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DEFENSE ENERGY INFORMATION SYSTEM (DEIS): RECOMMENDED DESIGN MO--ETC(U)
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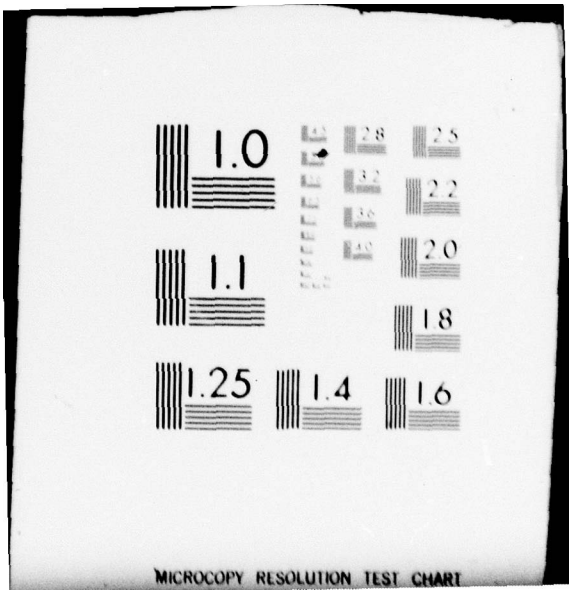
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DEFENSE ENERGY INFORMATION SYSTEM (DEIS): RECOMMENDED DESIGN MODIFICATIONS

(9) Final rept.

(11) Jun[redacted]79

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PREFACE

The Department of Defense, the largest single user of energy within the government, contributes to the achievement of national energy objectives by implementing energy conservation programs and assisting in the development and utilization of new energy technology. The Defense Energy Office, OASD/MRA&L Energy, Environment, and Safety, is responsible for the implementation of DoD energy policy. Their major responsibilities include the DoD energy budget, program coordination, petroleum logistics policy and supply problems, energy conservation, and the Defense Energy Information System.

These recommended design modifications are LMI's final report for DoD Contract MDS 903-77-C-0370, Task Order ML809, entitled "Improving the Utility of the Defense Energy Information System." The recommended functional requirements, data requirements, and plan for implementation are described herein. This report is directed to those persons in OASD responsible for the implementation of these modifications. It should also be useful for those currently associated with DEIS who may participate in its redesign and improvement.

Throughout this study, we have benefited from useful insights from DoD staff members. Mr. W. Sharkey, Mr. W. Vance, Mr. L. Smiley, Mr. J. Cunningham, and Mr. S. Bradshaw have provided valuable suggestions and observations. The Service energy offices also provided information and assistance during our study. MAJ Horn (Air Force), LTC Kinne (Army), Mr. T. Rooney (Army), LCDR Mitchum (Navy), and Mr. W. Prue (Navy) were particularly helpful.

EXECUTIVE SUMMARY

INTRODUCTION

The Defense Energy Information System (DEIS) is a worldwide, automated, management information system. It provides data on petroleum products used as mobility fuels by the military departments as well as most energy sources used for utility services at DoD installations.

DEIS consists of two related information systems. DEIS I reports the disposition and consumption of petroleum products, notably aviation gasoline, jet fuels, motor gasoline, distillate and residual oils within DoD. DEIS II reports the consumption of utility energy, i.e., electricity, natural gas, purchased steam/hot water, fuel oil and coal.

Accuracy and timeliness problems in the current DEIS have resulted in a lack of confidence and reduced usefulness of DEIS data. Recent developments in national energy policy, changing energy technologies, and decreasing fuel supplies have created additional user requirements that are not satisfied by the current DEIS.

ABSTRACT

This report examines the existing ~~DEIS,~~ Defense Energy Information System, describes current user requirements, analyzes alternative system concepts, and recommends an updated system design and implementation plan for the modification of DEIS. The study focuses on the entire system, from data collection at military bases and facilities, to the uses of DEIS by the Services, OSD, and the Department of Energy. ← ABSTRACT

This summary presents the most significant aspects of the study report: recommendations for the modification of DEIS, an overview of the recommended DEIS design (hardware, software, and data requirements), the operational and

administrative responsibilities required to support DEIS, and an overview of the implementation plan.

RECOMMENDATIONS

The DEIS user environment has changed considerably since the original development of DEIS in 1973. While DEIS met the needs of its users after the first oil embargo, recent developments have created a much wider base of DEIS users and uses. The need for a DoD energy management system (rather than a monitoring system) became evident during the study.

The recommendations to improve DEIS are based on extensive user interviews and are intended to achieve the following major objectives.

- Higher degree of accuracy. Most data errors are simple human mistakes (e.g., keying errors) or related to a lack of understanding of DEIS procedures. Better defined procedures, feedback of input to the services, and automated editing/validation can reduce errors to less than 5%.

- Increased flexibility to respond to the changing energy-technological environment. Changes in data content and applications must be permitted to meet the requirements of energy management. Flexibility is also required for output reporting due to numerous users and their varying responsibilities.

- Improved utility of information content (what data are stored in the system) and system content (what features/capabilities the system offers its users). DEIS currently requires additional data to support energy conservation management (e.g., facility square footage) and policy analysis (e.g., historical data availability). Analytic capabilities and on-line retrieval are also required by DEIS users.

- Greater system control for the Defense Energy Office, DEIS users, and those who provide data to DEIS. System control should be delegated according to the responsibilities of the organizations involved. The services require authority to prescribe procedures and requirements for DEIS inputs, the Defense Energy Office must have control over data processing functions and overriding authority over procedural issues, and DEIS users must be able to define their required outputs.

- More timely data collection and processing to ensure regular output reports within two weeks of data submittal. Improved timeliness requires better procedures at the service levels, better throughput in the data processing, and on-line inquiry for output reporting.

Based on these objectives, the following recommendations are made:

- The scope of DEIS should be expanded to provide more support (in terms of analysis and data) to the user functions of energy conservation management and energy policy analysis, while continuing its current support for supply management and readiness functions. DEIS should continue its role of supplying supporting data to the engineering/ research and development and budgeting functions of its users.

- Operational and procedural changes to DEIS should facilitate the decentralization of data management. This will provide improved communication between the bases and facilities, the major commands, the Service energy offices, and the Defense Energy Office regarding DEIS policy and procedures.

- The accuracy and flexibility of data collection and reporting from bases and facilities should be improved. Improvements should include more flexible and better documented procedures for bases and facilities as well as increased data processing to ease the burden of DEIS reporting.

- DEIS should facilitate the decentralization of the input processing function where the Services wish to utilize DEIS input data as part of an independent, Service-oriented data processing system.

- DEIS input control and feedback (to reporting bases and facilities) should be conducted at the Service headquarters level, and at the major command level, where possible. This requires active Service personnel for the review of DEIS input data and for the transmittal of error and summary reports to the bases and facilities.

- DEIS should provide capabilities to support the analysis of energy data, e.g., trend analysis, analysis of conservation measures, etc. These capabilities should include analytical packages, user-written analytical software, and standard user-specified analytical programs.

- Flexible output reporting should be made available to DEIS users. Current, historical, and baseline data should be accessible through on-line inquiry (from user terminals), standard user-specified report programs should be provided, and user-written report programs permitted. A generalized report-writer package (compatible with the DBMS), graphics hardware, microfiche output, and on-line terminals should be available to users.

- A data base orientation to DEIS data processing should be implemented including the use of disk storage and a generalized data base management system (DBMS). The data base should also have the flexibility to accept new data elements as they become relevant to DEIS users.

- Data for the square footage of facilities, heating/cooling degree days, and energy costs (where desired by the Services) should be added to the current data base.

- Data for new energy types (e.g., solar, geothermal, wind, etc.) should be added to the current data base.

- The implementation of the recommended DEIS modifications should be performed in an incremental fashion. Those modifications that can be easily made to the current system should be completed first. Those modifications requiring extensive redevelopment should be incorporated into a redesign and redevelopment of DEIS, implementing capabilities in a modular fashion based on priorities.

- Modular, structured programming techniques should be used in all redesign and redevelopment of the DEIS software.

OVERVIEW OF THE RECOMMENDED DEIS DESIGN

Consistent with the recommendations above, the recommended DEIS design facilitates modification of DEIS with minimal change to the Services' data collection and reporting procedures.

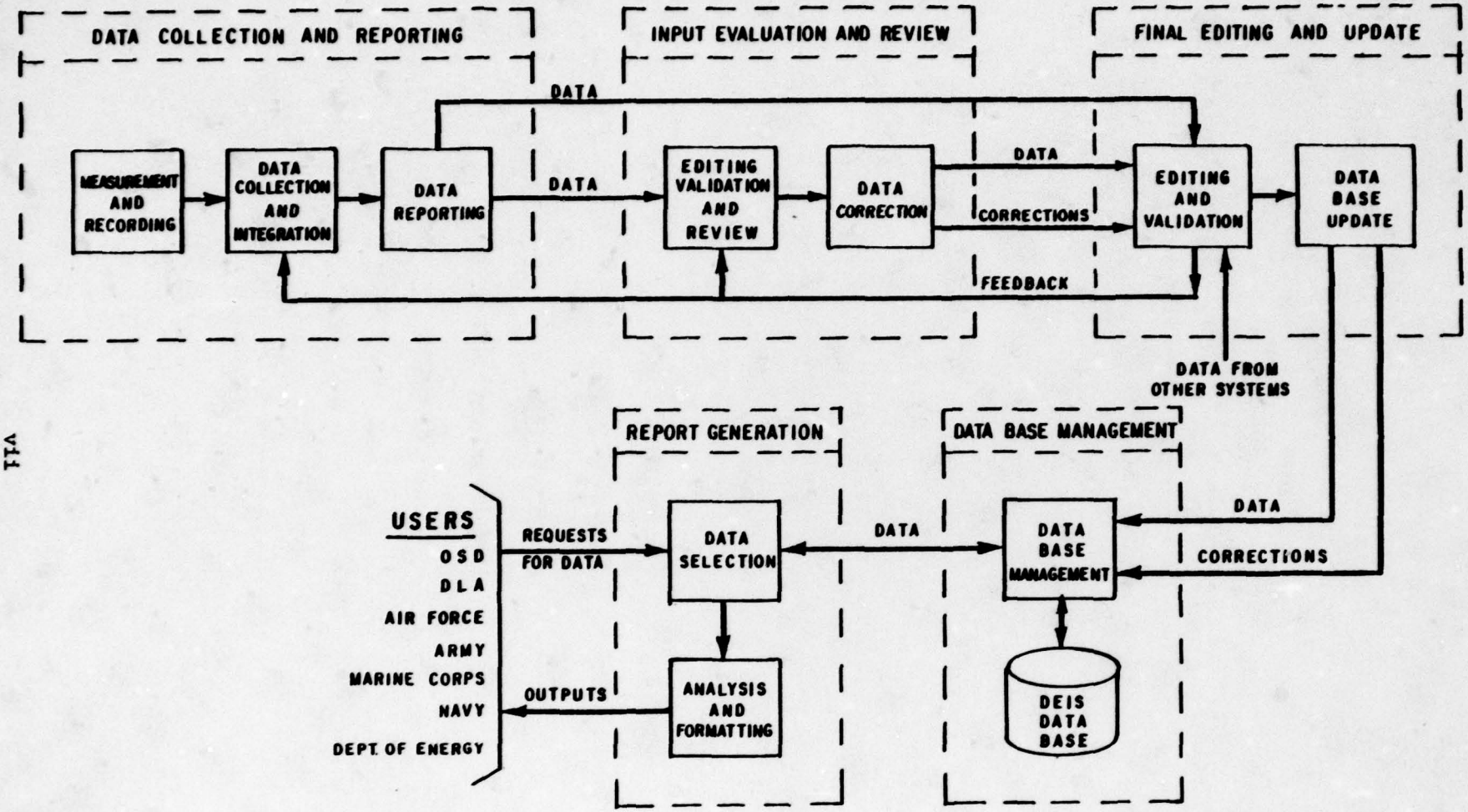
This overview presents the flow of DEIS data through the recommended manual and data processing functions. Hardware, software, and data requirements are specified. The recommended design includes existing DEIS functions with those modifications necessary to satisfy the DEIS user requirements. Figure 1 illustrates the functional flow of the recommended DEIS design.[1]

The recommended DEIS design consists of five main components, or modules. The first module, Data Collection and Reporting, includes the activities of the 1400 military bases and facilities that provide data to DEIS. Consumption and inventories are measured and recorded monthly or quarterly, collected and integrated and then reported to DEIS. This study has found that significant improvement is possible in consistency, accuracy, and completeness in reporting from the bases and facilities. The recommended modifications to the existing process include the use of descriptive and self-checking input forms, official acceptance of procedures now in use but previously considered inaccurate (e.g., reporting monthly consumption directly from utility company

[1]Functional similarities between DEIS I and DEIS II permit their integration in this overview.

FIGURE I

DEIS FUNCTIONAL OVERVIEW



invoices that may not correspond to the DEIS month), and the provision for feedback to bases and facilities from DEIS data processing (in the form of a monthly report).

The next module is Input Evaluation and Review. This process has evolved in some of the Services and has been adopted and expanded as an integral part of the recommended DEIS design. The organizations responsible for energy management in each Service edit, validate, and review DEIS inputs. Corrections are then sent to the next module.

Where such reviews occur in the current DEIS, a significant increase in the accuracy and regularity of reporting has taken place. Direct communication between these reviewing organizations and the bases and facilities has resulted in timely error correction.

The next three modules comprise the recommended DEIS central data processing. They are: Final Editing and Update, Data Base Management, and Report Generation. The most significant modification to the current system is a data base orientation. The use of a Data Base Management System (DBMS) is proposed, enabling extensive editing in the Final Editing and Update Module and very flexible output reporting and analytic capabilities in the Report Generation Module. The improved editing will contribute to increased data accuracy. Greater output reporting flexibility will increase the effectiveness of DEIS as a management tool.

Hardware Requirements

Table 1 lists the hardware requirements for the recommended DEIS design. These requirements are satisfied, in part, by the current DEIS hardware at the Defense Logistics Agency (DLA). However, the current DLA hardware cannot support the requirements for on-line interactive use.

TABLE 1. RECOMMENDED HARDWARE REQUIREMENTS

FACILITY	REQUIREMENT
Central Processor	
Core Size	Moderate, as required by DBMS, communications interface, and moderate (100K) applications programs
Processing Mode	On-line, batch, remote batch
Number of Users	2-3 simultaneous on-line users at peak
Frequency of Use	Daily on-line (1 hour average), peak usage corresponding to DEIS I and DEIS II input deadlines
	Nightly batch (data base update), with greatest volume corresponding to DEIS I and DEIS II input deadlines
Volume	Up to 400,000 characters input per day
System Software	Operating system should be fully interactive (timesharing, on-line data base and retrieval, and remote batch capabilities)
	High level language capabilities (COBOL, FORTRAN, and/or PL/1)
	Data Base Management System (batch/on-line, host language interface, user inquiry language, and report writer capabilities)
	Statistical and graphics packages desired
Communications	
Terminal Compatibility	Standard teletype dial-up interface (or through AUTODIN)
Data Communications (i.e.,	AUTODIN and teletype-compatible message
	Form 173 format)
Data Storage	
Type	Direct access storage device (e.g. disk) and standard computer tape
Volume	50 megabytes on-line data storage (expandable to 70 megabytes) plus DBMS overhead (25-60%)
	Tape volume as required for data base back-up and (infrequent) creation of user outputs
Other Peripherals	
Card Reader	Infrequent use for input transactions
Microfiche	Monthly creation of microfiche output reports
Printer	High speed, multiple copy
Graphics	Plotter desired

Alternative approaches have been explored during the course of this study. These include the expansion of the current DLA hardware, the use of various OSD computer systems (e.g., MULTICS), and the combined use of DLA and OSD computers. The specific computer system(s) will be selected by the MRA&L Automated Systems Office and Defense Energy Office.

The hardware required by bases/facilities and reviewing organizations are not considered part of DEIS hardware requirements, except that the proper interfaces between those computers and DEIS must be initiated and maintained.

Software Requirements

The modification of DEIS to a data-base-oriented system requires software redevelopment. A Data Base Management System with on-line inquiry and report writer capabilities will minimize the time and cost of reprogramming.

The programming for DEIS should utilize structured programming principles to provide modularity (permitting easier modification in the future) and high-level languages (e.g., COBOL, FORTRAN, or PL/1).

Data Requirements

The recommended DEIS data base includes historical data (monthly for two years and summary data to 1975), baseline data, and new additional data available on-line for immediate retrieval when necessary. The new data include square footage of facilities and weather data and data on new sources of energy (solar, biomass, recycling of fuels, etc.) for use in utility energy management.

The recommended data base is maintained by a DBMS and incorporates a data element dictionary concept to permit input flexibility and editing.

ADMINISTRATIVE AND OPERATIONAL PROCEDURES

The recommended design addresses the entire DEIS process from data collection through the use of output reports. Administrative and operational procedures are an integral part of the design. Table 2 details the recommended responsibilities of each organization associated with DEIS. A major emphasis of these recommendations is the decentralization of system control and responsibility to the Services, while maintaining centralized authority with the Defense Energy Office.

IMPLEMENTATION PLAN

The recommended plan for modifying DEIS is incremental and consists of two phases. Phase 1 is designed to provide some immediate benefits in terms of increased data accuracy and output report timeliness. Phase 1 does not require additional data processing development. Phase 2 is designed to complete the DEIS modification through reprogramming much of the existing system. Phase 1 is estimated to require four months, and Phase 2 is estimated to require an additional nine to eleven months.[2] The estimated total development costs range from $134,600 to $279,800 depending on which activities are funded and how much additional hardware is required. Figure 2 presents the cost and time estimates for the recommended two-phase implementation plan. By sequencing the Phase 2 tasks by priority, most of the user requirements can be satisfied in a shorter time frame.

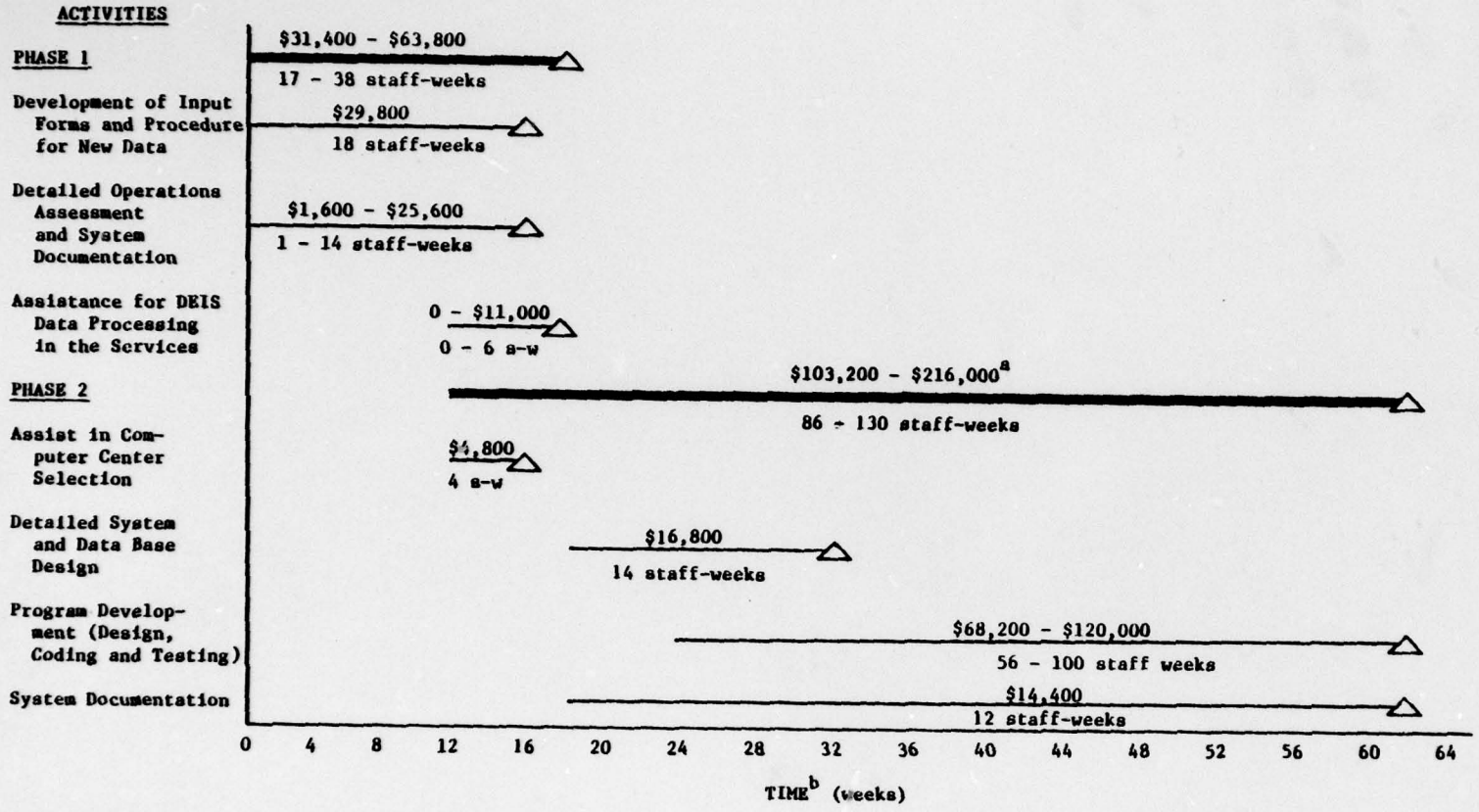
With the implementation of the recommended design modifications, DEIS will progress from an energy reporting system to an energy management tool. The data base management system approach will enable DEIS users to perform analysis of current and historical data, receive detailed and summarized

[2]These estimates reflect the minimum development time required and depend on staffing availability.

