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Project Summary

EADS Gaseous Emissions Data System 1982 Annual Report

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This report is the first data summary of solids media sampling and analysis results compiled in EPA's Gaseous Emissions Data System (GEDS). GEDS is a component of a group of related computerized data bases — the Environmental Assessment Data Systems (EADS) — that describe multimedia discharges from energy systems and industrial processes. EADS was designed to aid researchers in environmental assessment, source characterization, and control technology development. This report summarizes data compiled from the implementation of GEDS in 1980 through 1982. It lists the sources reported in GEDS, feed materials used, chemical analysis data on hazardous and priority pollutants, and the number of samples for each source.

This Project Summary was developed by EPA's Industrial Environmental Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

The Gaseous Emissions Data System (GEDS) is a computerized information system that contains results of sampling and analysis of gaseous media discharges from energy systems and industrial processes. GEDS is one of four waste stream data bases that make up the Environmental Assessment Data Systems (EADS). GEDS became operational in June 1980. This annual report describes GEDS and its growth, contents, and future within EADS.

EADS is a comprehensive system of computerized data bases that describe energy systems, industrial processes, control technologies, and process discharges. Morever, EADS is a protocol for data analysis and evaluation that allows users to make consistent and meaningful interpretations of the data collected and reported. The EADS protocol may be applied to any type of sampling and analysis activity in which discrete samples are collected.

EADS consists of four operational data bases for multimedia product, process, or waste streams sampled and analyzed, that are supported by a variety of reference data bases and data evaluation programs. The four sampling and analysis data bases now in operation are the Fine Particle Emissions Information System (FPEIS), GEDS, the Liquid Effluents Data System (LEDS), and the Solid Discharge Data System (SDDS).

Each data base contains extensive information on the source of the discharges, on applied control technologies, on fuels or feedstocks, and on the composition of each discharge. EADS applies to most sources, including industrial processes, energy systems, and wastewater treatment plants. The structure of EADS and the types of data contained in it are discussed in the project report.

The vast and growing volume of sampling and analysis data produced by EPA, its contractors, and other agencies required a mechanism to consolidate such data. These organizations have produced and still are producing a broad range of data from a variety of industrial and energy sources, and sampling and analysis methods and protocols are constantly evolving. EADS was created *to provide a comprehensive and diverse repository for multimedia environmental sampling and analysis data and to*

consolidate the data in a central location where they can be readily available to the user community. To meet this provision, EADS was designed to accommodate a variety of multimedia data from assorted sampling and analysis programs.

One requirement of an environmental data base was that a consistent format be used in order to facilitate accurate reliable data assessments. More specifically, it was essential that data be reported in similar units and be compiled with consistency in engineering conditions, technical bases, etc. To meet this need, EADS was developed to provide a standardized and uniform protocol for reporting sampling and analysis data.

A critical need existed for current information and standardized data analysis procedures. Thus, EADS was created to supply current sampling and analysis data for evaluation and to provide standard methods for retrieving and analyzing the data. LEDS, for example, has been useful to EPA's Office of Research and Development in developing the Wastewater Treatability Manual. EADS is updated and expanded constantly, and a Program Library aids users in their data evaluation needs through the utilization of standard reports and analysis software.

Finally, and possibly most important, EADS was created to document the quality of the data reported. EPA is committed to producing environmental data of high quality and to providing a cost-effective way to document results of sampling and analysis programs so that data quality may be determined. EADS is an integral component of IERL-RTP's approved Quality Assurance (QA) Program Plan and contains QA parameters to aid interpretation of the data by the user. The broad applicability and comprehensiveness of EADS make it particularly suitable for a QA documentation role.

Data from EADS have been used to model process engineering emissions, to design and evaluate control technology, and for many other applications. The EADS Program Library contains an extensive array of user programs, including special reports and computations. Data can be retrieved according to source control technology, sample methods, or other criteria. Data can be requested for the entire EADS or for any of the data bases within EADS. Specially designed routines are available to interface with statistical packages and to present the data in a variety of reporting formats. For example, the FPEIS data base has a program called PArticle Data REduction

(PADRE), which calculates particle distributions from user supplied stage weights/ concentrations and cut diameters, and stores the results in the FPEIS. These programs are designed to assist the user in obtaining useful and meaningful data in a variety of forms.

