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Interim Validation Report Major Fuel Burning Installation System

Steven Alter, Andrew Baum, Sally Hinds, Alfred Levinson, and Robert Seeburger

December 1978

Lawrence Berkeley Laboratory University of California/Berkeley

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INTERIM VALIDATION REPORT:

MAJOR FUEL BURNING INSTALLATION SYSTEM

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December 1978

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PREFACE

The purpose of this study is to examine the meaningfulness and accuracy of all information in the data base initiated by the 1975 Major Fuel Burning Installation (MFBI) survey. The data base remains the principal source of information about MFBIs in the U.S.

The information collected by the original survey [performed to implement the Energy Supply and Environmental Coordination Act (ESECA) of 1974] was intended to identify all MFBIs in the U.S. and to indicate which were potential candidates for orders prohibiting the burning of natural gas and oil. This interim validation report describes findings and recommendations to date regarding the meaningfulness and accuracy of the information collected by the original survey.

K. Comparison of MFBI Data Base and NEDS Data Base

L. Analysis of the MFBI Data Base for Inconsistencies and Obvious Errors

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INTERIM VALIDATION REPORT

MAJOR FUEL BURNING INSTALLATION SYSTEM

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

I. SYSTEM IDENTIFICATION

A. CURRENT IDENTIFICATION INFORMATION

System being validated: Major Fuel Burning Installations (MFBI)

Form: FEA-C-602-S-0

- EIA Standard Series Number: currently unavailable
- Clearance: General Accounting Office, mid-April 1975
- Expiration: June 30, 1977

Statutory Authority: The reporting requirements were established to implement Section 2(a) of the Energy Supply and Environmental Coordination Act of 1974 (ESECA) Pub. L. No. 93-319, 88 Stat. 24.

B. HISTORICAL IDENTIFICATION INFORMATION

No antecedent information systems have been identified. A new MFBI information system is being developed to implement the Power Plant and Industrial Fuel Use Act of 1978, Pub. L. No. 95-620,__Stat.__. Related, supplemental or successor systems are the EIA-97, Boiler Manufacturers' Report; the form FEA-C-607-S-0, MFBI Early Planning Process Report; and the FEA-C-602-S-1, supplement to form FEA-C-602-S-0.

C. IDENTIFICATION OF PURPOSE

The purpose of the MFBI system was both to identify all major fuel burning installations[a] and to provide information for specifying which

[a]Regulations developed under ESECA defined a major fuel burning installation as "an installation or unit other than a power plant that has or is a fossil fuel fired boiler, burner or other combustor of fuel, or any combination thereof, at a single site, that has individually or in combination a design firing rate of 100 million Btus per hour....Gas turbines and combined cycle units were excluded from this classification."

MFBIs were potential candidates for orders prohibiting the burning of natural gas or oil. The information required was derived from the regulations in ESECA. ESECA stated that the following criteria should be applied in issuing prohibition orders to particular MFBIs:

- The combustor should be capable of burning coal.
- The burning of coal should be practical.
- The burning of coal should be consistent with the purposes of ESECA.
- Coal and coal transportation equipment should be available.
- Other factors could be considered, such as the location of the installation, the amount of oil or natural gas presently burned, etc.

D. IDENTIFICATION OF INFORMATION COLLECTED

The form FEA-C-602-S-0 contained information in three categories -- general plant information, combustor information, pollution control device information. The numerical information on the form involved 1973 and 1974 fuel use. All information on the form was related to combustors in particular installations. Other than the fuel use information, most of the information on the form consisted of nominal or yes-no responses. Several questions called for narrative descriptions, e.g., identification of impediments to using more coal at the installation.

A second form, FEA-C-602-S-1 was sent to those installations that contained coal-capable combustors and reported using more than 150,000 barrels of oil or 921,000,000 cubic feet of natural gas (or the equiva-

lent combination) in 1974. Information collected on this form has not yet been analyzed.

E. IDENTIFICATION OF COLLECTION AND COLLATION PROCESS

The target universe of the MFBI survey was all Major Fuel Burning Installations that existed in June, 1975. The frame is an ad hoc construction consisting of names drawn from several trade association lists, and individuals who responded to Federal Register announcements. Response to the survey was mandatory. Responses were submitted by mail.

The MFBI survey was performed by the Office of Coal Utilization (OCU), which also checked both the incoming forms and edit listings of the information. Control Data Corporation keypunched and verified the responses. CACI developed a computer system for storing the information on tape, producing edit listings, and generating a series of standard reports. The MFBI tape is currently maintained by the Office of Data Services (ODS).

F. USES OF OUTPUT

The decision to perform the MFBI survey was made by the Office of Coal Utilization. According to the formal request for clearance of the form, the purpose of the form was to "identify the coal conversion candidate universe and provide necessary information for the selection of specific installations for further in-depth analysis before the issuance of mandatory conversion orders." During 1976-1977, the information from the form was used by the Office of Coal Utilization in the process of issuing orders prohibiting the burning of oil or natural

gas. It was used primarily as a screening tool for identifying which combustors should be examined in detail. The MFBI data base is currently being used only infrequently in regulatory activities.

The computerized MFBI data base has been and is being used for analytic purposes by many secondary users (see Appendix F). The MFBI data base (edited to protect confidentiality) has been made available for public distribution, and has been cited in reports written by secondary users.

G. RELATED SYSTEMS

The Environmental Protection Agency (EPA)'s on-going National Emission Data System (NEDS) contains information that overlaps with the information collected in 1975 by the MFBI system. Common data elements include:

- parent company name
- SIC codes (first four digits)
- combustor capacity (for boilers)
- primary energy source
- stack height

The NEDS target universe is identified in terms of point sources of pollution rather than MFBIs exceeding a designed firing rate cutoff.

II. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The information in the MFBI data base is a basically unsound representation of the universe of MFBIs and the characteristics of that universe. The meaningfulness and accuracy of this information are severely impaired by numerous design and implementation flaws. Nonetheless, the MFBI data base is probably the best currently available source of information about MFBIs.

The meaningfulness is seriously restricted by the unquantified non-coverage bias. No systematic procedure or rigorous definition exists to identify the elements of the frame. The quality of coverage of the universe by the frame remains unquantified. (Further LBL research will estimate the coverage and assess the impact of the non-coverage on the information.) Available evidence strongly suggests the possibility of non-response bias as well. No determination of the extent or estimate of the effect of the non-response exists. (Further LBL research will generate such an estimate.)

In addition, the recorded information about the engineering characteristics of the MFBIs is not specific enough to demonstrate coal-conversion capability. This lack of focus of the recorded information is compounded by the large quantity of extraneous information collected. (Section II.A.2, main text.) The lack of bounds for the non-coverage and non-response biases and the inadequacy of the information collected render the MFBI data base unreliable as a comprehensive

source of information about MFBIs in the U.S.

The condition of the data base itself is also highly suspect. At least 699 of 4,199 records are missing, without explanation. About 29 percent of the remaining records contain identified logical inconsistencies or errors. The information in the data base is out of date; most records are 3 to 6 years old. Nothing short of a total reconstruction is likely to cure the inaccuracies and inadequacies of the information in the MFBI data base.

B. RECOMMENDATIONS

1. Caveats

- The information is 3 to 6 years old.
- Coverage of the frame is uncertain (LBL studies will explore the frame coverage).
- The data base contains many internal inconsistencies and errors.

2. System Design

Recommendations about what specific information should or should not be collected to support the regulatory process are not being made at this time.

C. WORK TO BE DONE

Additional work by Lawrence Berkeley will focus on the development of methodologies for creating the frame for a new MFBI survey. This work will make it possible to develop a statistical estimate

of the coverage of the current MFBI data base. A secondary research area will involve the identification of mechanical features of different types of combustors that can be used to determine whether conversion to the use of coal is practical. Research on the information collected by the FEA-C-602-S-1 can also be undertaken if this work promises to provide useful results for OEIV.

FUTURE WORK TO BE DONE TO COMPLETE THE SYSTEM STUDY

Major Fuel Burning Installations

1. Investigation of the information required to appraise both the short-term and the long-term fuel switching capability of an installation, in terms of specific economic and technical factors.

2. Field work by experts on the accuracy of the submitted forms.

3. Discussion of consistency with other systems (including those under development).

4. Exploration of coverage of the frame.

5. Examination of relationships between the MFBI system and the Power Plant and Industrial Fuel Use Act of 1978.

Editors' Note

These reports were prepared under severe time contraints. As a result, only the executive summaries have been fully reviewed. If any differences appear between the executive summary, the main text and the appendices, the reader should be guided by the executive summary, and secondarily refer to the appendices about details of content. Also, in reading the report, the authors request the reader to mentally make the following changes.

(1) Wherever the word "sufficiency" appears, please read "meaningfulness." Meaningfulness is here defined as follows.

> The output of a system is meaningful to the degree to which a rational user could use the output as an input to a rational analysis designed to fulfill the purposes which the information system is operated to support.

(2) The text in places focuses exclusively on the MFBI data file as it relates to ESECA. Since the MFBI file exists in a context broader than that defined solely by ESECA, a variety of more recent forms and uses will be considered in the final report. The report will focus upon the information and its potential for rational use, not upon the actual behavior of any regulatory body or other user community.

INTERIM VALIDATION REPORT

MAJOR FUEL BURNING INSTALLATION SYSTEM

I. SYSTEM IDENTIFICATION

A. CURRENT IDENTIFICATION INFORMATION

This study concerns the Major Fuel Burning Installations (MFBI) System, which used form FEA-C-602-S-0. The EIA standard series number is currently unavailable. The form was cleared in mid-April 1975 by the General Accounting Office. It expired June 30, 1977. The reporting requirements were established to implement Section 2(a) of the Energy Supply and Environmental Coordination Act of 1974 (ESECA).

B. HISTORICAL IDENTIFICATION INFORMATION

See Fig. 1 for a chronology of important dates related to the legislation under which the MFBI survey was performed and its results used. The newly enacted Power Plant and Industrial Fuel Use Act of 1978 has superseded the past legislation. The new legislation shares a major objective of ESECA -- to reduce domestic consumption of oil and natural gas by encouraging or mandating the use of coal and other "alternate and synthetic fuels." It redefines an MFBI to be any boiler, gas turbine unit, combined cycle unit or internal combustion engine that (1) burns more than 100 million Btu/hr or (2) is in a combination of two or more such units at the same site and in which the aggregate has a design capacity of more than 250 million Btu/hr.

The act empowers the DOE to prohibit the burning of oil and natural gas by specific MFBIs, or to require that specific MFBIs burn a combination of oil or natural gas and other fuels.

C. IDENTIFICATION OF PURPOSE

1. Legislation

a. Introduction

The MFBI survey was undertaken to implement the Energy Supply and Environmental Coordination Act of 1974 (ESECA)[1] (see Fig.). ESECA was enacted:

> to provide for a means to assist in meeting the essential needs of the United States for fuels, in a manner which is consistent, to the fullest extent practicable, with existing national commitments to protect and improve the environment and (2) to provide requirements for reports respecting energy resources.[2]

The Act created a data collection and regulatory program designed, *inter alia*, to (1) reduce power plants' and MFBIs'[3] use of natural gas and petroleum products, (2) encourage these facilities to use coal as their primary energy source, and (3) accomplish these objectives without compromising air quality. Responsibility for the program was vested in the newly created Federal Energy Administration (FEA).[4]

The legislative history of the Act indicates that Congress had three basic reasons for encouraging increased utilization of coal by power plants and MFBIs.[5] First, a dependable market for the sale of coal, which would increase energy supplies by encouraging the opening of new coal mines and expansion of existing mine capacity. Second, to the extent that electric generating power plants are encouraged to reduce consumption of oil and natural gas, these scarce fuels would be available to meet other energy requirements. Third, air quality would be improved by having low pollution oil and natural gas burned, to the maximum extent,

June 22, 1974	The Energy Supply and Environmental Coordination Act of 1974 (ESECA) is enacted. Pub. L. No. 93-319, 88 Stat. 24. The Act vests the FEA with the authority to issue prohibition orders from June 22, 1974, until June 30, 1975. The FEA is also given authority to amend, repeal, rescind, modify, or enforce orders through December 31, 1978.
February 5, 1975	Proposed rules implementing the Coal Conversion and Allocation provision of ESECA are published in the Federal Register.
Late April, 1975	The initial questionnaire (Form FEA-C-602-S-0) is sent to MFBI prohibition order candidates.
May 9, 1975	Rules implementing the Coal Conversion provision of ESECA are published in the Federal Register. Chapter II of Title 10 of the Code of Federal Regulations is amended to incorporate these rules.
June 30, 1975	Authority to issue Prohibition Orders under ESECA expires.
December 22, 1975	The Energy Policy and Conservation Act of 1975 (EPCA) is enacted. Pub. L. No. 94-163, 89 Stat. 871. The Act extends FEA's authority to issue orders to June 30, 1977, and to amend, repeal, rescind, modify, or enforce orders through 1984. The FEA's authority to issue prohibition orders to MFBIs is expanded to include those MFBIs which have been issued construction orders pursuant to ESECA and those MFBIs that, after June 22, 1974 (the previous cut-off date), acquire or are designed with the capability and necessary plant equipment to burn coal. Pub. L. No. 94-163 Section 101.
June, 1976	The second questionnaire (Form FEA-C-602-S-1) is sent to MFBI prohibition order candidates which were not eliminated by their responses to the first questionnaire.
March 21, 1977	Proposed rules implementing the modification of ESECA by EPCA are published in the Federal Register.
May 6, 1977	Rules implementing the modification of ESECA by EPCA are published in the Federal Register. Chapter II of Title 10 of the Code of Federal Regulations is amended to incorporate these rules.
June 30, 1977	Prohibition orders are issued to 28 combustors.
July 21, 1977	The Federal Energy Administration Authorization Act of 1977 (FEAA) extends the FEA's authority to issue orders through December, 1978. Pub. L. No. 95-70, 91 Stat. 273, 277.
August 31, 1977	Proposed rules altering the scope of the FEA's prohibition orders by permitting the burning of limited amounts of oil and gas as primary energy sources, revising the definition of "primary energy source" and setting forth new or more detailed criteria used in making the findings required to issue a prohibition order are published in the Federal Register.
August 4, 1977	The Department of Energy Organization Act (DEOA) is enacted. Pub. L. No. 95-91, 91 Stat. 565. The Act transfers to and vests in the Secretary of Energy all of the functions vested by law in the FEA. Pub. L. No. 95-91 Section 301(a). The Act becomes effective on October 1, 1977.
October 1, 1977	The DOEA becomes effective and the Department of Energy is created.

FIG. 1. Important Events in the MFBI Prohibition Program

in sources for which no effective clean-up technology is available (e.g., homes, apartments, and small businesses) rather than in sources where such technology is available (e.g., power plants).

The information system validated here collected data on existing MFBIs. It did not obtain information on MFBIs under construction, nor on power plants. Therefore, this report will contain an analysis only of the portion of the coal conversion program pertaining to MFBIs.

b. Prohibition Orders

ESECA did not authorize the FEA to issue an order requiring an existing MFBI to convert to coal as its primary energy source. However, the FEA was vested with the discretion to issue an order prohibiting an existing MFBI from burning natural gas or petroleum products as its primary energy source.[6] The issuance of a prohibition order to an MFBI effectively forced it to convert to coal or cease operations.

ESECA required the FEA to make four substantive findings before issuing a prohibition order. First,[7] the MFBI must have been designed with, or thereafter have acquired, the capability and necessary plant equipment to burn coal.[8] Second,[9] the burning of coal in lieu of natural gas or petroleum products must be practicable. Third,[10] conversion must be consistent with the purposes of ESECA. Fourth,[11] coal and coal transportation facilities must be available during the period the order is in effect.[12]

2. The Regulations

ESECA vested the FEA with broad discretion to implement the MFBI prohibition order program. The FEA's first task was to interpret the

requirements of the Act. The agency published proposed rules, setting forth the criteria it would use to make the requisite findings and defining key terms (e.g., MFBI, primary energy source, and natural gas) in the Federal Register on February 5, 1975.[13] After consideration of both public and intra-governmental input, the FEA adopted the proposed rules with minor changes. On May 9, 1975, these rules were published in the Federal Register[14] and Chapter II of Title 10 of the Code of Federal Regulations was amended to incorporate them.[15] An overview of the FEA Regulations, organized around the statutorily required findings, is presented below.

a. Does the MFBI have the capability and necessary plant equipment to burn coal? (15 U.S.C.A. § 792(a)(2)(A) (1978)

ESECA does not specify the standard of readiness sufficient to satisfy the coal-burning capability requirement, nor the type or amount of equipment necessary to satisfy the plant equipment requirement. However, the House-Senate conferees suggested several indicia which the FEA incorporated into its regulations.[16] For the purpose of determining whether an MFBI had the requisite capability and plant equipment, the Regulations required the FEA to evaluate (1) the MFBI's coal and ash handling facilities and appurtenances - internal and external; (2) its equipment, such as boilers, burners, or other combustors of fuel, unloaders, conveyors, crushers, pulverizers, scales, burners, soot blowers, and special coal burning instrumentation and controls; and (3) the availability of land for the storage of coal.[17] If the FEA found, at a mimimum, that the combustor, on or after June 22, 1974, had the requisite

furnace configuration to burn coal, including the necessary configuration for ash removal from the furnace, and in the case of a boiler, the proper tube spacing to burn coal, then it concluded that the combustor had the capability and necessary plant equipment to burn coal.[18]

b. Is the burning of coal practicable? [15 U.S.C.A. § 792(b)(1)(A) (1978)]

The Regulations require the FEA to analyze the reasonableness of additional costs associated with burning coal (e.g., fuel costs, costs of equipment for burning coal, and costs of complying with applicable environmental protection requirements) as well as the financial capability of the owner of the MFBI.

In practice, the FEA computed the net operating cost differential (NOCD)[19] over the expected life of the combustor resulting from converting the combustor to coal. The FEA presumed that the issuance of a prohibition order would be reasonable if it found that converting the MFBI to coal would result in a decrease in the NOCD. However, if the FEA found that conversion would result in an increase in the NOCD of the combustor, the agency would apply a different analysis.

The FEA estimated the amount of petroleum products or natural gas that converting the combustor to coal would save. It then computed the equivalent cost of petroleum product or natural gas that would be saved. The FEA considered (1) the financial capability of the MFBI owner, (2) the amount of petroleum product or natural gas saved, and (3) other relevant factors to determine the reasonableness of imposing this increased cost on the MFBI owner.[20]

c. Is the burning of coal consistent with the purposes of ESECA? [15 U.S.C.A. § 792(b)(1)(A) (1978)]

The Regulations elaborate on the statement of purpose contained in the Act without setting forth quantitative indicia of consistency. The FEA was required to determine whether the prohibition order would discourage the use of natural gas and petroleum products and encourage the use of coal as a primary energy source by the MFBI in a manner consistent with existing national commitments to protect and improve the environment.[21] Although the criteria used in determining whether the issuance of a prohibition order would be consistent with the purposes of ESECA are set forth in the Regulations, the method used to evaluate them is not specified. Therefore, the FEA retained broad discretion in that area.

d. Will coal and coal transportation facilities be available during the period the order is in effect? [15 U.S.C.A. § 792(b)(1)(B) (1978)]

The FEA also did not specify the method it would use to evaluate the criteria used for making the coal and transportation facilities findings. For the purpose of determining the availability of coal during the requisite period, the FEA was required to evaluate (1) the type and location of coal that was anticipated for use by the MFBI, (2) the practicability of coal production, and (3) state or local laws or policies which limited the extraction or utilization of coal.[22] For the purpose of determining the availability of coal transportation facilities during this period, the FEA was required to evaluate the method by

which coal was or could be transported to the MFBI (e.g., rolling stock, trucks, barges, and pipelines).[23]

c. Other Factors

The FEA considered several factors in selecting an MFBI for a prohibition order which were not specified in ESECA. They included the location of the installation, its production or output, the purpose for which coal would be burned, the quantity of natural gas or oil presently burned, and the practicability of burning coal given the short-term variation of demand for the output of the installation.[24]

D. IDENTIFICATION OF INFORMATION COLLECTED

After examining many possible sources of information, the OCU concluded that no comprehensive source of MFBI information existed (see Appendix C).[25] Consequently, the OCU developed a survey form (FEA-C-602-S-0) to collect this information (see Appendix A). It was distributed in April and May of 1975.

The form contained three sections: general plant information, combustor information, pollution control device information. The information requested by each of these sections is summarized in Fig. 2.

The responses on the FEA-C-602-S-0 were used to identify 281 coal-capable combustors that were considered final candidates for prohibition orders. (The data base contained responses concerning 6,289 combustors at 3,485 installations.) To obtain some of the additional information needed for an in-depth analysis of each of the 281 final candidates, a supplementary form, the FEA-C-602-S-1 was designed and sent to each of the final candidates in June 1976 (see Appendix B). Information from the FEA-C-602-S-1 was not computerized, and resides in hard copy files along with other supplementary case-specific information items used in the detailed analysis of each case. Although we have not analyzed this information, such an analysis might yield insights concerning the potential value of specific items on any future MFBI survey.

1. General Plant Information

   -MFBI name and location

   -Parent company name and location

   -Person to contact

   -Number of boilers and other combustors at the installation

   -Total designed firing rate

   -SIC code for principal products produced

2. Combustor information

   -Type

   -Manufacturer

   -Date installed

   -Capacity

   -Fuel usage (type and amount)

   -Questions related to the practicality of conversion to coal

3. Pollution control device equipment

   -Stack height

   -Currently installed pollution control equipment

   -Changes in pollution control equipment required in order to burn coal and meet limitations related to federal and other air quality standards.

Fig. 2. Summary of information collected by the FEA-C-602-S-0.

E. IDENTIFICATION OF COLLECTION AND COLLATION PROCESS

The design and execution of the MFBI survey took place in 1975. Appendix C describes these events based on the recollections of the individuals[26] who worked on the MFBI survey at that time in the Office of Coal Utilization.

1. Design of the Survey

Although ESECA authorized the FEA to issue a prohibition order to any MFBI that met certain criteria, no comprehensive list of MFBIs existed. Consequently, the OCU undertook the MFBI survey as a way to identify MFBIs. According to the formal request for clearance of the form (see Appendix D), the purpose of the form was to "identify the coal conversion candidate universe and provide necessary information for the selection of specific installations for further in-depth analysis before the issuance of mandatory conversion orders." To accomplish the purpose of identifying the "coal conversion candidate universe," the OCU used the Federal Register, trade association newsletters, and direct mailings to installations on the EPA's NEDS data base to announce the mandatory reporting requirement for MFBIs. Of the 3,485 MFBI installations (6,289 combustors) that reported, approximately 50 percent responded to Federal Register notices, 40 percent responded to other means of notification, and 10 percent were identified by FEA regional officials. Although this notification process resulted in a list of MFBI installations, a careful assessment of the coverage of the MFBI universe was not performed by the system designers. (On-going research at LBL will make it possible to estimate the degree of coverage. See Section III.C.)

2. Processing of the Forms

About 10,000 completed survey forms were returned to the OCU during the summer of 1975. Each form was reviewed by OCU analysts. The forms for installations that did not qualify as MFBIs were discarded. The OCU then analyzed the balance of the responses to correct misinterpretations of questions on the form. To clarify questionable responses, and correct incomplete, inconsistent, or erroneous information, OCU analysts contacted respondents directly.

To make the collected information more manageable and accessible, the OCU stored most of the edited information on a computer tape. Control Data Corporation and CACI were the respective contractors for keypunching and the computer information system. The principal elements of the computerized system were data entry programs, data editing programs, and 58 sorting and report generating programs. The report generating programs produced a variety of listings and aggregations of the information.

With the exception of geographical information and record identification data, information on the data base was taken from the survey form. Combustor manufacturer, coal characteristics, ash and sulfur content of fuels used in 1973 and 1974, as well as other combustor information, were never keypunched. (This information would have been useful to several secondary users.)

3. The Current "System"

The MFBI tape is currently maintained by the Office of Data Services in EIA. To obtain one or more of the standard reports gen-

erated by the programs written by CACI, it is necessary to send a data service request to the Office of Data Services.

Since some of the MFBI information is considered proprietary (see Appendix E), the majority of requests for this information are routed through the Freedom of Information Office in the OCU. Initial requests are usually made by phone. The Freedom of Information (FOI) officer explains the proprietary nature of the information and states that a written request for specific information must be supplied to the FOI office. When this letter is received, the OCU decides which report(s) are to be generated. A programmer in the Office of Data Services (located in the same building) generates the reports and returns them to the FOI officer. If the information is for a non-official purpose, the FOI officer visually inspects the reports and removes any information classified as proprietary which can be linked to a specific installation. Example: A report that aggregated total MFBI combustor capacity in a region contains proprietary information if there were only one or two MFBIs in that region, but would not contain proprietary information otherwise. In a case such as this, the proprietary information would be removed from the report by the FOI officer if the information were for a non-official purpose.

F. USES OF OUTPUT

1. Primary Usage

The MFBI survey was performed to support the implementation of provisions of ESECA by the Office of Coal Utilization. The regulatory process that was used was defined in terms of the information that was collected, and proceeded through five steps:

1) Identification of MFBIs

The responses to the survey defined a list of MFBIs that were potential candidates for Prohibition Orders.

2) Screening to Identify Candidates for Prohibition Orders

Regulation #1 (coal burning capability) was used to screen the list of responding MFBIs to produce a list of MFBIs that were candidates for Prohibition Orders. Two criteria were applied in this screening:

- Did the combustor list a primary energy source other than coal? (Question II-8: See Appendix A)
- Were one or more of the following questions answered yes?
  - Was this combustor designed to burn coal? (Question II-12)
  - Has this combustor ever burned coal in the past? (Question II-13)
  - Can coal be burned in this combustor now? (Question II-14)

Of the 6,289 combustors (at 3,485 installations) about which information was obtained, 900 met both criteria and were classified as "coal capable." [27]

3) Pruning of Candidates for Prohibition Orders

Since the OCU did not possess sufficient manpower to analyze 900 combustors in detail, it restricted its efforts to those combustors that offered the greatest potential savings of oil and natural gas. Fuel use figures for 1974 (Question II-21) were used to reduce the number of conversion candidates from 900 to 246. Added to the 246 were an additional 35 combustors for which an intention to discontinue the use of coal was reported (Question II-10).

4) In-depth Analysis of the Remaining Candidates

The OCU decided that the MFBI data base did not contain the information required for an in-depth analysis of the remaining candidates for Prohibition Orders. As a result, a supplemental questionnaire (FEA-C-602-S-1) was developed and mailed to the remaining candidates in June 1976 (see Appendix B). The selection of recipients of Notices of Intent to Issue Prohibition Orders (NOIs) was based on the information gathered by the S-1 form and some on-site inspections. NOIs were eventually issued to 58 combustors.[28] (Additional FEA-C-602-S-1 forms were sent to 31 installations in November 1977. Four additional NOIs were published in the Federal Register on May 3, 1978.)

5) Issuance of Prohibition Orders

After public hearings concerning the practicality of conversion to coal, the OCU issued Prohibition Orders to 28 combustors on June 30, 1977.

2. Secondary Usage

Although MFBI information has not been published, the MFBI data

base has been used extensively for purposes other than regulation, especially in the development and analysis of energy policy. The secondary users included various groups within DOE and EPA plus their contractors. Modeling and analysis groups within DOE used the MFBI data base in policy development with emphasis on the impact of various energy policies on fuel use and on the economy. EPA users and their contractors applied the data base to assess the environmental impact of various energy and fuel use policies being considered for possible inclusion in the National Energy Plan. Table 1 identifies the items in the MFBI data base that were used by secondary users. Appendix F summarizes specific instances of secondary usage of the MFBI data base.

G. RELATED SYSTEMS

The Environmental Protection Agency (EPA)'s on-going National Emission Data System (NEDS) contains information that overlaps with the information collected in 1975 by the MFBI system. Common data elements include:

- parent company name
- SIC codes (first four digits)
- combustor capacity (for boilers)
- primary energy source
- stack height

The NEDS target universe is identified in terms of point sources of pollution rather than MFBIs exceeding a designed firing rate cutoff. The degree of overlap between the two target universes is not known. A comparison of the California installations in the two data bases revealed a substantial amount of non-overlap in the lists, and numerous inconsistencies where the same installation appeared in each list. Appendix K describes our attempt to compare boiler information in the NEDS and MFBI data bases.

TABLE 1

INFORMATION FROM THE MFBI DATA BASE
USED BY SECONDARY USERS

Data Element	Number of Projects Requiring that Data Element
MFBI location (Question I-1)	9
No. of combustors at installation (Question I-4, 5)	1
Total designed firing rate (Question I-6)	2
SIC codes (Question I-8)	6
Combustor type (Question II-2)	2
Combustor capacity (Question II-3)	10
Combustor age (Question II-5)	6
Primary energy source (Question II-8)	3
Alternate energy source (Question II-9)	3
Coal capability (Questions II-12, 13, 14)	7
1974 Fuel use (Question II-21)	14
Combustor output utilization (Question II-23)	4
Pollution control equipment status (Question II-3, 4, 5)	3
Number of secondary users 17	

II. SYSTEM VALIDATION

Since the MFBI survey was performed to support the implementation of provisions of ESECA by the OCU, system validation will proceed from the viewpoint of regulatory use. Two validation criteria will be used:

- Sufficiency: Assuming that the information is accurate, to what degree does the information satisfy the logical requirements of the task for which it was collected?

- Accuracy: To what degree does the information represent the reality it purports to represent?

The following analysis concludes that the information collected by the MFBI survey was unsound on both counts. A comparison of the legislation, regulations, and survey form demonstrates that the information collected was not sufficient for identifying coal-capable combustors.

Although work related to the incompleteness of the frame is currently in progress, a series of separate analyses have revealed serious problems related to other aspects of the accuracy of the data base. These analyses include:

- a detailed examination of each question on the form
- an examination of a sample of completed forms
- a series of exploratory respondent interviews
- an examination of logical inconsistencies and errors in the data base.

A. SUFFICIENCY OF THE INFORMATION

To analyze the sufficiency of the information collected on the FEA-C-602-S-0, it is necessary to start by establishing information requirements based on the legislation and regulations. These information requirements must then be compared with the information actually collected on the FEA-C-602-S-0.

1. Information Requirements

Section I. C. summarized the legislation and regulations. According to the regulations, the OCU should make a series of determinations related to 1) the capability of burning coal, 2) the practicality of conversion, 3) the consistency of coal conversion with the purposes of ESECA, 4) the availability of coal and coal transportation facilities, and 5) other factors.

In each determination, the information used should be unambiguous and capable of verification by field audit. This means that information gathered in any general survey of MFBIs should concern verifiable facts. Assuming that the regulatory process involves a screening phase to eliminate all MFBIs for which conversion is clearly inappropriate, detailed analyses of possible future equipment changes and their financial and environmental impact should not be requested or performed until likely candidates for Prohibition Orders have been identified.

Another aspect of verifiability is that whenever information could be verified using independent sources, such verification should be built into the system to the extent feasible.