TABLE 2. RECOMMENDED DEIS ORGANIZATIONAL RESPONSIBILITIES

Organization	Operational Procedures	Administrative Management
Defense Energy Office	Establish overall DEIS procedural requirements Create and maintain complete system documentation and data definition standards Initialize data base updates and report runs Conduct periodic reviews of user requirements	Require compliance to DEIS procedures Control the availability and dissemination of DEIS data Review and approve all changes to the system and procedures
DEIS Users	Initiate and create user-specified reports Propose system modifications as required	Disseminate user-specified reports to other users when appropriate
Major Commands and Service Energy Offices (or their delegates)	Document procedural requirements for bases and facilities Review, investigate and correct DEIS input data Verify receipt of inputs by due dates Disseminate reports to bases and facilities where applicable	Require compliance to procedural requirements Audit and review energy facilities Document MACOM/SEO procedures
Military Bases and Facilities	Measure and estimate energy consumption and storage Collect, integrate, and transmit DEIS data Investigate errors detected by DEIS processing	Require submission of data by base and satellite organizations Document base/facility procedures
DEIS Computer Staff	Provide operational and programming support to DEIS Perform all data base administrative operational procedures	Maintain DEIS program documentation Document data base administrative procedures

FIGURE 2. IMPLEMENTATION PLAN SUMMARY



[a]Includes $60,000 for data storage acquisition and program testing.

[b]Minimum time required for activities.

information immediately on request, and customize their output reports. The overall design will provide more timely receipt of outputs, flexibility to adapt more easily to changing requirements, provide a higher degree of accuracy, and give greater system control to those responsible for energy management in the Services.

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I. INTRODUCTION

BACKGROUND

The Defense Energy Information System (DEIS) is a worldwide, automated, management information system. It provides data on petroleum products used as mobility fuels by the military departments as well as most energy sources used for utility services at DoD installations.

DEIS consists of two related information systems. DEIS I reports the disposition and consumption of petroleum products, notably aviation gasoline, jet fuels, motor gasoline, distillate and residual oils within DoD. DEIS II reports the consumption of utility energy, i.e., electricity, natural gas, purchased steam/hot water, fuel oil, and coal.

DEIS I and II data are reported from over 1400 military bases and facilities, naval vessels, and DoD agencies. The data are transmitted monthly to the Defense Logistics Agency (DLA) computer center. The data are processed and used to produce DEIS I and DEIS II monthly and quarterly reports. These reports are distributed to major commands in the Services, the reporting DoD agencies, and to various offices in DoD that perform energy-management-related functions.

DEIS reports are currently used for supply management, energy conservation management, energy policy analysis, readiness assessment, and research and development. The Defense Energy Office (MRA&L) has management responsibility for DEIS.

Accuracy and timeliness problems in the current DEIS have resulted in a lack of confidence and reduced usefulness of DEIS data. Recent developments in national energy policy, changing energy technologies, and decreasing fuel

supplies have created additional user requirements that are not satisfied by the current DEIS.

This report examines the existing DEIS, describes user requirements, analyzes alternative system concepts, and recommends an updated system design and implementation plan for the modification of DEIS.

The overall recommendations and a description of the study methodology comprise the remainder of this introduction. The recommended system design and implementation plan are the subject of the remainder of the report. The functional specification in Chapter II outlines the flow of information through the recommended DEIS, the proposed operational and administrative responsibilities of the organizations associated with DEIS, and the hardware and software required to satisfy the recommended DEIS design. The data specifications for the recommended design are detailed in Chapter III. Chapter IV describes the proposed plan for implementing the recommended DEIS design. Staffing, costs, and a description of the required activities are presented. The Appendices include the current DEIS manual, analysis of the current DEIS, user requirements specification, and the evaluation of alternative system concepts used to define the recommended DEIS design.

RECOMMENDATIONS

The recommendations to improve DEIS are based on extensive interviews with DEIS users (see Appendix C for a description of user requirements). They are intended to achieve the following major objectives.

- Higher degree of accuracy
- Increased flexibility to respond to the changing energy-technological environment

- Improved utility of information content (what data are stored in the system) and system content (what features/capabilities the system offers its users)
- Greater system control for the Defense Energy Office, DEIS users, and those who provide data to DEIS
- More timely data collection and processing to ensure regular output reports within two weeks of data submittal.

Based on these objectives, the following recommendations are made.

- The scope of DEIS should be expanded to provide more support (in terms of analysis and data) to the user functions of energy conservation management and energy policy analysis, while continuing its current support for supply management and readiness functions. DEIS should continue its role of supplying supporting data to the engineering/ research and development and budgeting functions of its users.
- Operational and administrative procedural changes to DEIS should facilitate the decentralization of data management. This will provide improved communication between the bases and facilities, the major commands, the Service energy offices, and the Defense Energy Office regarding DEIS policy and procedures.
- The accuracy and flexibility of data collection and reporting from bases and facilities should be improved. Improvements should include the use of explicit self-checking input forms, complete system documentation, unit conversion software,[1] input editing/validation software, input structure and format flexibility, and flexible reporting periods for accurate consumption reporting.

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[1]Unit conversion software refers to computer-conversion of reported units of measure to BTUs, rather than manual conversion by the reporting facility.

- DEIS should facilitate the decentralization of the input processing function where the Services wish to utilize DEIS input data as part of an independent, Service-oriented data processing system. The Air Force Stock Fund System is a prime example, producing and transmitting DEIS I inputs as a by-product. The Army and Navy have plans for the automation of pre-DEIS processing.
- DEIS input control and feedback (to reporting bases and facilities) should be conducted at the Service headquarters level, and at the major command level, where possible. This requires active Service personnel for the review of DEIS input data and the transmittal of error and summary reports to the bases and facilities.
- DEIS should provide capabilities to support the analysis of energy data, e.g., trend analysis, analysis of conservation measures, etc. These capabilities should include analytical packages, user-written analytical software, and standard user-specified analytical programs.
- Flexible output reporting should be made available to DEIS users. Current, historical, and baseline data should be accessible through on-line inquiry (from user terminals), standard user-specified report programs should be provided, and user-written report programs permitted. A generalized report-writer package (compatible with the DBMS), graphics hardware, microfiche output, and on-line terminals should be available to users.
- A data base orientation to DEIS data processing should be implemented including the use of disk storage and a generalized data base management system (DBMS). The data base should also have the flexibility to accept new data elements as they become relevant to DEIS users.

- Data for the square footage of facilities, heating/cooling degree days, and energy costs (where desired by the Services) should be added to the current data base.
- Data for new energy types (e.g., solar, geothermal, wind, etc.) should be added to the current data base.
- The implementation of the recommended DEIS modifications should be performed in an incremental fashion. Those modifications that can be easily made to the current system should be completed first. Those modifications requiring extensive redevelopment should be incorporated into a redesign and redevelopment of DEIS, implementing capabilities in a modular fashion based on priorities.
- Modular, structured programming techniques should be used in all redesign and redevelopment of the DEIS software.

METHODOLOGY

The development of the above recommendations and the subsequent system design involved four primary tasks:

- Definition of the current system
- User requirements analysis
- Alternatives evaluation
- System design

The definition of the current system was oriented to the flow of information from the bases and facilities to DEIS data processing and finally to the users. Upon examination, this information flow revealed an unexpected degree of complexity, particularly in the transmittal of data from bases and facilities through a network of reviewing organizations to the DLA computer. An informal second level of DEIS management was uncovered and incorporated into our subsequent design considerations. The current DEIS is described in Appendix B.

The analysis of user requirements involved extensive interviews. Over 25 organizations plus the major commands of the Services currently receive DEIS outputs. This information is used for energy policy analysis, energy conservation management, budgeting, supply management, engineering/research and development, and readiness assessment. Appendix C provides a description of the current DEIS user requirements.

The evaluation of alternatives involved four steps. First, a list of alternative system modifications were derived from user interviews, an analysis of the current data processing system, and visits to reporting bases and facilities. While the user interviews and systems analysis established a basic set of potential improvements, the base/facility visits verified their feasibility, and provided additional alternatives.

Second, criteria for evaluating the alternatives were developed from the user requirements. The criteria reflect the DEIS objectives of utility, accuracy, timeliness, flexibility, and system control.

Third, a cost/benefit assessment was used to rate each alternative in terms of the criteria. A threshold was used to select those alternatives that provide a reasonable degree of benefit without a substantial cost. The selected alternatives were checked for reasonableness by presenting the results to the four major groups of system users.

Fourth, the selected alternatives were organized within three basic design strategies. The three designs were then evaluated in terms of their expected aggregate cost/benefit rankings from their previous assessments. Further description of the alternatives evaluation can be found in Appendix D.

II. RECOMMENDED DEIS FUNCTIONAL SPECIFICATION

INTRODUCTION

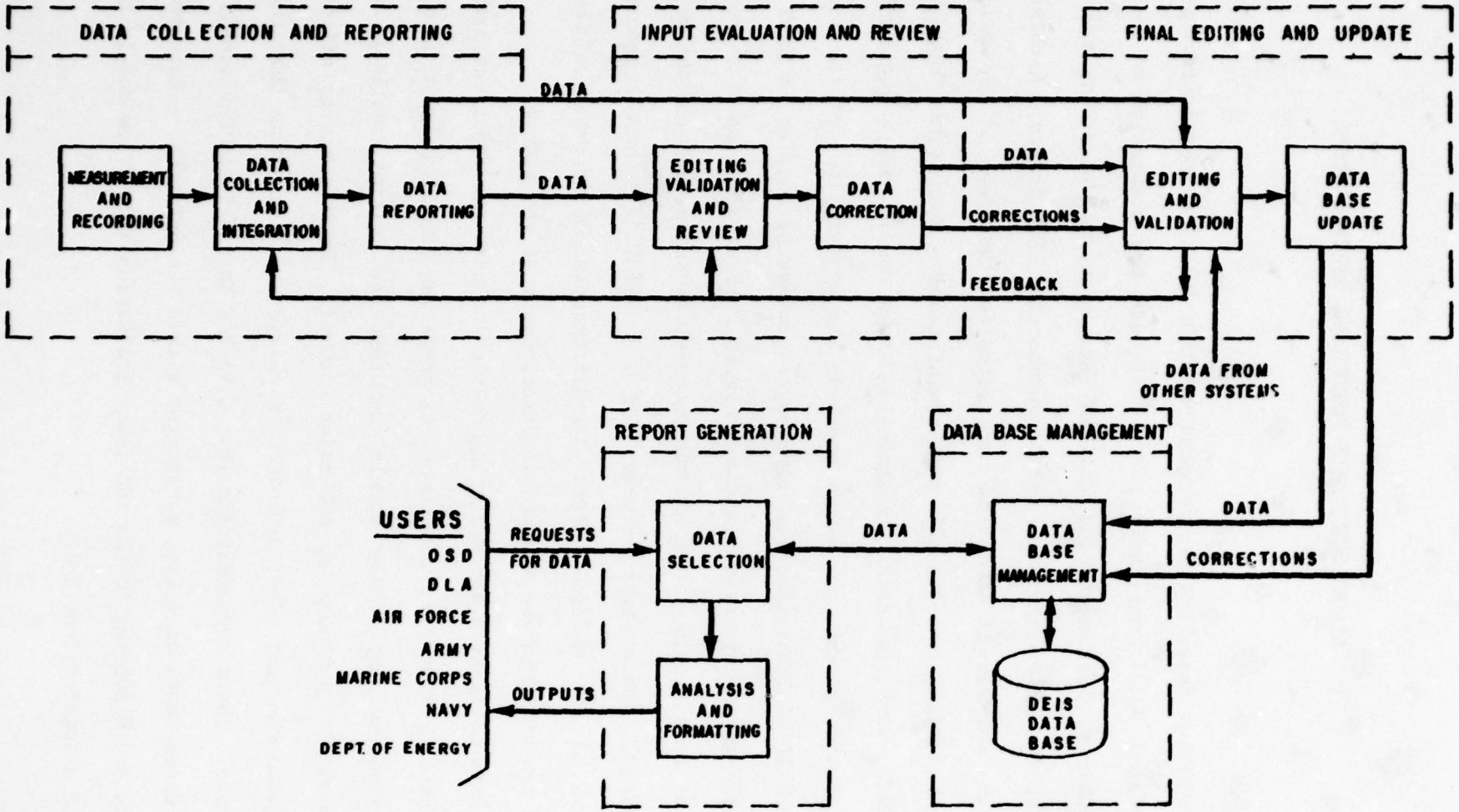
This chapter describes the recommended DEIS functions required to process energy related data from their sources through the generation of required output reports. The chapter is divided into sections describing the major components, or modules, defined in the recommended DEIS design. Each section contains an overview of the manual and automated functions of the module, a description of the operational and administrative procedures required to support DEIS, and the data processing software and hardware required. An overview of the recommended design preceeds the descriptions of the modules.

Figure II-1 illustrates the five major processing modules in DEIS I and DEIS II and their primary functions. Figure II-1 is also inset in the flow diagrams of each module to depict the interrelationships between the modules. The functional similarities between DEIS I and DEIS II permit a generalized description of the modules. Specific differences in information flow and functions are noted in the individual descriptions of the modules.

The Data Collection and Reporting Module includes the functions performed on the military bases and facilities in preparing the DEIS input data. The Input Evaluation and Review Module includes the editing, validation, and review functions performed by the major commands, Service energy offices (or their delegates), and other DoD offices charged with ensuring that the data are accurate. These organizations (e.g., NAVFAC Energy Field Divisions) often are the second level of energy management within the Services. Both the Data Collection and Reporting Module and Input Evaluation and Review Module include manual and automated functions.

FIGURE II-1

DEIS FUNCTIONAL OVERVIEW



The next three modules comprise the central data processing functions of DEIS. While the functions of data base update, data base management, and reporting are usually integrated, they are logically and physically separable in this design by their procedural, software, and hardware requirements.[1] The Final Editing and Update Module provides an automated error-checking function in addition to updating the data base. The Data Base Management Module consists entirely of the "packaged" software and hardware required to accept updates, maintain the data base, and provide data for outputs. The Report Generation Module includes the selection, computation, and formatting functions required to provide user-specified outputs.

DATA COLLECTION AND REPORTING

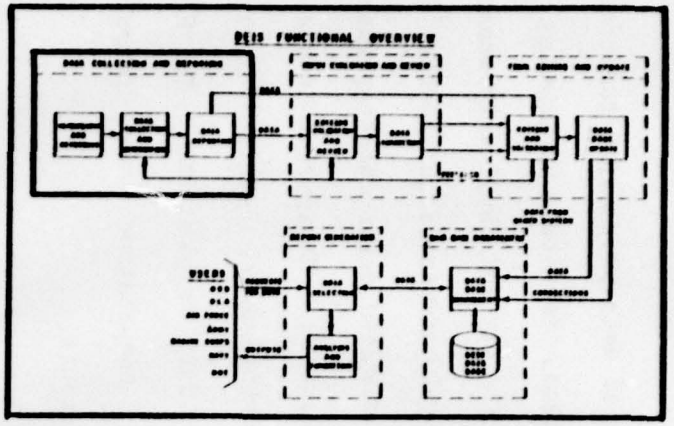
The Data Collection and Reporting Module illustrated in Figure II-2 includes the DEIS reporting activities of all military bases and facilities. Input data come from various sources, e.g., meter readings and inventory measurements, both on and off the base. (Some small facilities report as a part of a larger base or facility.) A single organization must collect the data from various sources (often from different components on the base) and integrate them into the DEIS input report. Computation is often required to determine totals for some energy products used. Finally the data are compiled into the forms and/or format necessary for data transmission. Normal procedures require monthly collection of DEIS I data and monthly or quarterly collection of DEIS II data.

Data collection and integration are currently being automated where the recording of energy data is already automated (e.g., Air Force Stock Fund

[1] The logical and physical separation of the three modules permits the separate development of each module on different computer systems (although not necessarily desirable).

FIGURE II-2

DATA COLLECTION AND REPORTING



MEASUREMENT AND RECORDING

METER READINGS

INVENTORY MEASUREMENTS

ENGINEERING ESTIMATES

INVOICES & UTILITY BILLS

CREDIT CARD TRANSACTIONS

MANUAL DATA COLLECTION AND INTEGRATION

AUTOMATED DATA COLLECTION AND INTEGRATION

ARMY *

AIR FORCE DEIS I

MANUAL DATA ENTRY VIA TERMINAL

AUTOMATED DATA TRANSMISSION

1

INPUT EVALUATION AND REVIEW

2

FINAL EDITING AND UPDATE

* CURRENT FT. McCOY PROTOTYPE POL SYSTEM

system) and where the computation of inputs is complex (e.g., some Navy stations have automated the proration of utility energy consumption by end-user). This trend towards automation is consistent with the recommended DEIS design.

The final step in the base/facility processing of DEIS input data is the keying of the input records. This is usually a function of the communications component on the base that transmits the data from a terminal via AUTODIN or a message network. The Air Force Stock Fund System provides inputs for DEIS I automatically. Since the Stock Fund System provides an accounting balance function before creating the DEIS I inputs, the data are sent directly to the Final Editing and Update Module. All other inputs go to the Input Evaluation and Review Module.

An important aspect of the Data Collection and Reporting Module is the variation in procedures and organizational responsibilities between bases and facilities. Measurement and recording, collection and integration, and data reporting might be performed by different organizations or by one organization. On many bases, the Data Collection and Reporting functions for DEIS I are performed by a different organization (usually the POL office) than for DEIS II (usually done by the engineering group). In addition, the definitions of organizational responsibilities vary from base to base.

Administrative and Operational Procedures

Table II-1 outlines the operational procedures and administrative management responsibilities for the Data Collection and Reporting Module. Activities marked with an asterisk are explained further below.

TABLE II-1. ORGANIZATIONAL RESPONSIBILITIES

Organization	Operational Procedures	Administrative Management
Base/Facility	Measure and estimate energy consumption and storage* Collect DEIS data and integrate into DEIS reporting format* Transmit the DEIS data (via AUTODIN where possible)	Require submittal of data by the proper organizations and satellite bases/facilities Establish written procedures for DEIS Data Collection and Reporting* Notify the major commands or Service energy office of changes to procedures
Major Commands and Service Energy Offices	Document procedural requirements for Data Collection and Reporting for Service and command*	Require compliance with Data Collection and Reporting procedures Audit and review energy facilities*
Defense Energy Office	Provide system documentation to all bases and facilities Document DoD-wide procedural requirements for Data Collection and Reporting	Require compliance with all Data Collection and Reporting procedures

Measure and Estimate Energy Consumption and Storage. Current measurement and estimating techniques are relatively accurate for DEIS requirements. However, errors have been caused by the omission of data or double-counting of energy consumption. The procedures for measuring and estimating consumption and storage should be reviewed by each base energy office to ensure accurate reporting.

Collect DEIS Data and Integrate into DEIS Reporting Format. Data must be collected in a timely fashion to meet the scheduled due dates. Descriptive, self-checking forms should be used to assist in the integration of DEIS input data (except where automated). The forms should facilitate the proper entry and computation of data, provide a computational cross-check of data to verify accuracy, and include instructions for keying data for transmission. An example of such a form is illustrated in Figure II-3. The actual forms to be used will be developed in a later study as discussed in Chapter IV.

Establish Written Procedures for DEIS Data Collection and Reporting. Data Collection and Reporting procedures should be documented at each base and facility to permit review and to maintain continuity when personnel changes occur. The documentation should include a description of any modifications of normal DEIS procedures, i.e., reporting monthly consumption that does not match the calendar month. Such changes must be approved by the major command and/or Service energy office. They should be implemented only where further accuracy or a significant reduction in staff hours for DEIS reporting can be shown. For example, where meter readings are made on the fourth of every month instead of the first, the meter readings may be more appropriate to be used for monthly consumption. Adding a computational function to estimate the amount each month will take more time and increase the probability of error.

Document Procedural Requirements for Data Collection and Reporting. Any standardization of Data Collection and Reporting procedures within a major command or Service should be documented and distributed to the bases and the Defense Energy Office.

Audit and Review Energy Facilities. Periodic audits and reviews of energy facilities should be conducted to further ensure accuracy. On-site

FIGURE II-3. SELF-CHECKING REPORT EXAMPLE

MONTHLY DEIS I REPORT
DIESEL FUEL/MIL-F-16884G

MEA 2 W51HU8
1 3 5 7 12

1. JULIAN DATE, END OF MONTH (e.g., March 31,1978 = 8090) — 1. 14 _ _ _ 17

DFM
14 17

2. OPENING INVENTORY (From Last Month, Closing Inventory, #6) — 2. 23 _ _ _ _ _ _ 29

3. ISSUES
   a. Depot #1 _ _ _ _ _ _ _ _
   b. Depot #2 _ _ _ _ _ _ _ _
   c. Total (a+b) _ _ _ _ _ _ _ _ → 3. 31 _ _ _ _ _ _ _ 37 (Enter 3c,Total)

4. RECEIPTS FROM COMMERCIAL CONTRACTS (From Comptroller's Office)
   a. Direct Deliveries _ _ _ _ _ _ _ _
   b. Contract Bulletins _ _ _ _ _ _ _ _
   c. Local Purchases _ _ _ _ _ _ _ _
   d. Total (a+b+c) _ _ _ _ _ _ _ _ → 4. 39 _ _ _ _ _ _ _ 45 (Enter 4d,Total)

5. BULK RECEIPTS FROM DOD (From POL Office) — 5. 47 _ _ _ _ _ _ 53

6. CLOSING INVENTORY
   a. Depot #1 _ _ _ _ _ _ _ _
   b. Depot #2 _ _ _ _ _ _ _ _
   c. Total (a+b) _ _ _ _ _ _ _ _ → 6. 55 _ _ _ _ _ _ _ 61 (Enter 6c,Total)

SELF-CHECKING COMPUTATION

ENTER 2.(cc 23-29) _ _ _ _ _ _ _ _
ENTER 4.(cc 39-45) _ _ _ _ _ _ _ _ ENTER 3.(cc 31-37) _ _ _ _ _ _ _ _
ENTER 5.(cc 47-53) _ _ _ _ _ _ _ _ ENTER 6.(cc 35-61) _ _ _ _ _ _ _ _
TOTAL (2+4+5) _ _ _ _ _ _ _ _ = TOTAL (3+6) _ _ _ _ _ _ _ _

THESE TOTALS MUST BE EQUAL

visits to major facilities will provide knowledge of reasonable energy consumption and storage amounts. Cross-checking DEIS data against facility descriptions from other sources (e.g., other information systems) can also provide a "reasonableness" check.

Software Requirements

When automated processing of energy data is available at a base/facility (e.g., Air Force Stock Fund System) or is planned, the automation of the data collection, integration, and data transmission of DEIS inputs is encouraged. The recent automation of such a system at Fort McCoy, Wisconsin has decreased both errors and the manual effort required of the POL office.

