAMPLING CONDITIONS: TEMP= 25 C PRESSURE= 760 MMHG WATER VAP %VOL = 12.0

COMMENTS ON THE MEASUREMENT:

PARTICLE SIZE DISTRIBUTION DATA

PARTICLE DENSITY= 2.27 GM/CC

AERODYNAMIC DIA (UM)		PARTICLE DIA (UM)		DM (UG/DNM3)	DM/DLDAE (UG/DNM3)	DS (UM2/CC)	DS/DLDAE (UM2/CC)	DN (NO./CC)	DN/DLDAE (NO./CC)	CUM M (%)
BNDRY	MID PT	BNDRY	MID PT							
2.299		1.500								
1.590	1.912	1.030	1.243	6.300E+02	3.935E+03	1.340E+03	8.368E+03	2.760E+02	1.724E+03	
1.319	1.448	.850	.936	3.897E+03	4.790E+04	1.101E+04	1.353E+05	4.002E+03	4.919E+04	
1.017	1.158	.650	.743	5.257E+03	4.652E+04	1.869E+04	1.654E+05	1.077E+04	9.530E+04	

TOTAL MASS CONC= 9.784E+03 TOTAL SURF CONC= 3.104E+04 TOTAL NUM CONC= 1.505E+04

TEST SERIES NO: 19 SUBSERIES NO: 2 RUN NO: 3 CONTROL DEVICE OUTLET

MEASUREMENT PARTICULARS------------------------------

MEAS. INST/METHOD: 4 CN COUNTER/DIFF. BATTERY (CALIBRATED) SIZE RANGE: .010 TO .200 UM
COLLECTION SURFACE/SUBSTRATE:
MEAS. START TIME: 1040 SAMPLING PERIOD: 0.0 MIN SAMPLING RATE: 0.00 LPM DILUTION FACTOR: 1.0

GAS SAMPLING CONDITIONS: TEMP= 0 C PRESSURE= 0 MMHG WATER VAP %VOL = 0.0

COMMENTS ON THE MEASUREMENT:

PARTICLE SIZE DISTRIBUTION DATA

PARTICLE DENSITY= 2.27 GM/CC

AERODYNAMIC DIA (UM)		PARTICLE DIA (UM)		DM (UG/DNM3)	DM/DLDAE (UG/DNM3)	DS (UM2/CC)	DS/DLDAE (UM2/CC)	DN (NO./CC)	DN/DLDAE (NO./CC)	CUM M (%)
BNDRY	MID PT	BNDRY	MID PT							
.289		.172								
.181	.229	.103	.133	7.007E+02	3.436E+03	1.391E+04	6.823E+04	2.500E+05	1.226E+06	
.117	.146	.064	.081	2.672E+02	1.428E+03	8.698E+03	4.648E+04	4.200E+05	2.244E+06	
.029	.059	.014	.030	1.785E+01	2.956E+01	1.576E+03	2.610E+03	5.600E+05	9.273E+05	
.017	.022	.008	.011	1.972E-01	8.579E-01	4.926E+01	2.143E+02	1.400E+05	6.089E+05	

TOTAL MASS CONC= 9.859E+02 TOTAL SURF CONC= 2.424E+04 TOTAL NUM CONC= 1.370E+06

SECTION 5

APPENDIX

CONTENTS

5.1 Sample FPEIS Data Input Forms

Standard data input forms have been developed for the FPEIS. Samples of completed forms are provided in pages RM-5.1-2 through RM-5.1-7. Detailed instructions for completing the forms are given in the FPEIS User Guide.

STATIONARY POINT SOURCE
FINE PARTICULATE EMISSIONS INFORMATION SYSTEM
DATA INPUT FORMS

Form 1 12/76

Form Completed by

A - SOURCE DESCRIPTION

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	SCC I (Source Category) (16-32)	SCC II (Type of Operation) (33-49)	SCC III (Feed Material Class) (50-66)	Test Series Start Date Mo	Da	Yr	Test Series Finish Date Mo	Da	Yr	UTM Zone (79-80)
43			A01	INDUSTRIAL PROCES	PRIMARY METALS	ZINC SMELTING	06	21	73	06	21	73	78

Card No. (11-13)	SCC IV (Operating Mode Class) (16-35)	Site Name (36-76)
A02	COKING	NEW JERSEY ZINC CO.