Exhibit 1 summarizes the information requirements related to each of the criteria in the regulations for implementing ESECA. Examination of Exhibit 1 reveals a strong rationale for the OCU's choice of a two-phase information gathering process.

- obtain factual screening information to identify coal-capable combustors
- perform detailed analyses of coal-capable combustors to determine whether coal conversion is practical and consistent with the purposes of ESECA.

Those installations that survive the initial screening can then provide the information needed for phase two. Since there is no general model for the analysis required in phase two, this analysis would necessarily proceed on a case-by-case basis and would usually involve information requirements developed on a case-by-case basis.

2. Comparison of Information Requirements with Information Actually Obtained

Table 2 illustrates the relationship between the questions on the FEA-C-602-S-0 and the regulations. Examination of Table 2 and comparison with the information requirements in Exhibit 1 reveal that information obtained by the form was not sufficient to meet the requirements for factual information to be used to identify potential candidates for Prohibition Orders.

In terms of sufficiency (rather than accuracy), the main problem with the FEA-C-602-S-0 is in the information obtained to determine coal

capability. This information is found in the responses to the following questions (see Appendix A for the full form):

II-4	Manufacturer (of the combustor)
II-5	Date installed
II-12	Was this combustor originally designed to be capable of burning coal?
II-13	Was coal ever burned in it?
II-14	Can coal now be burned in this combustor?
II-15	Is land available for coal storage?

Upon an audit, it might not be clear whether the respondent answered the last four of these six questions honestly, because thay can be construed as referring to the personal knowledge or opinion of the respondent. The respondent might not know whether a combustor was originally designed to be capable of burning coal, whether coal was ever burned in it, or whether coal can be burned in it (with or without physical modification). Whether land is available for coal is basically a space allocation or a financial decision to be made by the manager of the installation.

As outlined in Exhibit 1, the determination of whether a combustor is coal-capable should be based on detailed information about the combustor and ideally on the blueprint itself. Thus, the questions asked to identify coal-capable combustors may have failed to identify some coal-capable combustors as such.

Much of the other information on the form (e.g., questions listed in Table 2 under the headings of practicality, consistency with the purposes

of ESECA, and the availability of coal and coal transportation equipment) was neither needed for the initial screening, nor adequate to determine whether these criteria were met. The information requested under these headings was superfluous on the FEA-C-602-S-0 because actual determinations concerning practicality, consistency with the purposes of ESECA, and the availability of coal would require the results of detailed analyses that would involve substantial respondent burden. Consequently, these questions should not have been included unless part of the purpose of the form was to obtain general survey information about the potential effectiveness of coal-conversion programs.

1. Coal Capability

The regulations state that an MFBI is capable of burning coal if it has a combustor capable of burning coal, ash disposal equipment, adequate spacing in the heat exchange area, and necessary plant equipment such as conveyors, pulverizers, etc. A combustor not currently burning coal would require at least some operating adjustments (and perhaps significant modifications) in order to burn coal. Consequently, the appropriate interpretation of "a combustor capable of burning coal" is that such a combustor should be capable of burning coal with reasonable efficiency after an acceptable amount of adjustment or overhaul.

For combustors that have not been modified significantly, the most reliable source of information about coal capability is the original blueprint. Aside from accurately describing the physical configuration of the combustor, specifications for designed fuel usage are included. Thus, if the combustor was designed to burn coal, the blueprint says so. Obtaining and processing blueprints might be a cumbersome process, however. Obtaining blueprints from combustor manufacturers would involve significant burden. In addition, any combustor manufacturer no longer in business would be unable to comply. On the other hand, requesting blueprints from owners of installations might not be successful because legible blueprints might not be available from all installations.

If it proved impractical to obtain blueprints to determine the coal capability of all MFBIs, it would be necessary to ask a series of questions on a form such as the FEA-C-602-S-0. These questions would provide sufficient information to allow a combustor expert to estimate the amount of work that would be required for conversion. In initial LBL inquiries, combustor experts disagreed on whether any brief set of questions about combustor design could provide enough information to cover all cases, and if so, what questions were the most pertinent. The suggestions that were obtained concerned the following topics:

(1) Installation date (most boilers built before 1950 were designed to burn coal).

(2) Manufacturer (might be used to obtain blueprints if necessary).

Exhibit 1

Information requirements related to the criteria specified in the regulations implementing ESECA.

(3) Designed firing rate (Btu/hr) as stated on the blueprint. Other available measures of capacity include heating surface area (square feet) and safety valve relieving capacity (lbs/hr).

(4) Fuels that can be burned in this combustor according to the blueprint. If these fuels cannot be burned currently, explain why not. (Boilers designed only for oil and/or natural gas are difficult to convert. Also, modifications subsequent to installation may have made the combustor more difficult to convert.)

(5) Current fuel usage (by type of fuel, amount used per year and Btu content).

(6) Which of the following types of coal-burning equipment are in place at the combustor?

-receiving hoppers
-coal conveyors
-coal elevators
-crushers
-pulverizers
-scales
-soot blowers
-stoker (feeders and grates)
-bag filler
-flue gas desulfurizer
-electrostatic precipitator
-cyclone precipitator
-ash pits

(7) Tube spacing in boilers (tube spacing must be large enough to allow for cleaning of ash and slag).

(8) Space around the boiler for additional equipment. (To burn pulverized coal, one must install equipment such as soot blowers, scales, feeder, pulverizer, ash pit, and coal burners. It is not yet clear how one would ask a simple factual question about space for additional equipment.)

(9) Amount of land available for coal storage. (It is not yet clear how one could ask a simple factual question about available land.)

Exhibit 1

(continued)

(10) Internal volume of the combustor. In combustors designed to burn coal, the ratio of Btus per hour to cubic feet is much lower than in boilers designed to burn only oil and/or natural gas.

(11) Is this boiler packaged or field erected? (Conversion of packaged boilers designed to burn oil and/or natural gas is tantamount to total replacement.)

We are currently attempting to refine this list of questions. The results of this additional research should be applicable to any new MFBI survey.

2. Practicality of Conversion

In order to decide whether it is practical to convert a combustor to burn coal, it is necessary to consider factors such as the extent of the conversion, the mix (if any) of coal and other fuels that will be used, the physical characteristics of the coal that will be used, the effect of the conversion on local air quality (assuming appropriate pollution control gear is installed), and so on. The interplay of these factors is quite complex, and there is certainly no general model that will translate an arbitrary set of these factors into a cost estimate for an efficient conversion effort. In fact, for a respondent to merely define all the alternatives and perform even an adequate analysis would be quite time-consuming. Furthermore, since the costs of conversion could be significant, the analysis should involve considerable time and attention by managerial personnel. Because the related reporting burden would be very substantial, information related to the analysis of practicality of conversion should be obtained only from those installations that remain candidates for conversion orders after the application of more readily determined criteria such as coal capability and fuel usage.

3. Consistency with the Purposes of ESECA

In practical terms, the purposes of ESECA were to discourage the use of natural gas and petroleum products and encourage the use of coal while meeting national commitments to protect and improve the environment. Information related to the purposes of ESECA would

Exhibit 1

(continued)

therefore concern the potential reduction in the use of natural gas and petroleum products and the impact of such reductions on air quality. A good proxy for the maximum potential reduction in the use of natural gas or petroleum products by a combustor is its usage of these fuels in the recent past. The environmental impact of coal burning would be related to the type of pollution control equipment in place and the air quality in the locality. Thus, verifiable information that could be collected includes fuel usage and an inventory of existing pollution control equipment. Nonetheless, a reliable approximation of the impact of coal conversion on air quality would require a detailed analysis of the type of conversion to be undertaken, the additional pollution control gear to be obtained, the sulfur content of the coal to be burned, etc. Such an analysis should be requested only for installations that remain candidates for conversion orders after application of more readily determined criteria.

4. Availability of Coal and Coal Transportation Facilities

If coal is already being used (or was used recently), it is comparatively straightforward for the respondent to describe the availability of coal and coal transportation facilities. If coal is not being burned and has not been burned recently, it would be necessary for the respondent to make exploratory inquiries about the availability of coal and coal transportation equipment. The reliability of responses based on such inquiries (which might not be done enthusiastically) would be doubtful. Consequently, information about the availability of coal and coal transportation equipment should be obtained through research under the auspices of regional officers of the DOE. This should be done whether or not this information is requested directly from respondents.

5. Other Factors

The regulations stated that other factors to be considered included the location of the installation, the production or output of the installation, the purpose for which coal would be burned, the quantity of oil or natural gas burned, and the practicality of burning coal given short-term variation of demand for output of the installation. Of these, only the last is difficult to describe unambiguously and it could be described in a narrative response.

Exhibit 1

(end of exhibit)

TABLE 2

RELATIONSHIP BETWEEN REGULATIONS IMPLEMENTING ESECA

AND ITEMS ON THE FORM FEA-C-602-S-0

Regulation	Questions Pertaining to This Regulation
1. To have coal burning capability the MFBI must have:	
a) a combustor capable of burning coal	II- 4 Manufacturer
	II- 5 Date installed
	II- 6 a. If combustor has been modified to be capable of burning coal, what year was it modified?
	b. How was it modified?
	II- 8 Primary energy source for existing combustor 1=coal 2=residual 3=distillate 4=gas 5=other (specify)
	II- 9 Alternate energy source for existing combustor 1=coal 2=residual 3=distillate 4=gas 5=other 6=no alternate
	II-10 If coal is the primary energy source, do you intend to continue its use?
	II-11 If coal is not the primary energy source, do you intend to convert to coal in the near future?
	II-12 Was this combustor originally designed to be capable of burning coal?

Note: This table identifies the specific questions on the FEA-C-602-S-0 that are related to each of the regulations discussed in Section I.C.

Table 2 (continued)

Regulation	Questions Pertaining to This Regulation
	II-13 Was coal ever burned in it?
	II-14 Can coal now be burned in this combustor?
b) ash disposal equipment	(No question was asked.)
c) adequate spacing in the heat exchange area	(No question was asked.)
d) necessary plant equipment. This includes coal and ash handling appurtenances both inside and outside the installation, necessary land for coal storage, equipment such as unloaders, conveyers, pulverizers, scales, burners, soot blowers and special coal burning instruments and controls.	II-15 Is land available for coal storage?
	II-16 If the answer to No. 12 or 13 is "yes," is any or all of the coal burning support equipment still in place?
	II-17 If the answer to No. 12 or 13 is "yes," is any or all of the coal burning support equipment still operational?
	II-18 If the answer to No. 16 or 17 was "no," please identify any anticipated acquisition or refurbishing of coal handling and firing equipment.
2. Practicality of conversion. Practicality of conversion is to be determined on the basis of the cost of conversion, including:	
a) costs associated with compliance with the clean air act and other environmental regulations	III- 4 To burn coal and meet the SIP emission limitations relating to attainment of the federal primary ambient air quality standards. This installation must:

Table 2 (continued)

Regulation	Questions Pertaining to This Regulation
	a. Upgrade precipitators If yes, give approximate cost $_____time_____(weeks) b. Install precipitators If yes, give approximate cost $_____time_____(weeks) c. Install FGD If yes, give approximate cost $_____time_____(weeks) d. Obtain conforming coal This coal must be _____% sulfur by weight, _____% ash by weight Do you anticipate that you will be able to obtain conforming coal? III - 5 To burn coal and meet other applicable SIP requirement a. Upgrade precipitators If yes, give approximate cost $_____time_____(weeks) b. Install precipitators If yes, give approximate cost $_____time_____(weeks) c. Install FGD If yes, give approximate cost $_____time_____(weeks) d. Obtain conforming coal This coal must be _____% sulfur by weight, _____% ash by weight

Table 2 (continued)

Regulation	Questions Pertaining to This Regulation
b) the financial capability of the owner to meet these costs	Do you anticipate that you will be able to obtain conforming coal?
3. Conversion to coal is to be consistent with the purposes of ESECA.	
a) to reduce domestic consumption of oil and natural gas	III-20 Estimate your annual non-coal fuel savings if you were to convert to coal. Residual Distillate Gas
b) Maintain national commitments to protect and improve the environment	III- 2 Stack height (feet above ground) III- 3 Currently installed pollution control equipment as pertains to the combustor a. Precipitator (also referred to as dust collector) Type (centrifugal, electrostatic, etc.)_____ Date installed_____ Date last operated_____ Design efficiency (%)_____ Actual efficiency (%)_____

Table 2 (continued)

Regulation	Questions Pertaining to This Regulation
	b. Flue gas desulfurization (FGD) equipment (also referred to as scrubber or sulfur-dioxide absorber) Type (MAG OX, limestone, etc.)_____ Date installed_____ Date last operated_____ Design efficiency (%)_____ Actual efficiency (%)_____ % availability_____
4. Availability of coal and coal transportation facilities. a) the type and location of coal anticipated for use by the MFBI	II-19 If coal was ever used as the primary fuel source prior to 1973 give (for the last year coal was used): a. Year b. Rank of coal_____ c. Percent ash by weight (to the nearest percent) _____ d. Percent sulfur by weight (to the nearest percent) _____ e. Btu/lb_____ f. Quantity_____ g. Other unique characteristics_____ _____

Table 2 (continued)

Regulation	Questions Pertaining to This Regulation
b) the practicality of coal production, including the possibility of new mine openings, predicted demands, and state and local laws concerning coal extraction are also to be considered	
c) the availability of coal transportation facilities is to be based upon the method by which coal is or could be transported to an MFBI	h. Method of delivery (train, truck, barge, etc.) _____ _____
d) coal and coal transportation facilities will be available during the period a prohibition order is in effect.	i. If coal is not presently being used, do you anticipate that it could be obtained if you were to convert? j. If not, why not? _____
5. Other factors to be considered are:	
a) location of installation	II- 1 MFBI name and location Name_____ Street_____ City_____ State_____ _____ zip Air quality control region (if known)_____

Table 2 (continued)

Regulation	Questions Pertaining to This Regulation
b) production or output of installation	II- 8 Principal products produced at, or services provided by this installation (if SIC codes are unknown, provide written description in space provided) _____ _____
c) purpose for which coal would be burned	II-23 Indicate (to the nearest percent) the percent of combustor output that is devoted to: Electric generation Space heating Process steam Other
d) quantity of oil or natural gas presently burned	II-21 1974 annual fuel use Coal _____ _____ Residual _____ Distillate _____ Gas _____
e) practicality of burning coal given short-term variation of demand for output by installation	

B. ACCURACY OF THE INFORMATION

The accuracy of an information system is defined as the degree to which the information system represents the reality it purports to represent. Our analysis of the accuracy of the MFBI system covers the following topics:

1) Completeness: To what degree does the data base cover the universe?
2) Clarity of the instrument: Does the instrument communicate to the respondent the reality it attempts to capture?
3) Quality of responses: Were the forms understood and filled out completely and honestly?
4) Quality of the data base: Can errors and inconsistencies be identified by inspecting the data base or comparing it with other sources of information?

Since each of these inquiries uncovered pervasive accuracy problems, we conclude that the MFBI data base is not accurate.

An additional limitation of the MFBI data base is that it is outdated. Even if it were perfectly accurate, the combustor information is from 1975 and the fuel-use information from 1973 and 1974. Much has happened in the interim: a coal-conversion program has been in effect, prices and market forces have changed, combustors have been installed and others retired. Although we have not analyzed the aggregate impact of these changes, it is certainly reasonable to question the timeliness of the MFBI data base.

1. Completeness

We have not yet completed the work necessary to estimate the

degree to which the MFBI data base covers the universe (see Section III. C). We have determined that there is a question about whether the records in the MFBI data base cover all of the responses received. The installations in the MFBI data base were numbered consecutively as the forms were received. Since the highest MFBI number in the MFBI data base is 4,199, one would expect to find 4,199 installation records in the data base. A complete listing of the computerized data base reveals that 699 records (17 percent) are missing, of which 596 are contained in two long runs of numbers (see Fig. 3). Although the reason for the "missing" installations is not known, it is known that 16 percent of a 5 percent random sample of the complete forms residing in the OCU files were missing. The relationship between records missing from the data base and forms missing from the files has not yet been examined on a case-by-case basis.

2. Clarity of the Instrument

In order to systematically evaluate the clarity of the instrument, a standard analytical process was developed. Each question on the form was analyzed using this process which is outlined in Exhibit 2. Appendix G illustrates the application of this analytic process to selected questions on the form FEA-C-602-S-0. (These selected questions were used by the OCU in identifying coal-capable combustors that used large amounts of natural gas or petroleum.) Confirmation of the results of this examination of the form was obtained through a series of exploratory respondent interviews.

The conclusion drawn from the analysis of the form and the respondent interviews is that the FEA-C-602-S-0 suffered from significant shortcomings, including:

- Vague or imprecise questions
- Confusion with units
- Insufficient provision for accurate coding
- Insufficient internal consistency checks

Appendix H outlines examples of these problems. Appendix I describes the confirmatory results obtained in exploratory respondent interviews.

3. Quality of Responses

As described in Appendix J, a random sample of completed forms was obtained from the Office of Coal Utilization. In all, 159 forms were examined, and all changes, omissions or comments on the form were noted. (Changes were assumed to be editing changes by OCU.) For purposes of analysis, each change, omission, or comment was classified as a "problem" in filling out the form. A large number of problems were noted, e.g., that SIC codes were omitted or corrected on 72 of 159 forms or that 34 of 159 forms indicated confusion concerning units and/or exponential notation. See Appendix J for a complete discussion of the findings.

4. Quality of the Data Base

Short of an extensive set of field audits, there was no way to check the accuracy of the responses to many questions on the form. Since the FEA-C-602-S-0 was a one-time survey, there was no way to identify errors or discrepancies through time series analysis. Although the NEDS data base initially promised to provide a useful external check, the degree of inconsistency between the NEDS data base and the MFBI data base was such that nothing could be said other than that the data bases were inconsistent (see Appendix K). Despite these difficulties, it was possible to study

the accuracy of the data base by performing internal consistency checks and searching for obvious errors. Four types of checks were performed:

- Examination of the data base for missing records, duplicate records, and the inclusion of installations that were not MFBIs
- Completeness checks within records to identify omissions
- Range checks and other numerical checks to identify errors in fuel usage and capacity data
- Non-numerical cross-checks to identify the inconsistencies in the data base.

Appendices L and M describe the checks that were performed and the results. Among other findings, this analysis revealed that 29 percent of the records in the data base contain one or more logical inconsistencies or errors. Although this does not allow one to draw statistical inferences about the accuracy of responses to specific questions, at minimum it does indicate that great care should be exercised if this data base is used in the future.

152	153	155	164	298	759	871	1191	1309	1310	1311	1404	1413	1414	1415
1416	1417	1450	1458	1463	1482	1493	1520	1594	1595	1596	1597	1598	1599	1600
1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615
1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630
1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645
1646	1647	1648	1649	1656	1695	1696	1697	1727	1753	1758	1767	1768	1769	1770
1771	1772	1773	1774	1775	1776	1777	1778	1779	1845	1847	1848	1849	1863	1917
1919	2048	2125	2143	2163	2206	2212	2213	2232	2287	2310	2327	2332	2334	2353
2410	2421	2478	2512	2545	2564	2841	2868	3010	3104	3107	3121	3146	3147	3148
3156	3190	3191	3192	3193	3194	3195	3196	3197	3198	3199	3318	3325	3357	3373
3421	3441	3444	3453	3460	3461	3462	3463	3464	3465	3466	3467	3468	3469	3470
3471	3472	3473	3474	3475	3476	3477	3478	3479	3480	3481	3482	3483	3484	3485
3486	3487	3488	3489	3490	3491	3492	3493	3494	3495	3496	3497	3498	3499	3500
3501	3502	3503	3504	3505	3506	3507	3508	3509	3510	3511	3512	3513	3514	3515
3516	3517	3518	3519	3520	3521	3522	3523	3524	3525	3526	3527	3528	3529	3530
3531	3532	3533	3534	3535	3536	3537	3538	3539	3540	3541	3542	3543	3544	3545
3546	3547	3548	3549	3550	3551	3552	3553	3554	3555	3556	3557	3558	3559	3560
3561	3562	3563	3564	3565	3566	3567	3568	3569	3570	3571	3572	3573	3574	3575
3576	3577	3578	3579	3580	3581	3582	3583	3584	3585	3586	3587	3588	3589	3590
3591	3592	3593	3594	3595	3596	3597	3598	3599	3600	3601	3602	3603	3604	3605
3606	3607	3608	3609	3610	3611	3612	3613	3614	3615	3616	3617	3618	3619	3620
3621	3622	3623	3624	3625	3626	3627	3628	3629	3630	3631	3632	3633	3634	3635
3636	3637	3638	3639	3640	3641	3642	3643	3644	3645	3646	3647	3648	3649	3650
3651	3652	3653	3654	3655	3656	3657	3658	3659	3660	3661	3662	3663	3664	3665
3666	3667	3668	3669	3670	3671	3672	3673	3674	3675	3676	3677	3678	3679	3680
3681	3682	3683	3684	3685	3686	3687	3688	3689	3690	3691	3692	3693	3694	3695
3696	3697	3698	3699	3700	3701	3702	3703	3704	3705	3706	3707	3708	3709	3710
3711	3712	3713	3714	3715	3716	3717	3718	3719	3720	3721	3722	3723	3724	3725
3726	3727	3728	3729	3730	3731	3732	3733	3734	3735	3736	3737	3738	3739	3740
3741	3742	3743	3744	3745	3746	3747	3748	3749	3750	3751	3752	3753	3754	3755
3756	3757	3758	3759	3760	3761	3762	3763	3764	3765	3766	3767	3768	3769	3770
3771	3772	3773	3774	3775	3776	3777	3778	3779	3780	3781	3782	3783	3784	3785
3786	3787	3788	3789	3790	3791	3792	3793	3794	3795	3796	3797	3798	3799	3800
3801	3802	3803	3804	3805	3806	3807	3808	3809	3810	3811	3812	3813	3814	3815
3816	3817	3818	3819	3820	3821	3822	3823	3824	3825	3826	3827	3828	3829	3830
3831	3832	3833	3834	3835	3836	3837	3838	3839	3840	3841	3842	3843	3844	3845
3846	3847	3848	3849	3850	3851	3852	3853	3854	3855	3856	3857	3858	3859	3860
3861	3862	3863	3864	3865	3866	3867	3868	3869	3870	3871	3872	3873	3874	3875
3876	3877	3878	3879	3880	3881	3882	3883	3884	3885	3886	3887	3888	3889	3890
3891	3892	3893	3894	3895	3896	3897	3898	3899	3900	3901	3902	3903	3904	3905
3906	3907	3908	3909	3910	3911	3912	3913	3914	3915	3916	3917	3918	3919	3920
3921	3922	3923	3924	3925	3926	3927	3928	3929	3930	3931	3932	3933	3934	3935
3936	3937	3938	3939	3940	3941	3942	3943	3944	3945	3946	3947	3948	3949	3950
3951	3952	3953	3954	3955	3956	3957	3958	3959	3960	3961	3962	3963	3964	3965
3966	3967	3968	3969	3970	3971	3972	3973	3974	3975	3976	3977	3978	3979	3980
3981	3982	3983	3984	3985	3986	3987	3988	3989	3990	3991	3992	3993	3994	3995
3996	3997	3998	3999	4009	4042	4049	4078	4101						

Fig. 3. Installation identification numbers of installations apparently missing from the MFBI data base.

The following process was used in examining each question on the MFBI questionnaire. As indicated in Appendix H, this process revealed numerous problems with the form FEA-C-602-S-0.

1) PURPOSE

What is the purpose of the question? If the question is logical, is the answer needed? Or, what specific information was this question designed to collect?

2) RELEVANCE

a) Is this question relevant to the regulatory function? Was the information collected by this question used to assess the impact of issuing prohibition orders? Could the information collected by this question be used to make future regulatory decisions, or to assess the impact of those decisions?

b) Does the data collected by this question reflect the need of other users? To what extent?

3) INCENTIVES

Does the respondent have any incentives to mislead or make false statements? Specifically, might a respondent infer that a false or misleading answer would make conversion to coal appear less feasible?

4) CLARITY

a) Is the question vague? If so, how? Is it clear what information this question was designed to elicit? Are there any terms or phrases in the question that make its purpose unclear? Would two experts agree on how to answer the question?

b) How could the question be misinterpreted by mistake? Is the question worded so that a respondent might accidentally misconstrue the intent of the question?

c) How could a "misinterpretation" be intentional? Is the question worded in such a way that a respondent could use its construction to make a deliberate false statement?

Exhibit 2. A systematic process for evaluating each question on an information collection form.

5) POSSIBLE SOURCES OF ERROR

Can this question be answered precisely? -- with a discrete answer? Is there anything about the question, its format, coding, semantics, or information required that could lead to an inaccurate or incorrect response?

6) POSSIBLE IMPROVEMENTS IN THE QUESTIONS

Can the question be re-worded or the order of the words re-organized to improve the quality or character of the response? Do additional question need to be added to accomplish this? Should the question be deleted altogether?

7) VALIDATION CHECKS

Can the accuracy of the answer be verified?

a) Numerical Ranges: Are there limiting values for the data being collected?

b) Cross-checking Within the Form: Are there other answers to the questionnaire that can be used to verify the answer to this question?

c) Other Sources: Are there resources available that could be used to verify the accuracy of the answer to this question? (Site inspections, manufacturers, legal and technical experts).

8) CODING FOR COMPUTERIZATION

Is the answer to the question in an appropriate format for inclusion in a computer system? Can it be coded to make it appropriate? Was the answer to the question included in a computer system?

9) FORM DESIGN AND APPEARANCE

Do the layout, appearance and sequence of questions encourage accuracy and precise answers? If not, where can the format be improved?

Exhibit 2. (end of exhibit)

III. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The information in the MFBI data base is a basically unsound representation of the universe of MFBIs and the characteristics of that universe. The meaningfulness and accuracy of this information are severely impaired by numerous design and implementation flaws. Nonetheless, the MFBI data base is probably the best currently available source of information about MFBIs.

The meaningfulness is seriously restricted by the unquantified non-coverage bias. No systematic procedure or rigorous definition exists to identify the elements of the frame. The quality of coverage of the universe by the frame remains unquantified. (Further LBL research will estimate the coverage and assess the impact of the non-coverage on the information.) Available evidence strongly suggests the possibility of non-response bias as well. No determination of the extent or estimate of the effect of the non-response exists. (Further LBL research will generate such an estimate.)

In addition, the recorded information about the engineering characteristics of the MFBIs is not specific enough to demonstrate coal-conversion capability. This lack of focus of the recorded information is compounded by the large quantity of extraneous information collected. (Section II.A.2, main text.) The lack of bounds for the non-coverage and non-response biases and the inadequacy of the information collected render the MFBI data base unreliable as a comprehensive

source of information about MFBIs in the U.S.

The condition of the data base itself is also highly suspect. At least 699 of 4,199 records are missing, without explanation. About 29 percent of the remaining records contain identified logical inconsistencies or errors. The information in the data base is out of date; most records are 3 to 6 years old. Nothing short of a total reconstruction is likely to cure the inaccuracies and inadequacies of the information in the MFBI data base.

B. RECOMMENDATIONS

1. Caveats

- The information is 3 to 6 years old.
- Coverage of the frame is uncertain (LBL studies will explore the frame coverage).
- The data base contains many internal inconsistencies and errors.

2. System Design

Recommendations about what specific information should or should not be collected to support the regulatory process are not being made at this time.

C. WORK TO BE DONE

Additional work by Lawrence Berkeley Laboratory will focus on the development of methodologies for creating the frame for a new MFBI survey. This work will make it possible to develop a statistical estimate of the coverage of the current MFBI data base. A secondary research area will involve the identification of mechanical features of different types of combustors that can be used to determine whether conversion to the use of coal is practical. Research on the information collected by the FEA-C-602-S-1 can also be undertaken if this work promises to provide useful results for OEIV.

1. Research on Methodologies for Developing an MFBI Frame

The general approach in developing these methodologies is as follows:

1) Obtain a large number of lists containing potential MFBI sites in a state or country. If appropriate, try to obtain additional clues by interviewing people in the organization that developed some of the lists. Prioritize these lists in terms of the degree to which they would identify MFBIs directly, e.g., use a state boiler inspector's inventory before using a list of plastics plants. Identify potential MFBIs that are not on the MFBI data base, and develop a master candidate list for use in Step 2.

2) Use telephone interviews to learn what percentage of a sample of members of the candidate list are MFBIs. Use on-site interviews only if necessary.

3) Based on the results of Step 2, decide whether additional work must be done.

To date, significant progress has been made in locating potentially useful sources of information.

Thus far we have identified a number of lists containing installations with boilers, gas turbines, combined cycle units, and internal combusion engines. The major data sources are:

1) National Board of Boiler Inspectors, Manufacturers Data Reports. This is a non-computerized file of most industrial and commercial boilers manufactured since 1920. Each report contains name of manufacturer, date of manufacture, location of installation, and heating surface area. The files are arranged by manufacturer.

2) (For California) California Boiler Inspectors files. These contain name of manufacturer, date of installation, location of installation, heating surface area, fuels used, and SVRC. This file is supposed to contain all the commercial and industrial boilers in California. It is not computerized and is arranged by boiler owner. We have not determined the extent to which similar information exists in other states.

Major data sources for gas turbines, combined cycle units, and internal combustion engines are:

1) FPC, Form 12-C, Industrial Generating Capacity. This is a computerized data base of non-electric utility plants, containing data pertaining to on-site electric power generation facilities with a capacity of less than 10 MW. This data base contains the name of the company, location of the installation, capacity of the generators, type of generator, and type of fuel used.

2) FPC, Form 4, Monthly Power Plant Report. This is a computerized data base containing data pertaining to on-site electric power generation facilities with a capacity greater than 10MW. This data base contains the name of the company, location of the installation, capacity of the generators, type of generator, and type of fuel used.

We have identified a number of specialized lists which could be used to supplement the major lists, e.g., directories of installations for a particular industry and natural gas consumer data bases.

Other possible boiler data sources that must be investigated:

1) boiler engineering drawing files maintained by boiler manufacturers;
2) the American Boiler Manufacturer's boiler data base;
3) records of insurance companies that insure boilers.

The data on small (less than 10 MW) gas turbines, combined cycle units, and internal combustion engines is incomplete and other sources have to be developed.

2. Research on Features of Combustors that Determine the Feasibility of Coal Conversion

As outlined in Exhibit 1, inquiries to date have identified a set of features of combustors that are related to the feasibility of coal conversion. Further research in this area should be undertaken to extend and solidify what has been learned to date. Since we have encountered some disagreement among the experts and written sources that have been consulted, we will develop a study approach in which combustor experts

will interact in trying to specify what information can be gathered and how that information can be processed in assessing the feasibility of coal conversion. The details of the study approach will be worked out in cooperation with OEIV.

IV. NOTES AND REFERENCES

1. Pub. L. No. 93-319, 88 Stat 24 (amended in 1975 and 1977), relevant portions codified at 15 U.S.C.A. §§ 791-798, (1978).

2. 15 U.S.C.A. § 791 (1978).