Additionally, the automation of complex data integration functions can also reduce manual efforts and errors. The Indianhead Navy Station has developed such a system using a programmable calculator to assist in the computation and proration of end-user utility energy consumption for DEIS II reporting.

Hardware Requirements

Where economically feasible, the most accurate means of measurement and recording should be used. Both metering and the use of credit card machines have demonstrated accuracy and control for base/facility energy management. The further use of such devices is encouraged.

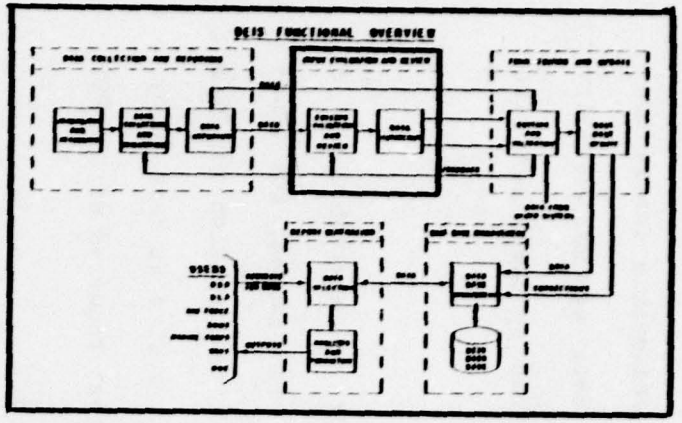
AUTODIN should be used where available to ensure computer readability of data transmissions.

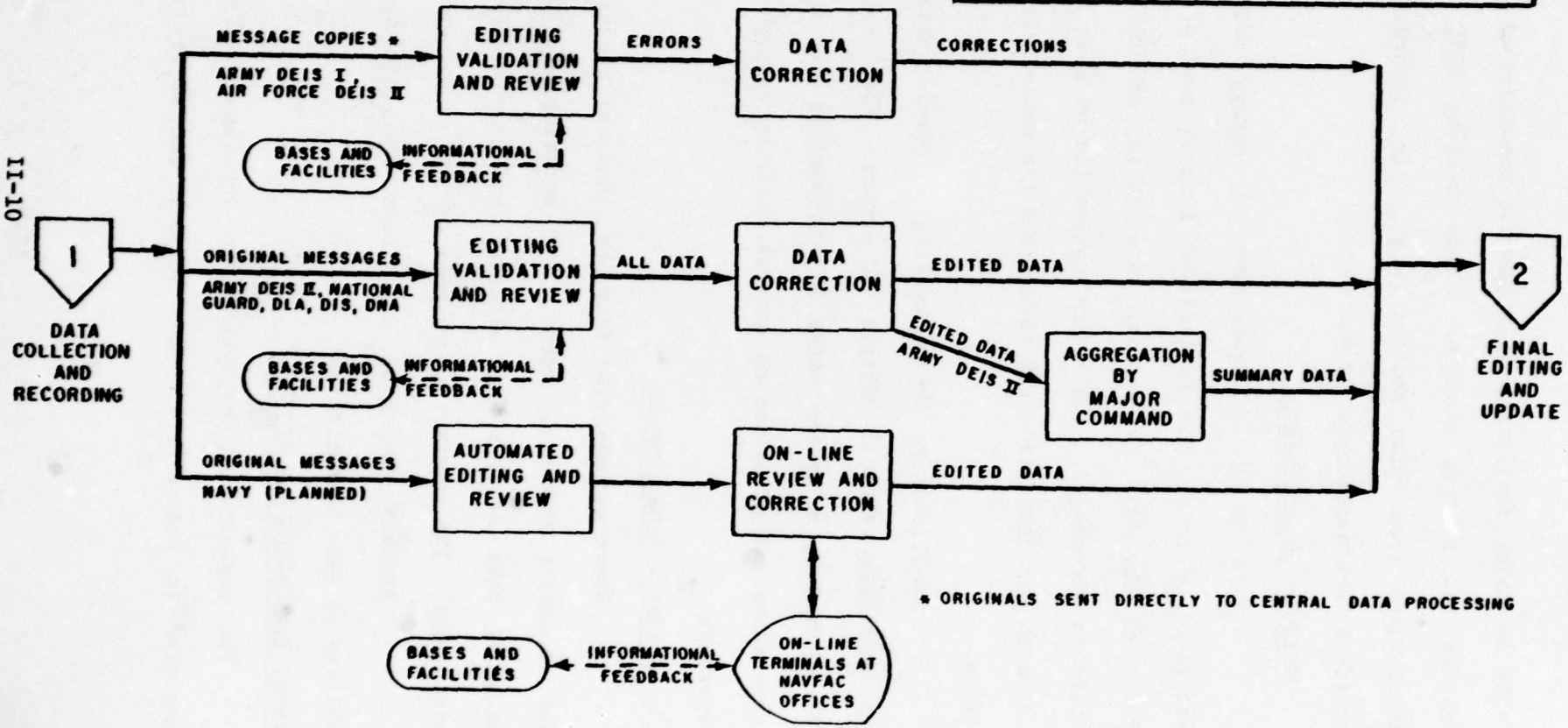
INPUT EVALUATION AND REVIEW

The organization responsible for the Input Evaluation and Review Module depicted in Figure II-4 varies between the major command and the Service

FIGURE II-4

INPUT EVALUATION AND REVIEW





energy office or its delegate (e.g., NAVFAC). Three variations of this function are currently in use or planned:

1) Copies of input data are sent to the reviewing organization. The original input message is sent directly to central data processing (the Final Editing and Update Module). The reviewer sends corrections to the Final Editing and Update Module for those inputs found to be in error. This review function is currently performed by the Army major commands (DEIS I) and Navy NAVFAC (DEIS II), and is planned for the Air Force (DEIS II).

2) In many cases, the input data are sent directly to the reviewer. The actual inputs are corrected and then transmitted for processing. This function is performed by the Army major commands (DEIS II) and Army and Air National Guards (DEIS I and II). The Army FORSCOM and TRADOC energy offices aggregate their data into a single input for the major command. The Defense Logistics Agency (DLA) will be responsible for reviewing DEIS I inputs from DLA, the Defense Nuclear Agency (DNA), and the Defense Investigative Service (DIS).

3) The Navy is planning to consolide DEIS II inputs at their computer center at the Navy Environmental Support Office. This will permit on-line review of the inputs by the NAVFAC Engineering Field Divisions. The edited data would then be sent directly to the Final Editing and Update Module. A similar approach may be used by the Air Force (DEIS II) and specific major commands in the Army.

The benefit of the Input Evaluation and Review Module is two-fold. First, it increases the accuracy of DEIS data by providing an edit function close to the bases and facilities, which can understand and respond to errors better than a centralized review organization. There is direct feedback between the reviewer and the base/facility, usually in the form of a telephone call, e.g., from the energy officer of a major command to the base energy officer.

Second, the Input Evaluation and Review Module relieves the burden of processing at the central DEIS computer, particularly where messages are edited (2 and 3 above). Although central DEIS processing provides a final

editing function, its processing requirements are reduced significantly if the input data are accurate.

Administrative and Operational Procedures

Table II-2 outlines the operational procedures and administrative management responsibilities for the Input Evaluation and Review Module. Activities marked with an asterisk are explained further below.

TABLE II-2. ORGANIZATIONAL RESPONSIBILITIES

Organization	Operational Procedures	Administrative Management
Base/Facility	Investigate data found questionable by the reviewing organization Review Base Input Edit Reports	N/A
Major Commands and Service Energy Offices	Confer with the bases/facilities regarding questionable input data Correct and transmit input data found inaccurate* Aggregate and transmit input data (Army only)* Review Base Input Edit Reports*	Establish written procedures for Input Evaluation and Review
Defense Energy Office	Document DoD-wide procedural requirements for Input Evaluation and Review	Require compliance with Input Evaluation and Review procedures

Review Base Input Edit Reports. The bases and facilities will receive a summary report of their inputs and any errors detected during the Final Editing and Update processing. Data that are rejected by that process must be corrected or explained to the reviewing organization so that a correction or change in edit values can be initiated.

Correct and Transmit Input Data Found Inaccurate. Those inputs found inaccurate will be corrected by the reviewing organization. Depending on the data flow, either a correction card will be transmitted or the input will be corrected and transmitted with the entire set of inputs.

Aggregate and Transmit Input Data (Army Only). Those Army major commands that send only summary data must compute quarterly totals for each energy type after corrections are made to their inputs.

Review Base Input Edit Reports. The reviewing organizations will check any errors indicated on the input summary and error reports to determine if further corrections are necessary or if edit value changes are required.

Software Requirements

Automation of the Input Evaluation and Review Module is encouraged where economically feasible. Such automation may reduce the manual efforts required by the reviewing organization. No specific DEIS requirements for such automation exist except those requirements for inputs (due dates, format, etc.). Input format requirements can be modified to facilitate computer-to-computer compatibility and/or data transmission efficiency (see Final Editing and Update Module software description).

Hardware Requirements

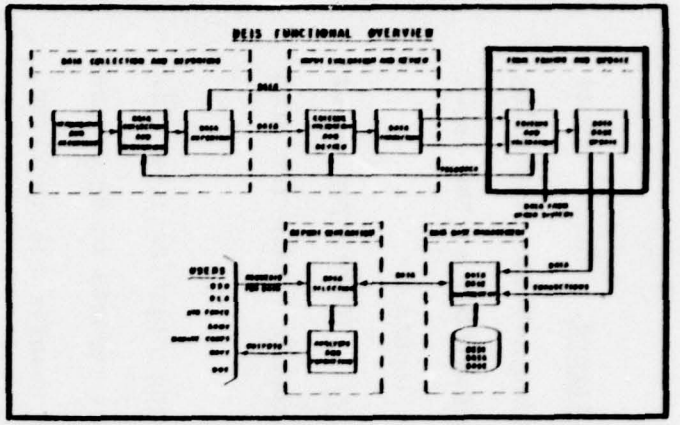
Where possible, all corrected and/or edited data should be transmitted to the Final Editing and Update Module via AUTODIN. No other hardware is required except for the automation of the review function where desired.

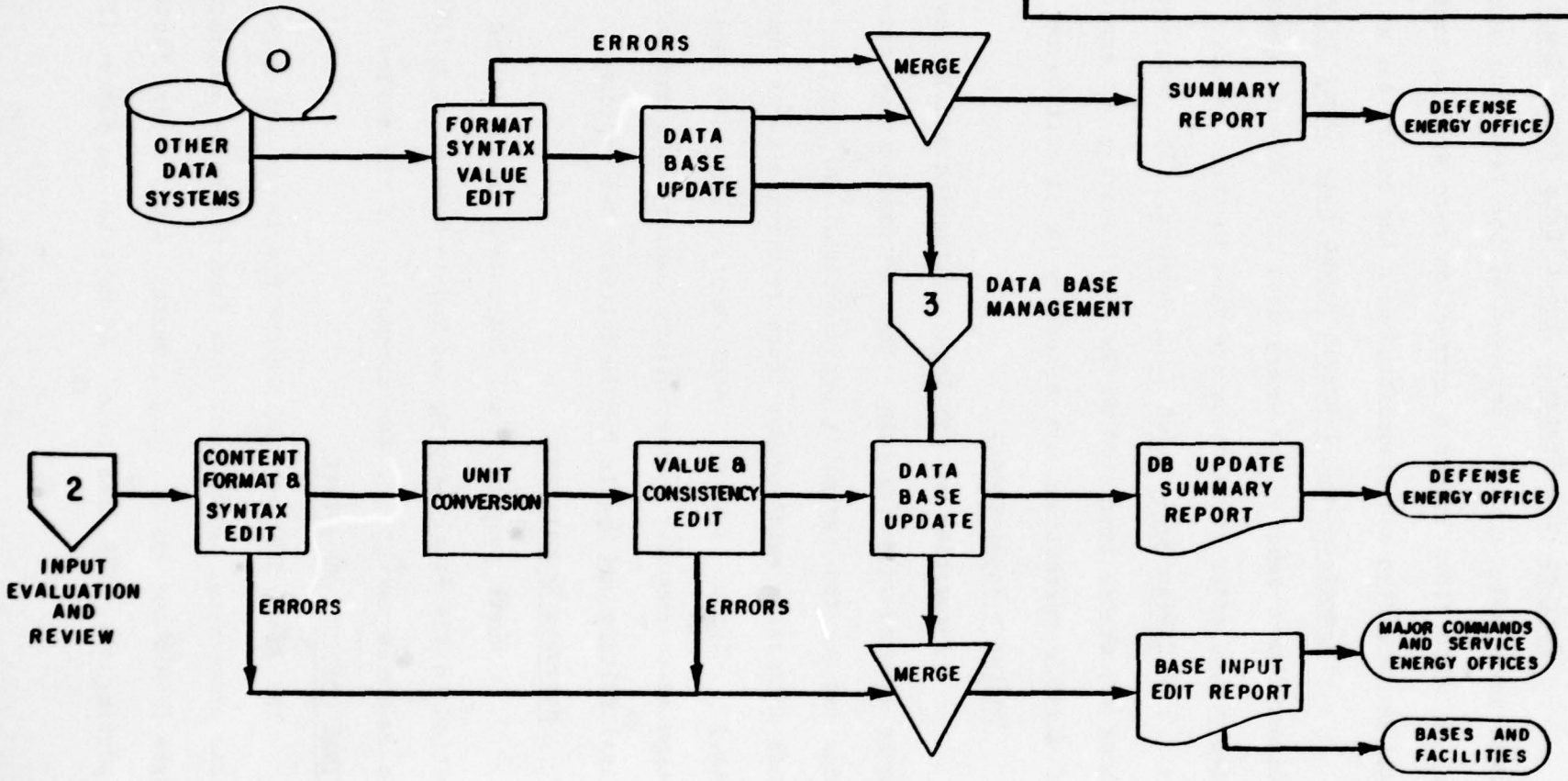
FINAL EDITING AND UPDATE

The Final Editing and Update Module is the first step in DEIS central data processing. DEIS input data from the bases and facilities and "non-DEIS" data from other systems (e.g., weather data, square footage) are processed for updating the DEIS data base. As depicted in Figure II-5, both the DEIS and

FIGURE II-5

FINAL EDITING AND UPDATE





non-DEIS data are screened for format, syntax, and value checks. The DEIS data are further screened for content consistency as well as processed through a unit conversion program. The data are then used to both update the data base and produce intermediate feedback reports.

Some examples of the editing process are:

1) Data Content Edit--This program checks that all required data elements are reported.

2) Format Edit--This program checks that data are located in their proper fields and that the data elements are limited to their prescribed field length.

3) Syntax Edit--This program checks that alphabetical and numerical digits are represented within the data elements according to the data content specifications.

4) Value Edit--This program provides a range check of the data value to assure that it falls within $\pm$ 10% of the same data value reported one year prior (given inflation and other built-in adjustments). This program also verifies that the opening inventory is exactly the same value as the closing inventory for that base/facility during its last reporting period.

Data failing to meet any or all of these edit checks are reported on hard-copy both to their source and to the reviewing organizations. Additionally, comprehensive reports (for DEIS and non-DEIS reporting) encompassing both errors and data input summaries are forwarded to the Defense Energy Office.

Administrative and Operational Procedures

Table II-3 outlines the operational procedures and administrative management responsibilities for the Final Editing and Update Module. Activities marked with an asterisk are explained further below.

Review Base Input Edited Report. This procedure occurs at the base/facility level to provide feedback to the bases and facilities. The long-range impact of this procedure is to minimize input errors. The same

report is provided to the major commands and the Service energy offices for managerial control.

TABLE II-3. ORGANIZATIONAL RESPONSIBILITIES

Organization	Operational Procedures	Administrative Management
Base/Facility	Review Base Input Edit Report*	N/A
Major Commands and Service Energy Offices	Review Base Input Edited Report* Verify receipt of all inputs by due date* Confer with Defense Energy Office regarding input changes*	N/A
Defense Energy Office	Initiate Final Editing and Update Run* Verify receipt of all inputs by due date Update Edit Check Values Review Data Base Update Summary Reports Review Other Inputs Summary Reports	Approve changes to edit check values Require compliance with all Final Editing and Update procedures

Verify Receipt of All Inputs by Due Date. This procedure requires immediate feedback to correct either missing and/or late reports within sufficient time to rectify the output to the Data Base Management System Module. This procedure is also the responsibility of the Defense Energy Office as an administrative backup to the system.

Confer with Defense Energy Office Regarding Input Changes. In response to the Base Input Edit Report, the reviewing organization should make recommendations to the Defense Energy Office to adjust the edit checks for an individual base/facility (or larger base grouping) to avoid unnecessary error reporting. The Defense Energy Office is responsible for approving changes to these edit values and updating the values on the data base.

Initiate Final Editing and Update Run. The Defense Energy Office must establish procedures for ensuring timely processing through this module. These procedures should include considerations for partial runs to alleviate a complete shutdown due to missing and/or late reports.

Software Requirements

The software requirements are not only divided between DEIS and non-DEIS reported data (as depicted in Figure II-6) but also functionally between the software used in a general editing and validation procedure and that used to update the data base.

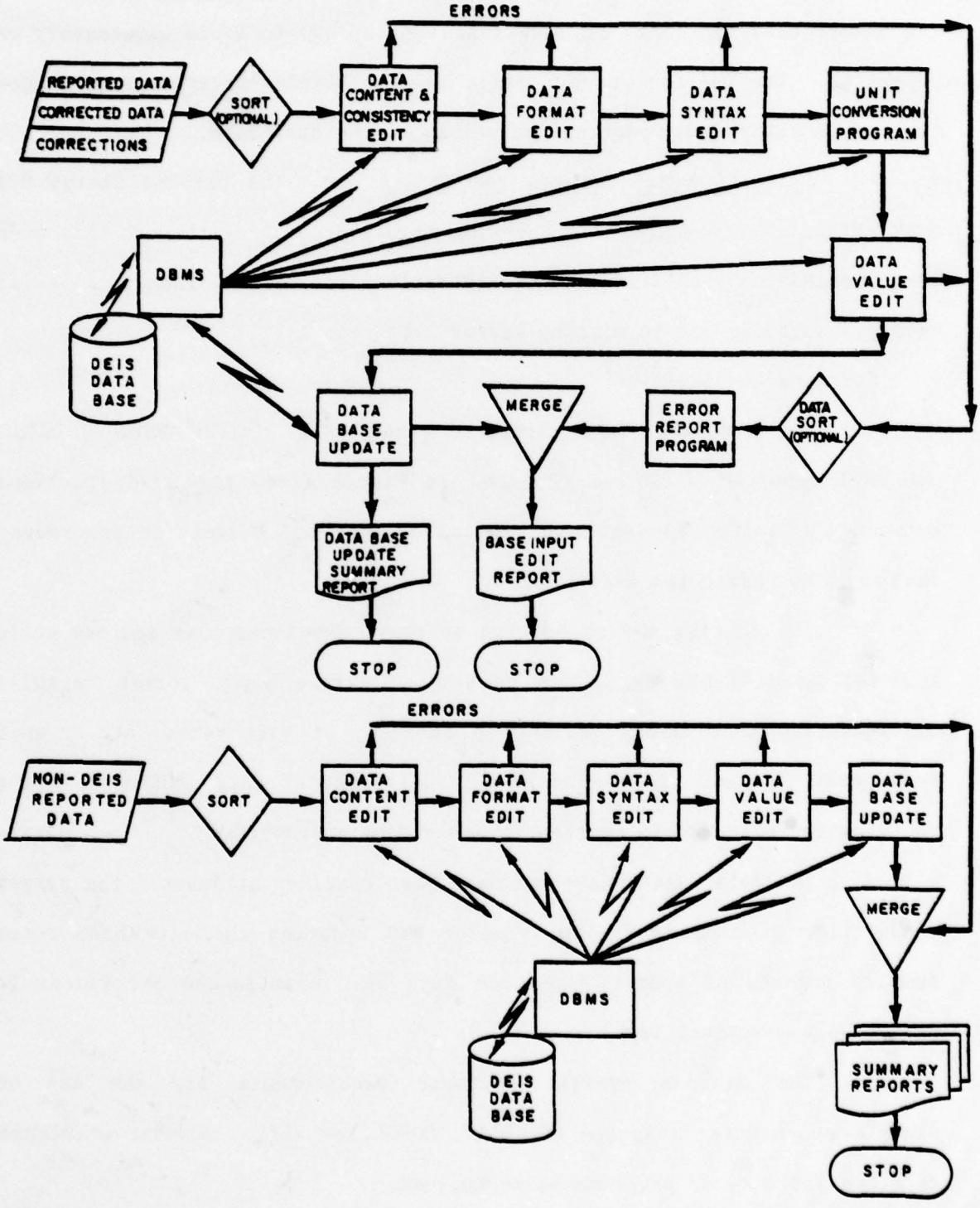
The editing and validation software developed must address at least the following: message header editing; flexible input format capability; unit/quantity conversion (gallons to barrels, or vice versa, etc.); editing for format, syntax, range of values, consistency of data contents; edit corrections for data record existence; and exception reporting.

The data base update software must consider at least: the selection computation of summary fields, finding and updating the data base records, summary reports of update runs, and data base maintenance procedures (copy data base to archival tape).

The minimum overall software requirements are the use of a high-level computer language (FORTRAN, COBOL, or PL/1), modular structure of code, and structured programming techniques.

FIGURE II-6

FINAL EDITING AND UPDATE SOFTWARE FLOW



Hardware Requirements

The hardware requirements for the Final Editing and Update Module include a central processor, communications facility, and peripherals. The central processor requires moderate core size (for 100K byte programs), batch processing modes, and capacity for up to 400,000 characters of input data per day (peak volume).

The communications interface must be compatible with AUTODIN and other DoD message services (i.e., Form 173). Spooling of DEIS I and DEIS II inputs is required for a nightly batch Final Editing and Update run.

Peripherals required include disk or tape (for temporary input spooling of up to 400,000 characters per day), a card reader, a tape drive for tape inputs, and a line printer for output reports.