Card No. (11-13)	Source Name (16-40)	Street (41-60)	City (61-78)	State (79-80)
A03	COKER NO. 6		PALMERTON	PA

Card No. (11-13)	Zip (16-20)	UTM Coords X (21-25)	UTM Coords Y (26-29)	Tested By (30-80)
A04				JACKO, R. B. ET AL., PURDUE UNIVERSITY

Card No. (11-13)	Reference (16-75)
A05	YOST, K. J. ET AL., PROGRESS REPORT NSF(RANN) GI-35106

B - TEST SERIES REMARKS

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	Remarks In Text (16-80)
			B01	
			B02	
			B03	
			B04	
			B05	
			B06	
			B07	
			B08	
			B09	
			B10	

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C - CONTROL DEVICE(S) CHARACTERISTICS

Test Series No. (1–5)	Sub Series No. (6–8)	Run No. (9–10)	Card No. (11–13)	↓ (14)	— (15)	—Device No. (1,2 or 3) Device Category (16–48)	Device Class (49–60)	Generic Type (61–80)
43			C 0 1	1				NONE

Card No. (11–13)	(14)	(15)	Commercial Name (16–45)	Manufacturer (46–75)	(76–80)
C 0 2					

Card No. (11–13)	(14)	(15)	Device Description (16–75)	(76–80)
C 0 3				

Card No. (11–13)	(14)	(15)	Device Description (continued) (16–75)	(76–80)
C 0 4				

CONTROL DEVICE(S) DESIGN PARAMETERS

Test Series No. (1–5)	Sub Series No. (6–8)	Run No. (9–10)	Card No. (11–13)	↓ (14)	— (15)	Serial No. (16–17)	—Device No. (1,2 or 3) Specifications (18–47)	Value (48–67)	(68–80)
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						
			C 0 5						

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D - TEST CHARACTERISTICS

Test Series No. (1–5)	Sub Series No. (6–8)	Run No. (9–10)	Card No. (11–13)	14	Control Device Inlet or Outlet (I or Ø) (15)	Test Sub Series Date Mo (16–17)	Da (18–19)	Yr (20–21)	Start Time (22–25)	Stop Time (26–29)	Source Operating Mode* (30–59)	Source Operating Rate* (60–76)	% Design Capacity* (77–80)
43	1		D01		Ø	06	21	73	1300	1500	CØKING	4680 KG/HR	80‸

Card No. (11–13)	14	15	Feed Material* (16–45)	Feed Material Composition* (46–80)
D02				

Card No. (11–13)	14	15	Sampling Location Description* (16–55)	Volume Flow Rate* (56–61)	Velocity* (62–65)	Temp.* (66–69)	Press.* (70–74)	% H_2O* (75–77)	% Iso Kinetic* (78–80)
D03			12 DIA DNSTREAM FLØW DISTURBANCE	3‸3	8‸4	900	760	11‸3	100

Card No. (11–13)	14	15	CO_2* (16–19)	CO* (20–23)	O_2* (24–27)	N_2* (28–31)	Trace Gases in ppm (Text)* (32–80)
D04			7‸3	0‸	11‸2	81‸5	

CONTROL DEVICE(S) OPERATING PARAMETERS

Test Series No. (1–5)	Sub Series No. (6–8)	Run No. (9–10)	Card No. (11–13)	14	15	Serial No. (16–17)	Device No. (1,2 or 3) Specification* (18–47)	Value* (48–67)	(68–80)
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						

* Need not be filled if the preceding subseries contains the same data.

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CONTROL DEVICE(S) OPERATING PARAMETERS (cont'd)

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	↓ (14)	— (15)	Serial No. (16-17)	—Device No. (1,2 or 3) Specification * (18-47)	Value * (48-67)	(68-80)
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						
			D05						

SUBSERIES REMARKS

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	(14)	(15)	Remarks in Text* (16-80)
			D06			
			D07			
			D08			
			D09			
			D10			
			D11			
			D12			
			D13			
			D14			
			D15			
			D16			
			D17			
			D18			
			D19			
			D20			

E - PARTICULATE MASS TRAIN RESULTS

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	(14)	(15)	Front Half (16-25)	Total (26-35)	Mass Train Comments (Text) (36-80)
43	1		E01			2.33 E+06	. E+	EPA METHOD 5

F - PARTICULATE PHYSICAL PROPERTIES

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	(14)	(15)	Density* (16-19)	↓ (20)	—Determination— Resistivity* (21-27)	↓ (28)	(29)	(30)	Other Physical Properties in Text (31-80)
43	1		F01			1	0	1.5 +11	0			

* Need not be filled if the preceding subseries contains the same data.