3. An MFBI is "an installation other than a power plant that has or is a fossil-fuel fired boiler, burner, or other combustor of fuel, or any combination thereof at a single site, and includes any person who owns, leases, operates or controls any such installation or unit." Gas turbines and combined cycle units are excluded from this classification. Energy, 10 C.F.R. § 305.2 (1978). An MFBI with a design firing rate of 100 million Btu per hour or greater is subject to an order prohibiting it from burning natural gas and petroleum products. Energy, 10 C.F.R. § 305.4(b)(1) (1978).

4. The Department of Energy Organization Act transferred to and vested in the Secretary of Energy all of the functions vested by law in the Administrator of the Federal Energy Administration. Pub. L. No. 95-91 § 301(a), 91 Stat 565, 577, codified at 42 U.S.C.A. § 7151, (1978). The program is now administered by the Office of Coal Utilization, Economic Regulatory Administration, within the Department of Energy.

5. House Conf. Rep. No. 1085, 93rd Cong, 2nd Sess. 36 reprinted in 2 (1974) U.S. Code Cong. and Ad. News 3305, 3315.

6. 15 U.S.C.A. § 792(a)(2) (1978).

7. 15 U.S.C.A. § 792(a)(2)(A) (1978).

8. ESECA, as originally enacted, required that the FEA find that the MFBI had the capability and necessary plant equipment to burn coal on June 22, 1974. The Energy Policy and Conservation Act of 1975 (EPCA) expanded EPA's authority to issue prohibition orders to MFBI's that were found to have acquired or have been designed with the capability and necessary plant equipment to burn coal. Pub. L. No. 94-163, § 101, 89 Stat 871, 875, codified at 15 U.S.C.A. § 792 (1978). Although EPCA was enacted on December 22, 1975, the FEA did not promulgate regulations implementing its new authority until May 6, 1977.

9. 15 U.S.C.A. § 792(b)(1)(A) (1978).

10. 15 U.S.C.A. § 792(b)(1)(A) (1978).

11. 15 U.S.C.A. § 792(b)(1)(B) (1978)

12. In addition, before issuing a prohibition order to an MFBI after June 30, 1975, ESECA required the FEA to arrange for public notice and provide an opportunity for public input. 15 U.S.C.A. § 792(b)(3)(A) (1978). The order would not become effective until the date the EPA certified as the earliest time the MFBI would be able to comply with applicable air pollution control requirements. 15 U.S.C.A. § 792(b)(3)(B) (1978).

13. 40 F.R. 5452 (1975).

14. 40 F.R. 20462 (1975).

15. Energy, 10 C.F.R. §§ 303, 305 and 307 (1977).

16. House Cont. Rep. No. 1085, 93rd Cong., 2nd Sess. 25, reprinted in 2 (1974) U.S. Code Cong. & Ad. News 3305.

17. Energy, 10 C.F.R. 305.4(b)(1) (1978).

18. The FEA set forth these mimimum requirements as the standards it actually employed in determining whether a combustor had the capability and necessary plant equipment to burn coal. See the FEA's discussion of its proposed amendments to the Regulations published in the Federal Register on August 31, 1977. 42 F.R. 43860 (1977). These proposed rules have not been adopted.

19. The FEA computed the net operating cost differential by (1) determining the annual cost which the combustor would incur by converting to coal, such as annualized additional capital costs (including the annual cost of capital) and increased annual operating and maintenance costs; (2) determining the remaining useful life of the combustor based on a presumed useful life of 40 years, or on such other useful service life as the FEA found was reasonable; and then (3) subtracting from or adding to the annual conversion costs the decrease or increase in annual fuel costs. In order to calculate estimated fuel usage, the FEA projected a capacity factor based on the combustor's average annual capacity factor for the most recent three year period for which data were available, or on such other evidence as the FEA considered probative. 40 F.R. 43860 (1977).

20. This formula was set forth in the FEA's discussion of its proposed amendments to the Regulations published in the Federal Register on August 31, 1977. 42 F.R. 43860 (1977).

21. Energy, 10 C.F.R. § 305.4(b)(2)(ii) (1978).

22. Energy, 10 C.F.R. § 305.4(b)(3)(i) (1978)

23. Energy, 10 C.F.R. § 305.4(b)(3)(ii) (1978)

24. Energy, 10 C.F.R. 305.4(b)(3)(c) (1978).

25. Private telephone conversation with John Dean (Office of Coal Utilization), August 17, 1978.

26. These individuals include John Dean, Deputy Director of the Division of Coal Regulation, and Barbara Ioanes and Ellen Russel of the Office of Coal Utilization.

27. John Dean, (report) Energy Alternatives for Industry - "An Analysis of the 1975 FEA Survey of Major Fuel Burning Installations," n.d., p. 9.

28. Private telephone conversation with John Dean (Office of Coal Utilization), August 17, 1978.

INTERIM VALIDATION REPORT

MAJOR FUEL BURNING INSTALLATION SYSTEM

APPENDICES

APPENDIX A

THE FEA-C-602-S-0 FORM

DO NOT FILL IN

[ ][ ][ ][ ][ ] [ ][ ] [ ][ ][ ]
1 10

FEDERAL ENERGY ADMINISTRATION
MAJOR FUEL BURNING INSTALLATION COAL CONVERSION REPORT
FEA C-602-S-0

This report is mandatory under Public Law 93-275

SECTION I GENERAL PLANT INFORMATION

1. MFBI NAME AND LOCATION:

NAME [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 11–26

STREET [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 27–42

CITY [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 43–53

STATE _____ _____ ZIP [ ][ ][ ][ ][ ] 54–58

AIR QUALITY CONTROL REGION (if known) _____

2. PARENT COMPANY NAME AND GENERAL OFFICE LOCATION:

NAME [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 59–73

STREET _____

CITY _____

STATE _____ ZIP [ ][ ][ ][ ][ ] 74–78

DO NOT FILL IN [ ][ ] [ ][ ][ ][ ][ ] 79 80 1–5

3. PERSON TO CONTACT IN FUTURE CORRESPONDENCE

NAME [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 6–22

TITLE [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 23–35

STREET _____

CITY/STATE _____

ZIP [ ][ ][ ][ ][ ] 36–40

TELEPHONE (with Area Code) ([ ][ ][ ]) [ ][ ][ ] - [ ][ ][ ][ ] 41–50

4. TOTAL NUMBER OF BOILERS AT THIS INSTALLATION [ ][ ] 52

MFBI NAME _____

5 TOTAL NUMBER OF OTHER COMBUSTORS AT THIS INSTALLATION [ ][ ] 53

6. TOTAL DESIGNED FIRING RATE (X 10^6 Btu/s/hr) (of #4 and #5) [ ][ ][ ][ ][ ] 55 59

7. IDENTIFY PAIRINGS (ETC) OF COMBUSTORS (Example: Boilers 04, 05, and 06 Share a Common Manifold and are Vented through a Common Stack)

	Standard Industrial Classification (4 Digit)	Percent of Total Shipments or Services by Value
8 PRINCIPAL PRODUCTS PRODUCED AT, OR SERVICES PROVIDED BY THIS INSTALLATION (If SIC Codes are Unknown, Provide Written Description in Space Provided).	[ ][ ][ ][ ] 60	[ ][ ][ ] 66
	[ ][ ][ ][ ] 67	[ ][ ] 72
	[ ][ ][ ][ ] 73	[ ][ ] 78

_____

_____

9. IDENTIFY THE MAJOR TECHNICAL, REGULATORY, ECONOMIC, AND ENVIRONMENTAL IMPEDIMENTS, IF ANY, TO YOUR UTILIZING COAL TO A GREATER EXTENT AT THIS INSTALLATION)

DO NOT FILL IN [ ][ ] 79 80

10. WHAT ACTIONS BY THE FEDERAL GOVERNMENT WOULD ENCOURAGE YOU TO UTILIZE COAL TO A GREATER EXTENT?

11. CERTIFICATION:

CERTIFYING OFFICER I certify to the best of my knowledge that the information in this report is correct.

NAME _____ SIGNATURE _____ DATE _____

TITLE _____

Title 18 USC 1001, makes it a crime for any person knowingly and willingly to make to any agency or department of The United States any false, fictitious or fraudulent statements as to any matter within its jurisdiction.

U.S. GOVERNMENT PRINTING OFFICE – OL-572-856

FEA C-602-S-0

FEDERAL ENERGY ADMINISTRATION
Washington D.C. 20461

APPROVED BY GAO
B-181254 (S75022)
EXPIRES 6-30-75

This Report is Mandatory Under P.L. 93-275

MAJOR FUEL BURNING INSTALLATION COAL CONVERSION REPORT

DO NOT FILL IN [ ][ ] [ ][ ]
1 5

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 99 MILLION BTUs/HR

MFBI NAME _____

SECTOR II COMBUSTOR DATA

1. COMBUSTOR NUMBER [ ][ ] 6

2. WHAT KIND OF COMBUSTOR IS THIS?
1 = boiler 2 = burner 3 = other combustor of fuel [ ]

3. COMBUSTOR CAPACITY (x 10^6 BTU/HR) [ ][ ][ ]

4. MANUFACTURER _____

5. DATE INSTALLED (YEAR) 19 [ ][ ]

6. a. If Combustor has been Modified to be Capable of Burning Coal, What Year was it Modified? 19 [ ][ ]
b. How was it Modified?

7. DO YOU INTEND TO INSTALL A TOPPING TURBINE ON THIS COMBUSTOR? [ ]

a. If Yes, Will You Need to: [ ]
(1) Replace Your Combustor,
(2) Modify Your Combustor,
(3) Make No Combustor Modification.

b. If the Answer to 7(a) was "1" or "2", Do You Intend to Modify/Replace Your Combustor so that You Can Burn Coal? [ ]

8. PRIMARY ENERGY SOURCE FOR EXISTING COMBUSTOR
1 = coal 2 = residual 3 = distillate 4 = gas 5 = other (specify) _____ [ ]

9. ALTERNATE ENERGY SOURCE FOR EXISTING COMBUSTOR
1 = coal 2 = residual 3 = distillate 4 = gas 5 = other (specify) 6 = no alternate. [ ]
List secondary alternate energy sources, if any: _____

10. IF COAL IS THE PRIMARY ENERGY SOURCE, DO YOU INTEND TO CONTINUE ITS USE? [ ]

11. IF COAL IS NOT THE PRIMARY ENERGY SOURCE, DO YOU INTEND TO CONVERT TO COAL IN THE NEAR FUTURE? [ ]

12. WAS THIS COMBUSTOR ORIGINALLY DESIGNED TO BE CAPABLE OF BURNING COAL? [ ]

13. WAS COAL EVER BURNED IN IT? [ ]

14. CAN COAL NOW BE BURNED IN THIS COMBUSTOR? [ ]

15. IS LAND AVAILABLE FOR COAL STORAGE? [ ]

16. IF THE ANSWER TO NO. 12 OR 13 IS "YES", IS ANY OR ALL OF THE COAL BURNING SUPPORT EQUIPMENT STILL IN PLACE? [ ]

17. IF THE ANSWER TO NO. 12 OR 13 IS "YES", IS ANY OR ALL OF THIS EQUIPMENT STILL OPERATIONAL? [ ] 29

18. IF THE ANSWER TO NO. 16 OR 17 WAS "NO", PLEASE IDENTIFY ANY ANTICIPATED ACQUISITION OR REFURBISHING OF COAL HANDLING AND FIRING EQUIPMENT.

COMBUSTOR NUMBER _____ A-5
MFBI NAME _____

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 99 MILLION BTUs/HR

19. IF COAL WAS EVER USED AS THE PRIMARY FUEL SOURCE PRIOR TO 1973 GIVE (for the last year coal was used):

a. Year 19 [ ][ ] 30

b. Rank of Coal _____

c. Percent Ash by Weight (to the nearest percent) _____

d. Percent Sulfur by Weight (to the tenth of a percent) _____ [ ] [ ]

e. BTU/lb _____

f. Quantity _____ Tons/Year

g. Other Unique Characteristics

_____

_____

_____

h. Method of Delivery: (Train, Truck, Barge, etc.)

_____

i. If Coal is not Presently Being Used, Do You Anticipate that it Could be Obtained if you Were to Convert? [ ]

j. If Not, Why Not?

_____

20. ESTIMATE YOUR ANNUAL NON-COAL FUEL SAVINGS IF YOU WERE TO CONVERT TO COAL

	QUANTITY	
RESIDUAL	[ ][ ][ ][ ] 35	10^3 bbls/yr
DISTILLATE	[ ][ ][ ][ ] 39	10^3 bbls/yr
GAS	[ ][ ][ ][ ] 43 46	10^3 MCF/yr

21. 1974 ANNUAL FUEL USE

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT ($\times 10^3$)		QUANTITY	
COAL	____	____	[ ][ ][ ][ ] 47	(lb)	[ ][ ][ ][ ] 54	10^3 tons/yr
RESIDUAL		____	[ ][ ][ ][ ] 55	(gal)	[ ][ ][ ][ ] 62	10^3 bbls/yr
DISTILLATE		____	[ ][ ][ ][ ] 63	(gal)	[ ][ ][ ][ ] 70	10^3 bbls/yr
GAS		____	[ ][ ][ ][ ] 71	(MCF)	[ ][ ][ ][ ] 78	10^3 MCF/yr

COMBUSTOR NAME _____
MFBI NAME _____

A-6

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 99 MILLION BTUs/HR

22. 1973 FUEL USE

DO NOT FILL IN (79 80 1 5)

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT (×10⁶)	QUANTITY	
COAL	____	____	(lb) (6)	(13)	10³ tons/yr
RESIDUAL		____	(gal) (14)	(21)	10³ bbls/yr
DISTILLATE		____	(gal) (22)	(29)	10³ bbls/yr
GAS		____	(MCF) (30)	(37)	10³ MCF/yr

23. INDICATE (to the nearest percent) THE PERCENT OF COMBUSTOR OUTPUT THAT IS DEVOTED TO:

ELECTRIC GENERATION (38)

SPACE HEATING (41)

PROCESS STEAM (44)

OTHER (Specify) (47)

SECTION III AIR QUALITY

1. STACK NUMBER

2. STACK HEIGHT (Feet Above Ground) . . . . . .

3. CURRENTLY INSTALLED POLLUTION CONTROL EQUIPMENT AS PERTAINS TO THE COMBUSTOR (Answer Yes or No with a "1" or "0" respectively).

a. Precipitator (Also referred to as Dust Collector)

Type (Centrifugal, Electrostatic, Etc.) _____

Date Installed _____

Date Last Operated _____

Design Efficiency (%) _____

Actual Efficiency (%) _____

b. FLUE GAS DESULFURIZATION (FGD) EQUIPMENT (Also referred to as Scrubber or Sulfur Dioxide Absorber) (55)

Type (MAG Ox, LIMESTONE, Etc.) _____

Date Installed _____

Date Last Operated _____

Design Efficiency (%) _____

Actual Efficiency (%) _____

% Availability _____

COMBUSTOR NO. _____
MFBI NAME _____

A-7

FILL IN THIS PAGE FOR EACH COMBUSTOR OVER 99 MILLION BTUs/HR

4. TO BURN COAL AND MEET THE SIP EMISSION LIMITATIONS RELATING TO ATTAINMENT OF THE FEDERAL PRIMARY AMBIENT AIR QUALITY STANDARDS, THIS INSTALLATION MUST:
(Answer with Yes (1) or No (0) in the blocks provided)

a. Upgrade Precipitators [ ] 56

If yes, give approximate cost $ _____ time _____ (weeks)

b. Install Precipitators [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

c. Install FGD [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

d. Obtain Conforming Coal [ ]

This coal must be _____ % Sulfur by weight, _____ % Ash by weight.

Do you anticipate that you will be able to obtain conforming coal? [ ]

5. TO BURN COAL AND MEET OTHER APPLICABLE SIP REQUIREMENTS, (THIS INSTALLATION MUST: (Answer with a Yes (1) or No (0) in the blocks provided)

a. Upgrade Precipitators [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

b. Install Precipitators [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

c. Install FGD [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

d. Obtain Conforming Coal [ ]

This coal must be _____ % Sulfur by weight _____ % Ash by weight

Do you anticipate that you will be able to obtain conforming coal? [ ] 65

DO NOT FILL IN [ ][ ] 79 80

GPO : 1975 OL-572-855

APPENDIX B

THE FEA-C-602-S-1 FORM

FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

Dear

Thank you for the information which you furnished to the Federal Energy Administration (FEA) in May 1975, in completing and submitting Form FEA C-602-S-0 relative to Major Fuel Burning Installations (MFBI's).

FEA is responsible for implementing the Energy Supply and Environmental Coordination Act of 1974 (ESECA), P.L. 93-319, as amended, by the recently enacted Energy Policy and Conservation Act, (EPCA), P.L. 94-163. The major thrust of ESECA is to conserve our Nation's dwindling natural gas resources and reduce our dependence on imported oil by converting gas- and oil-fired MFBI's and powerplants to the use of coal as their primary energy source.

Our initial review of the data furnished by you in Form FEA C-602-S-0 indicates that one or more combustors owned by your company potentially qualify as candidates for receipt of FEA Prohibition Orders under ESECA.

We need, however, additional information on which to base our determination. We must therefore require you to complete the attached questionnaire (FEA C-602-S-1) detailing additional information on combustors which indicate a potential for conversion, and a general questionnaire designed to aid us in establishing the financial ability of your firm to undertake these conversions.

The information requested on the attached Form (FEA C-602-S-1) is supported by the authority vested in Section 13 of the Federal Energy Administration Act of 1974, P.L. 93-275. Please note that the truth and accuracy of the information furnished in this questionnaire must be certified by the Chief Executive Officer of the company reporting.

The response to the aforementioned requirement for information shall be filed with the FEA on or before July 23, 1976, at the following address:

Federal Energy Administration
Office of Coal Utilization
Code MFBI-2
Room 6113, Federal Building
1200 Pennsylvania Avenue, NW
Washington, D.C. 20461

Some of the information required on this form may be confidential commercial information which FEA may withhold from public disclosure, because its release will cause substantial competitive injury. If you believe that any information is covered by the exemption of the Freedom of Information Act disclosure requirements for confidential commercial information contained in 5 U.S.C. 552(b)(4), and if you do not wish FEA to disclose such information to the public, you should inform FEA by letter accompanying the submission of this form. The letter must 1) cite briefly and specifically, by item number, which information you believe is confidential commercial information; 2) state that release of the information would be likely to cause substantial competitive injury resulting from release of each item; and 3) explain whether each item of information which you believe is confidential is customarily treated as confidential by your company and in your industry. FEA needs a detailed explanation of the competitive injury resulting from public disclosure - rather than general information - before it can evaluate or accept claims of confidentiality. FEA retains the right to make its own determination with regard to any claim of confidentiality.

If, with your response, we do not receive a request for confidentiality, with appropriate justification, we will conclude that you do not object to disclosure to the public of any information submitted by your company on the form.

Inquiries concerning this form may be addressed to Pat Pesacreta, (202) 961-7983.

FEA representatives may contact you to obtain additional information or to obtain clarification of your responses to this request for information.

We appreciate your cooperation in responding to our request.

Sincerely,

James S. Rubin

James S. Rubin, Director
Office of Coal Utilization
Energy Resource Development

Enclosure

FEDERAL ENERGY ADMINISTRATION
Washington, D.C. 20461

Approved by GAO
B-181254 (R0370
Expires 6-30-77

THIS REPORT IS MANDATORY UNDER P. L. 93-275

MAJOR FUEL BURNING INSTALLATION COAL CONVERSION REPORT
(Supplement to Form FEA C-602-S-0)

GENERAL FINANCIAL INFORMATION

COMPANY NAME AND PRINCIPAL OFFICE LOCATION

COMPANY NAME:
PRINCIPAL OFFICE ADDRESS:
STREET: CITY:
STATE: ZIP:

Please furnish the following additional general financial information:

1. Company Federal Employer ID Number.
2. Most recent annual report to shareholders.
3. Most recent ten year financial summary published for shareholders or other interested investors, or copies of annual reports for past 10 years.
4. Prospectus issued in conjunction with latest public offering.
5. Limitations or restrictions on your Company's ability to obtain financing of any costs associated with conversion to coal as a primary energy source, including Bond Agreements, Stock Agreements, Credit Agreements, Mortgage Agreements, and Corporate Charter. Also, include a copy of your Company's Corporate Charter with your response.
6. Method of depreciation -- including the life used as a basis -- used by your Company for combustors and other immediately related capital equipment.
7. Company construction budget for each of the previous and next five years, including 1976. Identify costs of major new plants and/or facilities, and the capacity thereof. Also, indicate anticipated major fuel burning plant retirements, and the capacity of such facilities.
8. Current Company operating budget for 1976.

CERTIFICATION:

CERTIFYING OFFICER: I hereby certify to the best of my knowledge that the information in this report is correct.

NAME _____ SIGNATURE _____
TITLE _____ DATE _____

Title 18 USC 1001 makes it a crime for any person knowingly and willingly to make to any agency or department of the United States any false, fictitious or fraudulent statements of any matter within its jurisdiction.

FEDERAL ENERGY ADMINISTRATION
Washington, D.C. 20461

Approved by GAO
B-181254 (R0370)
Expires 6-30-77

THIS REPORT IS MANDATORY UNDER P.L. 93-275

MAJOR FUEL BURNING INSTALLATION COAL CONVERSION REPORT
(Supplement To Form FEA C-602-S-0)

SPECIFIC COMBUSTOR INFORMATION

COMPANY NAME AND PRINCIPAL OFFICE LOCATION	
COMPANY NAME:	
PRINCIPAL OFFICE ADDRESS:	
STREET:	CITY:
STATE:	ZIP:

The following combustor identified by you in your Form FEA C-602-S-0 appears to have a potential for conversion to the use of coal as its primary energy source. The term "primary energy source" means the amount of fuel used for all purposes except for the minimum amount required for start-up, testing, flame stabilization, control uses, and fuel preparation.

MAJOR FUEL BURNING INSTALLATION (MFBI) NAME AND LOCATION	
NAME:	
STREET:	
CITY:	
STATE:	ZIP:
COMBUSTOR NUMBER:	
AIR QUALITY CONTROL REGION:	

With respect to the foregoing combustor, exclusively, please furnish the following additional information:

1. Federal Employer ID Number of the owner of the Major Fuel Burning Installation described above. [ ]

2. Since May 21, 1975, have you taken any action directed to changing this combustor's primary energy source to coal? Yes [ ] No [ ]

   If the answer is yes, briefly explain the nature of the actions taken.

MFBI Name _____

Combustor Number _____

3. A. Is coal now being burned in this combustor as the primary energy source? Yes ☐ No ☐

   B. If coal is now being burned, do you intend to continue burning coal in the combustor as its primary energy source until 1985? Yes ☐ No ☐

   C. If the answers are yes to 3A and 3B, no further questions need be answered.

4. As of May 21, 1975, what was your best estimate as derived from your Company's official records of the remaining useful service life, in years, of this combustor? Explain the basis for this estimate.

5. Do you have an engineering design plan developed, or presently being developed, to effect a conversion to the use of coal as this combustor's primary energy source? Yes ☐ No ☐

   % Completed ☐

6. Identify anticipated costs and lead times associated with the acquisition or refurbishment of the following coal storage, firing and handling facilities/equipment, as appropriate: (If no engineering plan has been performed giving precise costs, estimate anticipated costs.)

EQUIPMENT OR FACILITIES	ANTICIPATED COSTS ($x000)		LEAD TIME TO ACQUIRE OR COMPLETE (weeks)
	ACQUISITION	REFURBISHMENT	
Unloaders			
Conveyors			
Crushers			
Pulverizers			
Scales			
Feeders			
Air Heaters			
Combustors			
Soot Blowers			
Special Instrumentation/Controls			
Ash Handling & Ponding			
Additional Storage Property			
Other (Specify):			
TOTAL COSTS			

MFBI Name _____

Combustor _____

7. Provide an estimate, in normal production days, of the total lead time required to make the conversion, exclusive of the time associated with actions required to meet air pollution requirements.

8. Provide an estimate, in normal production days, of the combustor outage time for making the conversion.

9. Provide an estimate of the Operating and Maintenance (O&M) costs differential, if any, that you foresee will occur as a direct consequence of the conversion. Estimate present costs as well as costs assuming conversion, and itemize these costs; include fuel cost figures and personnel costs.

10. Provide an estimate of loss of revenue, if any, for which rescheduling cannot compensate, as a direct consequence of combustor outage time incident to the conversion.

11. Provide 1975 fuel use information, as follows:

	% Ash (by weight)	% Sulfur (by weight)	BTU Content ($x\ 10^3$)	Quantity ($x\ 10^3$)
Coal			lb	tons
Residual			gal	bbls
Distillate			gal	bbls
Gas			MCF	MCF

12. Provide a projected estimate of the average annual utilization factor of this combustor through the end of its useful service life as established in your answer to question 4. above, as follows:

$$F_u = \frac{(A)(N)}{(N)(8,760)} \times 100\%$$

Where: Fu=Utilization Factor
A =Average annual utilization, hours/year
N =Remaining years of useful service life

MFBI Name _____

Combustor Number _____

13. Provide the following coal and coal transportation information:

A. Identify the type of coal specified for use by the manufacturer of the combustor, as follows:

Characteristic		Minimum	Design	Maximum
Heat Content	BTU/lb			
Sulfur Content	%			
Ash Content	%			
Volatile Matter Content	%			
Ash Fusion Temperature	°F			

B. If coal was burned in this combustor in the past, identify the name of the transport company and the most commonly used mode (rail, truck or barge) of transport.

Company Name _____

Transport Mode _____

C. If coal was not burned in this combustor in the past, identify the name(s) of the transport company(ies) that most possibly would be available if a conversion of this combustor were to be effected.

D. Provide information on any long term (beyond December 31, 1976) fuel contracts or other commitments to purchase fuel that you have. Include information on prices of fuels to be provided by these contracts, and other details such as interruptability if natural gas is used, as well as any other information concerning fuel contracts that you consider relevent to conversion to coal.

MFBI Name _____

Combustor Number _____

E. Provide an estimate of the time, in normal production days, required to build a coal inventory adequate to permit the use of coal as the combustor's primary energy source.

F. Explain why a coal inventory of the size indicated by you by your response to E. above is necessary.

14. Is this combustor used for a purpose where the output of the plant or process experiences an unusually high or low short-term seasonal variation of productivity?

Yes ☐ No ☐

CERTIFICATION:

CERTIFYING OFFICER: I certify to the best of my knowledge that the information in this report is correct.

NAME _____ SIGNATURE _____

TITLE _____ DATE _____

Title 18 USC 1001, makes it a crime for any person knowingly and willingly to make to any agency or department of the United States any false, fictitious or fraudulent statements as to any matter within its jurisdiction.

APPENDIX C

BACKGROUND AND SYSTEM DEVELOPMENT

BACKGROUND AND SYSTEM DEVELOPMENT

A. LEGISLATIVE MANDATE

The MFBI survey was initiated to implement the Energy Supply and Environmental Coordination Act (ESECA) of 1974. The purpose of the Act is stated in the opening section:

> "The purposes of this chapter are (1) to provide for a means to assist in meeting the essential needs of the United States for fuels, in a manner which is consistent, to the fullest extent practicable, with existing national commitments to protect and improve the environment..."

In practical terms, the objective of ESECA was to discourage the use of natural gas and petroleum products, and to encourage the use of coal. ESECA deals with two types of users of fuel: (1) Power Plants and (2) Major Fuel Burning Installations (MFBIs). In ESECA, an MFBI is defined as "an installation or unit other than a power plant that has or is a fossil fuel fired boiler, burner or other combustor of fuel, or any other combination thereof, at a single site, that has individually or in combination a design firing rate of 100 million Btu/hr or greater and includes any person who owns, leases, operates, controls or supervises any such installation or unit. Gas turbines and combined cycle units are excluded from this classification."

Congressional debates leading to adoption of the statute reveal little more than a general idea of Congressional intent. According to the Conference Report, Congress anticipated the proposed legislation would save oil and natural gas and promote the use of coal for several reasons: (1) A dependable market for the sale of coal, provided by combustors prohibited from using gas or oil, would encourage opening of new coal mines and expansion of existing mine capacity; (2) Since power

plants and MFBIs burn a large amount of fuel, a measure that encourages electric generating power plants to cease burning oil and natural gas would permit these scarce resources to be used for other energy needs; (3) The coal conversion program appears to be an environmental trade-off because the oil and gas saved would be used increasingly to heat homes, apartments, and small businesses. Since no effective clean-up technology is available for such sources, increased use of these clean fuels would improve air quality. Power plants and MFBIs for which continuous emission-reduction technology is available could be required to burn coal. These goals are to be achieved by various executive orders. This has been covered in Section I.C.

B. NEED FOR THE MFBI SURVEY

The implementation of ESECA was conducted by the FEA's Office of Coal Utilization (OCU). In December of 1974, the OCU began to investigate the availability of the information required to identify MFBI candidates for Prohibition Orders. They considered the following as possible sources of information on MFBIs:

1) The Environmental Protection Agency's National Emission Data System (NEDS): The OCU found that this was the best source of information available but that its structure, content and scope prevented its use as a regulatory tool.

2) Department of Labor boiler data: The Department of Labor had 14 volumes of printed tables containing information on boilers built in the U.S. This information was not organized for easy access.

3) National Association of Manufacturers (NAM): The NAM had conducted a survey in 1973 of its members concerning their intention to convert to coal. The NAM considered the results of this survey confidential and released only aggregate statistics to the OCU. The fact that this survey collected company information, instead of the specific combustor data required by the OCU, also diminished its potential usefulness.

4) American Boiler Manufacturers Association (ABMA): The ABMA had records of every boiler installed in the United States since

1965. The ABMA considered this information confidential, however, and released only aggregate statistics to the OCU. The need for data on boilers built before 1965, and for other combustors, also diminished the usefulness of this source for the identification of candidates for Prohibition Orders.

After closely examining these and other possible sources of information, it became clear that no comprehensive sources of MFBI data existed. Thus, at the beginning of 1975, the OCU decided to perform a survey of industry in order to collect this information. The reasons for this decision were threefold: First, in order to be equitable to those who would receive Prohibition Orders, it was important to have a data base that was complete. Second, the OCU required comprehensive fuel use data in order to determine the potential savings that would result from the issuance of Prohibition Orders. Third, it was necessary to obtain MFBI information in order to issue Prohibition Orders before ESECA expired on June 30, 1975. The OCU was aware of this deadline and was hoping it would be extended to allow detailed analysis of candidates for Prohibition Orders. Nevertheless, the OCU believed Prohibition Orders could be issued immediately on the basis of information obtained from the S-0 form and a quick analysis of the most promising candidates.

C. DESIGN OF THE SURVEY FORM

A survey form was developed by the OCU during the first three months of 1975. A first draft of the questionnaire was developed after an ana-

lysis of ESECA that determined what information was required for its implementation. The form used in the NAM survey mentioned earlier was also examined to aid in the development of questions in sections of the form concerning general plant information, combustor characteristics, and fuel use. At the end of January 1975, this draft was circulated through the OCU for comments and suggestions. Comments on the form and content of the questionnaire were received, and the form was then refined, recirculated and refined again. By the middle of February 1975, a draft of the form was submitted for comments to several other groups in and out of government. These groups included:

1. Environmental Protection Agency (EPA)
2. Federal Power Commission (FPC)
3. FEA's Office of Policy and Analysis
4. Office of the General Counsel
5. Private Industry and Trade Associations

Suggestions for improvement covered changes to the wording of both questions and instructions, and the inclusion of additional questions. For example, questions concerning "principal products produced" and the use of "topping turbines" were among those included at the suggestions of industrial groups. Drafts of the form were also distributed to other offices within the FEA to ensure that the MFBI survey was not collecting information the government already possessed.