DATA BASE MANAGEMENT

The Data Base Management Module consists of the Data Base Management System (DBMS) package employed by DEIS and those operational procedures required to ensure data base reliability and integrity (Figure II-7). The DBMS receives data from the data base update software and requests for data retrieval from the Report Generation Module. The DBMS performs the actual updating and retrieval of data to/from the DEIS data base. In addition, various "utility" programs enable the Data Base Administrator (DBA)[2] to perform maintenance and recovery functions with the data base.

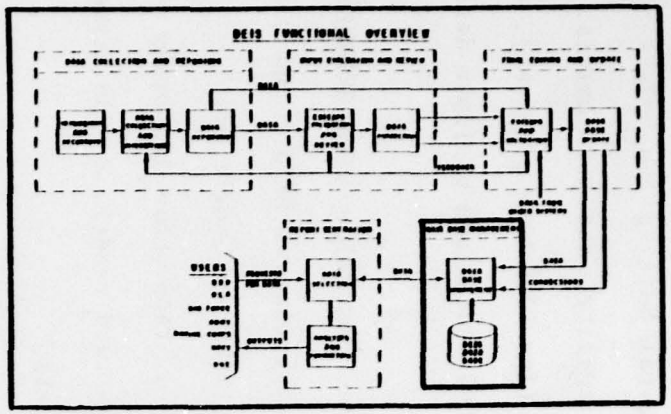
Administrative and Operational Procedures

Table II-4 defines the organizational responsibilities for Data Base Management. Activities marked with an asterisk are explained further below. The DEIS Computer Staff includes the programming and computer operations staff assigned to DEIS.

[2]The DBA is the person or persons responsible for maintaining data base integrity and reliability.

FIGURE II-7

DATA BASE MANAGEMENT



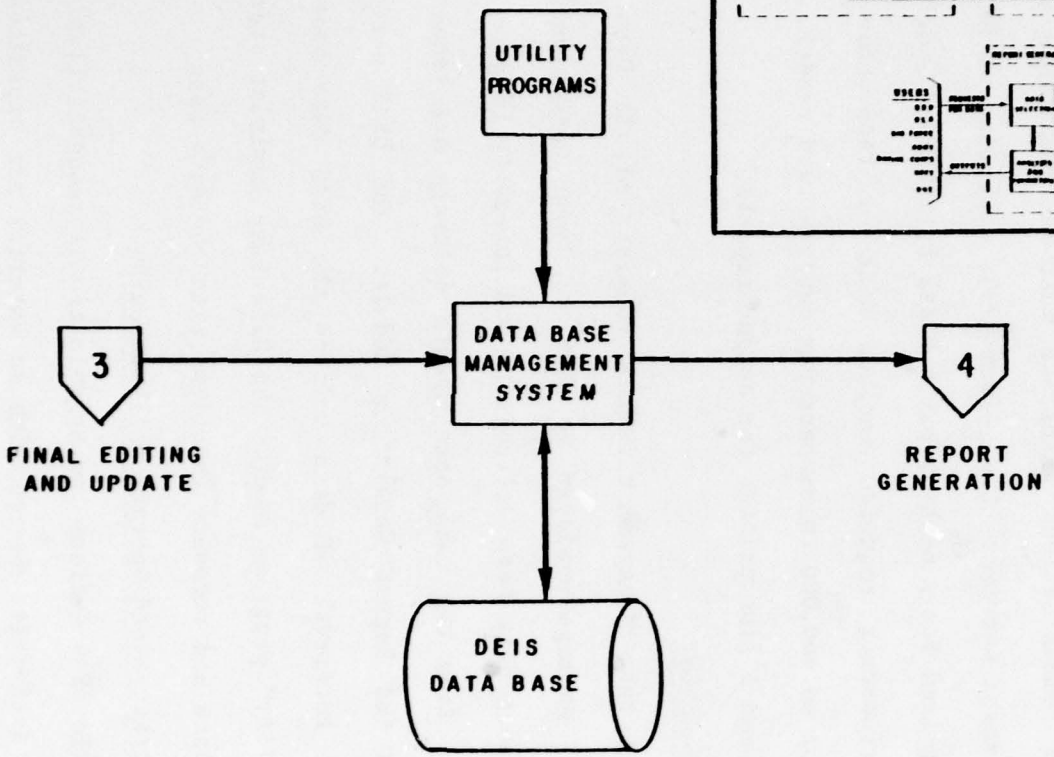


TABLE II-4. ORGANIZATIONAL RESPONSIBILITIES

Organization	Operational Procedures	Administrative Management
DEIS Computer Staff	Back up the data base* Invoke restart and recovery procedures* Review space requirements for the data base Load the data base* Set user update and access keys*	Document data base operational procedures
Defense Energy Office	N/A	Require compliance with data base operational procedures Define user update and access rights

Back Up the Data Base. The operations staff must periodically copy the data base to tape in case of a loss of data.

Invoke Restart and Recovery Procedures. When a loss of data occurs (e.g., due to computer disk crash), the operations staff should reload the data base using the necessary backup tapes and audit trail storage. (This procedure is DBMS-dependent and may be automatically controlled by the system.)

Load the Data Base. The computer staff should create the data base during the initial load and as required for reloading due to additional space requirements, data base changes, etc.

Set User Update and Access Keys. As requested by the Defense Energy Office, the computer staff should set user keys or passwords to prohibit updates and control access to portions of the data base.

Define User Update and Access Rights. The Defense Energy Office must define which organizations are allowed on-line data base update rights and the portion of the data base to which the updates are permitted. Retrieval of data must also be screened to prohibit unnecessary access. (This is particularly important if classified data are added to DEIS.)

Software Requirements

There are no programming requirements for the DBMS, since a packaged system will be utilized. However, the following capabilities and features are desirable.

- Fully inverted list structure
- Multiple user on-line access
- Host language interface to the programming language to be used for applications programs
- Automatic restart/recovery for system crashes
- Automatic logging of updates
- User password locks at the record level
- Batch update capabilities via host language program
- Ability to add new data fields (non-keyed) to existing data base records
- On-line query and report generation capabilities (see Report Generation Module)

Hardware Requirements

The hardware requirements for the DBMS are system dependent, except for the disk storage capacity. The estimated storage volume required is

50 million characters (bytes) plus system overhead requirements.[3] (See Chapter III for a more detailed discussion of data storage requirements.) The central processor must be able to support the DBMS core requirements and permit both batch and on-line access as required by the Final Editing and Update Module and the Report Generation Module.

REPORT GENERATION

This final module has two distinctive flows as illustrated in Figure II-8. The user may generate standard preprogrammed output reports, or interactively create his own. The user-specified option can produce almost limitless types of output reports given data availability. This option is expected to be used infrequently, however, only by users who could benefit from a uniquely tailored and/or one-time report. Regardless of the option chosen, all users' interactions with the data base in this module are limited to a read-only interface.

Data computation and format selection are optional in the user-specified output flow so that the user may retrieve a simple listing of selected data elements. This mode may be selected if the user, for example, were reviewing current data in the data base. If, however, the user were interested in a detailed analysis or reviewing compliance with goals and objectives, the use of automatic summations, column headings, and formatting could be provided by interfacing with the DBMS report generator user language in these two steps.

In the standard reports option, all computation, sorts, and report formats are preprogrammed to produce the most useful outputs efficiently. Variations of the current reports are to be produced including descriptive headings, cumulative data, and computation (where desired). Several versions are available to satisfy the requirements of different users.

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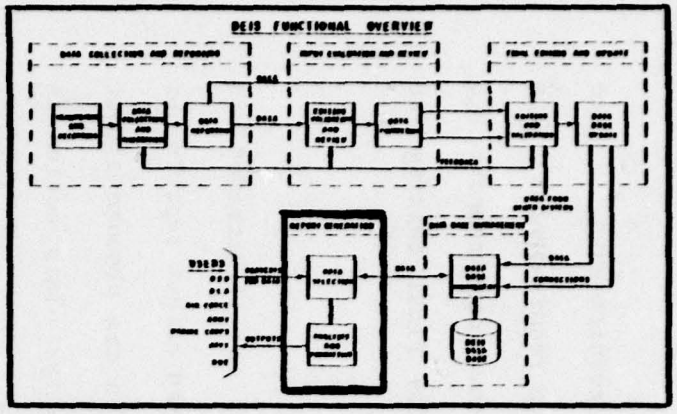
[3] Overhead requirements, e.g., for intrarecord pointers, vary from 25% to 60% of actual data, depending on the DBMS and the design requirements.

FIGURE II-8

REPORT GENERATION



OPTIONAL BYPASS

PASSWORD VERIFICATION

DATA SELECTION

DATA RETRIEVAL

DATA COMPUTATION

FORMAT SELECTION

OUTPUT MEDIA SELECTION

USER SPECIFIED REPORTS

OUTPUT REQUIRED AND/OR REQUESTED

SELECT OUTPUT TYPE

4

DATA BASE MANAGEMENT

DEIS UPDATED DATA BASE

STANDARD REPORTS

STANDARD REPORT SOFTWARE

REPORTS GENERATED

GRAPHICS

DISC FILES

REPORTS

PRINTOUTS

PLOTTER

TAPE STORAGE

COMPUTER OUTPUT MICROFICHE

OUTPUT DISSEMINATION

As indicated, the output media selection is limited only by the hardware peripherals available to the individual user. Multiple output media for a computer run are possible, e.g., generating a printout report as well as plotting the data on a graphics terminal. Although in the standard reports option, most of the outputs generated are standard computer printouts with tape back-up archival, Computer-Output-Microfiche (COM) or other media are readily available to users on request.

Both flows follow similar but not necessarily identical logic, and depending on the DBMS selected, the sequence indicated above may be altered. Before, or immediately following data selection, some form of user identification is necessary. Data retrieval could be limited by pre-determined guidelines, i.e., if a portion of the DEIS data base were to contain classified reports, access could be limited to a particular subset of users (see Administrative and Operational Procedures below). In either option, the interaction with the DEIS data base can be on-line, and uses the DBMS.

Administrative and Operational Procedures

Table II-5 outlines the operational procedures and administrative management responsibilities for the Report Generation Module.

TABLE II-5. ORGANIZATIONAL RESPONSIBILITIES

Organization	Operational Procedures	Administrative Management
Major Commands and Service Energy Offices	Disseminate reports to base/facilities where applicable	N/A
Defense Energy Office	Initialize and maintain user identification codes Create and maintain report dissemination procedures Initialization of standard report runs Periodic review of user reporting requirements Establish standard report archival policies	Advise Major Commands and Service energy office of data unavailability and report problems Require compliance with all Report Generation procedures
DEIS Users[a]	Initiation of user-specified reports	Dissemination of user-specified reports to other users where appropriate

[a]Including the DEO, major commands, Service energy offices and other users.

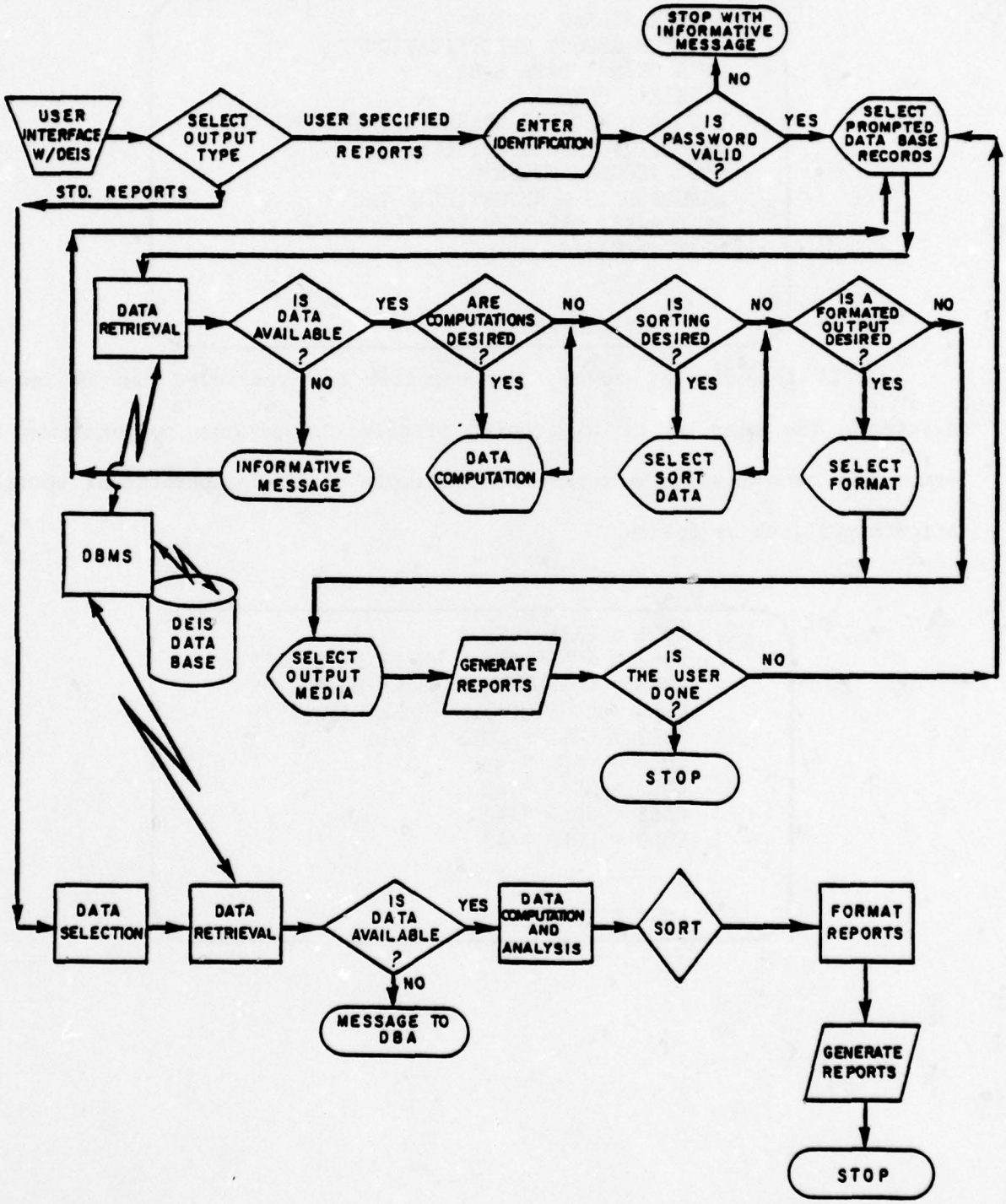
Software Requirements

The software flow depicted in Figure II-9 is offered as an example of the interaction between the Report Generation Module and the DBMS. Depending on the selected system's package, the order of the flow may be different (e.g., user identification may not occur until after the user attempts to select particular data, the records may need to be sorted before any computation could be performed, etc.).

In the user-specified option, the user is expected to have both valid access to the DBMS (read-only) and sufficient expertise with the DBMS

FIGURE II-9

REPORT GENERATION SOFTWARE FLOW



user-interface reporting language. An example of a user-specified report generation could be as follows.

```
**USER ACCESS VALID**
**ENTER REPORT SPECIFICATION**
OPEN DEIS 1 DATA BASE.
**DEIS 1 OPEN**
FIND ALL RECORDS WHERE DEPT=USAF MC=TAC,
DATE=1/79 THRU 3/79, FUEL=JP4.
**54 RECORDS FOUND**
HEADER=DEIS 1 REPORT USAF-TAC
HEADER=1ST QTR 1979 FOR JP4
PRINT, HEADER


     CRT DISPLAY 1
```

In the display above, the computer has retrieved the 54 records selected. The user is at this point prepared to perform computations and format the records into a report. An example of the computational specification might look as follows:

```
COL1 = BASE-NAME
COL2 = CONSUMPTION WHERE DATE=1/79
COL3 = CONSUMPTION WHERE DATE=2/79
COL4 = CONSUMPTION WHERE DATE=3/79
COL5 = COL2 + COL3 + COL4
COL6 = COL2 * 42
COL7 = COL3 * 42
COL8 = COL4 * 42
COL9 = COL5 * 42


 CRT DISPLAY 2
```

After additional formatting and heading specification, the resultant report would appear as follows:

DEIS 1 REPORT USAF-TAC
1ST QTR 1979 FOR JP4

BASE NAME	GAL CONSUM 1/79	GAL CONSUM 2/79	GAL CONSUM 3/79	TOTAL GAL CONSUM	BBL CONSUM 1/79	BBL CONSUM 2/79	BBL CONSUM 3/79	TOTAL BBL CONSUM
LANGLEY, AFB	XXXX.X	XXXX.X	XXXX.X	XXXXXX.X	XXX.X	XXX.X	XXX.X	XXXXX.X
HOLLOMAN, AFB	XXXX.X	XXXX.X	XXXX.X	XXXXXX.X	XXX.X	XXX.X	XXX.X	XXXXX.X
HOMESTEAD, AFB	XXXX.X	XXXX.X	XXXX.X	XXXXXX.X	XXX.X	XXX.X	XXX.X	XXXXX.X
S. JOHNSON, AFB	XXXX.X	XXXX.X	XXXX.X	XXXXXX.X	XXX.X	XXX.X	XXX.X	XXXXX.X

Hardware Requirements

The hardware requirements for the Report Generation Module include the following output peripherals: disk storage for output files; high-speed, multiple copy line printers, tape drive, graphics terminals, plotter capabilities, and microfiche output capabilities. The central processor must permit 2-3 simultaneous DEIS users (at peak), on-line and batch processing, and direct access to the DEIS data base. The communications capabilities must include standard teletype terminal and AUTODIN compatibility.

III. RECOMMENDED DEIS DATA SPECIFICATION

INTRODUCTION

This data specification chapter describes the recommended DEIS data flow, major components of the data base, data elements, inputs and outputs, and data base administration.

The most significant differences between DEIS I and DEIS II occur at the data level. However, in terms of the overall data flow and the total DEIS data base, there are sufficient similarities to permit a general description. The differences are discussed in more detail below.

Figure III-1 is an overview of the DEIS data flow. The flow of input data begins at the bases and facilities and ends at the Data Base Management Module. There are three major components to this input process: input data, corrections to the input data, and feedback. The input data and corrections are provided in relatively structured forms, e.g., via standard data communication formats from the bases to the major commands, Service energy offices, and central data processing. The feedback component includes error/update reports (Base Input Edit Report), periodic communication between the reviewing organizations and the bases and facilities,[1] and unstructured communications (e.g., telephone calls) to provide the proper editing and correction of input data.

[1]For example, the Air Force Tactical Air Command sends a monthly evaluation and comparison of all inputs to the bases in the Command.

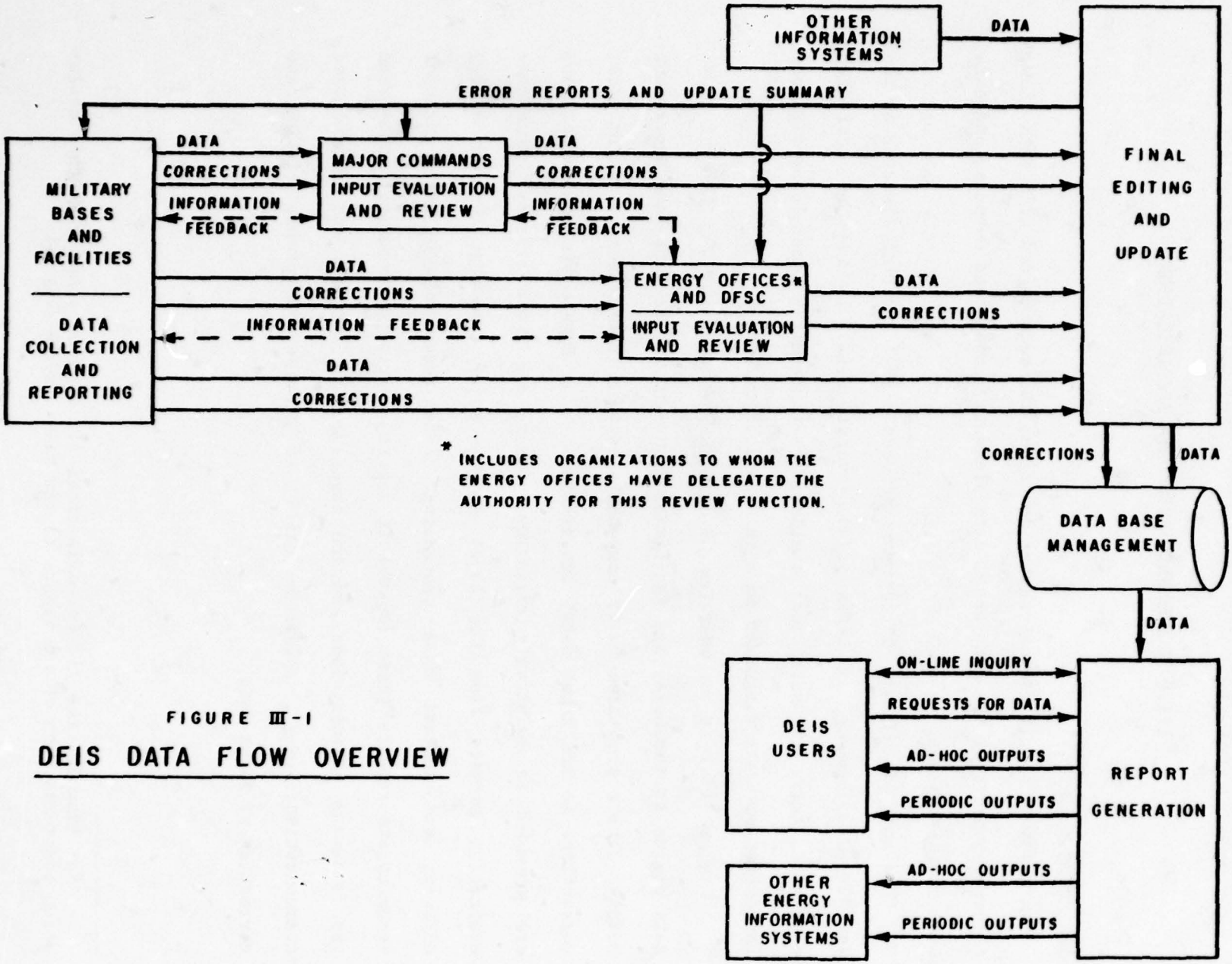


FIGURE III-1

DEIS DATA FLOW OVERVIEW

The report generation contains two major components in the flow of data: requests for data and generation of outputs. Requests for data include the standard user requirements for periodic reports and unstructured on-line inquiries. The outputs generated include periodic and ad hoc outputs on a variety of media: hard-copy reports, CRT displays, tapes, files, microfiche, and graphics. These outputs are distributed to users and to other energy information systems.