RM-5.1-5

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G - PARTICULATE BIOASSAY DATA

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	14	15	Bioassay Test Type (16-35)	Bioassay Comments (36-80)
			G01				
			G01				
			G01				
			G01				
			G01				

H - CHEMICAL COMPOSITION

Aerodynamic/Stokes Diameter (1 or 0)
Calib or Calc (1 or 0)

Particle Boundary Diameter *

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	14	15	16-18	Aerodynamic/Stokes Diameter (19)	Calib or Calc (20)	Upper Boundary Diameter (21-26)	① (27-32)	② (33-38)	③ (39-44)	④ (45-50)	⑤ (51-56)	⑥ (57-62)	⑦ (63-68)	⑧ (69-74)	⑨ (75-80)
43	1		H01				1	0	30.	24.2	15.1	10.	7.	4.6	2.4	1.4	.9	.

Analysis I.D.

Chemical Concentration (μg/m³)

Card No. (11-13)	14	15	Chemical I.D. (16-19)	(20)	Mass Train Filter or Pooled Stages (21-26)	① ± (27-32)	② ± (33-38)	③ ± (39-44)	④ ± (45-50)	⑤ ± (51-56)	⑥ ± (57-62)	⑦ ± (63-68)	⑧ ± (69-74)	⑨ ± (75-80)
H02			2110	A	.	1.5 +3	4.18 +2	1.84 +3	1.32 +3	1.02 +3	1.63 +3	6.06 +3	1.45 +4	.
H02			2128	A	.	0.	0.	1.36 +3	9.67 +2	5.76 +2	8.20 +2	2.63 +3	5.57 +3	.
H02			2167	A	.	4.62 +3	1.20 +3	7.93 +3	6.11 +3	4.16 +3	9.13 +3	3.10 +4	6.58 +4	.
H02			2114	A	.	4.08 +1	0.	4.08 +1	3.26 +1	0.	0.	4.89 +1	7.69 +1	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.
H02					.	.	.	.	.	.	.	.	.	.

* Need not be filled if the preceding subseries contains the same data.

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Form Completed by

I - MEASUREMENT PARTICULARS

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	Measurement Instrument/Method No. (14)	(15)	Measurement Instrument/Method Name** (16-45)	Meas. Start Time (46-49)	Sampling Period** (50-54)	Aerosol Flow Rate** (55-60)	Gas Conditions at Measurement Location** Temp. (61-64)	Press. (65-69)	% H_2O (70-72)	(73-75)	Dilution Factor** (76-80)
43	1	1	I01	1		ANDERSEN MODEL III	1340	2	184	900	760	1.3		1

Card No. (11-13)	(14)	(15)	Measurement Size Range** Lower (16-20)	Upper (21-25)	Collection Surface/Substrate and its Specifications** (26-80)
I02			9	30	GLASS FIBER

Card No. (11-13)	(14)	(15)	Comments on the Measurement** (16-80)
I03			
I04			
I05			

J - PARTICULATE SIZE DISTRIBUTION DATA

Test Series No. (1-5)	Sub Series No. (6-8)	Run No. (9-10)	Card No. (11-13)	Measurement Instrument/Method No. (14)	Aerodynamic/Stokes Diameter (1 or 0) (15)	Particle Size Data** (16-23)	(24-31)	(32-39)	(40-47)	(48-55)	(56-63)	(64-71)	(72-79)	Calib or Calc (1 or 0) (80)
43	1	1	J01	1	1	30.	24.2	15.1	10.	7.	4.6	2.4	1.4	0
			J02			0.9	.	.	.	.	.	.	.	
			J03			.	.	.	.	.	.	.	.	

Card No. (11-13)	Measurement Instrument/Method No. (14)	Mass/No. (1 or 0) (15)	Mass/Number Data (16-23) ±	(24-31) ±	(32-39) ±	(40-47) ±	(48-55) ±	(56-63) ±	(64-71) ±	(72-79) ±	(80)
J04	1	1	3.80 +4	2.99 +4	3.26 +4	2.45 +4	2.17 +4	3.53 +4	7.34 +4	1.58 +5	
J05			.	.	.	.	.	.	.	.	
J06			.	.	.	.	.	.	.	.	

** Need not be filled if the preceding subseries or run with this instrument/method contains the same data.

5.2 Example of FPEIS Standard Report Output

Both standard and optional formats are available for the output from the FPEIS data base. An example of the standard FPEIS report format is provided in pages RM-5.2-2 through RM-5.2-4, as typical of FPEIS output.