By the end of March the form was ready for submission to the GAO for final clearance. Although a minimum of 45 days was required to receive

this clearance, an emergency clearance was imperative if the OCU was to have any chance of issuing Prohibition Orders before the expiration of ESECA on June 30, 1975. The GAO had expressed concern related to the possible duplication within existing data bases and also the respondent burden in completing the survey form. However, with the aid of members of the Policy and Analysis Group, GAO clearance was obtained in mid-April, two weeks after the form was submitted for approval. The form was then given to the General Printing Office for printing, and the questionnaire was finally mailed on April 21 and 22, 1975. See Appendix A for a copy of the form.

D. IDENTIFICATION OF THE MFBI FRAME

Although the universe of Major Fuel Burning Installations has been legally defined, the degree to which the data base covers the universe remains uncertain. The history of the OCU's efforts to identify the frame follows:

1) The Publication of a notice in the Federal Register on March 20, 1975 asking all MFBIs to register with the FEA by March 30, 1975. This registration involved providing the FEA with the MFBI's name, address, total design firing rate, contact person and the person responsible for the MFBI (see Exhibit C-1).

2) On April 18, 1975, a second Federal Register Notice was published stating that the MFBI questionnaire would be mailed to those companies that responded to the March 20 notice. This notice also requested registration of the MFBIs that had not been registered

FUEL BURNING INSTALLATIONS

Identification Requirements

Pursuant to section 13 of the Federal Energy Administration Act of 1974 (Pub. L. 93-275), the Federal Energy Administration (FEA) hereby requires that major fuel burning installations, other than powerplants, provide to FEA the identifying information specified below in paragraphs numbered 1-5.

For the purposes of this notice, "powerplant" means a fossil-fuel fired steam electric generating unit that produces electric power for purposes of sale or exchange, and includes any person who owns, leases, operates, controls or supervises any such unit; and "major fuel burning installation" means an installation or unit other than a powerplant that has or is a fossil-fuel fired boiler, burner, or other combuster of fuel, or any comination thereof at a single site, that has a design firing rate of 100 million Btu's per hour or greater, and includes any person who owns, leases, operates, controls or supervises any such installation or unit. "Person" means any association, firm, company, corporation, estate, individual, joint-venture, partnership, or sole proprietorship or any other entity however organized including charitable, educational, or other eleemosynary institutions.

To assist in the implementation of sections 2 (a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (Pub. L. 93-319), which authorizes FEA to prohibit certain major fuel burning installations from burning natural gas or petroleum products as their primary energy source, each major fuel burning installations, as defined above, shall identify itself to FEA by providing the following information:

1. Name (or other descriptive information) of major fuel burning installation.
2. Name of person who owns, leases, operates, controls or supervises the major fuel burning installation.
3. Location (street address, city, county, state, Zip Code).
4. Name of person to whom any FEA inquiries may be directed and telephone number.
5. Firing rate (If an installation consists of boilers, burners br other combusters of fuel that are at a single site and in combination have a total firing rate of 100 million Btu's per hour or greater, state the firing rate of each individual boiler, burner or other combuster of fuel at the site.)

The information shall be filed with FEA by not later than March 31, 1975. It should be sent to the following address, and labeled "Major Fuel Burning Installation Identification" on the outside of the envelope in which it is tranimitted:

Federal Energy Administration, Code OFU, Washington, D.C. 20461.

Hand-delivered documents may be submitted to:

Federal Energy Administration, Office of Fuel Utilization, 12th & Pennsylvania Avenue NW., Room 6109, Washington, D.C.

The normal business hours of the FEA National Office are 8 a.m. to 4:30 p.m.

(This request for information has been approved under B-181254(S75020).)

Issued in Washington, D.C., on March 17, 1975.

ROBERT E. MONTGOMERY, Jr.,
General Counsel,
Federal Energy Administration.

[FR Doc.75-7401 Filed 3-18-75;12:08 pm]

MARCH 20, 1975

MAJOR FUEL BURNING INSTALLATIONS

Requirement To Complete FEA Questionnaire

On March 20, 1975, the Federal Energy Administration (FEA) gave notice of a reporting requirement applicable to all major fuel burning installations (MFBI) described in the Notice, requiring them to identify themselves to FEA by March 31, 1975 (40 FR 12706).

Notice is hereby given that the FEA will mail a questionnaire on April 21, 1975, to certain of the MFBIs which responded to the March 20 Notice. These MFBIs have been selected on the basis of an evaluation of the information received in response to the March 20 Notice, and other information available to the FEA. The questionnaire will provide the FEA with additional information it needs to determine whether an MFBI is a candidate for a prohibition order, prohibiting it from burning petroleum products or natural gas as its primary energy source, under section 2 of the Energy Supply and Environmental Coordination Act of 1974.

The questionnaire must be filed with FEA by May 21, 1975. Failure to file by that date may subject the MFBI to enforcement action.

MFBI's which have not yet responded to the March 20, 1975 notice, for whatever reason, should write or telephone FEA at the address or telephone number indicated below, and explain the reason for the failure to respond. This should be done immediately to ensure compliance with the May 21, 1975 filing date.

Written inquiries should be directed to:

Federal Energy Administration, Attn: Office of Fuel Utilization, Case Review Branch, Room 6117, Washington, D.C. 20461.

Inquiries by telephone should be directed to (202) 961-8591.

The normal business hours of the FEA National Office are 8 a.m. to 4:30 p.m.

Issued in Washington, D.C. on April 16, 1975.

ROBERT E. MONTGOMERY, Jr.,
General Counsel,
Federal Energy Administration.

[FR Doc.75-10283 Filed 4-16-75;10:35 am]

APRIL 18, 1975

Exhibit C-1. Federal register notices asking MFBIs to identify themselves to the FEA.

in response to the original Federal Register Notice. Several installations that had not responded to the original notice responded to the second one (see Exhibit C-1).

3) These Federal Register Notices resulted in the identification of 1500 to 1800 installations. Most of the companies who responded to these notices were relatively large, with legal staffs large enough to routinely read the Federal Register. Since the OCU knew that many smaller companies did not monitor the Federal Register regularly because of lack of staff, several other sources were used to identify the remainder of the MFBI frame. These sources included:

- EPA NEDS data base: MFBI Survey forms were sent to every industrial facility listed in the NEDS data base. Many of those listed were not MFBIs while others had already been sent forms as a result of their response to the original Federal Register Notice. NEDS was responsible for identifying approximately 10 percent of the installations finally included in the MFBI data base.

- Trade Associations: The OCU contacted 20 to 30 trade associations, such as the National Association of Manufacturers and the American Paper Institute. Other associations such as the American Dairy Association and the American Asphalt Association contacted the OCU with questions about the survey. These associations were asked to inform their members of the MFBI filing requirements through the use of newsletters and direct mailings. These

efforts led to the identification and registration of 20 to 30 percent of the MFBI installation that were ultimately included.

- FEA Regional Offices: FEA regional offices were asked to identify MFBIs in their region. They performed this identification through the use of press releases, contacts with state and local governments and research concerning other local combustor registrations. These efforts resulted in the identification of approximately 10 percent of the installations that were finally listed in the MFBI data base.

In spite of these efforts, the degree of coverage of the MFBI frame remains uncertain. There are several reasons for this.

1) Many operators of MFBIs did not read the Federal Register.
2) Other sources used to locate MFBIs were unable to offer complete information.
3) Since no list of MFBIs was available at the outset, there was no way to identify non-respondents, or to pursue them.

E. FORMS PROCESSING

Editing:

About 10,000 completed survey forms were returned to the FEA during the summer of 1975. Each form was reviewed by OCU analysts. The responses that did not qualify as MFBIs were discarded. The OCU then analyzed the balance of the responses to correct misinterpretations of questions on the form. To clarify questionable responses and correct incomplete, in-

consistent, or erroneous information, OCU analysts contacted respondents directly.

Programming:

Next, to make the collected information more manageable and accessible, OCU proceeded to store most of the edited survey data on computer tape. Thus, candidates for Prohibition Orders could be easily isolated and a rapid aggregation of energy consumption estimates could be made. Control Data Corporation and CACI were the respective contractors for keypunching and the computer information system. Included in the system were these principal elements:

- Data entry programs
- Data editing programs
- 58 sorting and report generating programs.

The report generating programs produced a variety of listings and aggregations of MFBI data.

With the exception of geographical information and record identification data, information on the data base was taken from the survey form. Combustor manufacturer, coal characteristics, ash and sulfur content of fuels used in 1973 and 1974, as well as other combustor information, were never keypunched. Secondary users stated that some of the foregoing information could have been useful had it been included in the MFBI data base.

The data entry process provided for data checks and the isolation of obvious errors.

1) The punched cards were visually inspected for errors and verified against information on the original questionnaire.
2) Other keypunch errors were eliminated by edit checks performed on Btu contents of fuels listed in questions concerning 1973 and 1974 fuel use. Alphanumeric and field checks were made about the same time.
3) Other computer validation checks were cross-checks and included comparisons of alternate and primary energy source responses to reported 1974 fuel use.

Initial implementation of the edit and consistency checks yielded approximately 300 pages of errors, including alphanumeric errors (numbers where letters should be and vice versa), inconsistencies, and obviously inaccurate reponses. Many of these errors arose from the proliferation of apparent errors when one entry was keypunched in the wrong column on a card. Other errors resulted from misinterpretation of fuel type definitions (especially "gas" which was interpreted to mean waste gas, blast furnace gas, coke oven gas, as well as the intended natural gas); "primary energy source" and "alternative energy source" definitions, "combustor capacity" definition and other terms on the survey form. These errors were investigated on a case-by-case basis, and approximately 200 additional follow-up calls were made to respondents. By the fall of 1975, an estimated 1000 corrections had been made.

Some errors such as improper ZIP codes were discovered but not corrected because the OCU decided that these errors would not have a serious impact on the regulatory process. This decision diminished the usefulness

of the MFBI data base for some secondary users (see Appendix F).

Additional errors were discovered in 1976 by Foster Associates, working with EPA. Most of these errors concerned 1974 natural gas consumption. These errors were pointed out to the OCU and corrections were made on the data base. Although it is estimated that approximately 50 corrections were made, no record of these corrections was kept.

APPENDIX D

FORMAL REQUEST FOR CLEARANCE

OF THE FEA-C-602-S-0

BY THE GAO

FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

MAR 2 4 1975

Honorable Elmer B. Staats
Comptroller General of
the United States
441 G Street, N. W.
Washington, D. C. 20548

Dear Mr. Staats:

The Federal Energy Administration requests clearance of the attached Major Fuel Burning Installation Coal Conversion Report (C 602-S-0).

The Energy Supply and Environmental Coordination Act of 1974 (ESECA), gives the Administrator of FEA the authority to prohibit major fuel burning installations, other than powerplants, from burning natural gas or petroleum as their primary fuel source if they meet certain criteria specified in the act. The proposed report form will identify the coal conversion candidate universe and will provide necessary information for the selection of specific installations for further in-depth analysis before the issuance of mandatory conversion orders.

There are several issues regarding the clearance of this form of which we would like to alert you.

(1) The Energy Supply and Environmental Coordination Act expires June 30, 1975, and with it the authority for issuing prohibition orders to major fuel burning installations. However, the regulations being developed to implement this program have not been finalized. Given the time constraints of this program we feel it necessary to forward this report for clearance before the regulations are published.

(2) In order to publish the Prohibition orders by June 30, it will be necessary to receive the completed responses the first week in May. Selection of candidates for further analysis should be completed by June 6. This would allow approximately one month from receipt of the responses for follow-up of nonresponse, data processing, and analysis of the data received.

In view of the severe time constraints of this program, we would appreciate any assistance you could provide in expediting this report form. Gilbert Rodgers of the Office of Energy Data Policy is available for any questions you may have regarding this submission.

A copy of the Federal Register Notice is attached.

The form has been coordinated and approved by the delegated authority within the Federal Energy Administration.

Sincerely yours,

Nathan H. Finch

Nathan H. Finch
Clearance Officer
Federal Energy Administration
961-8604

Attachments

COMPLETE MAILING ADDRESS:

Nathan H. Finch, Chief
Division of Printing Management
Office of Administrative Programs
Federal Energy Administration
Federal Building, Room 6500
12th and Pensylvania Avenue, N. W.
Washington, D. C. 20461

(1) Justification

(i and ii) Section 2(a) of the "Energy Supply and Environmental Coordination act of 1974" authorizes the Federal Energy Administration to issue prohibition orders to certain major fuel burning installations (MFBI's), other than power plants, to prohibit them from burning natural gas or petroleum products as their primary energy source.

The proposed survey addresses this requirement and has these four primary objectives: (1) identification of the coal conversion candidate universe and potential non-coal fossil fuel savings associated with conversion in the industrial sector; (2) selection of specific installations for subsequent, in-depth analysis leading to the issuance of mandatory conversion orders; (3) recognition of the technical, regulatory, economic, and environmental obstacles to coal conversion confronting industry and identification of industry-perceived government actions necessary to confront them; (4) acquisition of general plant and combustor information associated with coal conversion analysis.

This MFBI survey comprises a significant part of the Office of Fuel Utilization's effort to identify candidates

for coal conversion in both the utility and industrial sectors and subsequently issue mandatory orders prohibiting the burning of oil and natural gas at designated installations.

(iii) There currently does not exist a data base adequate to enable FEA to identify those MFBI's that potentially are candidates for the issuance of such prohibition orders. The Environmental Protection Agency's (EPA) testing of MFBI's in their National Emission Data System (NEDS) has only an estimated 40% of those that could be candidates for a prohibition order.

(2) Survey Plan (i) The survey will be mailed to every installation with a combustor capacity equal to or greater than 100 x 10^6 BTU/hr. The respondant universe is estimated to be 5,000 installations reporting on 8-20,000 combustors. The mailing list will be established through notification in the Federal Register requiring installations with the established combustor capacity to report: Name of MFBI, name of person who owns or controls the MFBI, location of MFBI and telephone number, the name of a person that FEA can contact, and the firing rate of combustor of fuel that is the MFBI or that in combination at a single site comprises the MFBI. A subsequent Federal Register notice will require that each installation receiving the questionnaire return the survey on or before a specified date. In addition to this procedure, FEA is notifying manufacturing organizations of the requirement

to permit them to notify their members through their newsletters. FEA also will utilize the NEDS file and is exploring the possibility of purchasing industrial mailing lists from private organizations to aid in compiling the mailing list.

(ii) The form constitutes a complete survey of MFBI's that potentially are candidates for prohibition orders, and therefore, it is not a sampling of MFBI's. Extensive discussions with industry representatives and analysis of a 1973 survey conducted by the Energy Users Council (a group formed by the National Association of Manufacturers and the National Chamber of Commerce) has precluded the necessity of any pretest of the proposed notice. MFBI's that do not respond to the notice will be contacted through telephone calls and/or letters.

(iii) Not applicable.

(3) Tabulation and Publication Plans

FEA will utilize an automated program to rank the installations according to their suitability for prohibition orders. A large number of plants will be eliminated from consideration initially: those which are now burning coal as their primary fuel source (Section II, Question 8) and those which clearly do not have the capability and necessary plant equipment to burn coal (Section II, Questions 10-18). The primary candidates will be selected among those who:

(i) do not now burn coal as the primary fuel source (Section II, Question 8); (2) intend to convert to coal in the near future (Section II, Question 11); (3) intend to install a topping turbine and will modify or replace the combustor so as to be capable of burning coal (Section II, Question 7b); (4) have the capability and necessary plant equipment to burn coal (Section II, Questions 10-18); and/or (5) those whose annual non-coal fuel use and potential oil or gas savings are high.

(4) Time Schedule

Mailing of the questionnaire is schedule to begin in April 1975, with responses returned in May. Identification of the candidates for prohibition orders to be studied in detail is projected to be completed June 3.

(5) Consultations Outside the Agency

(i) The following individuals outside the Government were consulted on the questionnaire: Stanley Berman, National Association of Manufacturers; Gerald C. Gambs, Vice President and Manager of Fuels, energy, and Environmental Division, Ford, Bacon, and Davis, Inc.; Dr. George Watkins, Energy and Environment, Inc., Sander E. Nydick, Thermo Electron Corporation; William S. Butler, Dick Barnes, and Gerald

ecker, Dow Chemical Co. No major problems were encountered n which agreement was not reached, and a significant number of changes have been made.

(ii) The following modifications to the preliminary questionnaire are illustrative of the changes made pursuant to suggestions from the above: (1) inclusion of a "principal products produced" question (Section I, No. 8) to aid in identifying energy-intensive industries for coal conversion purposes and their relationship (if any) to utilization of specific fossil fuels, (2) inclusion of a question permitting the respondant to identify what Government-sponsored incentives he feels are necessary to promote coal conversion (Section I, Nos. 9 and 10); and (3) inclusion of questions pertaining to the use of topping turbines and any associated conversion to coal (Section II, No. 8).

(iii) Stanley Berman of the National Association of Manufacturers furnished a 1973 study compiled by the Energy Users Council entitled "Survey of Industrial Energy Consumers" which provided the FEA with valuable macro-data on coal conversion potential. Sander Nydick furnished FEA a copy of Thermo Electron Corporation's book, Potential Fuel Effectiveness in Industry.

(iv) The following officials of other Federal agencies have been consulted: Alan Fry, Environmental Protection

Agency; Gene Sheridan, Division of Fossil Fuels, Bureau of Mines; Dr. Charles Reusch, Fuel and Environmental Analysis, Federal Power Commission, and Dr. Leonard Topper, National Science Foundation. These officials provided FEA with valuable comments pertaining to the questionnaire regarding (1) the technical problems associated with coal conversion; (2) proper terminology, and (3) techniques of surveying industrial installations. A substantial number of the recommended changes have been incorporated into the form. No indications were received that the requested information is already available from other sources.

(6) Estimation of Compliance

The large number of MFBIs that must respond to the notice is necessitated by the lack of applicable data available and is offset by the form's brevity, restriction of the requested information to basic data, and the one-time collection effort. The MFBI criteria limiting responses to those installations possessing a combuster of fuel, or combinations of such combusters at a single site with a design firing rate of 100 million Btu's per hour should eliminate the burden on small businesses with limited staffs.

(i) The estimate of man hours required per respondent is based on industry comment and comparison with reported experience from the Energy Users Council's 1973 survey. The estimated time is considered to be more than adequate,

APPENDIX E

PROPRIETARY NATURE OF THE INFORMATION IN THE MFBI DATA BASE

PROPRIETARY NATURE OF INFORMATION IN THE MFBI DATA BASE

Procedures for handling proprietary information contained in the data base were developed over two years. Development of these procedures can be summarized as follows:

- May 1975. OCU began to receive requests for MFBI data. Initial requests even within the government were not immediately granted because questions concerning the proprietary nature of the information had not been resolved. A cover letter attached to the MFBI questionnaire requested comments from respondents. OCU attorneys evaluated the survey form for questions that might give a competitive advantage. In addition, each form received was inspected for information labeled "Confidential."

- April 1976. A Federal Register Notice issued on the twenty-eighth of the month stated that the FEA believed none of the MFBI data to be confidential and requested comments from industry. Nineteen responses to this notice were received by the OCU. As a result of these responses and the work of the OCU legal staff, the Office of of General Counsel decided that nine items were proprietary and would not be released in response to Freedom of Information requests for MFBI data. These items were:

    1) Section II - Question 3: Combustor Capacity
    2) Section II - Question 5: Date Installed (year)
    3) Section II - Question 10: If coal is the primary energy source, do you intend to continue its use?

4) Section II - Question 11: If coal is not the primary energy source, do you intend to convert to coal in the near future?

5) Section II - Question 19 (a) - (g): Characteristics of Coal Used as Primary Energy Source Prior to 1973

6) Section II - Question 20: Savings through Conversion to Coal

7) Section II - Questions 21 and 22: 1974 and 1973 Fuel Use

8) Section I - Question 6: Total Designed Firing Rate

9) Section I - Question 9: Impediments to Greater Use of Coal

The reason for identifying each of these items as confidential is explained in a memorandum from the Office of General Counsel (see Exhibit E-1). A description of all proprietary data was mailed to each respondent.

- October 1976 to March 1977. Freedom of Information requests for MFBI data were handled by an OCU attorney.

- March 1977. A Freedom of Information Office was established in the OCU. The public can now obtain non-proprietary MFBI data through this office.

October 4, 1976

MEMORANDUM FOR: THE FILE

FROM: William Luck

SUBJECT: Rationale Supporting the Treatment of Certain Items on the Form FEA C-602-S-0 as within the Scope of 5 U.S.C. §552(b)(4

Form C-602-S-0 obtained information from major fuel burning installations to assist in determining whether they are eligible for prohibition orders under ESECA.

A Federal Register notice of April 28, 1976 (41 F.R. 17819) stated that FEA intended to release the form in its entirety and requested comments on this proposed course of action. Comments were received from 19 companies. On the basis of these comments and analysis by FEA staff, it has been determined that the following items of the form will not be released pursuant to FOI requests, on the ground that they constitute trade secrets or confidential commercial information, provided the respondent is an industrial or commercial establishment.

1. Section II - Item 3: Combustor Capacity

Release of this information could enable a person to determine the productive capacity (i. e., maximum production) of a given plant. This would give an indication of the quantity of product which can be sold from the plant in that general geographic area. Output figures are generally treated as proprietary, since they can be used by competitors in planning sales strategy.

Section II - Item 5: Date Installed (Year)

Knowledge of the date of installation of a combustor can give an indication as to when replacement of that combustor will become necessary. Since the purchase of a new combustor is a substantial capital expense, knowledge by a competitor of the timing of this event would give that competitor

cc: OGC (1), Luck (1) OGC:WLuck:eh x566-9296 10/4/76

Exhibit E-1. Memorandum from the Office of General Counsel regarding the proprietary nature of information in the MFBI data base.

information as to when the reporting company would be committing capital to this purpose and would not have it available for other uses. This information could be used to the competitive disadvantage of the respondent. The date of combustor installation -- the known date of a major capital expenditure -- can be analogized to planned construction budgets, which companies generally consider to be proprietary

Section II - Item 10: If Coal is the Primary Energy Source, do you intend to continue its use?

Section II - Item 11: If Coal is not the Primary Energy Source, do you intend to Convert to Coal in the Near Future?

If the answer given to question 10 is "No," then the fuel to which the respondent intends to convert is likely to be oil. Such an answer would indicate approximately the increased costs that will be incurred. Costs are generally treated as being proprietary. If the answer to question 10 is "Yes," then release of that information would serve to unmask the companies answering "No", even if "No" answers were deleted. Therefore, regardless of the answer given, proprietary treatment should be accorded the response.

The above rationale applies as well to question 11 -- release of either answer would indicate increased or decreased costs for respondents in the near future.

Section II - Item 19(a)-(g): Information Regarding Characteristics of Coal used as Primary Fuel Source Prior to 1973

This information reveals the precise kind of coal actually used and therefore the kind of coal for which a company is in the market. Release of this information would provide information about a company's fuel costs if it uses coal. Again, cost information is generally considered as proprietary.

Section II - Items 20, 21 and 22: Savings through Conversion to Coal, 1974 and 1973 Fuel use.

Fuel use relates directly to approximate fuel costs, and to the incremental cost differential if there were to be a conversion. The reasoning above regarding the release of cost-related information applies here as well.

Exhibit E-1. (continued)

NOTE: Estimates of increased cost and quantity might be disclosed in the course of an appropriate FEA proceeding if such disclosure were a necessary part of the proceeding. However, this question is not at issue here.

Section I - Item 6: Total Designed Firing Rate

This item is considered confidential only if there is only one combustor/boiler at a given location. The information then reveals combustor capacity (See discussion above, II-3).

Section I - Item 9: Impediments to Greater Use of Coal

The determination as to the proprietary nature of the answer to this question will be made on a case-by-case basis, since the answers are in essay form.

In the above determinations, no distinction was made between various SIC codes. Although information on fuel costs obviously is more sensitive in fuel-intensive industries, where fuel costs are a larger part of total costs, protection for information which reveals fuel use is being provided in all cases because it was felt that no line could be fairly drawn between significant and nonsignificant cost information.

Exhibit E-1. (end of exhibit)

APPENDIX F

SECONDARY USAGE OF THE

MFBI DATA BASE

SECONDARY USAGE OF THE MFBI DATA BASE

A. SECONDARY USERS

The MFBI data base was employed by secondary users for a diverse set of policy analysis tasks. Secondary users included various groups within the Department of Energy (DOE) and the Environmental Protection Agency (EPA) and their contractors. Table F-1 lists secondary users who were interviewed and indicates the items they used from the MFBI data base.

For secondary users, Table F-2 lists the number of analysis projects that used particular items on the MFBI data base; Table F-3 presents the importance of the MFBI data base; and Table F-4 summarizes comments on the adequacy of the universe relative to the analysis being performed. (Since "universe adequacy" had not been identified as a topic separate from "completeness of information" when the interviews were performed, most secondary users offered no comment about the adequacy of the universe.) Table F-5 summarizes additional data items that would have been used, had they been on the MFBI data base.

1. Secondary Use in DOE

DOE secondary user data needs are defined by: (a) projects in which the user is involved and (b) the data used to expedite the project. Examples of DOE use of the MFBI data base follow in roughly chronological order (significant uses of the MFBI data base are underlined - this information is summarized in Table F-1:

1) Use of the data base in the summer of 1975 by the Natural Gas Task Force (NGTF). Although it is known that this group included high

ranking FEA officials and that it prepared a report on Natural Gas Curtailments, the specific goals of the NGTF are still unknown. It is known that the group prepared a report using MFBI data. However, part of this report was not approved for release by the OCU because it concluded that improper assumptions were being drawn from MFBI data. Computer outputs titled "Natural Gas Task Force" and dated July 28, 1975, were found in system documentation at EIA. Examination of these printouts revealed that the NGTF used the MFBI data base for regionally aggregated primary and alternate energy source information, as well as individual combustor age, capacity, type of use, and pollution control equipment data. Yet, these computer reports were prepared before all the questionnaires had been received, and before error corrections had been completed. We have not determined whether this data was used in the preparation of published reports.

2) Applications of the MFBI data base by EEA (a private contractor) for four different projects. These are:

a) A study of the impact of ESECA for the Office of Coal Utilization (OCU) that began in October 1976 and was completed in March 1977. The study attempted to determine how many boilers were coal capable or could be retrofitted to burn coal. Once this was determined, a study was made of the impact of coal conversion on fuel use and air quality. Alternatives to coal conversion were also covered. The MFBI data base was used as the sole source of boiler location, gas and oil use, and coal capability information.

b) An analysis of the economic effects of portions of the National Energy Plan that dealt with industrial coal use. This analysis was an attempt to estimate the potential for increased coal use. This analysis was an attempt to estimate the potential for increased coal use in 1985 (based on different economic and regulatory scenarios). Emphasis was placed on determining the circumstances under which industry could and would retrofit their boilers to burn coal. The MFBI data base was used for boiler location, capacity, fuel use and coal capability data, and Standard Industrial Classification (SIC) information. Data on new boiler installations were obtained from the American Boiler Manufacturers Association, and MFBI data was used in extrapolating the future fuel use of these new boilers.

c) A study of the economics of coal utilization in the paper industry. This was a detailed case study covering the same items that were mentioned previously in (b). The same types of information were obtained from the MFBI data base, but emphasis was limited to SIC Code 26 (Paper and Wood).

d) Preparation of part of the industrial portion of the Market Oriented Programming Planning Study (MOPPS), published in December 1977. This study was performed to assess the market penetration and impact of different energy technologies. The MFBI data were used in computing combustor utilization (annual fuel use divided by capacity, then multiplied by 8760). These results were classified into high and low utilization, by large and small capacity combustors. Then, the

economics of fuel use for each of these categories was analyzed.

Note that in all of these projects the MFBI data base was used only for boiler data, since the classifications "burner" and "other" were not specific enough.

3) Use of the data base by the Office of Integrative Analysis (OIA) during the first half of 1978 in the development of a model on industrial boiler characteristics. The model was to be part of the DOE's Project Independence Evaluation System (PIES). OIA already had an aggregated model that was being used to forecast energy end-use demand for the period 1985 to 1995. The new model was to allow for a more detailed forecast of industrial fuel use by boilers during the same 1985-95 period. This forecast would be used to optimize fuel allocations during this period based on cost criteria. The MFBI data base was used as a source of boiler fuel use, capacity, installation data, SIC codes, design data and combustor output utilization data.

4) Use by Oak Ridge National Laboratory (ORNL) in several DOE projects. These projects were:

a) "Technical/Economic Problems of Converting Oil and Gas Boilers to Coal" (September 30, 1977), where an attempt was made to determine technical and, to a lesser extent, economic impacts of coal conversion in the Southwest. The study focused on the impacts of several portions of the National Energy Plan, including pricing policies for oil and gas, and accelerated switching of utilities and major industries from oil and gas to coal. The MFBI data base was used as the source of infor-

mation for combustor fuel use, age, capacity, and coal capability data.

b) "Engineering Analyses Related to the Development of an Energy Demand Model for the Paper Industry" (June 1978) was a model designed to provide "engineering assessments of alternative process technologies for energy production and the estimation of costs associated with these technologies." It was hoped this model would be later expanded to include other industries. The MFBI data base was used for plant information (especially location), combustor age, and fuel use data.

c) Assessment of the environmental impacts of ESECA (begun October 1976; not completed) to "determine the regional changes in residuals (air emissions and solid wastes) that would result from the Coal Conversion Regulatory Program." The assessment included evaluation of these effects by Air Quality Control Region and Water Resources Council subarea. The MFBI data base was used to supply plant location information, and combustor fuel use data. This study was performed for the Office of Coal Utilization.

5) Use by Brookhaven National Laboratory (BNL) in work on the National Coal Utilization Project. This effort analyzed portions of the National Energy Plan dealing with coal use. BNL was assessing environmental, health, and social ramifications of increased coal use in 1985 and 1990. The MFBI data base was used in efforts to determine the geographical distribution of industrial emissions. Specifically, the MFBI data were used to disaggregate regional industrial fuel projections to a

county level in order to make predictions concerning industrial emissions. Combustor size, location, SIC requirement and pollution control equipment data from the data base also were used in making these predictions.

2. Secondary Usage in EPA

Examples of EPA usage of the MFBI data base include:

1) Use of the MFBI tape in the preparation of a report titled "Impact of Natural Gas Shortage on Major Fuel-Burning Industrial Installations" for the Energy Strategies Branch of the EPA. Although this report was initiated by the EPA, it was prepared by Foster Associates (a private contractor). The report discussed the impact of natural gas curtailments, fuel switching and other energy policies on large industrial users of natural gas. Effects of these policies on air quality were also studied. The MFBI data base was used as the source of data regarding combustor type, fuel use, primary and alternate energy sources, and the utilization of combustor output. Work on this report began in May 1976; it was published in March 1977.