EADS is user-oriented. A GEDS User Guide is available documenting instructions for data encoding and submittal, along with methods for data retrieval. GEDS data may be retrieved by either direct computer access to the data base and its user program library of by written or verbal request to EADS technical support staff. Use of the GEDS data and analysis software is described in the GEDS User Guide. Revisions to the documentation are made easily, and supplements are issued as needed.

A key component of the design effort for the EADS data bases is flexibility. User needs will change, and EADS can adapt to these changes to remain a useful information resource. EADS has undergone several improvements since it became operational in 1980 and will undergo additional changes as needed. EADS is still the only sampling, analysis, and engineering data system available that is completely integrated across media boundaries.

Description of the GEDS Data Base

The GEDS data base contains industrial or energy process source emissions test data and related source and control system design and operating data. It describes gaseous emissions at the point where the gas sample is collected from the discharge stream. This is accomplished through a flexible data base structure and in the definitions of the principal data types that are reported. These data types are defined as data elements, each data element describing a particular piece of information (e.g., source characteristic, discharge stream characteristic, control device or treatment process, source operation, test information, analyses of the fuels and feedstocks, sampling activity information, chemical analyses, radionuclide analysis, or bioassay result). The data elements collectively describe the entire source test activity. SDDS may contain more than 500 discrete data elements for each site test activity reported. The extent (or completeness) of the data contained in the data base depends on the objectives of the site test plan.

Major categories of data at each level of the data base are given in Figure 1. The data are grouped into four general
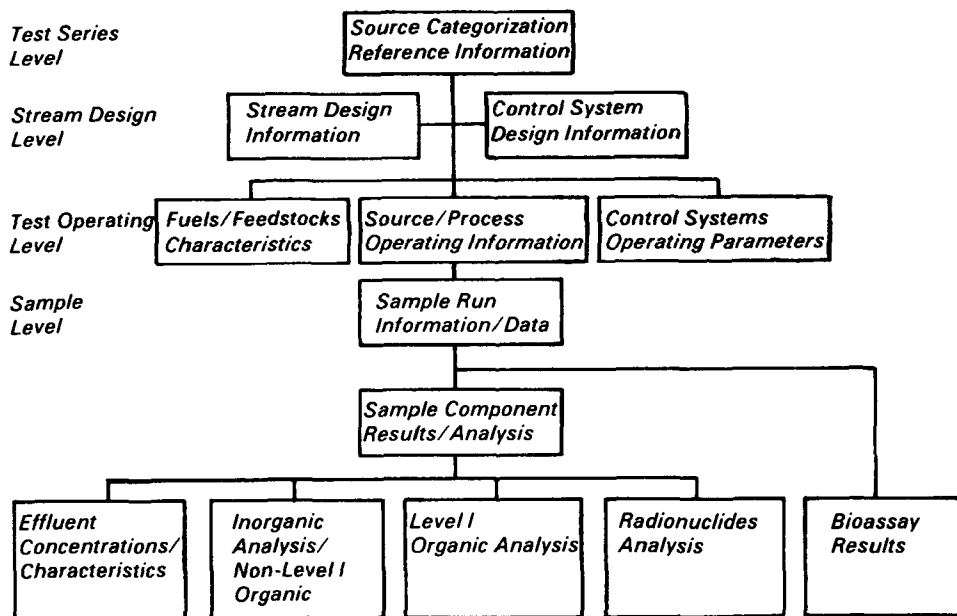

Figure 1. GEDS structure.

categories: general source description and related information; design conditions and parameters of the effluent stream and of the control device or treatment/storage/recovery process; test operating information including analysis of any fuels and feedstock; and sampling activities information including chemical, physical, radionuclide, and biological analysis results.

GEDS Data Summary

The GEDS data base contains about 450 samples from about 100 source tests. The rate of growth of the GEDS is expected to level off as concern with air pollution is supplanted by greater concern with toxic and hazardous pollutants, particularly at the Federal level. Toxic and hazardous pollutants are primarily a liquid and solid media problem. Source categories in GEDS are summarized in Table 1.