DATA BASE OVERVIEW

The recommended DEIS data base has three components: DEIS I data, DEIS II data, and a Data Element Dictionary (DED). The DEIS I and DEIS II data include all inputs for the most recent two years, summary data for previous years (from 1975), and baseline data. The DED includes descriptive data to support the editing functions (Final Editing and Update Module).

These three components are logical rather than physical divisions of the data base. The logical data base description represents the user's view of the data organization. The physical design, while not necessarily identical to the logical design, must permit the relationships and divisions between data that are represented in the logical design. The physical data base may actually consist of one or more files designed to facilitate efficient data processing.

DEIS I, DEIS II, and the DED are further described below in terms of the hierarchy of data elements, volume of data, and the indexing requirements (definition of the data access keys required by users).

DEIS I Data

The recommended DEIS I data base consists of approximately 27 million characters (not including the overhead requirements of the DBMS) for 5 years' data. This is increased to 40 million characters (plus overhead) at

10 years. The data base contains monthly data for the most current 2 years and quarterly summaries for historical data. As specified in Chapter II, crisis situations may require weekly data. Such flexibility must be incorporated in the data base design.

The data may be viewed in a hierarchical fashion, according to the potential levels (or aggregations) that a user may wish to report on. Figure III-2 illustrates the DEIS I hierarchy. While the hierarchical design represents the primary perspective of the DEIS I data base, there are others. For example, the current DEIS system also reports data by product (fuel type) and geographic area. These represent additional access keys to the data base that are required to permit random retrieval of data. The required data base keys are as follows:

Service/Organization. Army, DLA, Air National Guard, etc.

Geographic Region. Department of Energy regions (formerly FEA regions) and foreign regions for energy usage.

State. U.S. state boundaries.

Product. Fuel type, using product codes.

Date. Month and year, week and year (crisis situations only), quarter and year, or year only.

Major Command. The current system MACOM definitions will be used.

Reserves/Non-Reserves. Identification of a record as energy usage by reserves, non-reserves or combined.

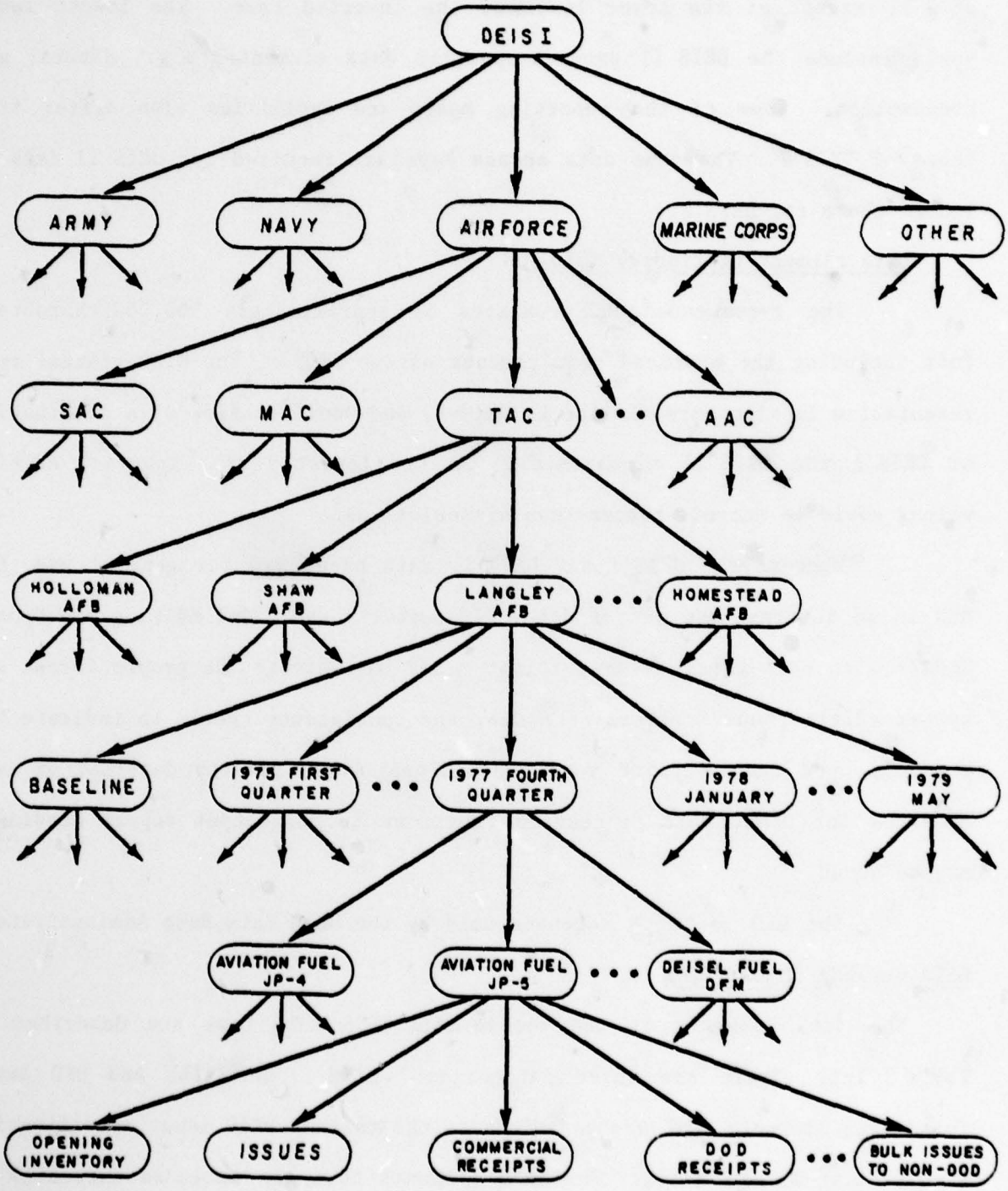
Base/Facility. DODAAC or UIC as in the current system.

DEIS II Data

The recommended DEIS II data base consists of approximately 20 million characters (not including the overhead requirements of the DBMS) for 5 years' data. This is increased to 30 million characters (plus overhead) at 10 years. The data base contains monthly data for the current 2 years and

FIGURE III-2

DEIS I DATA HIERARCHY



quarterly summaries for historical data. Data from DEIS II may also be required on a weekly basis during crises.

The hierarchical representation of DEIS II is nearly the same as DEIS I, except at the lower level of the inverted tree. The lowest level would include the DEIS II product-specific data elements, e.g., natural gas consumption. Some of the reporting bases and facilities also differ from those of DEIS I. The same data access keys are required for DEIS II data as listed above for DEIS I.

Data Element Dictionary (DED)

The recommended DED consists of approximately 500,000 characters (not including the overhead requirements of the DBMS). The hierarchical representation is also very similar to DEIS I, and would consist of a combination of DEIS I and DEIS II hierarchies. At the lowest level, however, editing values would be stored, rather than historical data.

Whereas the DEIS I and DEIS II data bases are for general use, the DED is an internal-use set of data. It supports the Final Editing and Update Module with edit check values, format codes to indicate the proper format and syntax editing, unit conversion codes, and consistency checks to indicate the products used in the prior year. Additional base/facility descriptive data required for other data processing functions (e.g., output report headings) may be added.

The DED is to be accessed only by the DEIS Data Base Administrator.

DATA ELEMENT DESCRIPTION

The data elements in the recommended DEIS data base are described in Table III-1. There are three categories: DEIS I, DEIS II, and DED data. Those data elements that are additions to the current DEIS input specification (DoD 5126.46-M) are noted. The data elements that are included currently in

TABLE III-1. DEIS DATA ELEMENTS

Data Element	Description	Input Source	Number of Characters[a]	Type[b]	Access Key	Frequency of Update	Comments
DEIS I							
Base/Facility Identifier	DODAAC or UIC	Base/Facility	6	A/N	Yes	Monthly	
Reporting Date	Month-year or week-year of report	Base/Facility	4	A/N	Yes	Monthly	
Product Code	Energy type as defined in DoD 4140.25M	Base/Facility	3	A/N	Yes	Monthly	
Operating Inventory	Inventory at beginning of month or quarter	Base/Facility	7	N	No	Monthly	Must agree with closing inventory of previous report
Issues	All issues including bulk transfers/sales, regrading and other losses	Base/Facility	7	N	No	Monthly	
Commercial Receipts	All receipts from commercial contracts	Base/Facility	7	N	No	Monthly	
DoD Receipts	All bulk intra- and inter-Service transfers plus gains from regrading	Base/Facility	7	N	No	Monthly	
Closing Inventory	Inventory at end of month or quarter	Base/Facility	7	N	No	Monthly	
Primary Use	Consumption by reporting base/facility as defined by military Service	Base/Facility	6	N	No	Monthly	
Secondary Use	Consumption by reporting base/facility as defined by military Service	Base/Facility	6	N	No	Monthly	
Tertiary Use	Consumption by reporting base/facility as defined by military Service	Base/Facility	6	N	No	Monthly	

TABLE III-1. DEIS DATA ELEMENTS

Data Element	Description	Input Source	Number of Characters[a]	Type[b]	Access Key	Frequency of Update	Comments
DEIS I (CONT.)							
Loss/Downgrade	Quantity of product lost by downgrading or determinable event	Base/Facility	6	N	No	Monthly	
Aviation Fuel-Special Use	Consumption/receipts from into-plane contracts and Form 15/44 purchases of aviation fuels	Base/Facility	6	N	No	Monthly	
Inter-Service Transfers (end-use)	Quantities issued to other services for immediate consumption	Base/Facility	5	N	No	Monthly	3 data elements per product, 1 for each "other" service
Inter-Service Receipts (end-use)	Quantities received from other Services for immediate consumption	Base/Facility	5	N	No	Monthly	New data element
Non-DoD Transfers	All quantities issued to non-DoD users	Base/Facility	5	N	No	Monthly	
Intra-Service Transfers	Bulk transfers to other activities in the same Service	Base/Facility	5	N	No	Monthly	
Inter-Service Transfers (Bulk)	Bulk transfers to all DoD activities not in the same Service	Base/Facility	5	N	No	Monthly	
Date of Update	Julian date of most recent update	System-generated	4	N	No	As required	New data element
Correction Code	Code to indicate that a modification to an existing record has been made	System-generated	1	N	No	As required	New data element
Issues Summary	Quarterly historical summary of issues	System-generated	8	N	No	Quarterly	New data element generated for data more than two years old

TABLE III-1. DEIS DATA ELEMENTS

Data Element	Description	Input Source	Number of Characters[a]	Type[b]	Access Key	Frequency of Update	Comments
DEIS I (CONT.)							
Commercial Receipts Summary	Quarterly historical summary of commercial receipts	System-generated	8	N	No	Quarterly	New data element generated for data more than two years old
DoD Receipts Summary	Quarterly historical summary of DoD receipts	System-generated	8	N	No	Quarterly	New data element generated for data more than
Average Inventory Summary	Quarterly historical average of closing inventories	System-generated	8	N	No	Quarterly	New data element generated for data more than two years old
Primary Use Summary	Quarterly historical summary of primary use data	System-generated	7	N	No	Quarterly	New data element generated for data more than two years old
Secondary Use Summary	Quarterly historical summary of secondary use data	System-generated	7	N	No	Quarterly	New data element generated for data more than two years old
Tertiary Use Summary	Quarterly historical summary of tertiary use data	System-generated	7	N	No	Quarterly	New data element generated for data more than two years old
Transfers Summary	Quarterly historical of all intra- and inter-Service transfers	System-generated	7	N	No	Quarterly	New data element generated for data more than two years old

TABLE III-1. DEIS DATA ELEMENTS

Data Element	Description	Input Source	Number of Characters[a]	Type[b]	Access Key	Frequency of Update	Comments
DEIS II							
Base/Facility Identifier	DODAAC or UIC	Base/Facility	6	A/N	Yes	Monthly[c]	
Reporting Data	Month-year, week-year, or quarter-year of report	Base/Facility	4	A/N	Yes	Monthly[c]	
Product Code[d]	Energy type identifier using standard codes specified for DEIS II	Base/Facility	3	A/N	Yes	Monthly[c]	
Inventory	Inventory for coal and bottled gas at end of month or quarter	Base/Facility	8	N	No	Monthly[c]	Btu-equivalent
Consumption[e]	Quantity of purchased fuel consumed during reporting period	Base/Facility	8	N	No	Monthly[c]	Megawatt hours for electricity; Btu-equivalent for other energy types
Variance Code[f]	Explanation for achievement of energy consumption goals	Base/Facility	2	N	No	Monthly[c]	
Date of Update	Julian date of most recent update	System-generated	4	N	No	As required	New data element
Correction Code	Code to indicate that a modification to an existing record has been made	System-generated	1	N	No	As required	New data element
Baseline Data	Approved baseline year consumption	Data Base Administrator	8	N	No	As required	
Square Footage	Square footage in facilities	Reviewing Organization	10	N	No	Annually as required	New data element
Heating Degree Days[g]	Total heating degree days by DOE region	Data Base Administrator	4	N	No	Monthly	New data element
Cooling Degree Days[g]	Total cooling degree days by DOE region	Data Base Administrator	4	N	No	Monthly	New data element

TABLE III-1. DEIS DATA ELEMENTS

Data Element	Description	Input Source	Number of Characters[a]	Type[b]	Access Key	Frequency of Update	Comments
DEIS II (CONT.)							
Inventory Summary	Quarterly historical average of inventories	System-generated	8	N	No	Quarterly	New data element generated for data more than two years old
Consumption Summary	Quarterly historical summary of consumption	System-generated	10	N	No	Quarterly	New data element generated for data more than two years old

TABLE III-1. DEIS DATA ELEMENTS

Data Element	Description	Input Source	Number of Characters[a]	Type[b]	Access Key	Frequency of Update	Comments
DATA ELEMENT DICTIONARY							
Base/Facility Identifier	DODAAC or UIC	Data Base Administrator	6	A/N	Yes	As required	New data element
DEIS I Format Code	Identification of the input format used	Data Base Administrator	1	A	No	As required	New data element
DEIS II Format Code	Identification of the input format used	Data Base Administrator	1	A	No	As required	New data element
Product Code/ Conversion Factor[i]	Identification of any deviation from standard reporting of products; product code and the conversion factor are included	Data Base Administrator	10	A/N	No	As required	New data element
Value Edit Code[i]	Identification of any deviation from the standard type of edit check on the value of product; product code and conversion factor are included	Data Base Administrator	4	A/N	No	As required	New data element
Reviewing Organization Code	Identification of the organization responsible for Input Evaluation and Review of base/ facility inputs	Data Base Administrator	1	A	No	As required	New data element

FOOTNOTES FOR TABLE III-1

a - The number of characters may be decreased in physical storage using various data compression techniques

b - A = alphabetic field; N = numeric field

c - Army DEIS II data are reported quarterly

d - Current DEIS II product codes are: ELC = electricity; NAG = natural gas; COL = bituminous coal; ANS = anthracite coal; SHW = purchased steam or hot water; fuel oil codes are the same for DEIS I, plus FSX = miscellaneous fuel oils

e - Reported consumption may represent deliveries or issues during the period rather than actual end-use consumption

f - Variance codes are defined in DoD 5126.46-M, Chapter 8

g - The reviewing organization is the organization responsible for Input Evaluation and Review. The actual data may be input from the Real Property Inventory System being evaluated by such organizations.

h - National Oceanic and Atmospheric Administration data are used.

i - These data elements are for use by the Final Editing and Update Module. Entries are made only when the standard conversion or edit value check is not used.

the "service use" columns of DEIS inputs (e.g., energy cost data) are not specified in this description. New specifications of these data will be made during the redesign and redevelopment of the DEIS data base.

INPUT/OUTPUT DESCRIPTION

The recommended DEIS inputs and outputs are described in this section in terms of their data content. Sample formats of selected inputs and outputs are provided in Chapter II.

Outputs from DEIS are of three types: standard output reports, ad hoc output reports, and administrative control reports. The standard outputs are those reports distributed to system users on a regular basis. Included are hard copy reports and tapes/files produced for use in other systems. Ad hoc reports are those reports that are user-created. These might be produced using the on-line inquiry facility of the DBMS, the report-writer of the DBMS, or a user-developed programming interface. They are not scheduled as part of the regular DEIS operations. Administrative control reports are produced for the system managers--defined here as the Data Base Administration function in the Defense Energy Office.

DEIS I and DEIS II Inputs

DEIS I and DEIS II have two basic inputs: initial inputs and corrections. Initial inputs utilize either the standard format presented in DoD 5126.46-M or a predefined format for a particular set of users. Non-standard formats will be defined during system modification (see Chapter IV, Implementation Plan) as required. Such formats are designed to make data transmission from another computer system more efficient, or for simplicity for bases/facilities that are entering data via a terminal.

Correction data are in one of two forms: the standard format of the original input (with a correction code as in the current DEIS format) or in an

on-line update format using the DBMS. The format for the on-line interactive update will depend on the DBMS selected for DEIS usage.

The data content for these inputs are as defined for DEIS I and DEIS II in Table III-1 (those data elements for which "Base/Facility" is indicated for source). Additional data are required for data transmission (see DoD 5126.46-M). The standard format also includes identification codes peculiar to the format, e.g., card number (see DoD 5126.56-M). Nonstandard formats may also contain similar identification codes to be specified during format design.

In addition, DEIS II requires baseline, square footage, and weather data inputs as noted in Table III-1. Baseline and square footage data are updated as required using the on-line interactive update facilities of the DBMS. (An annual review of base/facility square footage is required.) A customized program will be developed for the weather data inputs. Formats and content will depends upon what is available. It is expected that only DOE region, heating and cooling degree days, and date will be required for the input.

Data Element Dictionary Inputs

Inputs required for the DED are made as required using the on-line interactive update facilities of the DBMS. The format and content is DBMS-dependent. These inputs are made by the Data Base Administrator (as described later in this chapter).

Standard Output Reports

Monthly/Quarterly/Annual DEIS Reports. As part of the routine DEIS processing, monthly, quarterly and annual DEIS I and DEIS II reports are produced from the Report Generation Module. These reports are user-designed (see Chapter IV, Implementation Plan), using the available data elements

described in Table III-1. While similar to current DEIS reports, they provide further detail in headings, different alignments of columns (avoiding the current offset of rows versus columns), and allow user-specified computations (e.g., baseline vs. current ratios). New data elements (e.g., square footage) are available for these reports.

Base Input Edit Report. This report provides a summary of the inputs for a particular base or facility and an error listing describing the result of error checks made during the Final Editing and Update Module. The summary of inputs consists of a line-by-line listing of DEIS I or DEIS II inputs that are processed during an update of the data base. The error listing displays the data element(s) in question, the action taken (whether or not the input was accepted for update),[2] and a description of the error.

The Base Input Edit Report is distributed to the reviewing organizations and the submitting base or facility.

Periodic DEIS Output Files. The system also produces tape or disk files periodically for input to other systems (e.g., Navy's NEUPAS). These are defined by the requirements of the particular systems, ranging from copies of the monthly data (as currently supplied to NEUPAS) to customized formatting of selected data elements. These will be defined as required by other systems.

Ad Hoc Output Reports

Ad hoc outputs are undefined for DEIS. The basis for such reports is the availability of a report generator and on-line inquiry capability that permits users to request data as needed. In special cases, programmer assistance may be required for complicated formatting. The data content can

[2]Some error checks made during the Final Editing and Update Module, e.g., range checks, do not necessarily indicate an error if they are violated. Other errors, e.g., format, may require rejection of the input data.

include all data elements available to the user. (See the Report Generation Module description for an example.)

Administrative Control Reports

Summary Report of Other Inputs. This report is generated during the processing of special inputs from other systems (see Final Editing and Update Module). It includes a simple listing of the inputs and any diagnostic remarks generated during the editing. It is expected that weather data (heating and cooling degree days) and square footage data will be input in this manner. Each input type generates a similar report, oriented to the edits made and the particular data content. These reports are for review by the Defense Energy Office.

Data Base Update Summary Report. This report is produced from the Final Editing and Update Module. Included is a simple listing of all inputs processed during each editing and update run, the diagnostic messages from the editing performed, and the action taken for each input (accept or reject). This report is produced for review by the Defense Energy Office.

Other Administrative Control Reports. In addition to the reports produced as part of the routine DEIS processing, other reports can be produced for the Defense Energy Office for administrative purposes. Depending on the DBMS employed, system-generated outputs may be available that provide statistics on usage, storage efficiency, etc. Additional data may be obtained via ad hoc reports for specific purposes, e.g., to determine the percentage of inputs received for a reporting period.

DATA BASE ADMINISTRATION

The function of the Data Base Administrator (DBA) is important to any data-base-oriented system and particularly to DEIS due to its numerous users and input processes. The DBA function for DEIS is under the control of the

Defense Energy Office, providing centralized control and facilitating coordination with the other Defense Energy Office administrative functions.

The required DBA functions include both technical and administrative expertise. Therefore, placement of the DBA role may be divided between the DEIS programming and analysis staff and the Defense Energy Office. A list of the required DBA functions follows, including an indication of the technical and administrative aspects of each.

- Specification of user passwords and determination of user access rights to portions of the data base (administrative)
- Review of inputs to ensure completeness and accuracy of reporting (administrative)
- Consultation with users to determine if data base contents require change (administrative)
- Development of standard definitions for data elements (administrative)
- Update of Data Element Dictionary as indicated in Table III-1 (administrative and technical)
- Review of data base and system statistics (administrative and technical)
- Periodic initiation of update runs (administrative and technical)
- Design and development of the data base (technical)
- Daily operational control, i.e., restart/recovery procedures and data base backup (technical)

Those functions that are both administrative and technical can be delegated to either staff via strict procedural definitions or be performed jointly.

IV. IMPLEMENTATION PLAN

INTRODUCTION

The objective of the implementation plan is to provide some near-term benefits while maintaining consistency with the long-term recommended DEIS design for modification. The plan is incremental and consists of two phases. Phase 1 includes activities that are designed to provide short term benefits in terms of increased accuracy and improved timeliness. Phase 2 is designed to provide long term benefits and to complete the recommended modification of DEIS. Both Phase 1 and Phase 2 are divided into activities which are ordered to ensure development continuity while providing some benefits as soon as possible in each phase.