2) Use of the MFBI data base in conjunction with other sources - the EPA National Emissions Data System (NEDS) data base and the American Boiler Manufacturers (ABMA) data base - by a second EPA office in 1977 for a study on clean air standards and coal use in industry. This study emphasized coal cleaning and sulfur dioxide emission control technology. The goal of this study was to determine if individual states could meet clean air standards. The MFBI data base was used to establish fuel consumption figures by installation in order to relate them to state imple-

mentation plan requirements for sulfur dioxide. Specifically, fuel use and capacity figures from the data base were used in this effort. Battelle (a private contractor) worked extensively with the EPA on this project. They also used the MFBI tape to construct a census of industrial boilers by age and size for the EPA. The EPA used the information to evaluate revisions in new federal sulfur dioxide emissions standards for industrial boilers.

3) Use of the tape by a third EPA office from December 1977 to May 1978 for the industrial portion of a study on the availability of waste products for consumption by industry and utilities. Midwest Research Institute (a private contractor) used the MFBI data to aggregate total design firing rate and fuel use on a county-by-county basis in order to assess the possible use of waste products as a source of energy.

4) Use of the data base by IRT (a private contractor), who was working on the EPAS Strategic Environmental Assessment System (SEAS) model - a model of the economy that is being used to make forecasts concerning pollution through the year 2000. The SEAS model is broad in scope, and the MFBI was used in only a small part of it. The MFBI boiler data base was used to establish regional fuel use in modules describing pollution levels by region. Because the MFBI data base could explicitly identify combustor locations, densities, and fuel use, it was used to break down state coal and residual oil use figures obtained from NEDS into county totals. It was not used in determining county totals of natural gas or distillate fuel because large amounts of these fuels are consumed by smaller combustors not covered by the MFBI survey.

TABLE F-1

USE OF DATA ELEMENTS FROM MFBI DATE BASE IN INDIVIDUAL PROJECTS BY SECONDARY USERS

USER	PROJECT DESCRIPTION	MFBI LOCATION	NO. OF COMBUSTORS AT INSTALLATION	TOTAL DESIGN FIRING RATE	SIC CODES	COMBUSTOR TYPE	COMBUSTOR CAPACITY	COMBUSTOR AGE	PRIMARY ENERGY SOURCE	ALTERNATE ENERGY SOURCE	COAL CAPABILITY	1974 FUEL USE	COMBUSTOR OUTPUT UTILIZATION	POLLUTION CONTROL EQUIPMENT STATUS
NATURAL GAS TASK FORCE (NGTF)	1) Natural Gas Task Force - A report on natural gas curtailments.						X	X	X	X			X	
EEA (A PRIVATE CONTRACTOR)	2) A study on the impact of ESECA - This study emphasized coal capable boilers and boilers that could be retro fitted to burn coal	X									X	X		
-DOE-	3) An analysis of the economic effects of portions of the National Energy Plan that dealt with industrial coal use. This analysis attempted to estimate the potential for increased coal use in 1985.	X			X		X				X	X		
-DOE-	4) A study on the economics of coal use in the paper industry. Same emphasis as 3) above, but limited to the paper industry.	X			X		X				X	X		
-DOE-	5) Market Oriented Programming Planning Study (MOPPS) - This study was performed to assess the market penetration and impact of different energy technologies.						X					X		
Office of Intergrated Analysis (OIA)	6) A model on industrial boiler characteristics specifically, this model was to allow for a detailed forecast of industrial fuel use by boilers during the period of 1985-1995.				X		X	X			X	X	X	
Oakridge National Laboratory (ORNL)	7) "Technical/Economic problems of converting oil and gas boilers to coal". This was a study on the technical and economic impacts of coal conversion in the southwest.						X	X			X	X		
-DOE-	8) "Engineering Analysis related to the development of an Energy Demand Model for the Paper Industry" - This was a study on the impacts and costs of alternative energy technologies in the paper industry.	X						X				X		
-DOE-	9) A study on the environmental impacts of ESECA. This study attempted to forecast changes in air emissions and solid wastes as a result of the coal conversion regulatory program.	X										X		
Brookhaven National Laboratory (BNL)	10) A study that was part of the National coal utilization project. This project assessed the social, enviornmental and health ramifications of increased coal use in 1985 and 1990.	X			X		X							X
Foster Associates (A private contractor)	11) "Impact of natural gas shortage on MFBIs," This report discussed the impact of natural gas curtailments, fuel switching and other energy policy on large industrial users of natural gas.					X			X	X		X	X	
Battelle Memorial Institute (A private contractor)	12) A study on clean air standards and sulfur dioxide emission control techology. The goal of this study was to determine if individual status could meet clean air standards.						X					X		
Midwest Research Institute (a private contractor)	13) A study on the availability of waste products for consumption by industry and utilities.	X		X								X		
TRW (A private contractor)	14) A study that was part of the Strategic Environmental Assessment Model (SEAS). The MFBI data base was used in modules describing industrial pollution levels by region.	X										X		
Congressional Budget Office (CBO)	15) A study on the industrial use of coal this study concentrated on the use of coal gasifiers in industry.				X		X	X			X	X		
Office of coal utilization (OCU)	16) A study on the characteristics of combustors in industry, with an emphasis on the potential savings that would result from conversion to coal.	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE F-2

USE OF MFBI DATA ELEMENTS BY SECONDARY USERS

Data Element	Number of Projects Requiring that Data Element
MFBI location (Question I-1)	9
No. of combustors at installation (Question I-4, 5)	1
Total designed firing rate (Question I-6)	2
SIC codes (Question I-8)	6
Combustor type (Question II-2)	2
Combustor capacity (Question II-3)	10
Combustor age (Question II-5)	6
Primary energy source (Question II-8)	3
Alternate energy source (Question II-9)	3
Coal capability (Questions II-12, 13, 14)	7
1974 Fuel use (Question II-21)	14
Combustor output utilization (Question II-23)	4
Pollution control equipment status (Question II-3, 4, 5)	3
Number of secondary users 17	

TABLE F-3

IMPORTANCE OF THE MFBI DATA BASE

TO SECONDARY USERS

Importance to Project	No. of Projects
1) Primary Source of Information	7
2) Important, but data base was one of several sources	11
3) Secondary confirmatory source	1
4) No Comment on Importance	3

TABLE F-4

ADEQUACY OF THE UNIVERSE FOR SECONDARY USERS

Adequacy of Universe for User	No. of Users
1) Universe Adequate	2
2) Universe inadequate (100 million btu/hr lower bound to high)	4
3) No comment	11

TABLE F-5

ADDITIONAL DATA ITEMS

THAT WOULD HAVE BEEN USEFUL TO SECONDARY USERS

Item	No. of Users Citing a Use for This Item
Additional combustor types	5
Additional fuel types	4
Plant county information	4
Combustor Utilization	2
Factors affecting conversion to coal	2
Coal characteristics* (sulfur content, etc.)	2
More information on currently installed pollution equipment	2
More detail on combustor output utilization	1
Plant fuel - use	1

* Questions included in questionnaire but not computerized

B. USER PERCEPTIONS

Table F-1 has already listed the secondary users and indicated the data items they used. This section is concerned with users' perceptions of the adequacy of the data base, and consists primarily of Table F-6, which summarizes user perceptions concerning its accuracy and completeness. For comparison, perceptions of primary users are also mentioned in this section.

1. Perceptions of Primary Users

An inspection of Table F-6 reveals differences between the perceptions of the two primary users of the data base. The user responsible for the initial selection of candidates for prohibition orders found the data base to be a useful and accurate tool. However, the user responsible for the specific identification of candidates for prohibition orders was much more critical of its accuracy and usefulness. He stated it was inaccurate and incomplete and felt it was used incorrectly in the regulatory process. Further specific comments may be found in Table F-6.

2. Perceptions of Secondary Users

Table F-6 indicates that some secondary users of the MFBI data base questioned its adequacy. It also indicates that perceptions of secondary users concerning the accuracy and completeness of the MFBI data base varied significantly. One of the recommendations of this report is that procedures be developed whereby secondary users can learn of other users perceptions, thereby avoiding repetitious "discovery" of problems with the data base.

3. Problems Encountered in Secondary Usage

Examination of users' comments and perceptions revealed several common complaints and problems. These problems include:

1) Inaccurate data - the most frequently used data, combustor capacity and fuel use figures, were most often reported as inaccurate.

2) Incomplete data - missing data made it difficult for some users to perform comprehensive analysis or use aggregate statistics. Many felt that missing data was a result of poorly defined or meaningless terms and ambiguous questions on the original survey form. Users were especially critical of the combustor type definitions ("boiler," "burner," "other").

3) Badly defined or inadequate universe - most users felt the data base was fairly complete in its coverage of boilers, but less successful in capturing non-boiler combustors. Users also felt that the 100 million Btu/hr lower limit was much too high for their purposes.

4) Inclusion of insufficient information in the data base - many users reported that the data base could have been more useful if it had contained more or different information. Different users mentioned different unmet needs, but information or combustor utilization, and more detailed emissions and pollution control equipment data, were mentioned consistently as items that could have been of great use to secondary users.

C. DISSEMINATION PROCEDURES

The MFBI system was created to implement ESECA. It was used accordingly in the regulatory functions of the Office of Coal Utilization. MFBI data has also been disseminated to two kinds of users: secondary users within the Government (including its contractors) and tertiary users who obtained MFBI data through the FOI Office in OCU. Because of the proprietary nature of parts of the MFBI data base (see Appendix E), the dissemination process requires scrutiny. This section describes various routes by which MFBI information has been transmitted to secondary and tertiary users.

1. Dissemination to Secondary Users

Secondary users have obtained access to MFBI data through three government sources:

1) The Office of Coal Utilization (within ERA)
2) The Energy Information Administration (EIA)
3) The Environmental Protection Agency (EPA)

Factors affecting the dissemination process include not only the kind of organization receiving a request for MFBI data, but also:

1) the initiator of the request, and
2) the nature of information desired.

Table F-7 describes the step-by-step history of dissemination of MFBI data to secondary users.

a) Dissemination through OCU

Information in the MFBI data base was first released in July of 1975 by the OCU to the Natural Gas Task Force, which was prepar-

ing a study on Natural Gas Curtailments. The pressing circumstances under which the Natural Gas Task Force operated in 1975 necessitated the release of MFBI data despite the fact that forms were still being received by the OCU and that error corrections had not been completed.

Both the Director of the OCU and the Chief of the Industry Branch of OCU currently have the authority to disseminate MFBI data. An average of one to two requests are received by the OCU each week. Requests from potential users not in the Federal Government are routed through the FOI office.

The procedures for handling requests from Government users vary with the nature of the information required. If this information is non-proprietary (aggregated statistics over a region, for example), no follow-up is made. The request is granted and sent to ODS for programming. If the information requested is proprietary, a letter is sent to the government user informing him of the proprietary aspects of this data. A letter from the initiator of the request stating the purpose of the request and the means by which data will be safeguarded must then be sent to the OCU. Although a file of these requests is maintained by the OCU, this file is incomplete. Once a satisfactory letter has been received, a member of the OCU relays the request to a programmer for the ODS. He generates the required data and returns it to the OCU for transmittal to the government user. Several government agencies, congressmen, and contractors have obtained MFBI data in this way.

MFBI data is also disseminated by the OCU to OCU contractors who

need the data base. Two consulting firms and one National Laboratory have obtained the complete MFBI data base (tape) in this manner.

b) Dissemination through EIA

Dissemination of MFBI data through the EIA currently takes one of three forms, depending upon whether the request comes from DOE, other branches of government, or non-government users.

Requests from DOE

Requests from users in the Department of Energy are routinely handled and processed by ODS. A memo or letter listing the required data is sent to ODS and a programmer generates the desired data. If the desired data is significantly different from one of the standard MFBI reports (see Exhibit F-1), a Data Service Request (DSR) is required (see Exhibit F-2). The DSR is given to a programmer, who makes a cost estimate which is submitted for approval by the DSR officer and the Deputy Assistant Administrator for Data Services. The DSR is then sent back to the programmer for report generation and the resulting reports are distributed to the user. Exhibit F-3 is a list of past data service requests.

Requests from other government agencies

A DSR is required for requests from government agencies outside the DOE. These DSRs are handled in the same way as a DSR from a DOE user. Additional DSRs are not required for follow-up requests from government users.

Requests from non-government users

Requests for MFBI data through ODS from non-government users are sent to the FOI Office of OCU. However, in cases where contractors to the EIA require MFBI data, a memorandum is sent to the ODS and the requested data (usually the tape) is generated and transmitted to the user.

c) Dissemination through EPA

The complete MFBI data base was transmitted to the EPA on June 2, 1976, to permit analysis of the environmental effects of natural gas curtailments. The EPA has since maintained independent control over the use and dissemination of its copy of the MFBI tape. Several branches of the EPA and five EPA contractors have received a tape of the complete MFBI data base. Dissemination to these contractors is communicated neither to the OCU nor to the EIA by the EPA.

2. Analysis of the Dissemination Process

The dissemination process for the MFBI data base has taken on several forms since its creation in 1975. Three different directors of the OCU have chosen different dissemination policies, and no clear-cut dissemination process exists today. Consequently, the following situations have developed:

1) Some users have discovered the existence of MFBI data by word of mouth, while other potential users have discovered it too late for the MFBI data to be of any use.

2) Substantial confusion exists concerning appropriate pro-

cedures for obtaining MFBI data. The independent dissemination of MFBI data by three government agencies has created many different routes a user or potential user can follow to obtain data.

3) Some users, especially those unfamiliar with proper administrative channels, have had considerable difficulty obtaining MFBI data. Administrative "red tape" also has been the source of delays in obtaining this data.

4) Many users have received insufficient documentation of MFBI tapes. LBL received no record layout for one version of the tape.

5) No requirement or mechanism exists for informing the OCU of of error findings, corrections, and format alterations. Furthermore, there is no method for informing other secondary users of the existence of errors. As a result, each user has constructed his own version of the MFBI data base.

6) Several analyses using the data base have been repeated, because users have not been informed of other analyses involving the MFBI data base. Examples of these repetitions include:

- two studies on natural gas curtailments
- two models of the paper industry
- two studies of the environmental effects of ESECA

In each case, the users did not know of the existence of a similar project.

7) Users of the data base are not aware of the findings of previous users of the data base. As a result, the same errors in the data base have been found independently by different users, while other users have never learned of these errors.

8) No requirement or mechanism exists for returning confidential data to the agency providing the data.

9) No record of users of the MFBI data base has been maintained. Thus, it is not known how many people now have MFBI data. No one knows how many versions of the data base have been developed or how they differ from each other.

TABLE F-6

USER PERCEPTIONS OF THE ADEQUACY OF THE MFBI DATA BASE

USER	Type of Use	Degree of Involvement	Usefulness of the MFBI Data Base	Adequacy of the Universe	Completeness of the Information	Adequacy of the Information Requested in the S-O Form	Accuracy of the MFBI Data Base	Alterations in the copy of the Data Base that was used
JOHN DEAN (OCU)	1. Primary User : (a)User designed system and used it to reduce the number of candidates for prohibition orders from 6289 combustors to 281 combustors. (b)User assessed the political input of coal conversion upon U.S. dependence on oil and natural gas.	User was involved in the design and regulatory use of system.	The MFBI data base was the sole source of information for reducing the number of candidates for prohibition orders thus serving its purpose.	----------	User stated Universe was 95% complete. He felt it was complete in all essential items.	User stated technical experts should have been consulted more extensively.	User felt all systematic errors had been eliminated.	Along with assistants, made many error corrections. Made phone calls to respondents concerning errors. Found other errors that were considered irrelevant to regulatory effort. These errors were not corrected in the data base.
LOREN FARRAR (OCU)	2. Primary User: (a) User teased choice of specific candidates for prohibition orders on MFBI system.	User made final regulatory decision based on MFBI system.	User said he could have managed without the MFBI system.	----------	User estimated that up to 1/3 of the universe was not included in the MFBI system.	User stated that the use of questions requiring "yes" or "no" responses to determine coal capability was inadequate because it allowed respondents to exclude themselves from consideration as a candiate for a prohibition order. Stated serial number of combuster should also have been included.	User stated much of data was inaccurate especially coal capable data.	Found some errors but these errors were not corrected.
EPA - Energy Strategies Branch	3. Secondary User, Government: EPA, User employed the MFBI system in efforts to assess the impact of natural gas curtailments, looking at alternate fuels & air quality effects.	User referred to NEDS and industrial sources but relied heavily on MFBI system.	User thought MFBI system was better than NEDS and was necessary source for information.	----------	User noted incomplete definition of combustor types and fuels. User also noted much missing data related to stack conditions & air quality.	User wanted county identification and fuel use data by plant.	Users stated errors in fuel use data were due to poor fuel type definitions.	User worked with contractor on clean-up gas data, in the MFBI file.

TABLE F-6 (continued)

USER	Type of Use	Degree of Involvement	Usefulness of the MFBI Data Base	Adequacy of the Universe	Completeness of the Information	Adequacy of the Information Requested in the S-O Form	Accuracy of the MFBI Data Base	Alterations in the copy of the Data Base that was used
FOSTER ASSOCIATES	4. Secondary User, Contractor: User was under contract with EDA to study impacts of a natural gas shortage on major fuel burning installations.	User examined each MFBI combuster record individually.	MFBI data was necessary as the only data source with individual combustor fuel use figures.	User felt that the exclusion of combustors with a firing rate less than 100 MM Btu/hr should be changed.	User felt MFBI system coverage was pretty good	User desired information (in aggregate would be sufficient) on combustors with a firing rate less than 100MM Btu/hr	User felt aggregations from original data base were not sufficiently accurate to use.	User made corrections in gas data. Reported sometimes to OCU
EPA Fuel Process Branch	5. Secondary User Government EDA: User worked with contractor in review of clean coal standards and coal use in industry. The MFBI system was used to input coal use data.	----------	Research would have been done using contractors data if MFBI data was not available.	----------	----------	User desired more information on coal characteristics, specificially mining and preparation details and state regulations affecting coal use.	----------	----------
BATTELLE	6. Secondary User, Contractor: (a) User was under contract with the EDA to assess the environmental impact of physical coal cleaning by industrial coal burners. (b) User is utilizing MFBI system to establish an industrial boiler universe	The User worked with individual combustor records and performed error checks on a systematic basis.	The MFBI system was the only available source of information for non-boilers.	User criticism concerned the 100 MM Btu/hr lower size boundary.	User guessed MFBI system captured 95% of the industrial target universe. User said the data base was the most complete source of non-boiler data available.	User desired a further breakdown of combustor and fuel types.	User did not see any major errors that would invalidate data. User felt data was as accurate as any other data sources.	----------

TABLE F-6 (continued)

USER	Type of Use	Degree of Involvement	Usefulness of the MFBI Data Base	Adequacy of the Universe	Completeness of the Information	Adequacy of the Information Requested in the S-0 Form	Accuracy of the MFBI Data Base	Alterations in the copy of the Data Base that was used
IRT	7. Secondary User, Contractor: User used MFBI data in the development of a portion of a large econometric model designed to project pollution levels through the year 2000.	User received each installation record in order to add county codes to MFBI system.	The MFBI system was the best industrial fuel use data available.	User recommended an ongoing MFBI system to update universe and collect missing data.	User felt question vagueness contributed to omissions in the data base.	User desired more explicit emissions and pollution control specifics. User wanted more detail regarding specific energy usage, time & cost, factors of conversion, and the adaptability of various industries to alternate fuels.	User noted errors in capacity and fuel use data and distrusted the SIC code detail given.	----------
Congressional Budget Office	8. Secondary User, Government Congressional Budge Office User used MFBI industrial boiler data for report on industrial coal use.	User had access to MFBI reports only that were a combination of aggregate and specific data.	The MFBI system was the Users only major source of industrial boiler data.	----------	----------	User felt combustor types were meaningless. User wanted utilization rate & more information on boiler sizes.	User noted errors in capacity and fuel use data and distrusted the SIC code detail given.	----------
ULTRA SYSTEMS	9. Secondary User, Contractor: (a) User used MFBI system to validate EPA AEROS (b) based development of net operating cost differentials on MFBI system (c) studied economic impact of industrial coal conversion.	User worked extensively with MFBI system.	User referenced other data bases and working groups in addition to MFBI.	User felt all fuel burners 50,000 Btu/hr or greater should be included in the MFBI data base	----------	----------	User noted 2500 records with errors from 6300 installation records.	----------

TABLE F-6 (continued)

USER	Type of Use	Degree of Involvement	Usefulness of the MFBI Data Base	Adequacy of the Universe	Completeness of the Information	Adequacy of the Information Requested in the S-O Form	Accuracy of the MFBI Data Base	Alterations in the copy of the Data Base that was used
Office of Mid-Range Analysis	10. Secondary User, Government: EIA, Office of Integrated Analysis The MFBI system was used as a basis for a model of specific combustor characteristics.	User worked with individual installation records	The model was developed using only the MFBI system	----------	User noted much missing data.	Combustor type was not identified to degree desired by user.	User felt accuracy of data was questionable, especially capacity and fuel use figures.	----------
EEA	11. Secondary User, Contractor: User employed the MFBI system in several projects, including: (a) economics of coal use in the Paper Industry - Resource Applications (b) Impact of the NEP as it pertains to coal use - DOE Policy & Evaluation (c) environmental impacts of ESECA implementation-OCU (d) impact of various energy technologies-DOE, Energy Technology Division	User worked with the MFBI system extensively on several projects	User believed that coal-capable analysis was dependent on the MFBI system & that studies on the economics of coal conversion would have been restricted without it.	User felt that the Universe should be restricted to boilers but should include more detailed information on these boilers	User noted missing fuel use & capac ity figures.	User felt fuel catagories and combustor types should be expanded.	User noted ambiguous questions, incorrect SIC codes, incorrect output percentages and confusion over combustor types.	----------

TABLE F-6 (continued)

USER	Type of Use	Degree of Involvement	Usefulness of the MFBI Data Base	Adequacy of the Universe	Completeness of the Information	Adequacy of the Information Requested in the S-O Form	Accuracy of the MFBI Data Base	Alterations in the copy of the Data Base that was used
Office of Industrial Fuel Policy	12. Secondary User, Government: DOE -- Office of Industrial Fuel Policy; User worked with contractor in building a model of industrial fuel choice related to the NEP.	Because of time constraints, the MFBI system was relied on heavily	User referenced ABMA and NEDS but used MFBI system primarily.	User felt combustor size constraint limited survey usefulness.	User felt non-boiler universe was incomplete but boiler coverage was good.		User questioned accuracy of fuel use data.	
DOE Energy Technology Division	13. Secondary User, Government: DOE -- Energy Technology Division; User used the MFBI system in assessing the economic impact and market penetration of new energy technologies.	The MFBI system was used to augment the Energy Consumption Data Base.	The MFBI system was the only source for combustor size and capacity information.		User felt non-boiler data was weak with much information missing.	User wanted more detailed information.	User noted lack of clearly defined terms and ambiguity in the questions.	
ORNL	14. Secondary User, Contractor: Oak Ridge National Laboratory; (a) User used the MFBI system in preparation of an energy demand model for DOE; (b) User used the MFBI system to check census data.	User has worked extensively with the MFBI system and has drafted a review of the system.	User felt the MFBI system was a useful source of information.	User felt smaller boiler data would be useful.		User wanted more detailed fuel types, information on factors affecting cogeneration, and more detailed combustor types.	User noted errors in plant locations and fuel use data. User questioned figures showing greater than 30% electrical generation output. Problems with unites (gallons or barrels).	User corrected MFBI location data.

TABLE F-6 (continued)

USER	Type of Use	Degree of Involvement	Usefulness of the MFBI Data Base	Adequacy of the Universe	Completeness of the Information	Adequacy of the Information Requested in the S-O Form	Accuracy of the MFBI Data Base	Alterations in the copy of the Data Base that was used
Science Applications Inc.	15. Secondary User, Contractor; User was concerned with coal conversion in the Southwest on a project for ORNL.	User used a tape listing with some data removed.	The report was based solely on the MFBI system.		User said the data did not appear incomplete.	User felt fuel use types were inadequate.		
BNL	16. Secondary User, Contractor: Brookhaven National Laboratory; User used the MFBI system in developing energy policy and analysis for the DOE.	User has worked closely with the MFBI system.	Usefulness was limited because of poor system documentation.		User noted many blank fields on tape.	User wanted more specific information on boiler types and pollution control equipment.	User felt fuel use and capacity figures were in error.	
EPA Division of Stationary Sources	17. Secondary User, Government: EPA; Study on the availability of waste products as an energy source.	Never used MFBI data.	Only information on industrial fuel use available.	Did not understand the limitations of MFBI universe.		User felt the data base contained all the information necessary for the study.	User felt the data was sufficiently accurate to be used in aggregated form.	
Midwest Research Institute	18. Secondary User, Contractor: Study on the availability of waste products as an energy source.	Extensive use of MFBI tape.	Only information on industrial fuel use available.			All information needed was contained in MFBI data base.	Found alphanumeric errors; wondered whether the data had ever been checked.	Merged MFBI tape with ZIPCODE tape relating ZIP codes to counties.

TABLE F-7

THE DISSEMINATION OF MFBI DATA TO SECONDARY USERS

User	Difficulty of Access	Source of Data	Form of Data	DSR No.	Duration of Use
Natural Gas Task Force	None; DSR was granted in one day.	OCU	reports	76-003	7/7/75 - ?
EPA Research Triangle Park (RTP), Energy Strategies Branch	Obtaining tape took five months. Delayed start of project.	OCU through ODS	tape	76-319	6/2/76 - present
Foster Associates	Same as above.	EPA	tape	--	6/2/76 - present
EEA	Had no problem in obtaining access; access time did not delay project start-up.	OCU	tape	--	10/76 - present
Office of Industrial Fuel Policy	Worked with contractor that already had access. Did not delay start of project.	OCU (DOE contract)	tape	--	2/77 - present
DOE Energy Technology Division	Had tremendous difficulty obtaining access.	?	tape	--	Spring 1977 - 12/77
EPA, Fuel Process Branch	No problem gaining access; no delay due to access time.	EPA	tape	--	6/77 - 4/78
Rattlelle Memorial Institute	No problem gaining access; no delay due to access time.	EPA	tape	--	6/77 - 4/78
Congressman Dingell	Not interviewed.	ODS	reports	77-296	7/22/77 -

TABLE F-7 (continued)

User	Difficulty of Access	Source of Data	Form of Data	DSR No.	Duration of Use
Science Applications, Inc.	No problem gaining access; did not delay start of project.	Oakridge	Report covering entire data base	--	8/77 - 1/78
Congressional Budget Office	Access obtained after a letter was written to OCU. Access time did not delay start of project.	OCU through ODS	reports	77-370	10/5/77 - 6/78
Ultra Systems	Access obtained after a letter was written to OCU. Access time did not delay start of project.	OCU	tape	--	10/77 - present
Teknekron	--	EPA	tape	--	
EPA, Division of Stationary Sources, Cincinnati, OH	Project delayed one month because user did not initially know of data base. Two month delay due to difficulty in determining who controlled tape.	EPA	tape	--	12/77 - present
Midwest Research Institute	Same as above. User stated communication with OCU was ineffective.	EPA	tape	--	12/77 - present
IRT	No problem gaining access. No delay in project due to access time.	EPA & OCU (two versions)	tapes	--	12/77 - present
Oak Ridge National Laboratory (second project)	"It wasn't easy."	OCU	tape	--	1/78 - present

TABLE F-7 (continued)

User	Difficulty of Access	Source of Data	Form of Data	DSR No.	Duration of Use
Office of Mid-Range Analysis	Three to four weeks to obtain access. Access was through a software package that retrieves MFBI data from ODS.	ODS	tape	--	1/78 - present
National Laboratories; ORNL, LBL, ANL, BNL, PNL	No problem gaining access. No delay in project due to access time.	DOE contract through OCU	expurgated version of tape created by EPA contractor	--	3/78 - present
Institute for Energy Analysis	Letter was written to OCU. Access time was two weeks.	OCU	tape	--	3/78 - present
LBL	Several phone calls were required. DSR took one month to services access time, resulted in delay in portion of project.	ODS	MFBI reports	78-202	5/78 - present
LBL	EPA General Counsel approval required. One and one-half months to obtain tape. Access time resulted in delay in portion of project.	EPA Contractor	tape	--	7/78 - present
LBL	Access time was two months. Resulted in delay in portion of project.	ODS	tape	--	8/78 - present
LBL	One and one-half month access time. DOE General Counsel approval was necessary. Access time resulted in delay of portion of project	tape held by ORNL	tape	--	8/78 - present

PROCEDURE	MEMBER NAME	MFBI REPORT #	TITLE
$MFBIDMP	RPT01	1	Complete Printout of FEA C-602-S-0 by Record I.D.
	RPT01G	1G	Prinout of FEA C-602-S-0 by record I.D. to government inst
$MFBIDMP	RPT02	2	Complete Printout of FEA C-602-S-0 by MFBI State
$MFBICAN	RPT03A	3A	Potential Conversions from Coal
$MFBICAN	RPT03B	3B	Potential Conversions to Coal
$MFBISPL	RPT03C	3C	Potential Conversions from Coal by FEA Regions
$MFBISPL	RPT03D	3D	Potential Conversions to Coal by FEA Regions
**	RPT04	4	Total MFBI Designed Firing Rate
$MFBISPL	RPT04A	4A	Total MFBI Designed Firing Rate (Version 2)
$MFBICMB*	RPT0501	5.01	Data on Individual Combustors (Ranked by COMB.CAP.)
$MFBICMB*	RPT0502	5.02	Data on Individual Combustors (Ranked by COMB.CAP. for installations unable to convert to coal)
$MFBICMB*	RPT0511	5.11	Data on Individual Combustors (Ranked by TYPE COMB)
$MFBICMB*	RPT0512	5.12	Data on Individual Combustors (Ranked by TYPE COMB for installations unable to convert to coal)
$MFBICMB*	RPT0521	5.21	Data on Individual Combustors (Ranked by YR CONST)
$MFBICMB*	RPT0522	5.22	Data on Individual Combustors (Ranked by YR CONST for installations unable to convert to coal)
$MFBICMB*	RPT0531	5.31	Data on Individual Combustors (Ranked by TYPE OF FUEL &
$MFBICMB*	RPT0532	5.32	Data on Individual Combustors (Ranked by TYPE OF FUEL & for installations unable to convert to coal)
$MFBICMB*	RPT0541	5.41	Data on Individual Combustors (Ranked by AIR QUAL EQUIP)
$MFBICMB*	RPT0542	5.42	Data on Individual Combustors (Ranked by AIR QUAL EQUIP for installations unable to convert to coal)
$MFBICMB*	RPT0551	5.51	Data on Individual Combustors (Ranked by PRIME FUEL SOU
$MFBICMB*	RPT0552	5.52	Data on Individual Combustors (Ranked by PRIME FUEL SOU for installations unable to convert to coal)
$MFBICMB*	RPT0561	5.61	Data on Individual Combustors (Ranked by State & CAPACI
$MFBICMB*	RPT0562	5.62	Data on Individual Combustors (Ranked by State & CAPACI for installations unable to convert to coal)

Exhibit F-1. Reports that can be generated using the MFBI data base.