FINE PARTICULATE EMISSIONS INFORMATION SYSTEM
FPEIS SUMMARY REPORT

TEST SERIES NO: 43 TEST SERIES AT SITE FROM 06/21/73 TO 06/21/73 BY: JACKO,R.B. ET AL., PURDUE UNIVERSITY
REFERENCE: YOST, K.J. ET AL., PROGRESS REPORT NSF(RANN) GI-35106

SOURCE CHARACTERISTICS-------------------------

NEDS SCC CATEGORY: INDUSTRIAL PROCES
OPERATION CLASS: PRIMARY METALS
FEED MATERIAL CLASS: ZINC SMELTING
OPERATION MODE CLASS: COKING

SITE NAME NEW JERSEY ZINC CO.
SOURCE NAME COKER NO.6
ADDRESS
PALMERTON PA
UTM ZONE AND X-Y COORDS: 18 -0.0 -0.0

CONTROL DEVICE(S) CHARACTERISTICS-----------------

UNCONTROLLED SOURCE

TEST SERIES REMARKS------------------------------

TEST SERIES NO: 43 SUBSERIES NO: 1 INLET TEST DATE: 06/21/73 FROM 13:00 TO 15:00 HOUR

TEST CHARACTERISTICS----------------------------------

SOURCE OPERATING MODE: COKING
FEED MATERIAL:

SOURCE OPERATING RATE: 4680 KG/HR PCT DESIGN CAPACITY: 80.
FEED MATERIAL COMPOSITION:

CONTROL DEVICE INLET SAMPLING POINT DESCRIPTION: 12 DIA DNSTREAM FLOW DISTURBANCE % ISOKINETIC: 100

PROCESS CONDITIONS: VOL FLOW= 3.3 DNM3/S VELOCITY= 8.4 M/S T= 900 C P= 760 MMHG WATER VAP %VOL= 11.3

GAS COMPOSITION: ORSAT- CO2= 7.30 % CO= 0.00 % O2= 11.20 % N2= 81.50 %
TRACE GASSES(PPM)-

CONTROL DEVICE(S) OPERATING PARAMETERS ------------

PARTICULATE MASSTRAIN RESULTS -----------------

FRONT HALF= 2.330E+06 UG/DNM3 TOTAL=-0. COMMENTS: EPA METHOD 5

PARTICULATE PHYSICAL PROPERTIES -------------------

DENSITY= 1.00 GM/CC ASSUMED RESISTIVITY= 1.50E+11 OHM-CM ASSUMED

CHEMICAL COMPOSITION DATA--------------------------

PARTICULATE SAMPLER UNCALIBRATED

SAMPLER STAGE CUT POINTS (UM)

0	1	2	3	4	5	6	7	8	9
30.	24.2	15.1	10.	7.	4.6	2.4	1.4	.9	

CHEMICAL CONCENTRATION IN (UM/DNM3)

CHEMICAL NAME ANALYSIS METHOD	MAS TRN /POOLD	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6	STAGE 7	STAGE 8	STAGE 9
1) CADMIUM ATOMIC ABSORPTION		1.5 +3	4.18+2	1.84+3	1.32+3	1.02+3	1.63+3	6.06+3	1.45+4	
2) LEAD ATOMIC ABSORPTION		0.	0.	1.36+3	9.67+2	5.76+2	8.20+2	2.63+3	5.57+3	
3) ZINC ATOMIC ABSORPTION		4.62+3	1.20+3	7.93+3	6.11+3	4.16+3	9.13+3	3.10+4	6.58+4	
4) COPPER ATOMIC ABSORPTION		4.08+1	0.	4.08+1	3.26+1	0.	0.	4.89+1	7.69+1	

SUBSERIES REMARKS-----------------------------------

TEST SERIES NO: 43 SUBSERIES NO: 1 RUN NO: 1 CONTROL DEVICE INLET

MEASUREMENT PARTICULARS------------------------------

MEAS. INST/METHOD: 1 ANDERSEN MODEL III (UNCALIBRATED) SIZE RANGE: .900 TO 30.000 UM
COLLECTION SURFACE/SUBSTRATE: GLASS FIBER
MEAS. START TIME: 1340 SAMPLING PERIOD: 2.0 MIN SAMPLING RATE: 18.40 LPM DILUTION FACTOR: 1.0