Table IV-1 summarizes the phases, activities, time, and costs for the modification of DEIS. The staff hours and costs indicated reflect the most likely values. (A range of -10% to +20% to each activity may be inferred depending on the level of expertise of the associated staff.) The ranges provided in Table IV-1 for the staffing and costs of activities depend on the selection of the level of an activity desired (e.g., the number of analytic reports developed). The lower value is the minimum cost required to ensure the satisfaction of DEIS user requirements. The Phase 1 cost range is $52,200 and $63,800. The Phase 2 cost range is $103,200 to $216,000. Expected annual operating costs[1] are $80,000-$100,000 for personnel and $25,000 to $50,000 for computer processing.

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[1]Annual operating costs reflect estimated governmental service center charges to the Defense Energy Office (MRA&L) budget. These depend on the selection of the computer center for DEIS processing.

TABLE IV-1. IMPLEMENTATION PLAN SUMMARY

	ACTIVITY	STAFFING (WKS.)	COST[a]
PHASE 1			
1.	Input Forms Design	8	$12,800
2.	Detailed Assessment of Current Operations	1-4	1,600-6,400
3.	Current System Documentation	0-10	0-16,000
4.	Procedures for New Data	10	17,000[b]
5.	Assistance for DEIS Data Processing in the Services	0-6	0-11,600[c]
	Subtotal, Phase 1	17-38 weeks	31,400-63,800
PHASE 2			
1.	Assistance in Computer Center Selection	4	$ 4,800
2.	Program Design and Data Definition	6	7,200
3.	Data Base Design	8	9,600
4.	Data Input Program Development	12	14,400
5.	Data Base Update Program Development	12	14,400
6.	Initial Load Program Development	8-15	9,600-18,000
7.	Square Footage Input Program Development	10	12,000
8.	Standard Reports Program Development	10-20	12,000-24,000
9.	Analytic Reports Program Development	4-16	4,800-19,200
10.	Weather Data Input Program Development	0-10	0-12,000
11.	On-line Error Correction Program Development	0-5	0-6,000
12.	System Documentation	12	14,400
13.	Data Storage Hardware Acquisition	0	0-50,000
14.	Program Development Testing (Computer Costs)	0[d]	0-10,000
	Subtotal, Phase 2	86-130 weeks	$103,200-216,000
	Total, Phase 1 and Phase 2	103-168 weeks	$134,600-279,800

a - Staffing costs are figured at $40/hr. for systems analyst time (Phase 1) and $30/hr. for programmer/analyst (Phase 2)

b - Includes $1,000 for travel expenses

c - Includes $2,000 for travel expenses

d - Staffing hours for system testing are included in the program development estimates.

Total implementation time is dependent upon the initiation of each phase and the availability of staff. Phase 1 and Phase 2 can be treated independently and developed concurrently. However we recommend the sequential scheduling of the two phases. A minimum time schedule of one year is required for the initial implementation of the modified DEIS; a year and a half is most likely.

PHASE 1

Phase 1 requires 18 weeks for completion with a staff of 2 persons. Figure IV-1 indicates the sequence of activities and the major milestones for completion. We recommend the completion of input forms design, detailed assessment of current operations, and procedures for new data as the minimum requirements for Phase 1. Each activity is described below.

Input Forms Design

The design of DEIS input forms includes three subactivities: the design of the forms, the development of prototypes, and their review by the Service energy offices (and their delegates). More than one input form may be required. They must be self-checking and instructional (see Chapter II for an example). They also should be generalized for use by bases and facilities with differing input requirements.

Detailed Assessment of Current Operations

This activity has two parts: a review of the existing specification for improving DEIS data processing (written by DLA) and further analysis of current operations. The analysis has three steps: identification of the most likely areas for improvement (e.g., transmission of data by the Services, current production priority); further investigation of those areas to develop new procedures; and review by all parties involved.

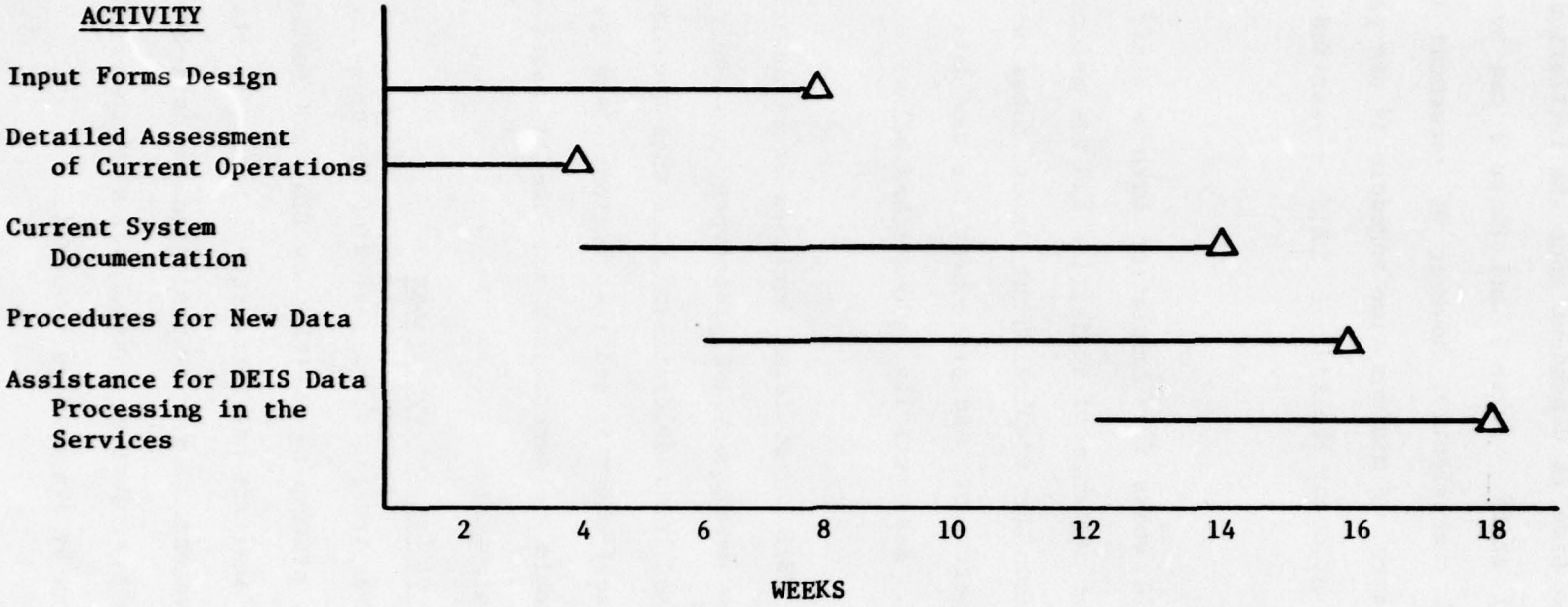


FIGURE IV-1. PHASE 1 IMPLEMENTATION

Current System Documentation

The total information flow of the current system must be documented to include the organizations involved and actions taken during the flow of data from the bases/facilties to DLA, standard data definitions, the identification of users, the sequence of data processing steps, etc. This activity includes the integration of available material into a comprehensive single document. The DEIS documentation must be designed for future modification to reflect planned (Phase 2) as well as unanticipated changes to the system.

Procedures for New Data

The addition of weather, facility square footage, and new energy type (solar, geothermal, etc.) data requires early standardization of data definitions, agreement on how the data should be collected and reported, and documentation and review of processing procedures for each data type.

Assistance for DEIS Data Processing in the Services

This activity includes any assistance needed by the Services in planning and developing DEIS-related data processing, as well as the coordination of these efforts. While not deemed an absolute requirement, this activity can ensure consistency between the Services and DEIS requirements and promote a transfer of ideas, design, and possibly software.

PHASE 2

Phase 2 requires at least 34 to 44 weeks for completion with full staffing. Figure IV-2 indicates the sequence of activities that are described below.

Assistance in Computer Center Selection

This activity involves coordination and consultation between the DEIS Project and the MRA&L Automated Systems Office. The DEIS staff will provide technical support for the selection of the data processing center(s)

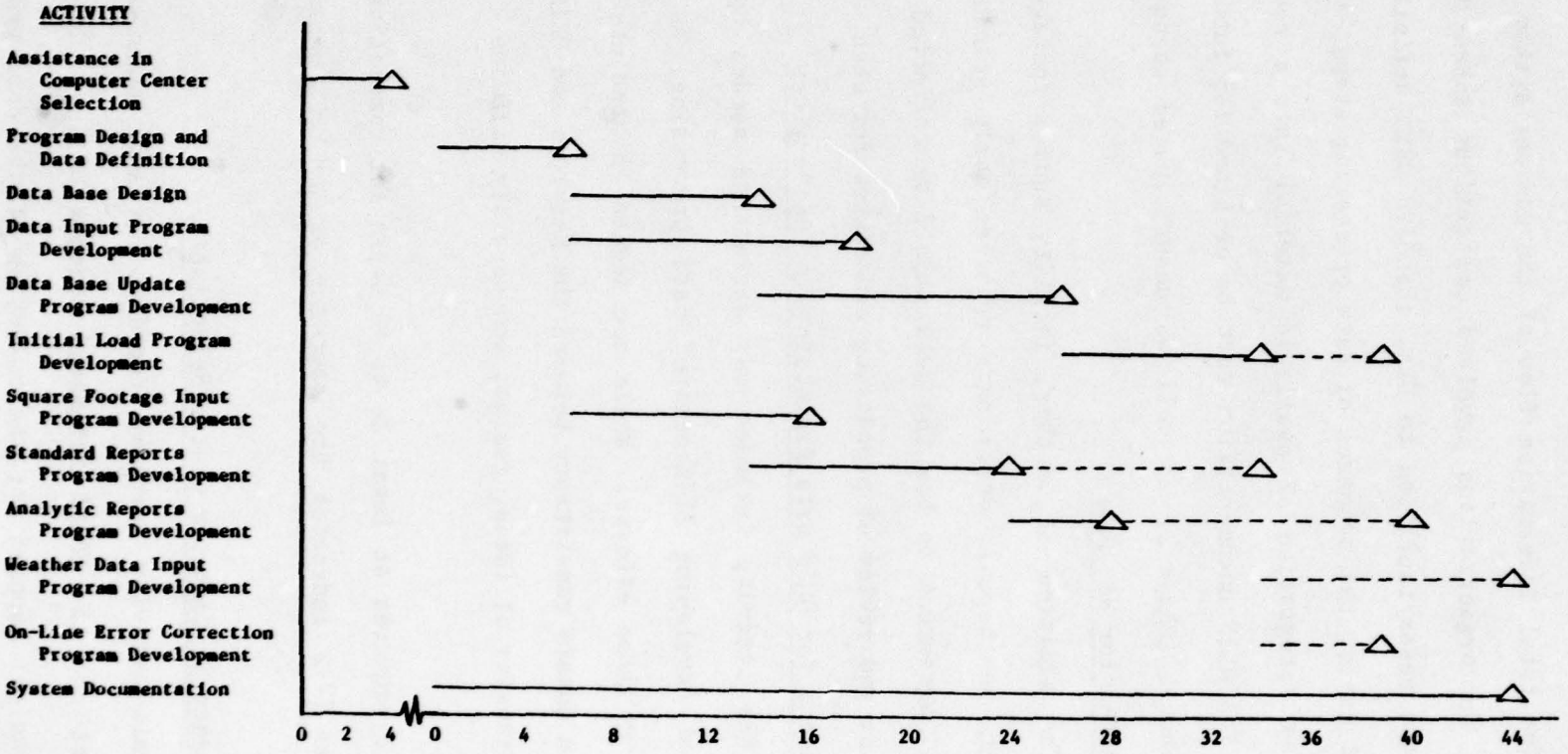


FIGURE IV-2. PHASE 2 IMPLEMENTATION SCHEDULE

- - - - Potential Activity Duration Depending on Implementation (See Text)

for DEIS. The decision will be made jointly by the Automated Systems Office and the Defense Energy Office.

Program Design and Data Definition

Before the initiation of system development, the leader(s) of the DEIS system development project will complete a detailed design of DEIS (specifying all programs and subroutines) and the definition of the program (data) interfaces. The Chief Programmer Team concept is recommended for this and subsequent design and development activities.

Data Base Design

The data base design activity includes the physical design of the data base, selection of the system utility programs required and their respective operational procedures (e.g., daily backup of the data base to tape, "quick recovery," etc.), coding the physical design in the data definition language of the DBMS, and testing.

Data Input Program Development

Design of the programs to accept and edit the DEIS input data, coding, and testing of all subroutines are included in this activity.

Data Base Update Program Development

Design, programming, and testing of all data base update processing is required of this activity.

Initial Load Program Development

A program to load the existing DEIS master file (historical and baseline data) on the data base is the product of this activity. The time/cost range indicated in Table IV-1 and Figure IV-2 depends on the degree of difficulty involved, the availability and readability of historical tapes, and the documentation and records of change available to the programmer.

Square Footage Program Development

This activity includes the design, coding, and testing of all programs required to add facility square footage data from other data bases (e.g., the Real Property Inventory records of the Services) or periodic inputs (e.g., additions to DEIS inputs) to the DEIS data base. The specification of the data source will be made by the Services. (Sources are currently being investigated by the Service energy offices.)

Standard Reports Program Development

The regular outputs for DEIS are to be designed, coded, and tested during this activity. The level of initial activity indicated in Table IV-1 and Figure IV-2 depends on how much variation between users is allowed. After obtaining the desired output layouts from the primary users, some integration/arbitration of requirements may permit a reduction in the initial programming requirements (e.g., four standard reports developed rather than seven).

Analytical Reports Program Development

This activity consists of the development of customized, ad hoc analytic procedures using the report generator (DBMS facility) user language. Since the standard reports should include some limited analysis, this activity is not as critical as others for the initial development of DEIS. However, at a minimum, some assistance should be provided to users who wish to utilize the user language to produce analytic reports or graphs.

Weather Data Input Program Development

The design of the program to input monthly regional weather data, coding, and testing are included in this activity. This activity may be eliminated from initial development (to be added later), as weather data are desirable, but a secondary DEIS requirement.

APPENDIX A

DEIS MANUAL - DOD 5126.46-M

The following appendix contains a reproduction of Defense Energy Information System (DoD 5126.46-M). This document describes the input procedure, formats, and data content of the current DEIS. The current DEIS data processing system, however, has not been modified to accept these inputs.

original input (with a correction code as in the current DEIS format) or in an

Defense Energy Information System

DoD 5126.46-M
Department of Defense
Office of the Assistant Secretary of Defense
(Manpower, Reserve Affairs and Logistics)

May 1978

(see Chapter IV, Implementation Plan), using the available data elements

Foreword

MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

May 12, 1978

This manual is published under the authority of DoD Directive 5126.46, "Defense Energy Information System (DEIS)." It is effective immediately and applies to all DoD activities without further formal issuance by any DoD Component. Report modifications required by this manual will be fully implemented on October 1, 1978. Reports now submitted will continue to utilize ongoing report procedures.

Assistant Secretary of Defense
(Manpower, Reserve Affairs and Logistics)

[2]Some error checks made during the Final Editing and Update Module, e.g., range checks, do not necessarily indicate an error if they are violated. Other errors, e.g., format, may require rejection of the input data.

Table of Contents

and input processes. The DBA function for DEIS is under the control of the

Chapter 1
Introduction

A. The Defense Energy Information System (DEIS) provides reliable and objective energy information for all DoD activities, eliminating duplicative energy data reporting requirements.

B. *The Defense Energy Information System currently consists of the DEIS-I, Bulk Petroleum Product* Report, and the DEIS-II, Utility Energy Report.

1. The DEIS-I provides information on inventory, consumption, resupply and sale of bulk petroleum products throughout the Department of Defense. It identifies all Defense Logistics Agency-owned petroleum products in transit (Military Sealift Command (MSC) tankers.)

2. The DEIS-II identifies inventory for coal, propane, and liquified petroleum gas (LPG) only, and the consumption of all utility energy (electricity, natural gas, propane, LPG, coal, fuel oil and purchased steam and hot water). It also compares energy consumption with baseline consumption periods to determine energy conservation achievements.

The DEIS-I and DEIS-II are intended to provide minimum essential energy management data on a ıely basis. The formats of these reports have been developed to facilitate preparation by reporting activities, provide for rapid transmission, and simplify automated data processing. When data from these two reporting systems are collated, a single data base is available, covering most energy resources used DoD-wide. The following tables illustrate the types of data fields and displays of the DEIS:

DEIS-I (Petroleum Report)

PRODUCTS	FIELDS	SUMMARIES AND DISPLAYS
AVIATION GASOLINES	INVENTORY	REPORTING ACTIVITIES
JET FUELS	CONSUMPTION	MAJOR COMMANDS
MOTOR GASOLINES	ISSUES	MILITARY SERVICE
DISTILLATES	RECEIPTS	CINCs
RESIDUALS	TRANSFERS	STATES AND COUNTRIES
	SALES TO NON-DOD ACTIVITIES	CONUS AND WORLDWIDE
	PRODUCTS IN TRANSIT	

DEIS-II (Utility Report)

ENERGY SOURCE	FIELDS	SUMMARIES
ELECTRICITY	INVENTORY (I.E., COAL, PROPANE/LPG)	REPORTING ACTIVITIES
NATURAL GAS	CURRENT CONSUMPTION	MAJOR COMMANDS
PROPANE/LPG	BASELINE CONSUMPTION	MILITARY SERVICE
HEATING FUEL	PERCENT CHANGE IN CONSUMPTION RATE	STATES AND COUNTRIES
COAL		CONUS AND WORLDWIDE
STEAM AND HOT WATER		

Chapter 2
Reporting Requirements

A. DEIS I (BULK PETROLEUM PRODUCT REPORT)

The DEIS-I report reflects bulk petroleum inventory, receipts, consumption, sales to DoD/non-DoD activities and Service unique utilization information.

1. **Report Frequency.** Prepare the DEIS-I report as of 0800 hours local mean time on the last Friday of each month. Transmit the report to arrive at the Defense Logistics Agency (DLA), not later than 0800 hours local mean time, Washington, D.C., on the Wednesday following the Friday cutoff. When more frequent reports are determined to be necessary by ASD(MRA&L), weekly reporting will be initiated. DoD components shall submit requests for frequency and reporting deviations to ASD(MRA&L) ATTN: Deputy Assistant Secretary of Defense (Energy, Environment, and Safety). Refer to Chapters 4,5 & 6 for instruction on preparation of DEIS-I data for transmission to DLA.

2. **Data Lines.** Report all data in whole barrels (42 U.S. gallons). Nomenclature and product codes of petroleum products to be reported are identified in Chapter 3. Three data lines will be prepared for each petroleum fuel stored, consumed, issued and/or sold and will be identified by document identifier code MEA and card type (2, 3, or 4 as applicable). In the event of a crisis, or when DoD needs greater visibility of petroleum product availability, the MEA data will be submitted at an increased frequency.

a. Data elements to be reported in the MEA data lines are identified below. Refer to Chapter 5 for instructions on formulating this data for transmission to DLA.

(1) **MEA 2 Data Card**

(a) **Opening Inventory.** Report total physical inventory (quantity) on hand at the beginning of the report period. The opening inventory must be the same as the closing inventory of the previous report. **Navy ships are exempt from reporting this element, except for Mobile Logistic Support Force (MLSF) ships carrying bulk petroleum cargoes and the Military Sealift Command (MSC) support tankers.**

(b) **Issues.** Report total quantity of fuel which has been issued through the reporting activity system. Include issues to all consuming vehicles regardless of ownership, all bulk transfers/sales (both intra and inter-service) and decreases in inventory due to regrading of product and determinable losses (i.e., pipeline rupture, etc.).

(c) **Receipts from Commercial Sources.** Report all quantity received during the report period from contract sources including direct delivery, contract bulletin and local purchases.

(d) **Receipts from DoD.** Report all quantity received during the report period from Defense Fuel Support Points (DFSPs) and from other DoD components. Include in this column gains to inventory caused by regrading of product.

(e) **Closing Inventory.** This will be the closing measured inventory at the asset cut-off time. **All Navy ships are exempt from reporting closing inventory, except MLSF oilers and MSC fleet support tankers.**

(2) **MEA 3 Data Card.** This data card is utilized to report consumption by the reporting Military Service and the use to which the product is applied, (Primary, Secondary, or Tertiary); report consumption/receipts from into-plane contracts. Form 15/44 purchases and credit card purchases; report downgrade of product and determinable loss of product. The Military Department will determine the definitions of these terms as they apply to their service. Data on this card must reflect those quantities of fuel issued into using entities of their own Military Service for immediate consumption with the exception of card column 44-49. (Chapter 5 provides more detail).

(3) **MEA 4 Data Card** is designed to provide detailed issue data for all product issued to activities other than the reporting activity. Columnar data elements are different for each Military Service. Chapter 6 provides detailed submission instructions.

3. Department of Defense terminal operations are not considered consuming activities; therefore, the Defense Fuel Supply Center (DFSC) will obtain pertinent petroleum data from their bulk petroleum terminal message report (RCS: DLA(W)1884) and subsequently process it in DEIS-I format. Additionally, DLA will report all product in transit via ocean tanker, summarizing destination by (a) Unified/Specified Commands, and (b) CONUS (East and West Coast); and all product in transit between procurement sources and Defense Fuel Support Points (DFSPs).

B. DEIS-II (UTILITY ENERGY REPORT)

DEIS-II is designed to address the consumption of energy resources used to provide utility energy. Product codes and conversion factors, where applicable, for utility services to be reported are identified in Chapter 8. The DoD component supplying utility services will report for all tenants and customers on or supported by the reporting installation. Where mutually agreeable between the host and tenant, major energy-consuming tenants may report energy consumption through their Service channels. However, data submitted in this manner will be coordinated between the host and tenant to insure that all consumption is reported and no consumption is reported twice.

1. **Report Frequency.** Unless unusual conditions dictate a change in frequency by the ASD(MRA&L), prepare the DEIS-II report as of the last day of each month. Transmit the report via AUTODIN, where available, or teletype to arrive at the Defense Logistics Agency, Cameron Station, Alexandria, Virginia 22314 by the fourth Wednesday of the month following the end of the report period, or as specified by the DoD Component and approved by ASD(MRA&L).