PROCEDURE	MEMBER NAME	MFBI REPORT #	TITLE
$MFBICMB*	RPT05A1	5.A1	Data on Individual Combustors (Ranked by Combustor Capac
$MFBICMB*	RPT05A2	5.A2	Data on Individual Combustors (Ranked by Combustor Capac for installations unable to convert to coal)
$MFBICMB*	RPT05B1	5.B1	Data on Individual Combustors (same as Report 5.A1 excep for State, Regional and National subtotals and totals)
$MFBICMB*	RPT05B2	5.B2	Data on Individual Combustors (same as Report 5.A2 excep for State, Regional and National subtotals and totals)
$MFBILST	RPT06A	6A	MFBI Alphabetical Listing
$MFBILST	RPT06B	6B	MFBI Record I.D. Listing
$MFBILST	RPT06C	6C	MFBI Alphabetical Listing by Parent Company
$MFBILST	RPT06D	6D	MFBI Alphabetical Listing by MFBI Name
$MFBILST	RPT06E	6E	MFBI Listing by Record ID for States and FEA Regions
$MFBILST	RPT06F	6F	MFBI Listing by Parent Name for States and FEA Regions
$MFBILST	RPT06G	6G	MFBI Listing by City Name for States and FEA Regions
		7	(Deferred)
$MFBILST	RPT08	8	Missing Companies Report
$MFBILST	RPT09	9	Combustor Summaries by STATE
$MFBILST	RPT09	10A	Energy Sources of Combustors > 99M BTU/HR (Quantity)
$MFBILST	RPT09	10B	Energy Sources of Combustors > 99M BTU/HR (BTU Cons)
$MFBILST	RPT09	11A	Primary Energy Sources of Combustor > 99M BTU/HR with no Alternate Energy Source (Quantity)
$MFBILST	RPT09	11B	Primary Energy Sources of Combustor > 99M BTU/HR with no Alternate Energy Source (BTU Cons.)
$MFBILST	RPT12	12	Dual Firing Report
$MFBIPES	RPT13	13	Combustors Using Primary Energy Source Coal with other Alternate Sources
$MFBIPES	RPT14A	14A	Comparison of Reported and Computed Prime Energy Sources
$MFBIPES	RPT14A	14B	Combustors with Prime Energy Source of Coal

Exhibit F-1 (continued).

PROCEDURE	MEMBER NAME	MFBI REPORT #	TITLE
$MFBIPES	RPT14A	14C	Combustors with Prime Energy Source of Residual
$MFBIPES	RPT14A	14D	Combustors with Prime Energy Source of Distillate
$MFBIPES	RPT14A	14E	Combustors with Prime Energy Source of Gas
$MFBIPES	RPT14S	14S	Comparison of Reported and Prime Energy Sources by Regio
$MFBISIC	RPT15	15	Primary Energy Source by SIC Category
$MFBISPL	RPT16	16	MFBI's Intending to Install Topping Turbines
$MFBISPL	RPT17	17A	Special MFBI Report for Natural Gas Task Force
$MFBISPL	RPT17	17B	Special MFBI Report for Natural Gas Task Force (Sorted b
$MFBIAGE	***	18A	Breakdown of Fuel Use by Age and Energy Source (Summary
$MFBIAGE	***	18B	Frequency Breakdown of Fuel Use by Age and Energy Source (All Combustors)
$MFBIAGE	***	18C	Quantity Breakdown of Fuel Use by Age and Energy Source (All Combustors)
$MFBIAGE	***	18D	Frequency Breakdown of Fuel Use by Age and Energy Source (Combustors with Historical Coal Burning Capability)
$MFBIAGE	***	18E	Quantity Breakdown of Fuel Use by Age and Energy Source (Combustors with Historical Coal Burning Capability)
$MFBIAGE	***	18F	Frequency Breakdown of Fuel Use by Age and Energy Source (Combustors by Consumption Categories)
$MFBIAGE	***	18G	Quantity Breakdown of Fuel Use by Age and Energy Source (Combustors by Consumption Categories)

* Refer to Run Procedures, Item II.B.4.ii.

** Can only be run as a single report execution.

*** Can only be run as a report series.

Exhibit F-1 (continued).

PROCEDURE	MEMBER NAME	MFBI REPORT #	TITLE
MFBILST	RPT19	19A	Parent Company Capacity
MFBILST	RPT19	19B	Parent Company Consumption
MFBICAN	RPT20	20	Candidate Selection Reports
MFBICAN	RPT21A	21A	Candidate Installation Summary
MFBICAN	RPT21B	21B	Candidate Combustor Summary
MFBISIZ	RPT22	22	Output Utilization by Boiler Size
MFBICAN	RPT23	23	Combustors Modified to Burn Coal
MFBISIC	RPT24	24	Combustor Size Distribution by 2-digit SIC
MFBISIC	RPT25	25	Combustor Size Distribution by 3-digit SIC
MFBISIZ	RPT26	26A	Fuel Use and Distribution by Combustor Size
MFBISIZ	RPT26	26B	Fuel Use and Distribution by Historical Coal-Unit S:
MFBISIZ	RPT26	26C	Fuel Use and Distribution by Installation Size

Exhibit F-1 (continued).

GY ADMINISTRATION

DATA SERVICES REQUEST (DSR) 14 JUL. REC'D

1. NAME OF ORGANIZATION MAKING REQUEST: OFFICE OF PROGRAM PLANNING, INFORMATION, AND EVALUATION	2. ORGANIZATION CODE: R	3. PERSON TO CONTACT: DAVE WEATHERS
4. TITLE: ERD SYSTEMS COORDINATOR	5. PHONE NO. 566-7681	6. DATE OF REQUEST: 5 Aug ~~JULY 14~~, 1977
7. REQUEST TITLE: SPECIAL MFBI REPORT FOR CONGRESSMAN DINGELL	8. REQUEST NUMBER: ERD774QUP1 77-296/6217	
9. KIND OF SERVICES: REPORTS OUTPUT	10. OFFICE REQUIRING SUPPORT: OFFICE OF COAL UTILIZATION	

11. LOCATION WHERE SERVICE WILL BE PROVIDED: WASHINGTON, D.C.

12. BASIS FOR REQUIREMENT (Justification): CONGRESSIONAL REQUEST

13. GENERAL DESCRIPTION AND OBJECTIVES OF SERVICE: OUTPUT REPORTS AS ATTACHED

14. REQUESTED START DATE: JULY 14, 1977	15. REQUIRED COMPLETION DATE: ~~JULY 19, 1977~~ JULY 29, 1977

16. AUTHORIZED BY: JULY 14, 1977 (Date)

DAVID N. WEATHERS, ERD SYSTEMS COORDINATOR (Name, Title, Organization)

17. VALIDATED BY: ODS Design and Procedures Support Division — 14 JUL 1977 (Date)

18. APPROVAL: Deputy Assistant Administrator for Data Services — ☐ APPROVED ☐ DISAPPROVED — Date

PRIORITY: ☐ TOP ☐ HIGH ☐ LOW

19.

ODS Code(s)	Control No.	User Code(s)	Object Class	Mgmt. Objective

20. REMARKS:

FEA-F-120 (Revised 6/76)

Exhibit F-2. Example of a data service request.

Special report from the MFBI Data Base

Sort Sequence:
Major: FEA REGION
Sic Code
Combustor Size

List: By Fea Region, by selected SIC codes, by selected aggregated combustor capacity the following data:

Number of installations
Number of combustors
Number of combustors which can convert to coal burning

Regional totals

Grand Totals

Example:

Region 1 (COMBUSTOR SIZE by REGION AND SIC CODE)

Comb. size	SIC 20	26	28	29	32	33	34	35	49	Other	Sic Spec
000-099											
# Install.	1	4									
# Combustors	3	4									
# Can Convert	0	3									
100-149											
# Install											
# Comb											
# can Convert											
150-199											
(same as above)											

other Comb. Sizes:
200-249 etc. up to 950-999
250-299 1000+
300-349
350-399

Region Totals

Grand Totals

Exhibit F-2 (continued).

Data Selection Criteria:

Sic Code should be the first two digits of the primary Sic code in data base. Aggregate in SIC categories listed on proceeding page.

Combustor Size: From the Combustor size field. Do not include if nothing (NOT ZERO) was reported.

Number of Installations: Add one for each MFBI number by Sic category by combustor size

Number of Combustors: Add one for each combustor record by Sic category by combustor size

Number of combustors which can convert to coal; Question 12, 13 or 14 was answered yes

Please refer to MFBI report 24d for a similar report program

Exhibit F-2 (continued).

APPENDIX VII

10	76-003	PROVIDE MFBI COAL CONVERSION DATA FOR NATURAL GAS CURTAILMENTS STUDY	07/07/75	MGTF	SDP	07/07/75	6217		52
11	76-104	PROGRAMMING FOR ERD REPORTS	11/12/75	R	PMD	12/20/76	6217	COMPLTED	52
11	76-227	MFBI CONVERSION RPT MODIFICATION & EARLY PLANNING PROCESS EVALUATION SYSTEM	2/19/76	R	PMD	07/11/77	6217	COMPLTED	31
11	76-319	TRANSFER MFBI FILE TAPES TO E.P.A.	05/28/76	R	PMD	06/02/76	6217	COMPLTED	52
11	77-045	PRODUCE REPORT OF NON-PROPRIETARY MFRI-SURVEY INFORMATION AS RESPONSE TO FREEDOM-OF-INFORMATION REQUESTS	12/02/76	R	PMD	12/23/76	6217	COMPLTED	52
11	77-092	REPRODUCE THE MFBI FREEDOM OF INFORMATION REPORT	02/03/77	R	PMD	01/31/77	6217	COMPLTED	52

DSR HISTORY LIST 5/19/78 PAGE 46

STATUS CODE	DSR #	TITLE	DATE RCVD	REQ AA	LEAD DIV	ACTION DATE	CONTROL NUMBER	EXPECTED STATUS CHANGE DATE	CAT TYPE
11	77-205	MFBI DATA EXTRACTION	05/17/77	EIA	PMD	05/17/77	6217	COMPLTED	33
12	77-234	MFBI CAPACITY DATA FOR DROUGHT STUDY	06/02/77	R	PMD	06/07/77	6217	CANCELED	32
11	77-296	SPECIAL MFRI REPORT FOR CONGRESSMAN DINGELL	07/14/77	R	PMD	07/22/77	6217	COMPLTED	52
11	77-346	MFBI/NOI DATA BASE & FORMS FORMAT DISPLAY FOR SELECTED RECORDS	08/18/77	R	EDD	01/10/78	6217	COMPLTED	31
11	77-364	GAO REPORT ON SELECTED MFBI	08/31/77	R	PMD	08/31/77	6217	COMPLTED	52
11	77-370	PRODUCE MFBI DATA REPORTS FOR CONGRESSIONAL BUDGET OFFICE	09/06/77	R	PMD	10/05/77	6217	COMPLTED	52
11	78-004	ACCOUNT TRANSFER OF MFRI NOCO PROGRAM (6256 TO 6217)	10/07/77	ERA	EDD	10/12/77	6217	COMPLTED	56
11	78-079	PRODUCE SELECTED LISTING OF BOILERS FROM MFBI	01/13/78	ERA	EDD	02/03/78	6217	COMPLTED	52
11	78-099	ACCESS TO MFBI FILE FOR OFF. OF ANALYTIC METHODS, OAA/EIA	01/26/78	EIA	EDD	02/06/78	6217	COMPLTED	56
11	78-100	MODIFIED 10.A REPORT FROM MFBI FILE	01/26/78	ERA	EDD	03/01/78	6217	COMPLTED	52
11	78-109	PROVIDE P&E CONTRACTOR ACCESS TO MFBI FILE	02/03/78	PE	EDD	02/08/78	6217	COMPLTED	56
11	78-132	SELECTED MFBI DATA FOR POLICY PLANNING, & ANALYSIS/RA	02/24/78	RA	EDD	03/06/78	6217	COMPLTED	52
A	78-156	MFBI DATA FOR ELECTRIC POWER CURTAILMENTS PLANNING	03/16/78	ERA	EDD	03/16/78	6217	A.3.4.P.	52
A	78-189	FORMS DESIGN/CLEARANCE ASSISTANCE FOR MFBI COAL CONVERSION REPORT FORMS DESIGN/CLEARANCE ASSISTANCE FOR MFBI COAL CONVERSION REPORT	04/07/78	ERA	EDSE	04/07/78	6217	04/21/78	08
A	78-202	DATA VALIDATION: MFBI AND EMMS REPORTS DATA VALIDATION: MFBI AND EMMS REPORTS	04/17/78	EIA	EDI	05/08/78	6217	05/19/78	59

Exhibit F-3. List of past data service requests.

APPENDIX G

DETAILED EXAMINATION OF SELECTED QUESTIONS ON THE FEA-C-602-S-0

MFBI QUESTIONNAIRE PROCESS

(QUESTION)

II-8. Primary Energy Source for Existing Combustor

1-coal 2-residual 3=distillate 4=gas 5=other (specify)_____ ☐

1. What is the purpose of this question?

This question is intended to identify the major fuel source for this combustor.

2. a. Is the question relevant to the regulatory function?

This question is necessary for the coal-conversion decision-making process, because combustors already burning coal as the primary energy source would not be considered for forced conversion.

b. Is the data collected from this question relevant to other users?

This question supplies information concerning fuel type usage in industry which may be useful in assessing the impacts of various energy policies.

3. Are there any incentives to lie or mislead?

Validation with question II-21 makes purposely false responses unlikely.

4. Is the question vague? If so, how?

Sources of vagueness resulting in confusion are:

1) definition of gas type
2) what to do when a combustor has 2 or more fuel sources used in equal amounts
3) definition of primary energy source

a. How could it be misinterpreted by mistake?

Gas can be interpreted as natural gas or another form, for example furnace gas, coke oven gas or waste gas.

b. How could it be misinterpreted on purpose?

None

---

5. Possible sources of error.

1. Some combustor units have more than one fuel source used in equal proportions, for example distillate and residual oil, making identification of one source over the other difficult.

2. Definition of gas

---

6. Rewording of question, additional questions, deletions.

Gas means natural gas and should be expressed as such. All five types should be defined. Suggest listing fuel sources as:

	% (of BTUs burned)
1. steam coal	_____
2. matallurgical coal	_____
3. residual oil	_____
4. distillate oil	_____
5. natural gas	_____
6. liquified petroleum gas	_____
7. biomass	_____
8. other (specify)	_____

Where "%" is % of total fuel used by type. "Primary energy source" is confusing and should be redefined. If a combustor burns two fuels in nearly equal amounts, the term "primary energy source" does not apply.

---

7. Validation

a. Establish numerical ranges.

None

---

b. Other data bases.

NED's

---

c. Cross-checking within form.

1) If the answer to this question is /5/-other, no fuel use checks can be performed.
2) Check to see if fuel use data Question II-21 leads to a different primary energy source.
3) If the answer to this question is /1/-coal, there must be an answer to Question II-10.
4) If the answer to this question is not /1/-coal, there must be an answer to Question II-11.
5) If the answer to this question is /1/ yes, there must be yes answers to Questions II-13, 14, 15, 16, 17.
6) The answer to this question must be different from the answer to Question II-9.

---

d. Other sources (experts, legal, technical, manufacturers).

Aggregates by industry for comparison.

---

8. Can the answer to this question be computerized?

Responses are computer coded.

MFBI QUESTIONNAIRE PROCESS

(QUESTION)

II-10. If coal is the primary energy source, do you intend to continue its use?

1. What is the purpose of this question?

For a combustor currently using coal as its primary energy source, the question is intended to note any planned changes from coal to another primary energy source.

2. a. Is the question relevant to the regulatory function?

Combustors presently burning coal but planning to switch to a non-coal primary energy source change are issued the S-1 form. Those answering "no" to this question are removed from consideration as potential candidates for conversion.

b. Is the data collected from this question relevant to other users?

Fuel usage information may be useful in assessing the impacts of difficult energy policies.

c. Can this question realistically be answered effectively?

Yes

3. Are there any incentives to lie or mislead?

An installation that has future plans to convert a combustor from coal to oil or gas may answer yes if converstion is not taking place immediately.

4. a. Is the question vague? If so, how?

The question lacks specificity. "Intend" is unclear and no time constraint is included. It is not clear how to answer questions II-10 and II-11 if coal is being burned in a capacity other than as the primary energy source. If coal is listed as an alternate energy source, the question "will you convert to coal" could be confusing.

b. How could it be misinterpreted by mistake?

See 4a.

c. How could it be misinterpreted on purpose?

"intend" can be interpreted to mean 'talk about' or 'plans on paper' and the lack of any time limit leaves the question open-ended.

---

5. Possible courses of error.

1) Vagueness - See 4a
2) Instructions are not given as to how to proceed if the question does not apply. "0" could be answered meaning either "no" or "does not apply".
3) The use of 1/0 for yes/no could be a source of confusion.

---

6. Rewording of question, additional questions, deletions.

Questions II-10 and II-11 are general and require specificity to be useful.

For example: "Is coal currently burned in this combustor?

☐ yes ☐ no

Will coal be burned in 19__?(next year)?

☐ yes ☐ no

Will coal be burned in 19__ (5 years from now)?

☐ yes ☐ no

---

7. Validation

a. Establish numerical ranges.

None

---

b. Other data bases.

None

---

c. Cross-checking within form.

1) If the answer to Question II-8 is ☐-coal, there must be an answer to this question.
2) Only one of Questions II-10 or LL-11 should be answered.

---

d. Other sources (experts, legal, technical, manufacturers).

None

---

8. Can the answer to this question be computerized?

Responses are computer coded.

MFBI QUESTIONNAIRE PROCESS

(QUESTION)

II-12. Was this combustor originally designed to be capable of burning coal?

1. What is the purpose of this question?

The question establishes whether the combustor unit was originally designed by its manufacturer to be capable of burning coal.

2. a. Is the question relevant to the regulatory function?

A yes answer defines a combustor as "coal capable" and directly affects the regulatory process. Coal capable combustors were sent the more detailed S-1 form.

b. Is the data collected from this question relevant to other users?

Fuel usage data can affect various energy policies. This information could be useful to boiler manufacturers.

c. Can this question realistically be answered effectively?

The answer of a definition of "capable of burning coal" or knowledge of the original specifications affects the quality of responses.

3. Are there any incentives to lie or mislead?

Since a "yes" answer defines the combustor as coal capable, a "no" answer would make coal-conversion seem less feasible.

4. a. Is the question vague? If so, how?

The question is clear.

b. How could it be misinterpreted by mistake?

If management is newer than the combustor, they may answer "no" without verifying the accuracy of their response.

c. How could it be misinterpreted on purpose?

None

---

5. Possible sources of error.

1) If MFBI management does not look up the manufacturers specifications, answers could be incorrect.
2) The use of 1/0 for yes/no could be a source of confusion.

---

6. Rewording of question, additional questions, deletions.

To encourage the respondent to look at the original manufacturers plans before answering, suggest

1) "According to the manufacturers specifications, was the combustor designed to be capable of burning coal?"
2) "Capable of burning coal" should be clearly defined in the instructions.

---

7. Validation

a. Establish numerical ranges.

None

---

b. Other data bases.

None

---

c. Cross-checking within form.

1) See cross check 2 in Question II-6
2) See cross check 3 in Question II-6
3) See cross check 4 in Question II-6
4) If answer appears in Question II-16 or II-17, either II-12 or II-13 or both must be yes.
5) If either II-12 or II-13 or both are yes, then II-16 and II-17 must be answered.

---

d. Other sources (experts, legal, technical, manufacturers).

Manufacturers records.

---

8. Can the answer to this question be computerized?

Responses are computer coded

MFBI QUESTIONNAIRE PROCESS

(QUESTION)

II-13. Was coal ever burned in it?

1. What is the purpose of this question?

The question tells the regulators whether the combustor has ever been "capable of burning coal".

2. a. Is the question relevant to the regulatory function?

Yes. A yes answer defines the combustor as coal capable.

b. Is the data collected from this question relevant to other users?

Fuel usage data can affect other energy policies. It could be of use to combustor manufacturers.

c. Can this question realistically be answered effectively?

Yes

3. Are there any incentives to lie or mislead?

Respondent may respond "no" incorrectly to avoid being defined as coal capable. Answers to this question may be difficult to verify.

4. a. Is the question vague? If so, how?

The question is not vague.

b. How could it be misinterpreted by mistake?

Respondent may not be aware of an isolated coal burning incident in the past.

c. How could it be misinterpreted on purpose?

Respondent may decide an isolated coal burning incident is not significant enough to warrant reporting.

5. Possible sources of error.

   1) Misinterpretations - see 4b and c.
   2) The use of 1/0 for yes/no could be a source of confusion.

---

6. Rewording of question, additional question, deletions.

   Suggest: "Has coal ever been burned in this combustor? ☐
   If so, specify time period: from 19__ to 19__."

---

7. Validation

   a. Establish numerical ranges.

      None

---

   b. Other data bases.

      None

---

   c. Cross-checking within form.

      1) If the answer to Question II-8 is /1/-coal, this answer must be yes
      2) See cross-check 2 on Question II-6
      3) See cross-check 4 on Question II-6
      4) See cross-check 4 on Question II-12
      5) See cross-check 5 on Question II-12

---

   d. Other sources (experts, legal, technical, manufacturers).

      None

---

8. Can the answer to this question be computerized?

   Responses are computer coded.

MFBI QUESTIONNAIRE PROCESS

(QUESTION)

II-14. Can Coal Now be Burned in this Combustor?

1. What is the purpose of this question?

The question determines whether the combustor unit, if required, could burn coal.

2. a. Is the question relevant to the regulatory function?

This directly affects decisions in the regulatory process. A yes answer defines the combustor as coal-capable.

b. Is the data collected from this question relevant to other users?

The question is too subjective to be relevant to other users.

c. Can this question realistically be answered effectively?

Effective responses require a more specific question, clarifying modifications allowed.

3. Are there any incentives to lie or mislead?

Those installations not wanting to convert to coal may deny a capability for burning coal.

4. a. Is the question vague? If so, how?

The question is unclear regarding:

1) does "now" refer to immediately or the near future? A time frame is needed.
2) is the question asking if coal can be burned with <u>little</u> or <u>no</u> modifications?

b. How could it be misinterpreted by mistake?

Vagueness - see 4a.

c. How could it be misinterpreted on purpose?

An installation could interpret "now" as immediately and answer "no" if any, even very slight, modifications would be necessary.

5. Possible sources of error.

   1) Since this question is vague, it allows misinterpretations to to occur easily.
   2) The use of 1/0 for yes/no could be a source of confusion.

---

6. Rewording of question, additional questions, deletions.

   Suggest omitting this question, since questions II-6, II-12, and II-13 cover the same data.

---

7. Validation

   a. Establish numerical ranges.
      None

---

   b. Other data bases.

      None

---

   c. Cross-checking within form.

      If the answer to Question II-8 is coal, this answer must be yes.

---

   d. Other sources (experts, legal, technical, manufacturers).

      None

---

8. Can the answer to this question be computerized?

   Responses are computer coded.

MFBI QUESTIONNAIRE ANALYSIS

21. 1974 ANNUAL FUEL USE

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT (×10⁶)		QUANTITY	
COAL	____	____	47	(lb)	54	10³ tons/yr
RESIDUAL		____	55	(gal)	62	10³ bbls/yr
DISTILLATE		____	63	(gal)	70	10³ bbls/yr
GAS		____	71	(MCF)	78	10³ MCF/yr

22. 1973 FUEL USE

79 80 1 5 DO NOT FILL IN

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT (×10⁶)		QUANTITY	
COAL	____	____	6	(lb)	13	10³ tons/yr
RESIDUAL		____	14	(gal)	21	10³ bbls/yr
DISTILLATE		____	22	(gal)	29	10³ bbls/yr
GAS		____	30	(MCF)	37	10³ MCF/yr

1. What is the purpose of this question?
   The questions measure fuel usage by type for the two years prior to the study and are designed to establish combustor fuel consumption trends and to identify any combustor size-to-fuel consumption relationships.

2. a. Is the question relevant to the regulatory function?
   The purpose in part of the legislation requiring this survey is to reduce U.S. oil and natural gas consumption. Thus plant fuel use information would be useful to those performing the regulatory function

   b. Is the data collected from this question relevant to other users?
   Data could be useful in aggregated form to identify any combustion size-to-fuel consumption relationships.

   c. Can this question realistically be answered effectively?
   These questions can be answered effectively, assuming notation of units is understood.

MFBI QUESTIONNAIRE ANALYSIS

3. Are there any incentives to lie or mislead?
Because a lower limit upon fuel consumption for combustors that are eligible for prohibition orders must be made, underestimating fuel consumption may eliminate a combustor from consideration. However, deliberate false responses are unlikely since data is quantitative and verifiable.

4. a. Is the question vague? If so, how?
The question asks for quantitative amounts and is clearly stated.

b. How could it be misinterpreted by mistake?

None.

c. How could it be misinterpreted on purpose?

None.

5. Possible sources of error.

1. The use of exponential powers is a potential error source.

2. The use of defined units is a source of error

6. Rewording of question, additional questions, deletions. All conversion factors be included in the definitions.

" 19__ Annual Fuel Use

	% Ash (by weight)	% Ash (by weight)	Heat Value		Quantity	
Steam coal	☐☐ %	☐.☐ %	☐☐☐☐	thousand btu/lb	☐☐☐☐	thousand tons/yr
Metallurgical coal	☐☐ %	☐.☐ %	☐☐☐☐	thousand btu/lb,	☐☐☐☐	thousand tons/yr
Residual oil	☐☐ %	☐.☐ %	☐☐☐☐	thousand btu/gal	☐☐☐☐	thousand tons/yr
Distillate oil	☐☐	☐.☐ %	☐☐☐☐	thousand btu/gal	☐☐☐☐	thousand bbls/yr
Natural gas	☐☐ %	☐.☐ %	☐☐☐☐	thousand btu/MCF	☐☐☐☐	thousand MCF/yr
Biomass	☐☐ %	☐.☐ %	☐☐☐☐	thousand btu/MCF	☐☐☐☐	thousand MCF/yr
Other (specify)	☐☐ %	☐.☐ %	☐☐☐☐	thousand btu/lb	☐☐☐☐	thousand tons/yr

7. Validation

a. Establish numerical ranges

1. heat content ranges for various vuels

a.	residual	130,000 - 153,000 btu/gal
b.	distillate	121,000 - 143,000 btu/gal
c.	natural gas	9,000 - 1,100 btu/cu. ft.
d.	coal	6,000 - 15,000 btu/lb

b. Other data bases. Data systems exist which annually summarize fuel consumption. See "Data Sources for Industry Energy Analysis" by U.S. DOE,Nov. 1977, pg. III -4.

e. Cross-checking within form.

1) A ratio between 73 and 74 values should be consistent in terms of magnitude.

2) Check to see if total fuel consumption and combustor capacity (Question II-3) lead to an unreasonable number of operating hours (must be less than 8760 hours in a year).

3) Check to see if fuel consumption leads to a different primary energy source (II-8) and alternate energy source (II-9).

d. Other sources (experts, legal, technical manufacturers).

None.

8. Can the answer to this question be computerized?

Heat content and quantity are computer coded. Ash and sulfur content are not, but could be.

APPENDIX H

ANALYSIS OF THE SURVEY

FORM FEA-C-602-S-0

ANALYSIS OF THE SURVEY FORM FEA-C-602-S-0

Using the analytic process described in Table 3, we examined each question on the FEA-C-602-S-0. An example of the results is shown in Appendix G, which contains a detailed examination of selected questions. These are our overall findings concerning the questions on the form.

A question-by question analysis of the current MFBI questionnaire revealed several significant shortcomings. Four of the most prominent deficiencies follow:

1. Vague and Imprecise Questions

a) Insufficient Technical Precision:

Designers of the MFBI questionnaire lacked the technical knowledge of cumbustors and their operation to correctly construct questions using special terminology. Example: Questions related to combustor capacity and topping turbines.

b) Questions and Definitions:

Many questions employ phrases that are subject to interpretation by the respondents. Examples are: "Available for Coal Storage," "In the Near Future," "Capable of Burning Coal," "Non-Coal Fuel Savings." "MFBI" is ambiguous by itself because it is applied to both industrial plants as well as individual combustors. "Primary Energy Source" as defined in the instructions does not apply to combustors burning more than one fuel.

2. Confusion with Units

Units required for numerical responses are difficult to understand.

Examples:

a) Questions II-21 and II-22 (Annual Fuel Use) call for

answers that switch from pounds to tons with no explanation or apparent reason.

b) Questions I-6, II-3, II-20, II-21 and II-22 use exponents with which some people are not familiar. "Million" should be spelled out as a term or presented in numerical form.

3. Insufficient Provision for Accurate Coding

Provisions for computer coding are insufficient. Examples:

a) Questions I-1: Only 16 boxes were provided for an MFBI number. This number of coding boxes is inadequate.

b) Questions II-4 and II-5 ask respectively for the number of boilers and other combustors at an installation. Because only two coding boxes were provided, respondents having more than 99 boilers or combustors can only respond with 99 which results in a loss of accuracy.

c) Responses to other questions are not coded at all, even though they could have been. For example, see Questions II-19 and II-21.

4. Insufficient Internal Consistency Checks

The effectiveness of internal consistency checks would improve if additional questions were added. Examples include:

a) Questions asking the percent of time the combustor actually operates.

b) Question regarding plant fuel use to establish an upper bound on combustor fuel use.

c) Question concerning boiler capacity given in units of pounds of steam per hour. The answer would provide a check on combustor capacity (BTU per hour).

d) Response which indicates the county location of the MFBI to supply an internal consistency check on MFBI state and ZIP code.

e) A request for combustor status (i.e., operational, standby or permanently shut down). This question would offer two things: (i) a check on combustor use, and (ii) a determination as to whether a lack of response to Question II-21 (1974 Fuel Use) is the result of respondent omission or that the combustor burned no fuel during 1974.

APPENDIX I

EXPLORATORY RESPONDENT INTERVIEWS

EXPLORATORY RESPONDENT INTERVIEWS

Exploratory respondent interviews were conducted with eight companies chosen randomly from MFBI respondents located close to other locations at which LBL was interviewing for other purposes. Since there were pressing needs in other LBL studies, the number of respondent interviews was limited so that resources could be allocated to work that had a higher potential payoff.

The main purpose of the interviews was to determine whether each of the questions was clear and whether the requested information was readily accessible. The emphasis of the source interviews was qualitative in nature. The MFBI survey was reviewed with respondents in as much detail as possible to solicit their reactions and comments on the nature and format of each question. General suggestions and criticisms relevant to the survey form and system operation were sought.

4.2.2 Specific Comments on the FEA-602-S-0 Survey Form

For each question, comments by respondents will be summarized:

1) Question I-3: Person to contact in future correspondence.