GAS SAMPLING CONDITIONS: TEMP= 900 C PRESSURE= 760 MMHG WATER VAP %VOL = 11.3

COMMENTS ON THE MEASUREMENT:

PARTICLE SIZE DISTRIBUTION DATA

PARTICLE DENSITY= 1.00 GM/CC

AERODYNAMIC DIA (UM)		PARTICLE DIA (UM)		DM (UG/DNM3)	DM/DLDAE (UG/DNM3)	DS (UM2/CC)	DS/DLDAE (UM2/CC)	DN (NO./CC)	DN/DLDAE (NO./CC)	CUM M (%)
BNDRY	MID PT	BNDRY	MID PT							
30.000		30.000								
24.200	26.944	24.200	26.944	3.800E+04	4.073E+05	8.462E+03	9.069E+04	3.710E+00	3.976E+01	
15.100	19.116	15.100	19.116	2.990E+04	1.460E+05	9.385E+03	4.582E+04	8.175E+00	3.991E+01	
10.000	12.288	10.000	12.288	3.260E+04	1.821E+05	1.592E+04	8.894E+04	3.355E+01	1.875E+02	
7.000	8.367	7.000	8.367	2.450E+04	1.582E+05	1.757E+04	1.134E+05	7.989E+01	5.158E+02	
4.600	5.675	4.600	5.675	2.170E+04	1.190E+05	2.294E+04	1.258E+05	2.268E+02	1.244E+03	
2.400	3.323	2.400	3.323	3.530E+04	1.249E+05	6.374E+04	2.256E+05	1.838E+03	6.505E+03	
1.400	1.833	1.400	1.833	7.340E+04	3.136E+05	2.403E+05	1.026E+06	2.276E+04	9.723E+04	
.900	1.122	.900	1.122	1.580E+05	8.234E+05	8.445E+05	4.401E+06	2.134E+05	1.112E+06	

TOTAL MASS CONC= 4.134E+05 TOTAL SURF CONC= 1.223E+06 TOTAL NUM CONC= 2.383E+05

5.3 Test Series Numbers and References in the FPEIS

This section provides a master listing of Test Series Numbers and references for the data in the FPEIS data base. As new test data are added to the FPEIS, this list will be updated.

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
1	Harris, D. B., and D. C. Drehmel, "Fractional Efficiency of Metal Fume Control as Determined by Brink Impactor," EPA/CSL (1973).	Brink Impactor Model B, 5-stage, Gelman type "A" final filter flow rate = 2.83 lpm Δp = 10"Hg	Zn Roaster	Wet ESP	4
2	Harris, D. B., and D. C. Drehmel, "Fractional Efficiency of Metal Fume Control as Determined by Brink Impactor," EPA/CSL (1973).	Brink Impactor Model B, 5-stage, Gelman type "A" final filter flow rate = 2.83 lpm Δp = 10"Hg	Cu Converter	Wet ESP	4
3	Harris, D. B., and D. C. Drehmel, "Fractional Efficiency of Metal Fume Control as Determined by Brink Impactor," EPA/CSL (1973).	Brink Impactor Model B, 5-stage, Gelman type "A" final filter flow rate = 2.83 lpm Δp = 10"Hg	Zn Sintering	Dry ESP	2
4	Harris, D. B., and D. C. Drehmel, "Fractional Efficiency of Metal Fume Control as Determined by Brink Impactor," EPA/CSL (1973).	Brink Impactor Model B, 5-stage, Gelman Type "A" final filter flow rate = 2.83 lpm Δp = 10"Hg	Pb Sintering	Baghouse (Orlon)	2
5	Harris, D. B., and D. C. Drehmel, "Fractional Efficiency of Metal Fume Control as Determined by Brink Impactor," EPA/CSL (1973).	Brink Impactor Model B, 5-stage, Gelman type "A" final filter flow rate = 2.83 lpm Δp = 10"Hg	Pb Blast Furnace	Baghouse (wool felt)	2
6	Statnick, R. M., "Measurement of SO_2, Particulate, and Trace Elements in a Copper Smelter Converter and Roaster/Reverberatory Gas Streams," EPA/CSL	Brink Impactor (Model B) at inlets, Andersen Sampler (Mark III) at outlets Brink flow rate = 2.83 lpm Andersen flow rate = 23.8 lpm	Cu Roaster and Reverberatory Furnace (ASARCO)	Dry ESP (pipe) and parallel type ESP	2