2. **Data Line.** Report all data, except purchased electricity, in millions of British Thermal Units (Mega BTUs). Report purchased electricity in megawatt hours (MWH). Specific data elements to be reported in the DEIS-II report are identified below. Refer to Chapter 4 and 7 for instructions on preparing and formulating the DEIS-II data for transmission to DLA.

a. **Inventory.** Report inventory on hand for coal and propane/LPG only at the end of the report month.

b. **Baseline.** Fill this column of data with zeros (data will be extracted from DLA master file for approved baseline year). This column of data may only be changed by submitting corrected figures (on a type 3 card transaction in complete overlay format) along with appropriate justification to Service Headquarters, who will in turn approve/disapprove changes and forward to DFSC-CB for input to the master file.

c. **Consumption.** Report quantity of product consumed during the month covered by the report.

d. **Variance Code.** Indicate appropriate two digit variance code. Variance codes reflect the reason for a variance and serve as a tool for monitoring energy conservation peformance relative to goals or limits established by ASD(MRA&L). Variance codes and their definitions are identified in Chapter 9.

e. **Option Data.** Two eight-digit data fields are available for Military Service Use.

C. REPORTS CONTROL SYMBOL

Reporting requirements identified in this manual have been assigned the Reports Control symbol DD-M (AR) 1313 (formerly DD-I&L (AR) 1313).

Chapter 3
Products and Product Codes for DEIS-I Reporting

NOMENCLATURE	PRODUCT CODE
Gasoline, Aviation, Grade 100/130 MIL-G-5572 (NATO F-18)	130
Gasoline, Aviation, Grade 100/130 Low Lead, MIL-G-5572E	131
Gasoline, Aviation, Grade 108/135 PWA 510A	135
Gasoline, Aviation, Grade 115/145 MIL-G-5572 (NATO F-22)	145
Gasoline, Aviation, Grade 80/87 MIL-G-5572	887
Gasoline, Aviation, Grade 91/96 MIL-G-5572	996
Turbine Fuel, Aviation, Grade JP-4 MIL-T-5624 (NATO F-40)	JP4
Turbine Fuel, Aviation, Grade JP-5 MIL-T-5624 (NATO F-44)	JP5
Turbine Fuel, Aviation, Referee for JP-4, Grade I, MIL-T-5161	JR1
Turbine Fuel, Aviation, Referee for JP-5, Grade II, MIL-T-5161	JR2

NOMENCLATURE	PRODUCT CODE
Turbine Fuel, Aviation, Grade JP-8, MIL-T-83133	JP8
Turbine Fuel, Aviation, Grade Jet A ASTM D-1655	JAA
Turbine Fuel, Aviation, Grade Jet B ASTM-D-1655	JAB
Turbine Fuel, Aviation, JP-TS MIL-T-25524	JTS
Turbine Fuel, Aviation, Grade A-1, ASTM-D-1655, Type A-1	JA1
Gasoline, Automotive, Combat Type I, 3.17 gms per gal., max. metallic lead content, MIL-G-3056 (NATO F-46)	MG1
Gasoline, Automotive, Combat, Type II, 3.17 gms per gal., max. metallic lead content, MIL-G-3056 (NATO F-46)	MG2
Gasoline, Automotive, Premium 4.23 gms per gal., max. lead content, FED-VV-G-76	MGP
Gasoline, Automotive, Regular 4.24 gms per gal., max. lead content, FED-VV-G-76	MGR
Gasoline, Unleaded .07 gm per gal., max. allowable tetraethyl lead; FED-VV-G-109	MGU
Gasoline, Automotive, Special No Lead, FED-VV-G-1690	MUS

NOMENCLATURE	PRODUCT CODE
Gasoline, Automotive, Regular, No Lead, FED-VV-G-1690	MUR
Gasoline, Automotive, Premium, No Lead, FED-VV-G-1690	MUP
Gasoline, Automotive, limited lead; 1.5 ml. max. tetraethyl lead ml. per gal. allowable FED VV-G-1690	MLL
Gasoline, Automotive, no/low lead, Premium, .50 gms per gal. max. lead content, FED-VV-G-1690	MLP
Gasoline, Automotive, no/low lead, Regular, .50 gms per gal. max. lead content	MLR
Diesel Fuel, MIL-F-16884G (NATO F-76)	DFM
Diesel Fuel (with exceptions to MIL-F-16884G)	DFW
Diesel Fuel, Grade DF-1, Winter, FED-VV-F-800	DF1
Diesel Fuel, Grade DF-2 FED-VV-F800 (NATO F-54)	DF2
Diesel Fuel, Arctic, DF-A FED-VV-F-800B (NATO F-56)	DFA
Diesel Fuel (for AF missile sites)	DFB
Fuel Oil Burner, FS-1, FED-VV-F-815	FS1

NOMENCLATURE	PRODUCT CODE
Fuel Oil Burner, FS-2 FED-VV-F-815	FS2
Fuel Oil Burner, FS-4 FED-VV-F-815	FS4
Fuel Oil Burner, FS-5 FED-VV-F-815	FS5
Fuel Oil Burner, FS-6 FED-VV-F-815	FS6
Fuel Oil, Diesel (MMS) AFPID 9140/1	DFS
Fuel Oil Burner, Low Sulfur MIL-F-859	FSL
Kerosene, FED-VV-K-211	KSN
Kerosene, Deodorized VV-K-220	KSD
Fuel Oil, Burner, Navy Distillate MIL-F-24397 (NATO F-85)	NDF
Fuel Oil Burner, Navy Special MIL-F-859 (NATO F-77)	NSF

Chapter 4
DEIS Report Preparation

A. STANDARD MESSAGE FORM (DD FORM 173)

1. When a DD Form 173 is used to transmit DEIS data, the following information will be included in the applicable blocks. This information modifies ACP 126 procedures where applicable.

BLOCK	COMMENT
Security Classification	Enter "UNCLASSIFIED"
Page	Number consecutively; i.e., 1 of 1; 2 of 2.
Drafter or Releaser Time	Leave Blank
Precedence Act	Enter "PP"
Precedence Info	Enter "RR" if an info addressee is listed: otherwise leave blank
LMF	Enter "TC"
Class	Enter "UUUU"
CIC	Enter "HHBW"
From	Enter appropriate activity address
To	Enter "DEIS DLA Cameron Sta Alexandria VA"
Info	Enter information addresses
Classification	Enter "UNCLAS" above subject
Subject	Enter "DEIS-I, RCS: DD-M (AR) 1313" or "DEIS-II, RCS: DD-M (AR) 1313" as appropriate

2. Data lines will be entered according to the formats in the following chapters. An example of proper message text for the MEA data line is:

MEA 2 W26AAA 4270 JP4 0000010 0000002 0000010 0000000 0000017

Note that there is only one space between data elements; no dash is placed in product codes and leading zeros are used to fill unused card columns of data elements. If a particular data element does not apply, zeros are used to fill data element. This procedure facilitates proper spacing of message text, (Navy afloat units using modified ACP 126 Procedures will comply with NTP-4).

B. AUTODIN INSTRUCTIONS

Always transmit a header card, subject card, action card for energy resources being reported, and a trailer card.

1. **Header Card:**

Card Column	Comment
1	Enter "P"
2-3	Enter "CC"
4	Enter "U"
5-8	Enter "HHBW"
9	Blank
10-16	Routing indicator of transmitting station

Card Column	Comment
17-20	Sequential number
21	Space
22-24	Julian Day
25-28	Time of File
29	Blank
30-33	Card count of "MTMS"
34	Enter dash "—"
35-40	Blank
41-47	Enter "RUEBOIL." Always use this routing indicator.
48	Enter period "."
49-80	Leave Blank

2. **Subject Card:**

Card Column	Comment
1-4	Enter "DEIS"
5	Blank
6	Enter "1" for DEIS-I or "2" for DEIS-II
7	Blank
8-10	Enter "RCS"
11	Blank
12-13	Enter "DD"

Card Column	Comment
14	Blank
15	Enter dash "—"
16	Enter "M"
17	Blank
18-19	Enter "AR"
20	Blank
21-24	Enter "1313"
25-30	Leave Blank

3. **Action Card** (Data line): Format according to Chapters 6,7, and 9.

4. **Trailer Card:** Autodin trailer card is identical to the header card through card column 38 except that the trailer card must contain the actual card count in columns 30-33. Columns 39 through 76 and blank columns 77-80 contain "NNNN."

Chapter 5
Petroleum Product Reporting Format

Data elements will be reported in the following format. Separate cards or line entries will be prepared for each applicable product category.

MEA 2 CARD (All Quantity Fields in Barrels)

CARD COLUMN	DATA
1-3	MEA
4	Blank
5	Numeric 2
6	Blank
7-12	DODAAC - (i.e., FP2300 NOO151 A26FAA). These activity address codes are defined in DOD 4000.25D
13	Blank
14-17	Julian date of the asset cut-off time
18	Blank
19-21	Product Code - 3 position code as defined in DOD 4140.25M
22	Blank
23-29	Opening Inventory - This quantity will always agree with the closing inventory from previous report.

CARD COLUMN	DATA
30	Blank
31-37	Issues - Report total quantity of fuel which has been issued through the reporting activity system. Include issues to all consuming vehicles regardless of ownership, all bulk transfers/sales (both intra and inter Service) and decreases in inventory due to regrading of product and determinable losses.
38	Blank
39-45	Receipts from commercial contracts. Report total quantity received during the report period from contract sources including direct delivery, contract bulletins and local purchases.
46	Blank
47-53	Receipts from DoD - Report all bulk receipts from intra and inter service transfers. Include in this column gains to inventory caused by regrading of product.
54	Blank
55-61	Closing Inventory. This will be the closing measured inventory at the asset cut-off time.

Leading zeros will be used to fill unused card columns of data fields. If a particular data field does not apply, zeros will be used to fill the data field.

MEA 3 CARD

This data card consists of five separate six position entries of data specifically required by ASD(MRA&L) and are reported through card column 56. Card columns 58 through 63 are provided for individual service optional use.

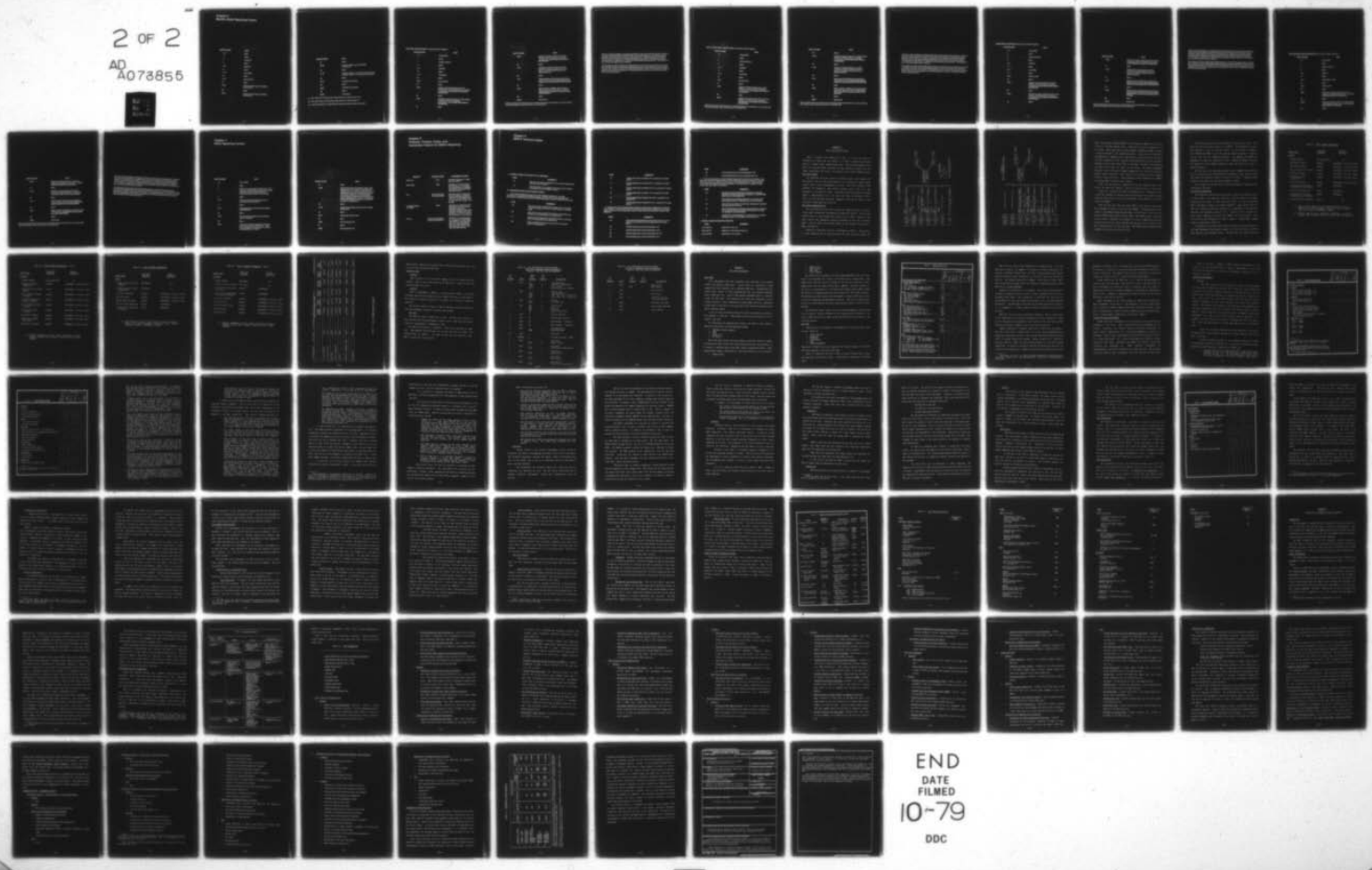
This data card is utilized to report consumption by the reporting Military Service and the use to which the product is applied, (Primary, Secondary, or Tertiary); report consumption/receipts from into-plane contracts, Form 15/44 purchases and credit card purchases; report downgrade of product and determinable loss of product. The Military Department will determine the definitions of these terms as they apply to their service. Data on this card must reflect those quantities of fuel issued into using entities of their own Military Service for immediate consumption with the exception of card column 44-49.

CARD COLUMN	DATA
1-3	MEA
4	Blank
5	Numeric 3
6	Blank
7-12	DODAAC
13	Blank
14-17	Julian date (last Friday of month)
18	Blank
19-21	Product Code
22	Blank
23-28	Primary Use

CARD COLUMN	DATA
29	Blank
30-35	Secondary
36	Blank
37-42	Tertiary
43	Blank
44-49	Quantity of product downgraded and quantity applicable to determinable loss (*i.e.*, pipeline rupture, etc.)
50	Blank
51-56	Consumption/Receipts from into-plane contracts and Form 15/44 purchases for aviation fuels — oil company credit cards for ground products consumed.
57	Blank
58-63	Service Use

AD-A073 855 LOGISTICS MANAGEMENT INST WASHINGTON D C F/G 5/3
DEFENSE ENERGY INFORMATION SYSTEM (DEIS): RECOMMENDED DESIGN MO--ETC(U)
JUN 79 M LUTZ, M FIORELLO, J GALE MDA903-77-C-0370
UNCLASSIFIED NL

2 OF 2
AD A073855



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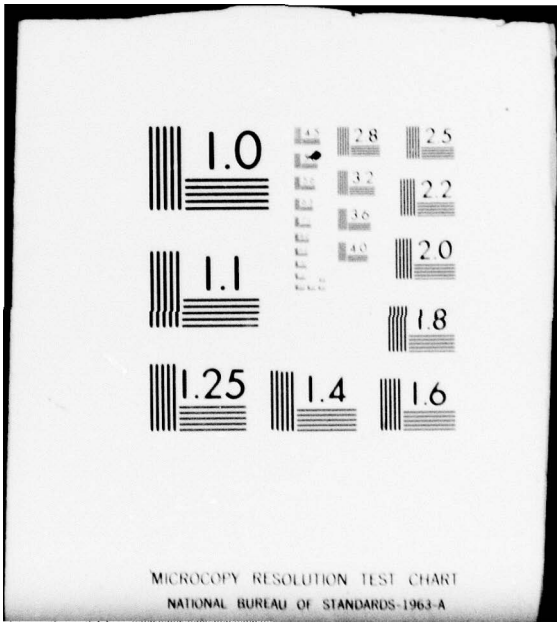

1.0
1.1
1.25
1.4
1.6
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Chapter 6
Monthly Detail Reporting Format

CARD COLUMN	DATA
1-3	MEA
4	Blank
5	Numeric 4
6	Blank
7-12	DODAAC
13	Blank
14-17	Julian Date
18	Blank
19-21	Product Code
22	Blank
23-27	Quantity issued to a for immediate consumption
28	Blank
29-33	Quantity issued to b for immediate consumption

CARD COLUMN	DATA
34	Blank
35-39	Quantity issued to c for immediate consumption
40	Blank
41-45	Quantity issued to non-DoD. Include all issues whether in bulk or for immediate consumption
46	Blank
47-51	Intra Service Transfers
52	Blank
53-57	Inter-Service Transfers
58	Blank
59-63	Service Use

a Army report AF; AF report Army; Navy report Army, Marine report Army

b Army report Navy; AF report Navy; Navy report AF, Marine report AF

c Army report Marine; AF report Marine; Navy report Marine, Marine report Navy

ARMY MEA 4 INSTRUCTION (All Quantity Fields in Barrels)

CARD COLUMN	DATA
1-3	Always MEA
4	Blank
5	Always numeric 4
6	Blank
7-12	DODAAC
13	Blank
14-17	Julian Date
18	Blank
19-21	Product Code
22	Blank
23-27	Quantity of product issued into an Air Force vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**
28	Blank
29-33	Quantity of product issued into a Navy vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**
34	Blank

CARD COLUMN	DATA
35-39	Quantity of product issued into a Marine vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**
40	Blank
41-45	Quantity of product issued to Non-DoD Activities. Include all issues made to any agency outside DoD both bulk and into consuming entity.
46	Blank
47-51	Report quantity of **Bulk** product transfers to other Army Activities. **Do Not Report product issued into consuming entity in this data field.**
52	Blank
53-57	Report quantity of **Bulk** product issued to DoD activities other than US Army. **Do Not Report product issued into consuming entity in this data field.**
58	Blank
59-63	Service Use

NOTE: Leading zeros will be used to fill unused card columns of data fields. If a particular data field does not apply, zeros will be used to fill the data field.

The DLA computer program will total data reported in card columns 23 through 49 of the MEA 3 card with all data reported on the MEA 4 card, columns 23 through 57, and compare to data reported in card columns 31 through 37 of the MEA 2 card. These quantities should balance. The computer will then perform a mathematical check using the formula opening inventory minus issues plus receipts from contract and others equals closing inventory. The difference, if any, will print as a gain/loss to inventory.

The computer will also combine Army data reported in columns 23 through 42 and 51 through 56 of the MEA 3 card with quantities reported as issued into Army vehicles by other services to arrive at Army monthly consumption. Quantities reported in columns 51 through 56 will also be added by the computer to receipts from commercial sources to arrive at total service receipts from commercial sources.

NAVY ACTIVITY MEA 4 INSTRUCTION (All Quantity Fields in Barrels)

CARD COLUMN	DATA
1-3	Always MEA
4	Blank
5	Always numeric 4
6	Blank
7-12	DODAAC
13	Blank
14-17	Julian Date
18	Blank
19-21	Product Code
22	Blank
23-27	Quantity of product issued into an Army vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**
28	Blank
29-33	Quantity of product issued into an Air Force vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**

NOTE: Leading zeros will be used to fill unused card columns of data fields. If a particular data field does not apply, zeros will be used to fill the data field.

CARD COLUMN	DATA
34	Blank
35-39	Quantity of product issued into a Marine Corps vehicle or other end item for immediate consumption. **Do Not Report Bulk issues in this data field.**
40	Blank
41-45	Quantity of product issued to Non-DoD Activities. Include all issues made to any agency outside DoD, both Bulk and Into Consuming entity.
46	Blank
47-51	Report quantity of Bulk product transfers to other Navy Activities. **Do Not Report product issued into consuming entity in this data field.**
52	Blank
53-57	Report quantity of Bulk product issued to DoD Activities other than US Navy. **No Not Report product issued into consuming entity in this data field.**
58	Blank
59-63	Service Use

NOTE: Leading zeros will be used to fill unused card columns of data fields. If a particular data field does not apply, zeros will be used to fill the data field.

The DLA computer program will total data reported in card columns 23 through 49 of the MEA 3 card with all data reported on the MEA 4 card, columns 23 through 57, and compare to data reported in card columns 31 through 37 of the MEA 2 card. These quantities should balance. The computer will then perform a mathematical check using the formula opening inventory minus issues plus receipts from contract and others equals closing inventory. The difference, if any, will print as a gain/loss to inventory.

The computer will also combine Navy data reported in columns 23 through 42 and 51 through 56 of the MEA 3 card with quantities reported as issued into Navy vehicles by other services to arrive at Navy monthly consumption. Quantities reported in columns 51 through 56 will also be added by the computer to receipts from commercial sources to arrive at total service receipts from commercial sources.

MARINE MEA 4 INSTRUCTION (All Quantity Fields in Barrels)

CARD COLUMN	DATA
1-3	Always MEA
4	Blank
5	Always numeric 4
6	Blank
7-12	DODAAC
13	Blank
14-17	Julian Date
18	Blank
19-21	Product Code
22	Blank
23-27	Quantity of product issued into an Army vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**
28	Blank
29-33	Quantity of product issued into an Air Force vehicle or other end item for immediate consumption. **Do Not Report Bulk Issues in this data field.**
34	Blank

CARD COLUMN	DATA
35-39	Quantity of product issued into a Navy vehicle or other end item for immediate consumption. **Do Not Report Bulk issues in this data field.**
40	Blank
41-45	Quantity of product issued to non-DoD Activities. Include **All** issues made to any Agency outside DoD both Bulk and Into Consuming entity.
46	Blank
47-51	Report quantity of **Bulk** product transfers to other Marine Activities. **Do Not Report product issued into consuming entity in this data field.**
52	Blank
53-57	Report quantity of **Bulk** product issued to DoD Activities other than US Marine Corps. **Do Not Report product issued into consuming entity in this field.**
58	Blank
59-63	Service Use

NOTE: Leading zeros will be used to fill unused card columns of data fields. If a particular data field does not apply, zeros will be used to fill the data field.