   Question I-3: Sources were divided as to whether the person would be someone at the plant location or at a head office. This was dependent on the communication and organizational structure of the company. If one or the other is preferred by the OCU, this should be specified. In at least one case, when the contact person was at a head office, the OCU ignored the listed contact and sent correspondence directly to the plants. This resulted in confusion and a loss of efficiency on the part of that particular company.

2) Question I-4 and I-5: Total number of boilers at this installation.

   Total number of other combustors at this installation.

Questions I-4 and I-5: Three respondents stated that the order and physical locations of these two questions was misleading. They should appear on the same page of the survey form and the order should be reversed, beginning with the most general question. The term "combustor" was sometimes interpreted incorrectly as meaning "burner", because of the order of the questions.

3) Question I-6: Total designed firing rate (X 10 BTUs/hr) (of #4 and #5).

Question I-6: Four respondents noted the difference between the total designed firing rate or the literal design specifications and the actual designed firing rate or operating design specifications of an installation. The question should be more specific.

4) Question I-7: Identify pairings (ETC) of combustors (Example: Boilers 04, 05, and 06 share a common manifold and are vented through a common stack.)

Question I-7: This question was viewed as inapplicable by four respondents.

5) Question I-8: Principal products produced at, or services provided by this installation. (If SIC codes are unknown, provide written description in space provided.)

Question I-8: Seven respondents stated Standard Industrial Classification (SIC) codes for products or services produced were usually known but individual codes were not known. The inclusion of a general reference list for SIC codes was recommended.

6) Questions I-9 and I-10: Identify the major technical, regulatory, economic, and environmental impediments, if any, to your utilizing coal to a greater extent at this installation.

What actions by the Federal Government would encourage you to utilize coal to a greater extent?

Questions I-9 and I-10: Six respondents stated the questions were not usually taken seriously. The most common initial reaction was a laugh followed by a comment such as "nothing" or "money."

7) Questions II-2: What kind of combustor is this?
1 = boiler 2 = burner 3 = other combustor of fuel

Question II-2: Three respondents were bothered by the use of the term "burner" to define a combustor unit since a burner is used to ignite the fuel in all combustors, including boilers.

8) Question II-3: Combustor capacity (x 10^3BTU/HR)

Question II-3: Four sources repeated the comment on the differences between actual and design firing rate. The exponential notation was confusing to some. Though units of BTU/hr were not commonly used, conversion to them was not considered a problem.

9) Question II-6: a. If combustor has been modified to be capable of burning coal, what year was it modified?

b. How was it modified?

Question II-6: Two sources stated respondents should be directed how to answer when the question is not applicable.

10) Question II-7: Do you intend to install a topping turbine on this combustor?

a. If yes, will you need to:
(1) Replace your combustor.
(2) Modify your combustor.
(3) Make no combustor modification.

b. If the answer to 7(a) was "1" or "2", Do you intend to modify/replace your combustor so that you can burn coal?

Question II-7: For six respondents "topping turbine" was not a familiar term. As topping turbines are used only in conjunction with electricity generation, the question frequently does not apply. A statement indicating whether a topping turbine is already installed should have prefaced this question.

11) Questions II-8 and II-9: Primary Energy Source for existing combustor.
1=coal 2=residual 3=distillate 4=gas 5=other

Alternate Energy Source for existing combustor
1=coal 2=residual 3=distillate 4=gas 5=other
6=no alternate.

List secondary alternate energy source, if any:

Questions II-8 and II-9: Four respondents stated the terms "primary" and "alternate" need further definition. A combustor can burn more than one primary fuel as this is currently defined in the directions. The fuels listed should be expanded (including wood products, coke products, waste products), and gas should be listed as natural gas.

12) Question II-10 through II-17: If coal is the primary energy source, do you intend to continue its use?

If coal is not the primary energy source, do you intend to convert to coal in the near future?

Was this combustor originally designed to be capable of burning coal?

Was coal ever burned in it?

Can coal now be burned in this combustor?

Is land available for coal storage?

If the answer to no. 12 or 13 is "yes," Is any or all of the coal burning support equipment still in place?

If the answer to no. 12 or 13 is "yes," Is any or all of this equipment still operational?

Question II-10 through II-17: Responses were divided as to whether yes/no responses to these questions were adequate. Some sources felt these questions were too subjective and did not reflect the effort necessary to answer them correctly. Other sources simply skimmed these questions, frequently answering questions that did not apply.

13) Question II-18: If the answer to No. 16 or 17 was "no," please identify any anticipated acquisition or refurbishing of coal handling and firing equipment.

Question II-18: Five respondents stated this question was difficult to understand and was subsequently skipped by most respondents. The referencing of previous questions within a question should be avoided.

14) Question II-19: If coal was ever used as the primary fuel source prior to 1973 give (for the last year coal was used):

a. year
b. Rank of Coal
c. Percent Ash by Weight (to the nearest percent)
d. Percent Sulfur by Weight (to the tenth of a percent)
e. BTU/lb
f. Quantity_____Tons/Year
g. Other Unique Characteristics
h. Method of Delivery: (Train, Truck, Barge, etc.)
i. If Coal is not Presently Being Used, Do you Anticipate that it could be obtained if you were to convert?
j. If not, why not?

Question II-19: Seven respondents feld that the most relevant coal use data was the most recent and the 1973 designatior was often ignored and 1974 data given. The rank of coal should be defined, possibly with alternative ranks listed. Parts h, i and j were separated from the rest of the question by lines and were often answered as separate questions unrelated to parts a through g. Characteristics given in part g varied. They should be specified for consistency.

15) Question II-20: Estimate your annual non-coal fuel savings if you were to convert to coal.

Question II-20: Seven respondents interpreted "savings" as actual dollar savings and the question was skipped or marked non-applicable.

16) Question II-22: 1973 Fuel Use.

Question II-22: This information was accessible and the questions were clear to all eight respondents.

17) Question II-23: Indicate (to the nearest percent) the percent of combustor output that is devoted to:

Electric generation
Space Heating
Process Steam
Other

Question II-23: Three respondents felt that a rough estimate was all that could be expected and that answers would be useless. Plant output can be categorized more easily than individual combustor output.

18) Section III: Air Quality

Section III: Five sources felt this section represented unnecessary duplication of information already collected by the EPA and insufficient in itself on which to base any conclusions.

19) Questions III-4 and III-5: To burn coal and meet the sip emission limitations relating to attainment of the Federal Primary Ambient Air Quality Standards.

a. Upgrade Precipitators
b. Install Precipitators
c. Install FGD
d. Obtain conforming coal

To burn coal and meet other applicable sip requirements. (This installation Must)

a. Upgrade precipitators
b. Install Precipitators
c. Install FGD
d. Obtain conforming coal

Questions III-4 and III-5: Five respondents stated the term "SIP" (State Implementation Plan) was not understood. Respondents felt that these two questions were redundant and that realistic cost estimates were impossible.

APPENDIX J

EXAMINATION OF A SAMPLE OF COMPLETED FORMS

A random sample consisting of five percent of the MFBI questionnaires was requested from the FOI Office within the OCU. Of the 174 installations whose MFBI numbers were drawn in the random sample, 135 sets of questionnaires were received by the LBL validation group. Copies of the questionnaires for the 24 installations that received NOI s (Notices of Intent) were also obtained. Twenty-two of the questionnaires were not received from the FOI Office.

Each of the 159 questionnaires received (including those for the 23 installations receiving NOI s) was examined. All changes, omissions or comments on the forms were noted. For analysis purposes, each change, omission, or comment was classified as a "problem" in filling out the form. The remainder of this section displays each question (or section) of the form, lists the number of problems encountered for that question, and describes in general terms the most common problems associated with that question.

1. In identifying the plant, parent company, and contact person, the physical format and coding boxes caused confusion. 80 installations showed that changes, especially in plant name, were made. The mixed use of boxes and lines for responses was misleading.

I-1 MFBI NAME AND LOCATION

NAME [ ] 11 26

STREET [ ] 27 42

CITY [ ] 43 53

STATE _____ ZIP [ ] 54 58

AIR QUALITY CONTROL REGION (if known) _____

I-2 PARENT COMPANY NAME AND GENERAL OFFICE LOCATION

NAME [ ] 59 73

STREET _____

CITY _____

STATE _____ ZIP [ ] 74 78

DO NOT FILL IN [ ] 79 80 1 5

4.3 A SAMPLE OF RESPONSES

A random sample consisting of five per cent of the MFBI questionnaires was requested from the FOI Office within the OCU. Of the 174 installations whose MFBI numbers were drawn in the random sample, 135 sets of questionnaires were received by the LBL validation group. Copies of the questionnaires for the 24 installations that received NOI's (Notices of Intent) were also obtained. Twenty-two of the questionnaires were not received from the FOI Office.

Each of the 159 questionnaires received (including those for the 23 installations receiving NOI's) was examined. All changes, omissions or comments on the forms were noted. For analysis purposes, each change, omission, or comment was classified as a "problem" in filling out the form. The remainder of this section displays each question (or section) of the form, lists the number of problems encountered for that question, and describes in general terms the most common problems associated with that question.

1. In identifying the plant, parent company, and contact person, the physical format and coding boxes caused confusion. 80 installations showed that changes, especially in plant name, were made. The mixed use of boxes and lines for responses was misleading.

I-1 MFBI NAME AND LOCATION

NAME 11 26

STREET 27 42

CITY 43 53

STATE _____ ZIP 54 58

AIR QUALITY CONTROL REGION (if known) _____

I-2 PARENT COMPANY NAME AND GENERAL OFFICE LOCATION

NAME 59 73

STREET _____

CITY _____

STATE _____ ZIP 74 78

DO NOT FILL IN 79 80 1 5

I-3 PERSON TO CONTACT IN FUTURE CORRESPONDENCE

NAME 6 22

TITLE 23 35

STREET

CITY/STATE

ZIP 36 40

TELEPHONE (with Area Code) (41) 50

2. SIC (Standard Industrial Classification) codes were omitted or corrected on forms from 72 of 159 installations. If the products or services were described on the lines given, then "Per cent of total shipments or services by value" was often left blank.

I-8 PRINCIPAL PRODUCTS PRODUCED AT, OR SERVICES PROVIDED BY THIS INSTALLATION (If SIC Codes are Unknown, Provide Written Description in Space Provided)

Standard Industrial Classification (4 Digit)	Percent of Total Shipments or Services by Value
59	66
67	72
73	78

3. Section II: Seven installations inserted a statement of combustor status to indicate that a combustor unit was no longer in service or was used only on a standby or back-up basis.

4. In identifying intentions concerning topping turbine installation, 11 plants inserted a statement indicating that topping turbines were already installed.

II-7 DO YOU INTEND TO INSTALL A TOPPING TURBINE ON THIS COMBUSTOR? [ ]

a If Yes Will You Need to [ ]
(1) Replace Your Combustor.
(2) Modify Your Combustor.
(3) Make No Combustor Modification

b If the Answer to 7(a) was "1" or "2", Do You Intend to Modify/Replace Your Combustor so that You Can Burn Coal? [ ]

5. The definition of primary energy source was insufficient and secondary energy source was not defined. For 17 installations, responses to these questions were reversed by those reviewing the submitted forms.

II-8 PRIMARY ENERGY SOURCE FOR EXISTING COMBUSTOR [ ]
1 = coal 2 = residual 3 = distillate 4 = gas 5 = other (specify) _____

II-9 ALTERNATE ENERGY SOURCE FOR EXISTING COMBUSTOR [ ]
1 = coal 2 = residual 3 = distillate 4 = gas 5 = other (specify) 6 = no alternate

List secondary alternate energy sources if any _____

6. Non-applicable Questions: Questions such as these do not apply to all combustors. 52 installations gave answers when the question should have been omitted.

II-6 a. If Combustor has been Modified to be Capable of Burning Coal, What Year was it Modified?
b. How was it Modified? [ ] 55 59

II-10. IF COAL IS THE PRIMARY ENERGY SOURCE DO YOU INTEND TO CONTINUE ITS USE? [ ]

II-11. IF COAL IS NOT THE PRIMARY ENERGY SOURCE, DO YOU INTEND TO CONVERT TO COAL IN THE NEAR FUTURE? [ ]

II-16 IF THE ANSWER TO NO. 12 OR 13 IS "YES" IS ANY OR ALL OF THE COAL BURNING SUPPORT EQUIPMENT STILL IN PLACE? [ ]

II-17. IF THE ANSWER TO NO. 12 OR 13 IS "YES", IS ANY OR ALL OF THIS EQUIPMENT STILL OPERATIONAL? [ ] 29

II-18 IF THE ANSWER TO NO. 16 OR 17 WAS "NO", PLEASE IDENTIFY ANY ANTICIPATED ACQUISITION OR REFURBISHING OF COAL HANDLING AND FIRING EQUIPMENT.

7. In collecting details on coal as a primary fuel source prior to 1973, changes and inconsistencies were present in responses from 40 installations. Parts i and j, concerning the anticipated obtaining of coal, were treated as a separate question and responses were given when the remainder of the question was not answered. The sulfur content in part d, requested to a tenth-of-a-percent, resulted in errors in coding and notation.

II-19. IF COAL WAS EVER USED AS THE PRIMARY FUEL SOURCE PRIOR TO 1973 GIVE (for the last year coal was used).

a. Year 19 [ ][ ] 30

b. Rank of Coal _____

c. Percent Ash by Weight (to the nearest percent) _____

d. Percent Sulfur by Weight (to the tenth of a percent) _____ [ ] [ ]

e. BTU/lb _____

f. Quantity _____ Tons/Year

g. Other Unique Characteristics

_____

_____

_____

h. Method of Delivery: (Train, Truck, Barge, etc.)

_____

i. If Coal is not Presently Being Used, Do You Anticipate that it Could be Obtained if you Were to Convert? [ ]

j. If Not, Why Not?

_____

8. 62 installations did not provide an estimate of annual non-coal fuel savings if they were to convert to coal. The question was omitted or noted as "non-applicable" or "can't convert".

II-20. ESTIMATE YOUR ANNUAL NON-COAL FUEL SAVINGS IF YOU WERE TO CONVERT TO COAL

	QUANTITY	
RESIDUAL	35	10^3 bbls/yr
DISTILLATE	39	10^3 bbls/yr
GAS	43 46	10^3 MCF/yr

9. For 34 installations, the units given and the exponential notation were sources of error in defining 1973 and 1974 fuel use. Also, respondents were not instructed how to reply if the fuels listed did not include those used at an installation.

II-21. 1974 ANNUAL FUEL USE

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT (×10⁶)		QUANTITY	
COAL	———	———	47	(lb)	54	10^3 tons/yr
RESIDUAL		———	55	(gal)	62	10^3 bbls/yr
DISTILLATE		———	63	(gal)	70	10^3 bbls/yr
GAS		———	71	(MCF)	78	10^3 MCF/yr

II-22. 1973 FUEL USE

79 80 1 5 DO NOT FILL IN

	% ASH (by weight)	% SULFUR (by weight)	BTU CONTENT (×10⁶)		QUANTITY	
COAL	———	———	6	(lb)	13	10^3 tons/yr
RESIDUAL		———	14	(gal)	21	10^3 bbls/yr
DISTILLATE		———	22	(gal)	29	10^3 bbls/yr
GAS		———	30	(MCF)	37	10^3 MCF/yr

10. For six installations, per cent did not sum to 100 per cent.

II– 23. INDICATE (to the nearest percent) THE PERCENT OF COMBUSTOR OUTPUT THAT IS DEVOTED TO:

ELECTRIC GENERATION [ ][ ][ ] 39

SPACE HEATING [ ][ ][ ] 41

PROCESS STEAM [ ][ ][ ] 44

OTHER (Specify) [ ][ ][ ] 47

_____

11. Section III: Nine installations omitted all of Section III, some noting it "non-applicable".

12. Responses from 68 installations concerning SIP (State Implementation Plan) requirements were incomplete. These questions were often not answered. Common responses were "cannot convert to coal" and "not applicable". When the questions were answered, responses were frequently the same or answers were given in III-4 and "same as above" given in III-5.

III–4. TO BURN COAL AND MEET THE SIP EMISSION LIMITATIONS RELATING TO ATTAINMENT OF THE FEDERAL PRIMARY AMBIENT AIR QUALITY STANDARDS, THIS INSTALLATION MUST:
(Answer with Yes (1) or No (0) in the blocks provided)

a. Upgrade Precipitators [ ] 56

If yes, give approximate cost $ _____ time _____ (weeks)

b. Install Precipitators [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

c. Install FGD [ ]

If yes, give approximate cost $ _____ time _____ (weeks)

d. Obtain Conforming Coal [ ]

This coal must be _____ % Sulfur by weight, _____ % Ash by weight.

Do you anticipate that you will be able to obtain conforming coal? [ ]

III-5. TO BURN COAL AND MEET OTHER APPLICABLE SIP REQUIREMENTS. (THIS INSTALLATION MUST: (Answer with a Yes (1) or No (0) in the blocks provided)

a. Upgrade Precipitators ☐

If yes, give approximate cost $ _____ time _____ (weeks)

b. Install Precipitators ☐

If yes, give approximate cost $ _____ time _____ (weeks)

c. Install FGD ☐

If yes, give approximate cost $ _____ time _____ (weeks)

d. Obtain Conforming Coal ☐

This coal must be _____ % Sulfur by weight _____ % Ash by weight

Do you anticipate that you will be able to obtain conforming coal? ☐ 65

13. Coding: Use of "1" for yes and "0" for no introduced error. Six installations answered questions with a "y" or "n" rather than "1" or "0" as directions specified.

APPENDIX K

COMPARISON OF MFBI DATA BASE AND NEDS DATA BASE

COMPARISON OF MFBI DATA BASE AND NEDS DATA BASE

Lawrence Berkeley Laboratory checked several DOE and EPA data bases to determine if they could be used for external validation of the MFBI data base. Specifically, we were looking for a data base that could be used to:

- check the completeness of the frame defined by the MFBI data base,
- cross-check the accuracy of individual data items in the MFBI data base.

The EPA's National Emissions Data System (NEDS), which contained information on Industrial Combustors, seemed the most likely validation tool.

The NEDS data base

The NEDS data base, under the jurisdiction of the EPA, collects detailed information on pollution emitting sources throughout the country, organized by state, county, plant and point source. A point source is "Any stationary source with the potential of emitting more than 100 tons per year of any pollutant for which there is a national standard." Instructions for the NEDS point source coding form state: "Any boiler should be considered a separate and individual point source..." However, they go on to state: "There are instances when it is permissible to combine boilers as a single point source:

a) When two are more similar small boilers (burning the same type of fuel, having the same operating hours, and having similar operating

capacities) are discharged through a common stack, they may be combined as a single source on one coding form if the total emission of any one pollutant is less than 100 tons/yr.

b) Where a number of very small boilers exists at a facility, each emitting five tons per year or less of any pollutant and each discharging through separate similar stacks, they may be combined as a single source on one coding form."

The NEDS User Point File Data Selection Report, dated June 28, 1978, contained the following information for each point source listed:

1) Facility identification including state and county codes

2) Plant and point source numbers (assigned by regional EPA office)

3) First 20 positions of plant name and address

4) Source classification codes (SCC) (each point source is classified by type, size, fuel use type and range)

5) Standard Industrial Classification (SIC) codes

6) Boiler capacity

7) Fuel usage rate

8) Maximum hourly design rate of the equipment

This information is updated semiannually. If the information remains accurate, no updating is performed.

Comparison Effort

We compared the MFBI data base listing for California with the NEDS User Point File Data Selection Report, dated June 28, 1978, which contained a complete set of records on California installations that had boilers. This comparison consisted of two parts:

- a record-by-record comparison to check the completeness of the MFBI frame with respect to NEDS.
- an attempt to compare individual data items to reveal possible erroneous data in the MFBI data base.

These extremely time-consuming comparisons provided no conclusive results.

Comparison of Frames

There were two problems in comparing the frames by computer.

1) The MFBI data base was organized by combustor record, the NEDS data base by point-source record.

2) The same installation and parent company were often identified differently in the two data bases. For example, a plant listed as "Oscar Mayer & Co." in the MFBI data base was listed as "Mayer, Oscar and Co." in the NEDS data base.

As a result of these problems, we did a manual comparison. A check on the completeness of combustor records was restricted to boilers because boilers were the only item in the specification of combustor type common to both data bases.

We counted the number of boilers listed in each data base, but were unable to identify specific boilers common to both data bases. Combustor capacity was not a useful indicator, because differences in format and aggregation introduced too much variation into the data. (For example, at the same plant the MFBI data base listed 4 boilers with a combined capacity of 360 million Btu/hr, while the NEDS data base listed two point sources with capacities of 90 million Btu/hr.)

Therefore, we were unable to use the NEDS listing to identify boilers missing from the MFBI data base.

Our findings were limited to the following:

1) 116 of the 243 plants listed in the MFBI California report were also listed in the NEDS data base.

2) The MFBI data base listed 64 installations with boilers of a capacity over 100 million Btu/hr--the NEDS data base listed 76 such installations.

Comparison of Specific Data Items

Both data bases contain the following items:

1) parent company name
2) Standard Industrial Classification (SIC) code first 4 digits
3) combustors identified as boilers
4) boiler capacities
5) primary energy source
6) stack height

Our lack of success in identifying boiler records common to both data bases precluded the use of the NEDS data base as a tool for cross checking individual data items in the MFBI data base.

Even if this problem could be solved, an item by item comparison would be impractical if not impossible because:

- In NEDS, it is not clear when the data was collected.
- Any comparison would involve time and effort.

Conclusions

One might be able to locate some MFBI installations not listed in the MFBI data base. However, no results concerning individual combustors or the accuracy of specific MFBI data could be obtained. In order to achieve even these limited results the following would be required:

1) Sorting tapes of each data base
2) Referencing NEDS code books
3) Adding county codes to MFBI entries
4) Manually performing final comparisons.

This large amount of effort for very limited results does not justify the use of the NEDS data base as a tool for the validation of the MFBI data base.

APPENDIX L

ANALYSIS OF THE MFBI DATA BASE

FOR INCONSISTENCIES AND OBVIOUS ERRORS

ANALYSIS OF THE MFBI DATA BASE FOR INCONSISTENCIES AND OBVIOUS ERRORS

In examing the MFBI data base for inconsistencies and obvious errors, we considered completeness with respect to records and internal consistency in terms of improper records, duplicate records, omissions of items, error frequency, and consistency among different versions of the data base.

A. COMPLETENESS WITH RESPECT TO RECORDS

The data base is numbered consecutively from 1 to 4,199 inclusive. Approximately 700 numbers are missing. Figure 3 - Installation identification numbers of installations apparently missing from the MFBI data base - is reproduced here.

B. INTERNAL CONSISTENCY

Lawrence Berkeley Laboratory has developed a procedure to identify the type and frequency of obvious inconsistencies and inaccuracies in the MFBI data base. This procedure, or plan, consists of four steps:

1) Examination of the data base for record duplication and other records that should not have been included.
2) Completeness checks to identify omissions.
3) Range checks and other numerical checks to identify errors in fuel usage and capacity data.
4) Non-numerical cross-checks to identify the inconsistencies in the data base.

1. Improper Records

a. Installations that were not MFBIs

An evaluation of responses to Question I-6 ("Total Designed Firing Rate") revealed that three percent of the combustors listed in the data base actually had capacities below 100 million Btu per hour, indicating (a) they were not MFBIs or (b) an error in the response to question I-6. (Check 1 in Appendix M)

b. Combustors

An evaluation of responses to Question II-3 ("Combustor Capacity") revealed only ten cases where the combustor capacity was listed as less than 100 million Btu per hour, indicating (a) they were not MFBI combustors or (b) an error in response to Question II-3. (Check 2 in Appendix M)

2. Duplicate Records

A check of duplicate records in the data base revealed no repeated MFBI numbers (Check 3 in Appendix M). However, a manual inspection of the data base has revealed the probable duplication of three records under different MFBI numbers. An additional check revealed the multiple listing of 67 MFBI combustors. (Check 4 in Appendix M) Specifically:

- 65 combustors were listed twice
- 1 combustor was listed three times
- 1 combustor was listed four times

Thus, approximately one percent of the 6,295 combustors should not have been listed in the data base.

3. Omission of Items

An inspection of the data base on an item-by-item basis revealed a substantial number of omissions (see Table L-1). Several hypotheses might explain these omissions.

a. Lack of Information

It is conceivable that respondents did not complete several questions because they did not understand the term necessary to answer them. These questions were:

Question I-1: Air Quality Control Region (AQCR) -- Respondents may not have known where to find this information or what an AQCR was.

Question I-7: "Principal Products Produced at, or Services Provided at this Installation" -- asked for Standard Industrial Classification (SIC) code. It is possible respondents did not possess this information. Many may not have known what SIC codes were.

Question III-4: "To burn coal and meet the SIP emission limitations relating to the attainment of the Federal Primary Ambient Air Quality Standards this installation must:" -- Some respondents did not understand what SIP (State Implementation Plan) meant nor what action was necessary to meet its requirements.

Question III-5: "To burn coal and meet other applicable SIP requirements, this installation must:" -- Again,

some respondents did not know what SIP meant.

b. Vagueness of Questions

The relatively large number of omitted responses to certain questions might have been a result of vagueness in the wording. Such questions include:

Question II-10: "If coal is the primary energy source, do you intend to continue its use?"

Question II-11: "If coal is not the primary energy source, do you intend to convert to coal in the near future?"

Question II-12: "Was this combustor ever designed to be capable of burning coal?"

Question II-13: "Was coal ever burned in it?"

Question II-14: "Can coal now be burned in this combustor?"

Question II-15: "Is land available for coal storage?"

Question II-16: "If the answer to No. 12 or 13 is yes, is any or all of the coal burning support equipment still in place?"

Question II-17: "If the answer to No. 12 or 13 is yes, is any or all of the coal burning support equipment still operational?"

Question II-20: "Estimate your annual non-coal fuel savings if you were to convert to coal."

The format of Questions II-10, II-11, II-16 and II-17, requiring response

only if other questions had been answered in a specific way, also may have confused respondents.

c. Information Previously Supplied

Respondents have previously supplied the government with data. The large number of omissions in Section III (concerning air pollution requirements and equipment) could have resulted because respondents had supplied the government with this information in previous surveys and thus felt no need to supply it again.

4. Error Frequency Within Records

An examination of error frequency records revealed a significant number of errors.

a. Btu Range Check

Table L-2 lists the results of a range check performed on the Btu contents of fuels burned in 1973 and 1974. (Check 5 in Appendix M) The OCU intended to collect data only on natural gas. Because of the inclusion of coke oven gas, blast furnace gas, and other gases in the gas data, the OCU concentrated on correcting errors in the Btu content of gas. Consequently, fewer errors remain in this data than in residual or distillate data. The range of acceptable Btu values for coal is so broad that only egregious errors could be detected. This, combined with closeness of the ranges used by the OCU and LBL, could be the reason that so few Btu errors for coal were discovered. Sixty-one (55 percent) of the distillate errors were within 5 percent of the range

bounds and could have been caused by approximations or the use of small amounts of residual oil along with distillate oil.

b. Combustor Utilization

Table L-3 contains the results of computations of combustor utilization. (Check 6 in Appendix M) It was computed in order to compare combustor capacity data to fuel use figures.

Although it is possible for a combustor to operate at utilization levels above 100 percent for short periods of time, figures between 95 and 110 percent are unlikely, because combustors that burn at this level for any period of time will burn out. Also, combustors are generally down each year for maintenance. Furthermore, they usually are not operated at maximum capacity. Utilization figures above 110 percent are wrong; 140 combustors in the data base (approximately 3 percent) were found to have utilization rates greater than 110 percent. Incorrect utilization figures could have arisen from incorrect combustor fuel use or capacity data.

c. Primary Energy Source vs. Fuel Use Figures

A comparison of primary energy source responses and 1974 fuel use figures revealed that 110 records (2 percent of those checked) contained inconsistencies between these two items. (Check 7 in Appendix M) An investigation of those records revealed:

- 28 cases where fuel use figures indicated the listed primary energy source was the alternate energy source and vice versa.

- 24 cases where fuel use figures indicated the listed primary energy source had not been burned in 1974.
- 7 cases where fuel use figures indicated the listed primary energy source was the secondary alternate energy source and vice versa.
- 5 cases where fuel use figures indicated the listed primary energy source was the alternate energy source, the listed alternate energy source was the secondary alternate energy source, and the listed secondary alternate energy source was the primary energy source.
- 46 cases where the listed alternate energy source was the secondary alternate energy source and vice versa.

In 13 of these cases, coal was listed as the primary energy source when fuel use figures indicated otherwise. Each of these combustors was "coal-capable," and would have survived the first cut of the regulatory process had coal not been listed as the primary energy source.

d. Total Design Firing Rate (TDFR) vs. Total Combustor Capacities (TCC)

TDFR of an installation is defined as the sum of the combustor capacities (design firing rates) of all combustors at that installation regardless of size. The TCC is the sum of the combustor capacities of all MFBI combustors at an installation (combustors with a design firing rate of over 100 million Btu/hour). This check is divided into three parts which are presented below. (see Check 8 Appendix M)

Part A: TCC should be less than or equal to the TDFR because all combustors included in TCC should be included in TDFR. A check revealed 96 MFBI records in which this was not the case. The complete results of this check can be found in Table L-4.

Part B: If the TDFR equals the TCC, all combustors at an installation should be MFBI combustors (the presence of non-MFBI combustors would cause the TDFR to exceed the TCC). A check revealed 88 records in which this was not the case. The complete results of this check can be found in Table L-4.

Part C: If the TDFR is greater than the TCC, the difference between these two numbers divided by the number of non-MFBI combustors at an installation should be less than 100 million Btu/hour. A figure greater than 100 million Btu/hour would indicate the presence of at least one unreported MFBI combustor. A check revealed 84 records in which this was not the case. The complete results of this check can be found in Table L-4.

5. Cross-Checks

A series of cross-checks revealed inconsistent or contradictory entries in the data base. These checks are described below.

a. Improper Responses

Several questions on the MFBI questionnaire were to be answered only if previous questions had been answered in a specific way. A series of checks was performed in order to determine if all those who should have responded to these questions did so. (The results of these

checks can be seen in Table L-1, entries 23, 24, 29, 30.)

Another series of checks was performed in order to determine if all those who answered these questions should have done so.