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
7	Statnick, R. M., "Measurement of SO_2, Particulate, and Trace Elements in a Copper Smelter Converter and Roaster/Reverberatory Gas Streams," EPA/CSL	Brink Impactor (Model B) at inlets, Andersen Sampler (Mark III) at outlets Brink flow rate = 2.83 lpm Andersen flow rate = 23.8 lpm	Cu Converter	Plate type ESP	2
8	McCain, J. D., and W. B. Smith, "Lone Star Steel Steam-Hydro Air Cleaning System Evaluation," EPA-650/2-74-028 (1974).	Brink Impactor at inlet and Andersen Sampler at outlet. Optical particle counter and diffusion battery. Method 5 technique.	Open Hearth Furnace	Lone Star Steel Steam-Hydro Scrubber	38
9	Cooper, D. W., and D. P. Andersen, "Dynactor Scrubber Evaluation," GCA Corporation (1974)	Andersen (Mark III) 14 lpm	Test Aerosol from Dust Feeder	Dynactor Scrubber	50
10	Harris, D. B., "Tests Performed at Celotex Corporation, Goldsboro, North Carolina	Pilat Impactor	Asphalt Roofing	Afterburner	1
11	Harris, D. B., and J. A. Turner, "Particulate and SO_2/SO_3 Measurement Around an Anthracite Steam Generator Baghouse," EPA/CSL (1973)	Brink Impactor flow rate = 4.7 lpm Δp = 10"Hg	Pulverized Coal-Fired Boiler (anthracite) Pennsylvania Power and Light Company	Baghouse bulked weave, glass fiber bags with a Teflon finish	4
12	McKenna, J. D., "Applying Fabric Filtration to Coal-Fired Industrial Boilers: A Preliminary Pilot Scale Investigation," Enviro-Systems and Research, Inc. (1974)	Andersen Sampler	Coal-Fired Industrial Boiler Kerr Industries, Concord, North Carolina	Nomex Baghouse	3
13	Cowherd, C., et al., "Hazardous Emission Characterization of Utility Boilers," EPA-650/2-75-066	Brink Impactor	Utility Boiler	Cyclone	6

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
15	Statnick, R. M., and D. C. Drehmel, "Fine Particulate Control Using SO_2 Scrubbers," EPA (1974).	Brink Impactor and Andersen Sampler. Total Particulates using EPA Method 5.	Coal-Fired Power Boiler (TVA, Shawnee)	TCA Scrubber	14
16	Statnick, R. M., and D. C. Drehmel, "Fine Particulate Control Using SO_2 Scrubbers," EPA (1974).	Brink Impactor and Andersen Sampler. Total Particulates using EPA Method 5.	Coal-Fired Power Boiler (TVA, Shawnee)	Venturi Scrubber	4
17	Statnick, R. M., and D. C. Drehmel, "Fine Particulate Control Using SO_2 Scrubbers," EPA (1974).	Brink Impactor and Andersen Sampler. Total Particulates using EPA Method 5.	No. 6 Fuel Oil Fired Power Boiler (Mystic)	Venturi MgO Scrubber	8
18	Riggenbach, J. D., E. D. Johnson and M. K. Hamlin, "Measurement of Particulate Grain Loadings, Particle Size Distribution, and Sulfur Gas Concentrations at Hoerner Waldorf's Pulp and Papermill No. 3 Recovery System, Vols. I, II, and III, Environmental Science and Engineering, Inc.	Brink Impactor	Pulp and Papermill Recovery Biler	ESP	38
19	Shannon, L. J., et al., "St. Louis/Union Electric Refuse Firing Demonstration Air Pollution Test Report."	Total Mass by EPA Method 5 Brink Impactor and Andersen Sampler	Coal-Fired Utility Boiler Refuse Firing Demonstration, St. Louis/Union Electric	ESP	26
20	McCain, J. D., "Evaluation of Aronetics Two-Phase Jet Scrubber," EPA-650/2-74-129	Brink Impactor, Andersen Sampler Method 5, Optical Particle Counter, Diffusion Battery + CNC	Ferro-Alloy Electric Arc Furnace	Aronetics Two-Phase Jet Scrubber	41
21	Bosch, J. C., M. J. Pilat, and B. F. Hrutfiord, "Size Distribution of Aerosols From a Kraft Mill Recovery Furnace," Tappi 54(11):1871 (1971).	Pilat Impactor	Kraft Mill Recovery Furnace	ESP	4

Test Series Nos. 14 and 47 has missing or invalid data and will be coded when test data are available.