Much data in GEDS resulted from environmental assessments conducted for EPA during the last 5 years. These studies are often multimedia, and any corresponding data in other media may be located in corresponding data bases. Over 70 percent of all test series in GEDS have been conducted on combustion

Table 1. Summary of Source Categories in GEDS

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Data Base: GEDS

Environmental Assessment Data Systems
Source Category Summary

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Where Clause Follows.
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Source Category	Source Type	Product or Device	Process Type	SIC	Number of Test Series	Number of Samples
Agrichemicals	Fertilizers	Mixed Fertilizer	Blending	2875	1	2
Chemical Manufac	Industrial Inorganic	Boric Acid	Boiler	2819	1	5
Chemical Manufac	Industrial Inorganic	Boric Acid	Borax & Sulfuric	2819	1	2
Combust-Energy	Government	Internal Combust	Reciprocating Engine	4900	1	4
Combust-Energy	Industrial	Boiler	Firetube	4960	5	29
Combust-Energy	Industrial	Boiler	Single Wall	4960	1	12
Combust-Energy	Industrial	Boiler	Stoker	4960	2	4
Combust-Energy	Industrial	Boiler	Watertube	4960	1	4
Combust-Energy	Industrial	Internal Combust	Reciprocating Engine	4960	2	14
Combust-Energy	Residential	Furnace	Single Burner	4900	3	15
Combust-Energy	Utility	Boiler	Cyclone	4911	6	31
Combust-Energy	Utility	Boiler	Horiz Opposed Wall	4911	7	48
Combust-Energy	Utility	Boiler	Not Specified	4911	2	3
Combust-Energy	Utility	Boiler	Single Wall	4911	10	26
Combust-Energy	Utility	Boiler	Stoker	4911	5	10
Combust-Energy	Utility	Boiler	Tangential	4911	7	59
Combust-Energy	Utility	Internal Combust	Reciprocating Engine	4911	6	21
Combust-Energy	Utility	Internal Combust	Simple Cycle Turbine	4911	7	14
Consumer Products	Glass & Glass Prod	Glass Bottles	Manufacture	3221	3	13
Fabricated MTL Prod	Metal Products	Automobiles	Surface Coating	3449	2	6
Food Industry	Grain Mill Products	Carob Kibble	Roasting	2041	1	3
Food Industry	Grain Mill Products	Rice	Processing	2044	1	3
Lumber & Wood Prod	Millwork	Housing Products	Finishing	2431	1	3
Lumber & Wood Prod	Wood	Lumber	Sawmill Operations	2421	2	6
Metals	Primary Ferrous	Steel	Abrasive Blasting	3312	1	2
Metals	Primary Ferrous	Steel	Heat Treating	3312	1	3
Metals	Primary Ferrous	Steel	Sintering	3312	1	6
Metals	SEC Nonferrous	Aluminum	Reverb Furnace	3341	1	3
Metals	Secondary Ferrous	Steel	Open Hearth	3320	1	6
Minerals	Building Materials	Brick	Manufacture	3251	1	2
Minerals	Building Materials	Cement	Production	3241	2	6
Minerals	Building Materials	Fiberglass Wool	Manufacture	3296	1	4
Minerals	Building Materials	Gypsum Products	Calcining	3275	1	2
Petroleum Refining	Intermediate Dist	Heavy Fuel Oils	Process Heater	2911	1	2
Petroleum Refining	Light Distillates	Gasoline	Cracking	2911	1	3
Petroleum Refining	Paving & Roofing MTL	Asphalt	Batching	2951	1	6
Petroleum Refining	Paving & Roofing MTL	Asphalt	Roofing	2952	1	4

energy sources; the remainder are primarily in the metals and minerals source category. Of the combustion energy source tests, there is a relatively even distribution of control device types, including combustion modifications (including fuel additives), electrostatic precipitators, filters, afterburners, liquid scrubbers, and mechanical collectors. The full report summarizes source categories, control systems, feed materials, and the number of samples in GEDS.

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