- Question II-10 states, "If coal is the primary energy source, do you intend to continue its use?" A record should contain an answer to this question only if coal is listed as the primary energy source for an MFBI combustor. A check revealed 452 records (28 percent of the 1584 records containing responses to Question II-10) in which this question had been answered even though a fuel other than coal was listed as the primary energy source. Thus, of the 5098 records listing a primary energy source other than coal, 9 percent contained answers to Question II-10 that should not have been entered. (see Check 9 in Appendix M)

- Question II-11 states, "If coal is not the primary energy source, do you intend to convert to coal in the near future?" A record should contain an answer to this question only if it lists a non-coal primary energy source. A check revealed 111 records (2 percent of the 4886 records containing responses to Question II-11), in which this question had been answered even though coal had been listed as the primary energy source. Thus, of the 1197 records listing coal as the primary energy source, 9 percent contained responses to Question II-11 that should not have been entered. (Check 10 in Appendix M)

- Because Question II-10 is to be answered only if coal is the primary energy source, and II-11 is to be answered only if a fuel other than coal is listed as the primary energy source, each record should contain an answer to only one of these questions. A check revealed 440 records containing responses to both Questions II-10 and II-11. Thus, of the 6299 combustor records in the data base, 7 percent contained a response to Question II-10 or II-11 that should not have been entered. (Check 11 in Appendix M)

- Question II-16 states, "If the answer to No. 12 or

13 is 'yes', is any or all of the coal burning equipment still in place?" A record should contain an answer to this question only if Question II-12 and/or II-13 has been answered 'yes'. A check revealed 187 records (9 percent of the 2126 records containing responses to Question II-16) in which this question had been answered, even though Questions II-12 and II-13 had been answered 'no'. Of the 4061 records containing 'no' responses to Question II-12 and II-13, 5 percent contained responses to II-16 that should not have been entered. (Check 12 in Appendix M)

- Question II-17 states, "If the answer to No. 12 or 13 is 'yes', is any or all of the coal burning support equipment still operational?" A record should contain a response to this question only if Question II-12 and/or Question II-13 has been answered 'yes'. A check revealed 180 records (9 percent of the 2079 records containing responses to Question II-17) in which this question had been answered, even though Questions II-12 and II-13 had been answered 'no'. Thus, of the 4061 records containing 'no' responses to Question II-12 and II-13, 5 percent contained responses to Question II-17 that should not have been entered. (Check 12 in Appendix M)

b. Year Installed vs. Year Modified

A combustor cannot be modified before it is installed. Responses to Question II-5 ["Date Installed (year)"] should therefore be less than responses to Question II-6 ("If combustor has been modified to burn coal, what year was it modified?"). Of the 462 records containing answers to both Questions II-5 and II-6, 274 listed the combustor as having been modified before it was installed. In 272 of these cases, the year modified was listed as 1900. It is possible that the installation date was incorrectly listed. Because zeros were used to signify a negative response on the questionnaire, it is more likely

that respondents listed "00" to signify that the combustor had never been modified to burn coal. This is another instance in which the use of a question beginning with a conditional clause was a source of error. (Check 13 in Appendix M)

c. Primary Energy Source vs. Coal Capability

A combustor burning coal as its primary energy source should:

- have burned coal in the past,
- possess adjacent land available for coal storage,
- have the capability of burning coal now, and
- have coal burning support equipment in place and operational.

A check of the 1,197 records listing coal as the primary energy source revealed the following. (Check 14 in Appendix M)

- 20 records (2 percent of those listing coal as the primary energy source) containing 'no' responses to Question II-13 ("Has coal ever been burned in it?").
- 53 records (4.5 percent of those listing coal as the primary energy source) containing 'no' responses to Question II-15 ("Is land available for coal storage?").
- 2 records (0 percent of those listing coal as the primary energy source) containing 'no' responses to Question II-16 ("If the answer to No. 12 or 13 is 'yes,' is the coal burning support equipment in place?").

- 18 records (2 percent of those listing coal as the primary energy source) listing 'no' responses to Question II-17 ("If the answer to No. 12 or 13 is 'yes,' is any or all of the coal burning support equipment operational?").

- 32 records (3 percent of those listing coal as the primary energy source) listing a 'no' response to Question II-14 ("Can coal now be burned in this combustor?").

The small number of errors revealed by these checks is not surprising because these questions were easily answered for combustors burning coal as their primary energy source. These cross-checks did not reveal errors in the questions for combustor records listing a non-coal primary energy source, where most errors in these questions would be expected to occur.

d. Combustor Output Utilization

Question II-23 states, "Indicate (to the nearest percent) the percent of combustor output that is devoted to: electric generation, space heating, process steam and other (specify)." The sum of the responses to this question on each record should total 100 percent. A check on responses to this question revealed 183 records, or 3 percent of those checked, in which the total was not 100 percent. (Check 15 in Appendix M) This could be explained by respondents double counting combustor output that was used more than once (recycled steam, for example), resulting in totals greater than 100 percent, or not counting waste heat, resulting in totals less than 100 percent.

6. Comparison of Different Versions of the Data Base

Three different versions of the MFBI data base are being compared against each other to determine how they differ. These versions are:

- A version prepared by EIA
- A version prepared by the EPA
- A version prepared by Teknekron (a private consulting firm). This is an extract of the EPA version mentioned above.

The data bases are being compared:

- on a record by record basis to see if they contain the same number of records and
- on an item-by-item basis to determine if they contain different data.

The computer program that is being used to perform this comparison is not complete. Partial results indicate there are some differences among the three versions, but that these differences are minor compared to other problems with the data.

152	153	155	164	298	759	8[illegible]1	1191	1309	1310	1311	1404	1413	1414	1415
1416	1417	1450	1458	1463	1482	1493	1520	1594	1595	1596	1597	1598	1599	1600
1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615
1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630
1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645
1646	1647	1648	1649	1656	1695	1696	1697	1727	1753	1758	1767	1768	1769	1770
1771	1772	1773	1774	1775	1776	1777	1778	1779	1845	1847	1848	1849	1863	1917
1919	2048	2125	2143	2163	2206	2212	2213	2232	2287	2310	2327	2332	2334	2359
2410	2421	2478	2512	2545	2564	2841	2868	3010	3104	3107	3121	3146	3147	3148
3156	3190	3191	3192	3193	3194	3195	3196	3197	3198	3199	3318	3325	3357	3373
3421	3441	3444	3453	3460	3461	3462	3463	3464	3465	3466	3467	3468	3469	3470
3471	3472	3473	3474	3475	3476	3477	3478	3479	3480	3481	3482	3483	3484	3485
3486	3487	3488	3489	3490	3491	3492	3493	3494	3495	3496	3497	3498	3499	3500
3501	3502	3503	3504	3505	3506	3507	3508	3509	3510	3511	3512	3513	3514	3515
3516	3517	3518	3519	3520	3521	3522	3523	3524	3525	3526	3527	3528	3529	3530
3531	3532	3533	3534	3535	3536	3537	3538	3539	3540	3541	3542	3543	3544	3545
3546	3547	3548	3549	3550	3551	3552	3553	3554	3555	3556	3557	3558	3559	3560
3561	3562	3563	3564	3565	3566	3567	3568	3569	3570	3571	3572	3573	3574	3575
3576	3577	3578	3579	3580	3581	3582	3583	3584	3585	3536	3587	3588	3589	3590
3591	3592	3593	3594	3595	3596	3597	3598	3599	3600	3601	3602	3603	3604	3605
3606	3607	3608	3609	3610	3611	3612	3613	3614	3615	3616	3617	3618	3619	3620
3621	3622	3623	3624	3625	3626	3627	3628	3629	3630	3631	3632	3633	3634	3635
3636	3637	3638	3639	3640	3641	3642	3643	3644	3645	3646	3647	3648	3649	3650
3651	3652	3653	3654	3655	3656	3657	3658	3659	3660	3661	3662	3663	3664	3665
3666	3667	3668	3669	3670	3671	3672	3673	3674	3675	3676	3677	3678	3679	3680
3681	3682	3683	3684	3685	3686	3687	3688	3689	3690	3691	3692	3693	3694	3695
3696	3697	3698	3699	3700	3701	3702	3703	3704	3705	3706	3707	3708	3709	3710
3711	3712	3713	3714	3715	3716	3717	3718	3719	3720	3721	3722	3723	3724	3725
3726	3727	3728	3729	3730	3731	3732	3733	3734	3735	3736	3737	3738	3739	3740
3741	3742	3743	3744	3745	3746	3747	3748	3749	3750	3751	3752	3753	3754	3755
3756	3757	3758	3759	3760	3761	3762	3763	3764	3765	3766	3767	3768	3769	3770
3771	3772	3773	3774	3775	3776	3777	3778	3779	3780	3781	3782	3783	3784	3785
3786	3787	3788	3789	3790	3791	3792	3793	3794	3795	3796	3797	3798	3799	3800
3801	3802	3803	3804	3805	3806	3807	3808	3809	3810	3811	3812	3813	3814	3815
3816	3817	3818	3819	3820	3821	3822	3823	3824	3825	3826	3827	3828	3829	3830
3831	3832	3833	3834	3835	3836	3837	3838	3839	3840	3841	3842	3843	3844	3845
3846	3847	3848	3849	3850	3851	3852	3853	3854	3855	3856	3857	3858	3859	3860
3861	3862	3863	3864	3865	3866	3867	3868	3869	3870	3871	3872	3873	3874	3875
3876	3877	3878	3879	3880	3881	3882	3883	3884	3885	3886	3887	3888	3889	3890
3891	3892	3893	3894	3895	3896	3897	3898	3899	3900	3901	3902	3903	3904	3905
3906	3907	3908	3909	3910	3911	3912	3913	3914	3915	3916	3917	3918	3919	3920
3921	3922	3923	3924	3925	3926	3927	3928	3929	3930	3931	3932	3933	3934	3935
3936	3937	3938	3939	3940	3941	3942	3943	3944	3945	3946	3947	3948	3949	3950
3951	3952	3953	3954	3955	3956	3957	3958	3959	3960	3961	3962	3963	3964	3965
3966	3967	3968	3969	3970	3971	3972	3973	3974	3975	3976	3977	3978	3979	3980
3981	3982	3983	3984	3985	3986	3987	3988	3989	3990	3991	3992	3993	3994	3995
3996	3997	3998	3999	4009	4042	4049	4078	4101						

Fig. 3. Installation identification numbers of installations apparently missing from the MFBI data base.

TABLE L-1

COMPLETENESS OF INFORMATION

IN INDIVIDUAL RECORDS

NO.	ITEM	NO. OF EXPECTED ENTRIES	NO. OF OMISSIONS	% OF OMISSIONS
(1)	MFBI Name (I-1)	3485*	0	0
(2)	MFBI State (I-1)	3485	1	0
(3)	AQCR (I-1)	3485	3483	100
(4)	MFBI Street (I-1)	3485	267	8
(5)	MFBI City (I-1)	3485	3	0
(6)	MFBI Zip (I-1)	3485	5	0
(7)	Parent Co. Name (I-2)	3485	0	0
(8)	Parent Co. Zip (I-2)	3485	14	0
(9)	Contact Person Name (I-3)	3485	3	0
(10)	Contact Person Title (I-3)	3485	91	3
(11)	Contact Zip (I-3)	3485	1	0
(12)	Contact Phone (I-3)	3485	3	0
(13)	No. of Boilers at the Installation (I-4)	3485	4	0
(14)	No. of Combustors at the Installations (I-5)	3485	2	0
(15)	Total Design Firing Rate (I-6)	3485	0	0
(16)	SIC Codes (I-8)	3485	201 (all three missing)	6
(17)	Combustor Number (II-1)	6299+	1	0
(18)	Combustor Type (II-2)	6299	5	0
(19)	Combustor Capacity (II-3)	6299	5	0
(20)	Date Installed (II-5)	6299	40	1
(21)	Primary Energy Source (II-8)	6299	4	0
(22)	Alternate Energy Source (II-9)	6299	6	0
(23)	Continue to burn coal? (II-10)	1197°	66	5
(24)	Intend to switch to coal? (II-11)	5098⊕	373	7
(25)	Designed to burn coal? (II-12)	6299	83	1
(26)	Burned coal in the past? (II-13)	6299	97	1
(27)	Can coal be burned now? (II-14)	6299	177	8
(28)	Land available for coal storage (II-15)	6299	782	12
(29)	Support Equipment in place? (II-16)	2065~	115	5

TABLE L-1 (continued)

NO.	ITEM	NO. OF EXPECTED ENTRIES	NO. OF OMISSIONS	% OF OMISSIONS
(30)	Support Equipment operational (II-17)	2065~	135	7.6
(31)	Residual Fuel Savings (II-20)	1124*+	383	34
(32)	Distillate Fuel Savings (II-20)	172*°	101	59
(33)	Gas Fuel Savings (II-20)	2944*⊕	1147	39
(34)	1974 Coal Btu Content (II-21)	1197°	1	0
(35)	1974 Coal Quantity (II-21)	1197°	5	0
(36)	1974 Coal Btu Content and Quantity (II-21)	1197°	53	5
(37)	1974 Gas Btu Content (II-21)	1124*+	0	0
(38)	1974 Gas Quantity (II-21)	1124*+	10	1
(39)	1974 Gas Btu Content and Quantity (II-21)	1124*+	61	5
(40)	1974 Distillate Btu Content (II-21)	172*°	0	0
(41)	1974 Distillate Quantity (II-21)	172*°	3	2
(42)	1974 Distillate Btu Content and Quantity (II-21)	172*°	24	20
(43)	1974 Residual Btu Content (II-21)	2944*⊕	0	0
(44)	1974 Residual Quantity (II-21)	2944*⊕	24	1
(45)	1974 Residual Btu Content and Quantity (II-21)	2944*⊕	92	3
(46)	Combustor Output usage (II-23)	6299	219	3
(47)	Stack Number (III-1)	6299	919	15
(48)	Stack Height (III-2)	6299	461	7
(49)	Precipitator Installed? (III-3)	6299	616	10
(50)	FGD Installations (III-3)	6299	707	11
(51)	Pollution Control Equipment Required for Fed. Air Standards (III-4)	6299	4765 (at least one entry missing)	76
(52)	Pollution Control Equipment Required to acct. SIP? (III-5)	6299	4859 (at least one entry missing)	77

TABLE L-1 (continued)

FOOTNOTES:

* No. of MFBI installation records

+ No. of MFBI combustor records

o No. of combustors listing coal as primary energy source

⊕ No. of combustors listing a non-coal primary energy source

~ No. of combustor records listing a "yes" response to question II-12, II-13 or both

*+ No. of combustor records listing residual as primary energy source

*o No. of combustors listing distillate as primary energy source

TABLE L-2

BTU RANGE CHECKS

FUEL	Published Range	OCU + Range	No. of records containing BTU content (1974)	No. of records containing BTU content (1973)	No. out of published range (1974)	No. out of published range (1973)	% out of published range (1974)	% out of published range (1973)
COAL	6000-15,000 btu/lb**	7000-14,000 btu/lb	1431	1391	2	3	0	0
RESIDUAL	130,000 - 153,000* btu/gal	100,000 - 160,000 btu/gal	2365	2216	126	113	5	5
DISTILLATE	121,000 - 143,000* btu/gal	100,000 - 160,000 btu/gal	692	634	112	104	16	16
GAS	900-1100*** btu/cu. ft.	600-1100 btu/cu. ft.	3932	3830	355	309	9	8

*Source: Paul Schmidt, Fuel Oil Manual; Industrial Press, New York, 1969, pp. 45-46.

**Source: Paul Anuitt, Coal in United States Mineral Resources, Brobst & Pratt, eds., 1973, pp. 133-142

***Source: W. L. Thomas, Office of Producer and Pipeline Regulation, FERC, verbal communication, July 14, 1978

+ Range: Used by the OCU in a range check it performed in mid-1975

TABLE L-3

COMBUSTOR UTILIZATIONS

COMBUSTOR UTILIZATION	FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
Under 5%	168	4%	4%
5% - 20%	468	10%	14%
20% - 40%	915	20%	34%
40% - 60%	950	21%	55%
60% - 80%	1004	22%	77%
80% - 95%	548	12%	89%
95 -100%	185	4%	93%
100 -110%	190	4%	97%
110% +	140	3%	100%
TOTAL:	4568	100%	---

TABLE L-4

TOTAL DESIGN FIRING RATE VS. TOTAL COMBUSTOR CAPACITY

TYPE OF ERROR	NO. OF CHECKS MADE	NO. OF ERRORS FOUND	% OF ERRORS FOUND TO NEAREST %	POSSIBLE CAUSE OF ERROR
(1) Total combustor capacity greater than total design firing rate	1753	96	5%	Error in response to question I-6 (Total Design Firing Rate) or one of more responses to question II-3 (combustor capacity)
(2) Total combustor capacity equals total Design firing rate and number of boilers and other combustors at an installation greater than number of MFBI combustors at an installation.	1753	88	5%	Error in one or more responses to questions I-4 & I-5 (No. of boilers and other combustors at an installation), I-6 (Total Design Firing Rate), II-3 (combustor capacity) It is possible some respondents believed the TDFR applied to MFBI combustors only
(3) Difference between Total Design Firing Firing Rate and total combustor capacity divided by number of non-MFBI combustors at an installation is greater than 99 million	1753	84	5%	1) Error in one or more responses to questions I-4,I-5 (No. of boilers & other combustors at an installation), I-6(Total Design Firing Rate)or II-3 (combustor capacity) 2)One or MFBI combustors were not reported.
TOTAL	5259	268	5%	

APPENDIX M

DETAILED LOGIC AND RESULTS OF COMPUTERIZED CONSISTENCY CHECKS FOR THE MFBI DATA BASE

APPENDIX M

Check 1 (Non - MFBIs)

Check: Question I-6 Total Designed Firing Rate (X 10^6 BTU/HR) (of #4 and #5)

Method

Check the answer to I-6. If it is less than 100 (that is, 100 million BTU per hour), print: "MFBI _____ if not an MFBI TDFR = _____."

This check was skipped if no answer appeared in Question I-6.

Results

Number of Skips:	9
Number of checks made:	3479
Number of errors:	101
Percentage of errors:	3%

Check 2 (Non-MFBI Combustors)

Check: Question II-3 Combustor Capacity (X10^6 BTU/HR)

Method

Only combustor capacities of more than 99 million BTU/HR are supposed to be individually reported. If the answer to this question is less than 99, (99 million BTU/HR) print: "MFBI _____, Combustor _____, lists combustor capacity as _____ million BTU/HR" This check was skipped if no answer appeared in Question II-3

Results

Number of Skips:	5
Number of Comparisons:	3480
Number of Errors:	10
Percentage errors:	0%

Check 3 (Duplicate Records)

Check: MFBI Number

Method

Check the MFBI numbers. If any MFBI number is duplicated, print: "MFBI _____, is listed _____ times in the data base."

Continued:

Check 3 (Duplicate Records) Cont'd

Results

Number of Skips:	0
Number of checks:	3485
Number of errors:	0
Percentage errors:	0%

Check 4 (Duplicate MFBI Combustors)

Cross Check: Question II-1 Combustor Number
With: Question II-2 What kind of Combustor is this?
1 = Boiler, 2=burner, 3=other combuster of fuel

Method

No Combustor should be listed more than once in the data base. If duplicate combustors are found within an MFBI record, print: "MFBI _____, combustor _____, is listed _____ times in the data base."

Results

Number of Skips:	0
Number of checks made:	3488
Number of errors:	67
Total number of repeated combustors:	70
Percentage errors:	2%

Check 5 (BTU Range Check)

Range Check: Questions II-21 and II-22

1974 and 1973 BTU contents of coal, residual, distillate, and gas.

Method

The BTU contents of each of these fuels varies depending upon the source of the fuel. Therefore it is difficult to determine whether a given BTU content is in "error". The ranges used are listed below:

Coal: 6,000 - 15,000 BTU per pound *
Residual: 130,000 - 153,000 BTU per gallon **
Distillate: 121,000 - 143,000 BTU per gallon **
Natural Gas: 900 - 1100 BTU per cubic foot ***

Continued:

Check 5 (BTU Range Check) Cont'd

* Schmidt, Paul Fuel Oil Manual, Industrial Press, New York, 1969, p. 45-6

** Aunitt, Paul Coal in United States Mineral Resources, Babst and Pratt, eds., 1973 p. 133-142

*** Thomas, W.L. Office of Producer and Pepeline Regulation, FIERCE Verbal Communication, 7/14/78

Results

	1974 Fuel Use	1973 Fuel Use
Coal:		
Number of Checks	1431	1391
Number of Errors	2	3
Percent Errors	0%	0%
Residual:		
Number of Checks	2365	2216
Number of Errors	126	113
Percent Errors	5%	5%
Distillate:		
Number of checks	692	634
Number of Errors	112	104
Percent Errors	16%	16%
Natural Gas:		
Number of checks	3932	3830
Number of Errors	355	309
Percent Errors	9%	8%

Check 6 (Combustor Utilization)

Cross Check: Question II-3 Combustor Capacity ($X10^6$ BTU/HR)

With: Question II-21 1974 Fuel Use Data

Method

Although it is possible for combustors to operate at more than 95% capacity this generally does not occur. In fact, combustors are usually down for repairs for a short period of time each year. This check determines whether the combustor burned more fuel in 1974 than its capacity would normally allow. Combustor utilizations of over 95% or under 5% are considered unlikely. Due to round-off errors in BTU content and in qunatity of fuel burned, however, a combustor utilization of slightly over 100% may be acceptable.

Continued:

Check 6 (Combustor Utilization) Cont'd

However, a combustor utilization of over 110% is obviously an error. To determine combustor utilization, first determine the total number of BTUs generated in 1974. (Multiply the BTU contents by the respective fuels). Divide this figure by the combustor capacity to obtain combustor utilization. If this number is over 110%, print : MFBI _____, Combustor _____, Combustor Utilization is _____%." This check was not performed when BTU contents were out of range. (See check 5)

Results

The following combustor utilization frequency table does not include combustors without fuel use data or combustors with a primary energy source of "other".

UTILIZATION	FREQUENCY
0- 5%	168
5- 20%	468
20- 40%	915
40- 60%	950
60- 80%	1004
80- 95%	548
95-100%	185
100-110%	119
Over 110%	140

Number of Skips	1801
Number of checks	4498
Number of known errors	140
Percentage errors	3%

Check 7 (Primary Energy Source)

Cross Check: Question II-8 Primary Energy Source for Existing Combustor 1=coal, 2=residual, 3=distillate, 4-gas, 5=other

With: Question II-9 Alternate Energy Source for Existing Combustor 1=coal, 2=residual, 3=distillate, 4=gas, 5=other, 6=no alternate.

Question II-21 1974 Fuel use data

Method

Compute the total energy in BTU generated by each fuel source listed in Question II-21.

Continued:

Check 7 (Primary Energy Source) Cont'd

Compare the fuel source generating the most, second most (if applicable), and third most (if applicable) energy in 1974 with the primary and alternate energy sources listed in Question II-8 and II-9. If they do not agree, print: "MFBI _____, Combustor _____, primary energy source is listed as _____, alternate energy source is listed as _____, but 1974 fuel reveals primary energy source is _____ burning _____BTU in 1974 and alternate energy source is _____ burning_____ BTU in 1974."

This check is not performed when BTU contents are out of range or when primary or alternate energy source is listed as "other".

Results

Number of Skips	1801
Number of Checks	4498
Number of Errors	110
Percentage Errors	2%

Error Breakdown

A	Primary and alternate switched	28
B	Primary not burned in 1974	24
C	Primary and secondary alternate switched	7
D	Primary was the alternate, the alternate was the secondary alternate, and the secondary alternate was the primary	5
E	Alternate and Secondary alternate switched	46
		110

Check 8 (Firing Rate Consistency)

Cross Check:	Question I-6	Total Designed Firing Rate ($X10^6$ BTU's/HR) (of #4 and #5)
With:	Question II-3	Combustor Capacity ($X10^6$ BTU/HR)
And:	Question I-4	Total Number of Boilers at this Installation
And:	Question I-5	Total Number of Other Combustors at this Installation

Method

In order to compare total designed firing rate (TDFR) to the sum of reported combustor capacities (TCC), the following test was made:

$$TEST = TDFR - TCC$$

Continued:

Check 8 (Firing Rate Consistency) Cont'd

Check 5 A

If the TEST result was negative, the sum of designed firing rates of the individual combustors exceeded the total designed firing rate and the following error message was printed : "For MFBI _____, TDFR is less than TCC by _____units. This check was skipped if no answer appeared in either Question I-6 or Question II-3.

Check 5 B

If the TEST result was zero, a second test was performed comparing the number of total units (NTU) (number of boilers and number of others) to the sum of reported units (NRU). Since the TEST result was zero, it was assumed that total and summed reported units should be equal. If the unit comparisons differed, the following error message was printed: "For MFBI _____, TDFR=TCC but NTU is greater than NRU by _____ units". This check was skipped if no answer appeared in any of Questions I-6,II-3, I-4 or I-5.

Check 5 C

If the TEST result was positive, it was assumed that excess capacity would be explained by the number of units supporting a capacity of less than 100 million BTU/HR. A second test was then performed:

$$\text{DIFFERENCE} = \frac{(\text{TDFR} - \text{TCC})}{(\text{NTU} - \text{NRU})}$$

If DIFFERENCE was greater than 99, at least one additional MFBI combustor should have been reported. The following error message as then printed. "MFBI _____ has unreported MFBI combustors TDFR =_____, TCC =_____, NTU =_____, NRU =_____."

This check was skipped if no answer appered in any of Questions I-t, II-3, I-4, or I-5.

Results

Check 5 A

Number of Skips	4
Number of checks made	3481
Number of errors	96
Percent errors	3%

Check 5 B

Number of Skips	5
Number of Checks made	3480
Number of errors	88
Percent of errors	3%

Continued:

Check 8 (Firing Rate Consistency) Cont'd

Check 5 C

Number of Skips	5
Number of checks made	3480
Number of errors	267
Percent errors	8%

Total Check 5

Number of Skips	5
Number of checks made	3480
Number of errors	451
Percent errors	13%

Check 9

Cross Check: Question II-8 Primary Energy Source, 1 =coal, 2 =residual, 3 = distillate, 4 = gas, 5 = other

With: Question II-10 If Coal is the primary energy source, do you intend to continue its use?

Method

Question II-10 should be answered only if the primary energy source is listed as coal. If an answer appears in Question II-10 and the primary energy is listed as gas, residual, distillate, or other, print: "MFBI _____, Combustor _____, lists _____ as answer to II-10 but lists _____ as the primary energy source." This check was skipped if Question II-8 was unanswered.

Results

Number of Skips	4
Number of Checks	6295
Number of Errors	452
Percentage Errors	7%

Check 10

Cross Check: Question II-8 Primary Energy Source for Existing Combustor 1 = coal, 2 = residual, 3 =distillate, 4 = gas, 5 = other

With: Question II-11 If coal is not the primary energy source, do you intend to convert to coal in the near future?

Continued:

Check 10 (Cont'd)

Method

Question II-11 should be answered only if the primary energy source is not listed as coal. If an answer appears in Question II-11 and the primary energy source is listed as coal, print " MFBI _____, Combustor ____ lists coal as the primary energy source but answers to II-11". This check was skipped if question II-8 was unanswered.

Results

Number of Skips	4
Number of Checks	6295
Number of Errors	111
Percentage errors	2%

Check 11

Cross Check: Question II-10 If coal is the primary energy source, do you intend to continue it's use?

With: Question II-11 If coal is not the primary energy source, do you intend to convert to coal in the near future?

Method

Only one of these questions should be answered. If both are answered, print: "MFBI _____, Combustor _____ listed answers to both II-10 and II-11. Answer to II-10 is _____. Answer to II-11 is _____."

Results

Number of Skips	0
Number of Checks	6299
Number of Errors	440
Percentage Errors	7%

Check 12

Cross Check: Question II-12 Was this combustor originally designed to be capable of burning coal?

With: Question II-13 Was coal ever burned in it?

And: Question II-16 If the answer to No. 12 or No. 13 is yes, is any or all of the coal burning support equipment still in place?

And: Question II-17 If the answer to No. 12 or No. 13 is yes, is any or all of this equipment still operational?

Continued:

Check 12 (Cont'd)

Method

Questions II-16 and II-17 should be answered only if one or both of questions II-12 or II-13 are answered "yes". If an answer appears in Questions II-16 and Questions II-12 and II-13 are both answered "no", print: "MFBI _____, Combustor _____, answers II-16 _____ but lists no as answers to II-12 and II-13". If an answer appears in II-17 and questions II-12 and II-13 are both answered "no", print: "MFBI _____, Combustor _____, answers II-16 _____ but lists no as answers to II-12 and II-13. These checks are skipped if either question II-12 or question II-13 is left unanswered.

Results

Question II-16

Number of skips	173
Number of checks	6126
Number of errors	187
Percentage errors	3%

Question II-17

Number of skips	173
Number of checks	6126
Number of errors	180
Percentage errors	3%

Check 13

Cross check: Question II-5 Date Installed (year)
with: Question II-6 If this combustor has been modified to to be capable of burning coal, what year was it modified?

Method

The combustor must have been installed before being modified. If the date modified is before then the date installed, print: "MFBI_____, combustor_____, was designed in_____and was modified in_____." This check was skipped when no answer appeared in Question II-5.

Number of skips	40
Number of checks	462
Number of errors	274
Number of errors due to answers to Question II-6 of 0 or 00	272
Percentage of errors	59%

Check 14

Cross Check: Question II-8 Primary Energy Source for Existing Combustor
1 = coal, 2 = residual, 3 = distillate, 4 = gas
5 = other.

With:
A) Question II-13 Was coal ever burned in it?
B) Question II-15 Is land available for coal storage?
C) Question II-16 If the answer to No. 12 or 13 is "yes", is any or all of the coal burning support equipment still in place?
D) Question II-17 If the answer to No. 12 or 13 is "yes", is any or all of this equipment still operational?
E) Question II-14 Can coal now be burned in this combustor?

Method

If coal is the primary energy source, each of Questions II-13 - II-17 should be answered affirmatively. However, if the combustor has been permanently shut down, "no" answers to II-14, II-15, II-16, and II-17 may be acceptable. There are no means of discovering whether flags from this check are actually errors. If any of the responses to questions II-13 - II-17 is no where coal is the primary energy source, print: "MFBI _____ Combustor _____, lists coal as the primary energy source but:

A) Coal has never been burned
B) Coal cannot now be burned
C) Land is not available for coal storage
D) Support equipment is not in place
E) Support equipment is not operational

Each of these checks was skipped when either question II-8 was unanswered or when the checked question was unanswered.

Results

A. II-13

Number of skips	98
Number of checks	1182
Number of errors	20
Percentage errors	2%

B. II-14

Number of skips	738
Number of checks	1182
Number of errors	53
Percentage errors	4%

C. II-15

Number of skips	4162
Number of checks	1182
Number of errors	2
Percentage errors	0%

D. II-16

Number of skips	
Number of checks	1182
Number of errors	18
Percentage errors	2%

E. II-17

Number of skips	4162
Number of checks	1182
Number of errors	32
Percentage errors	3%

Check 15

Check: Question II-23 Indicate (to the nearest percent) the percent of combustor output devoted to 1) electric generation 2) space heating, 3) process steam 4) other (specify)

Method

The sum of the responses to this question should equal 100%. If not, print: "MFBI_____, Combustor_____, lists

electric generation output _____
space heating output _____
process steam output _____
other output _____

This check was skipped if no answer appeared in question II-23.

Results

Number of skips	219
Number of checks	6080
Number of errors	185
Percentage errors	3%

This report was done with support from the Department of Energy. Any conclusions or opinions expressed in this report represent solely those of the author(s) and not necessarily those of The Regents of the University of California, the Lawrence Berkeley Laboratory or the Department of Energy.

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