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
22	McGarry, F. J., and C. J. Gregory, "A Comparison of the Size Distribution of Particulates Emitted From Air, Mechanical, and Steam Atomized Oil-Fired Burners," JAPCA, 22(8):636 (1972).	Andersen Sampler	Air Atomized Oil-Fired Boiler	ESP	1
23	McGarry, F. J., and C. J. Gregory, "A Comparison of the Size Distribution of Particulates Emitted From Air, Mechanical, and Steam Atomized Oil-Fired Burners," JAPCA, 22(8):636 (1972).	Andersen Sampler	Mechanical Atomized Oil-Fired Boiler	ESP	1
24	McGarry, F. J., and C. J. Gregory, "A Comparison of the Size Distribution of Particulates Emitted From Air, Mechanical, and Steam Atomized Oil-Fired Burners," JAPCA, 22(8):636 (1972).	Andersen Sampler	Steam Atomized Oil-Fired Boiler	ESP	1
25	Lee, R. E., Jr., H. L. Crist, A. E. Riley, and K. E. MacLeod, "Concentration and Size of Trace Metal Emissions From a Power Plant, a Steel Plant, and a Cotton Gin," Env. Sci. and Tech., 9(7):643 (1975).	UW Mark III Sampler	Emissions from a Power Plant	ESP	2
26	Lee, R. E., Jr., H. L. Crist, A. E. Riley, and K. E. MacLeod, "Concentration and Size of Trace Metal Emissions From a Power Plant, a Steel Plant, and a Cotton Gin," Env. Sci. and Tech., 9(7):643 (1975).	UW Mark III Sampler	Emissions from a Steel Plant	Baghouse	2

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
27	Lee, R. E., Jr., H. L. Crist, A. E. Riley, and K. E. MacLeod, "Concentration and Size of Trace Metal Emissions from a Power Plant, a Steel Plant, and a Cotton Gin," Env. Sci. and Tech., 9(7)643 (1975).	UW Mark III Sampler	Emissions from a Cotton Gin	Wet Scrubber	2
28	"St. Louis-Union Electric Refuse Fuel Project," MRI Project No. 3821-C(4), January 1975	Brink and Andersen Impactors	Coal-Fired Utility Boiler Refuse Firing Demonstration	ESP	67
29	"St. Louis-Union Electric Refuse Fuel Project," MRI Project No. 4033-C, Monthly Report No. 1	Brink and Andersen Impactors	Coal-Fired Utility Boiler Refuse Firing Demonstration	ESP	12
30	"Test and Evaluation Program for St. Louis-Union Electric Refuse Fuel Project," MRI Project No. 4033-C, Monthly Report No. 4	Brink and Andersen Impactors	Coal-Fired Utility Boiler Refuse Firing Demonstration	ESP	43
31	"Test and Evaluation Program for St. Louis-Union Electric Refuse Fuel Project," MRI Project No. 4033-C, Monthly Report No. 11	Brink and Andersen Impactors	Coal-Fired Utility Boiler Refuse Firing Demonstration	ESP	19
32	Toca, F. M., "Lead and Cadmium Distribution in the Particulate Effluent from a Coal-Fired Boiler," Ph.D. Thesis, University of Iowa, Ames, Iowa, July 1972	Andersen Ambient Sampler	Coal-Fired Boiler	ESP	5
33	Baladi, E., "Particle Size Distribution Tests for Beker Industries Corporation," MRI Project No. 5-1379-C	Brinks Impactor	Phosphate Rock Calciner	Venturi Scrubber	5

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
34	Gooch, J. P., and J. D. McCain, "Particulate Collection Efficiency Measurements on a Wet Electrostatic Precipitator," EPA-650/2-75-033	Brink Andersen Samplers Optical Particle Counter, Diffusion Battery and CN Counter	Aluminum Reduction Cells	ESP Preceded by Spray Towers	17
35	Bradway, R. M., and R. W. Cass, "Fractional Efficiency of a Utility Boiler Baghouse," EPA-600/2-75-013-a	Andersen Impactor	Coal-Fired Boiler	Baghouse	86
36	McKenna, J. D., J. C. Mylock, and W. O. Lipscomb, "Applying Fabric Filtration to Coal-Fired Industrial Boilers," EPA-650/2-74-058-a	Andersen Impactor	Coal-Fired Boiler	Nomex Baghouse	28
37	McKenna, J. D., J. C. Mylock, and W. O. Lipscomb, "Applying Fabric Filtration to Coal-Fired Industrial Boilers," EPA-640/2-74-058-a	Andersen Impactor	Coal-Fired Boiler	Teflon Felt (Style 1) Baghouse	7
38	McKenna, J. D., J. C. Mylock, and W. O. Lipscomb, "Applying Fabric Filtration to Coal-Fired Industrial Boilers," EPA-650/2-74-058-a	Andersen Impactor	Coal-Fired Boiler	Teflon Felt (Style 2) Baghouse	5
39	McKenna, J. D., J. C. Mylock, and W. O. Lipscomb, "Applying Fabric Filtration to Coal-Fired Industrial Boilers," EPA-650/2-74-058-a	Andersen Impactor	Coal-Fired Boiler	Gore-Tex/Nomex Baghouse	11
40	McKenna, J. D., J. C. Mylock, and W. O. Lipscomb, "Applying Fabric Filtration to Coal-Fired Industrial Boilers," EPA-650/2-74-058-a	Andersen Impactor	Coal-Fired Boiler	Dralon Baghouse	7

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
41	McCain, J. D., "Evaluation of Centrifield Scrubber," EPA-650/2-74-129-a	Brinks Andersen Impactors Diffusional, Optical and Electrical Methods	Asphalt Dryer Burning No. 2 Fuel Oil	1. Coarse Cyclone 2. Secondary Collector 3. Scrubber	31
42	Cooper, D. W., "Pentapure Impinger Evaluation," EPA-650/2-75-024-a	Andersen In-Stack Impactor	Gray Iron Foundry	Pentapure Impinger	12
43	Yost, K. J. et al., "The Environmental Flow of Cadmium and Other Trace Metals," Progress Report NSF (RANN) Grant GI-35106, Purdue University, West Lafayette, Indiana	Andersen Impactor	Zinc Coker Plant	-	1
44	Yost, K. J. et al., "The Environmental Flow of Cadmium and Other Trace Metals," Progress Report NSF (RANN) Grant GI-35106, Purdue University, West Lafayette, Indiana	Andersen Impactor	Zinc Vertical Retort	Baghouse	3
45	Yost, K. J. et al., "The Environmental Flow of Cadmium and Other Trace Metals," Progress Report NSF (RANN) Grant GI-35106, Purdue University, West Lafayette, Indiana	Andersen Impactor	Steel Mill Open Hearth Furnace	ESP	6
46	Yost, K. J. et al., "The Environmental Flow of Cadmium and Other Trace Metals," Progress Report NSF (RANN) Grant GI-35106, Purdue University, West Lafayette, Indiana	Andersen Impactor	Municipal Incinerator	Scrubber	1
48	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark II and Andersen Impactors	Urea Prilling Tower	Valve Tray	12

Test Series No.	Report's Author and Name	Testing Equipment	Source	Control Equipment	No. of Runs
49	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark III and Andersen Impactors	Potash Dryer	Scrubber	17
50	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark III and Andersen Impactors	Coal-Fired Boiler	TCA Scrubber	6
51	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark III and Andersen Impactors	Coal-Fired Boiler	Venturi Scrubber	6
52	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark III and Andersen Impactors	Salt Dryer	Wetted Fiber Scrubber	16
53	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark III and Andersen Impactors	Salt Dryer	Impingment Plate Scrubber	12
54	Calvert, S., N. J. Jhaveri, and S. Yung, "Fine Particle Scrubber Performance Tests," EPA-650/2-74-093	UW Mark III and Andersen Impactors	Iron Wetting Cupola	Venturi Rod Scrubber	18

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16. ABSTRACT The report is a basic reference manual on the Fine Particle Emissions Information System (FPEIS), a computerized database on primary fine particle emissions to the atmosphere from stationary sources, designed to assist engineers and scientists engaged in fine particle control technology development. The FPEIS will contain source test data including particle size distributions; chemical, physical, and bioassay testing results performed on particulate samples; design and typical operating data on particle control systems applied; process descriptions of the sources; and descriptions of the sampling equipment and techniques employed. The FPEIS, a successor to the MRI Fine Particle Inventory developed in 1971, report describes in detail the data types contained in the database. It identifies and discusses the input data requirements and protocol. For reference, it includes a list of available information request procedures, and describes the general database management system used to implement the FPEIS.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution	Environmental	Air Pollution Control	13B
Standards	Biology	Stationary Sources	06F
Dust		Reference Manual	11G
Data Storage		Fine Particle Emissions Information System	09B, 05B
Sampling			14B
Size Determination		FPEIS	

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