The DLA computer program will total data reported in card columns 23 through 49 of the MEA 3 card with all data reported on the MEA 4 card, columns 23 through 57, and compare to data reported in card columns 31 through 37 of the MEA 2 card. These quantities should balance. The computer will then perform a mathematical check using the formula opening inventory minus issues plus receipts from contract and others equals closing inventory. The difference, if any, will print as a gain/loss to inventory.

The computer will also combine Marine data reported in columns 23 through 42 and 51 through 56 of the MEA 3 card with quantities reported as issued into Marine vehicles by other services to arrive at Marine monthly consumption. Quantities reported in columns 51 through 56 will also be added by the computer to receipts from commercial sources to arrive at total service receipts from commercial sources.

AIR FORCE MEA CARD 4 INSTRUCTION (All Quantity Fields in Barrels)

CARD COLUMN	DATA
1-3	Always MEA
4	Blank
5	*Always numeric 4*
6	Blank
7-12	DODAAC
13	Blank
14-17	Julian date of report
18	Blank
19-21	Product Code
22	Blank
23-27	Quantity of product issued into an Army vehicle for immediate consumption — **Do Not Report Bulk Issues in this data field.**
28	Blank
29-33	Quantity of product issued into a Navy vehicle for immediate consumption — **Do Not Report Bulk Issues in this data field.**
34	Blank

CARD COLUMN	DATA
35-39	Quantity of product issued into a Marine vehicle for immediate consumption — **Do Not Report Bulk Issues in this data field.**
40	Blank
41-45	Quantity of product issued to Non-DoD Activities. Include **All** Issues including Bulk Sales and Issues into consuming vehicles.
46	Blank
47-51	Report quantity of Bulk product transfers to other Air Force Activities. **Do Not Report any product issued into consuming vehicles.**
52	Blank
53-57	Report quantity of **Bulk** product issued to other DoD Activities. **Do Not Report product issued into consuming vehicles.**
58	Blank
59-63	Service Use

NOTE: Leading zeros will be used to fill unused card columns of data fields. If a particular data field does not apply, zeros will be used to fill the data field.

The DLA computer program will total data reported in card columns 23 through 49 of the MEA 3 card with all data reported on the MEA 4 card, columns 23 through 57, and compare to data reported in card columns 31 through 37 of the MEA 2 card. These quantities should balance. The computer will then perform a mathematical check using the formula opening inventory minus issues plus receipts from contract and others equals closing inventory. The difference, if any, will print as a gain/loss to inventory.

The computer will also combine Air Force data reported in columns 23 through 42 and 51 through 56 of the MEA 3 card with quantities reported as issued into Air Force vehicles by other services to arrive at Air Force monthly consumption. Quantities reported in columns 51 through 56 will also be added by the computer to receipts from commercial sources to arrive at total service receipts from commercial sources.

Chapter 7
Utility Reporting Format

CARD COLUMN	DATA
1-3	Enter "MEB"
4	Blank
5	Enter "2" for an original (initial) report. A "3" is used only to correct data in card column 23-69 and is not used for late submissions or correcting a product code or a Julian date.
6	Blank
7-10	Enter four-digit Julian date of last day of consumption period reported
11	Blank
12-17	The appropriate consuming activity address code (DODAAC)
18	Blank
19-21	The approved three-digit product codes as shown in Chapter 8
22	Blank
23-30	Inventory for coal and propane/LPG/butane only in same units as consumption. Leave blank for electricity, natural gas, fuel oil and purchased steam/hot water.

CARD COLUMN	DATA
31	Blank
32-39	Zero fill this column of data since data will be extracted from DLA master file for approved baseline year. This column of data may only be changed by submitting corrected figures (on a type 3 card transaction in complete overlay format) along with appropriate justification to Service Headquarters, who will in turn approve/ disapprove changes and forward to DFSC-CB for input to the master file.
40	Blank
41-48	Quantity consumed during the month covered by the report
49	Blank
50-51	Appropriate variance code
52	Blank
53-60	DoD component use
61	Blank
62-69	DoD component use

Chapter 8
Products, Product Codes, and Conversion Factors for DEIS-II Reporting

PRODUCT	PRODUCT CODE	CONVERSION FACTOR
Electricity	ELC	Not applicable; report in mega-watt hours (MWH)
Natural Gas	NAG	Use factor of 1,031 BTU/SCF if certified factor is not available from supplier and it is necessary to convert from Standard Cubic Feet (SCF) to BTU
Coal	COL (Bituminous) ANC (Anthracite)	Use factor of 25.4 (Mega BTUs)/ short ton (2000 lbs) for anthracite coal and 24.58 (Mega BTUs) /short ton for bituminous coal, or use certified figures from supplier
Purchased Steam/ Hot Water	SHW	Use factor of 1,340 BTUs of fuel consumed per pound of steam delivered to consumer (assumes 1,000 BTUs per pound of steam purchased, 82% boiler efficiency, and 12% line loss) or certified factor from the supplier
Fuel Oil	Report actual grade of product (see Chapter 3)	OPTIONAL; Use certified factor from suppliers, or 5.825 (Mega BTUs)/BBL for distillates (DF1, DF2, FS1, FS2, Kerosene and NSF) and 6.287 (Mega BTUs)/ BBL for residual fuel oils (FS4, FS5, FS6, NSF and FSL)

Chapter 9
DEIS-II Variance Codes

A. GENERAL CODES (APPLICABLE TO ALL SERVICES)

CODE	COMMENTS
00	Use when: comment or explanation is not required; established Goal achieved or exceeded.
01	Applicable reason not included in the numeric code. Explanation presented in the message comments.

B. CONSUMPTION REDUCTION VARIANCE CODES

1. The following codes are some of the common reasons the reduction in energy consumption was less than the established goal. The code used must be reasonable and supportable. If an appropriate code has not been established, narrative comments will be used.

CODE	COMMENTS
05	New construction, less demolition/abandonment, consumed 1-5% of the energy consumed for the same period in the base period.
06	New construction consumed more than 5% of the energy consumption for the same period in the base period.
07	Inactive facilities reactivated. These facilities had no consumption for the same period in the base period.
08	Newly activated activity had no consumption for the same period in the base period.

CODE	COMMENTS
10	Heating degree days increased 1-5%, compared to the base period.
11	Heating degree days increased 5-10%, compared to the base period.
12	Heating degree days increased over 10%, compared to the base period.
15	Cooling degree days increased 1-5%, compared to the base period.
16	Cooling degree days increased over 5-10%, compared to the base period.
17	Cooling degree days increased over 10%, compared to the base period.

2. Explanations are not required when reductions in consumption exceed the conservation goal; however, it is recommended that the following codes be used, as appropriate, to explain energy reductions of a non-permanent nature in order to assure a consistency in year-to-year baselines.

CODE	COMMENTS
09	Active facilities deactivated and consumed at least 1% of the activity's consumption during the same period of the base period.
20	Heating degree days for period decreased 1-5%
21	Heating degree days for period decreased 5-10%
22	Heating degree days for period decreased over 10%
25	Cooling degree days for period decreased 1-5%

CODE	COMMENTS
26	Cooling degree days for period decreased 5-10%.
27	Cooling degree days for period decreased over 10%.

3. The following codes will be used to explain trade-offs in consumption. Generally, they apply when the activity achieved the minimum overall reduction goal; however, an individual energy source may not reflect lower consumption than the same period in the base period. Thus, these codes frequently explain a decrease in one product and an increase in another product when the reason is interrelated.

CODE	COMMENTS
30	Burned alternate fuel because of anticipated or scheduled deliveries, or primary fuel, were not received or price advantage was in favor of the alternate fuel.
31	Fuel consumption increased more than 1%, because utility service was curtailed or interrupted by the utility company.
32	Approved fuel conversion; for example, heating plant converted from burning fuel oil to coal.
33	Routine maintenance or equipment failure resulted in consumption of less fuel and the purchase of more electricity (at least 1% decrease in fuel consumption).
34	Change from in-house generation or production to commercial purchase (at least 1% decrease in fuel consumption).

C. SPECIAL CODES (FOR MILITARY SERVICE)

CODE	COMMENTS
40 through 59	Reserved for Army Use
60 through 79	Reserved for Navy/Marine Corps use
80 through 99	Reserved for Air Force Use

APPENDIX B

DEIS--THE EXISTING SYSTEM

DEIS is currently used extensively in DoD. It is the only source of information for some users; for others it is used in conjunction with other reports of energy and/or energy-related data. The following appendix documents the existing system including the data sources and input flow, the output distribution and lastly, an overview of the current computer system.

DEIS DATA SOURCES

The reporting activities consist of military bases, naval vessels, and DoD agencies that use DoD energy supplies (e.g., Defense Fuel Supply Center issues) and/or utilize DoD-managed facilities. Facilities occupied by DoD personnel but managed by other Federal agencies such as GSA (e.g., the Pentagon) are not reported to DEIS. Facilities leased by DoD where the energy usage is indeterminable (e.g., the rental bill does not delineate utility costs) are also excluded from DEIS. Appendix A detailed the types of data collected on these bases and facilities.

DEIS INPUT/INFORMATION FLOW

Our interviews with users have revealed two important areas of interest in the input/ information flow presented in Figures B-1 and B-2. First is the identification of those groups that provide data to DEIS. Second are the error control and aggregation functions performed in the data collection phase. Each of these are described below in the separate discussions of DEIS I and DEIS II.

Figure B-1 illustrates the flow of information in DEIS I. The majority of those reporting data at military bases and other facilities report the

FIGURE B-1

DEIS I INFORMATION FLOW

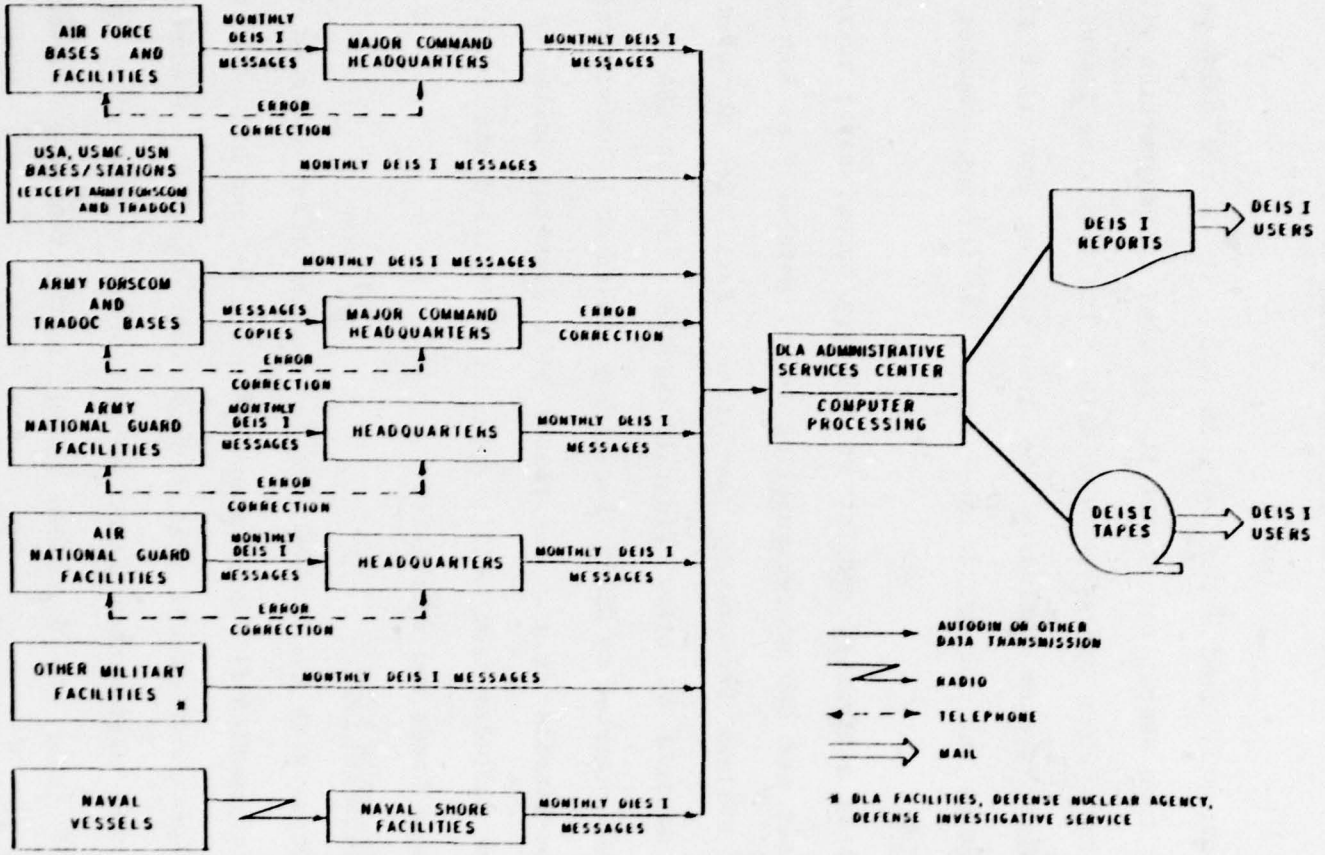
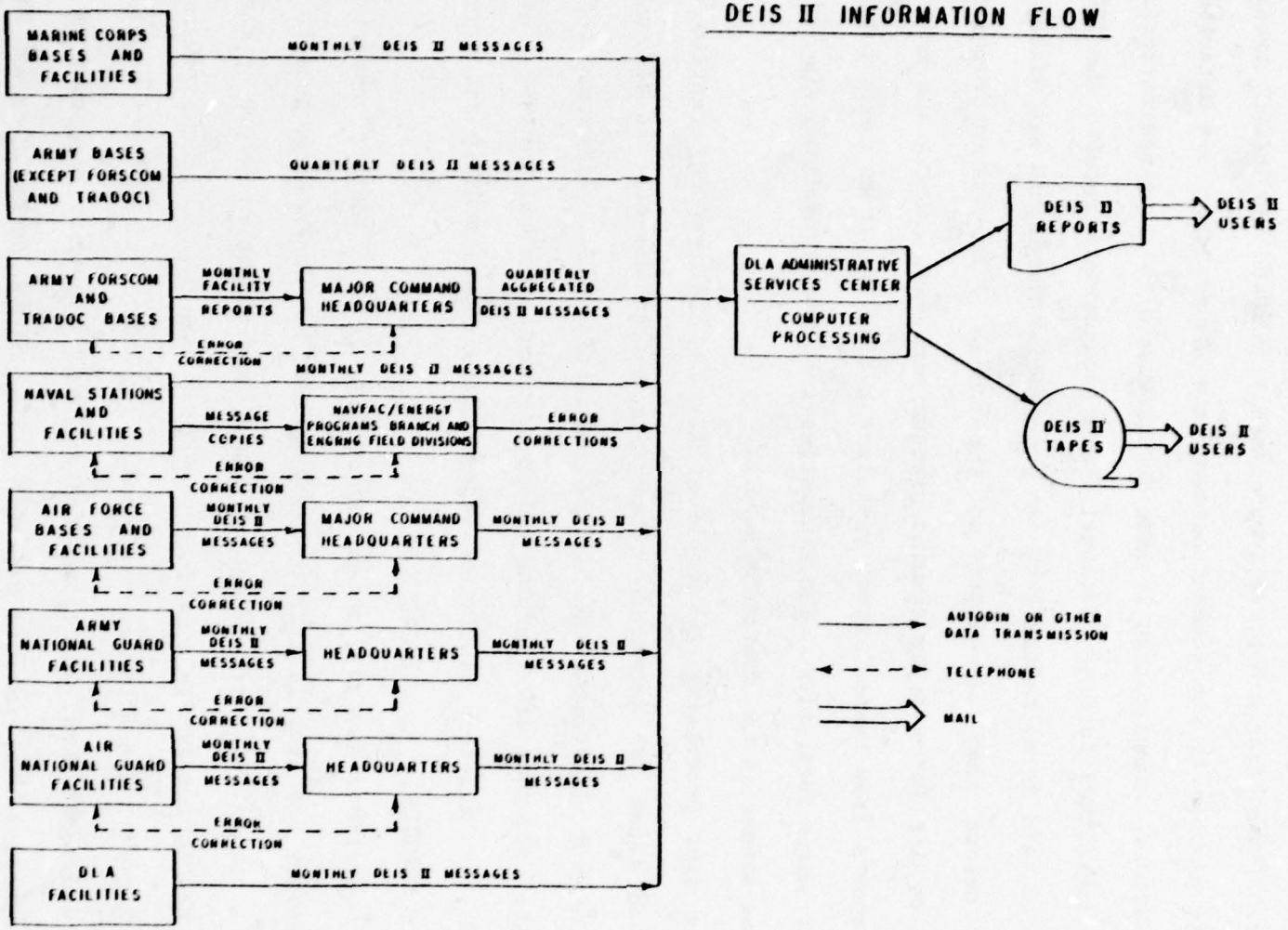


FIGURE B-2

DEIS II INFORMATION FLOW



DEIS I data monthly through AUTODIN (or other message communication facility) directly to the DLA computer center. Exceptions, as noted on Figure B-1, are as follows. Those bases under two Army commands, FORSCOM and TRADOC, transmit a duplicate message to the command headquarters. When errors are detected by the headquarters, communication is made directly with the base and corrections are then transmitted to DLA. National Guard headquarters receive the DEIS I messages (in card form) before they are processed. The inputs are edited and corrected before they are input to the system. The Energy Management Divisions in Air Force major command headquarters also receive and edit the monthly reports from bases. Naval vessels (at sea) report by radio communications to shore facilities. These messages are then transmitted via AUTODIN in the same manner as the station's reports.

After data processing is completed at the DLA computer center, both reports and tapes are produced. These are mailed directly to the users.

Figure B-2 illustrates the DEIS II information flow. Differences occur in both the frequency of reporting and the processing of data inputs. Marine Corps and other military facilities report DEIS II data monthly and directly to DLA via AUTODIN.

Naval stations and facilities report DEIS II data monthly, except that their messages are sent in triplicate over AUTODIN. One message goes to DLA, another to the NAVFAC Energy Programs Branch, and the third to one of the six regional NAVFAC Energy Field Divisions (EFD). Both NAVFAC groups review the data for errors. The EFDs are responsible for direct communication with the stations and facilities, which includes ensuring that data are input on time and correcting errors in data reporting. The NAVFAC Energy Programs Branch transmits the corrections directly to DLA.

The Army bases and facilities report DEIS II data quarterly to DLA. Most bases and facilities report directly via AUTODIN. (Some aggregation of bases and facilities is done for overseas forces.) As in the DEIS I information flow, FORSCOM and TRADOC control data through command headquarters. However, in this case, data are transmitted monthly to the commands via AUTODIN and aggregated for quarterly transmission to DLA. FORSCOM and TRADOC facilities are reported as total command consumption; bases and facilities are not reported separately.

The Air Force civil engineering groups at major commands receive DEIS II data on a monthly basis for editing before transmittal to DLA. National Guard data inputs are reviewed for DEIS II as they are for DEIS I. Changes are made directly to the input cards and then transmitted to DEIS.

Once the data are received, DEIS II reports and tapes are produced by DLA and mailed to the users.

DEIS OUTPUT DISTRIBUTION

The contents of the DEIS hard-copy reports reflect the same data fields as those input by the reporting activities, with the addition of a summary (sub-totals and totals) of those same data fields. At least thirty-seven DEIS I and DEIS II reports are produced regularly. These reports differ by their sort sequence and the data contained (e.g., Department of the Army only, DLA only, all reporting activities, etc.). Table B-1 lists the DEIS I reports, their frequency, the major sort sequence, and the recipients. Table B-2 lists the same information for DEIS II reports. A sample DEIS I summary report is reproduced in Table B-3.

In addition to hard-copy reports, DEIS data tapes are provided monthly to the Army Management System Support Agency, Air Force Data Center, and Naval Ship Research and Development Center. The Army data tape contains Army and

TABLE B-1. DEIS I REPORT DISTRIBUTION

REPORT NAME	MAJOR SORT SEQUENCE	REPORT RECIPIENTS
MONTHLY		
Overall Summary	DOE Region/CINC	(a)
Army Detail Summary	Command	OASD(MRA&L), Services, Agcys
Navy Detail Summary	Command	OASD(MRA&L), Services, Agcys
Marine Corps Detail Summary	Command	OASD(MRA&L), Services, Agcys
DLA Detail Summary	Command	OASD(MRA&L), Services, Agcys
DoD Detail Summary (DIS, DNA)	Command	OASD(MRA&L), Services, Agcys
DFSC Detail Summary	Command	OASD(MRA&L), Services, Agcys
Activities Not Reporting (Compared to Prior Month)	DoDAAC	OASD(MRA&L)
Activities Not Reporting	Product	OASD(MRA&L)
Activities Not Reporting (MEA/MEC Data by Product)	DoDAAC	OASD(MRA&L)
Petroleum Product Summaries	Product	(b)

(a) DFSC, Naval War Research Center/Stanford Research Institute (NWRC), OJCS, Atlantic Command, Panama Canal (Navy), USEUCOM, DALO-TSE-A, AFLGY/F, OASD(MRA&L), USAGMPA

(b) DFSC-CB, AFLGY/F, AFBCC, AFCOS/LGRX, OASD(MRA&L), DA, USAGMPA, CINCPAC, CNET, CINCLANT, CINCEUR, CNO OP-41, NWRC, USMC(HQ), DNA

TABLE B-1. DEIS I REPORT DISTRIBUTION - Cont'd.

REPORT NAME	MAJOR SORT SEQUENCE	REPORT RECIPIENTS
QUARTERLY		
Overall Summary	DOE Region/CINC	(c)
Defense Consumption Summaries	Command	OASD(MRA&L), Services, Agcys
Conservation Performance Report	Product	OASD(MRA&L), Services, Agcys
Army Consumption Detail & Summary	Command	OASD(MRA&L), Services, Agcys
Air Force Consumption Detail & Summary	Command	OASD(MRA&L), Services, Agcys
Navy Consumption Detail & Summary	Command	OASD(MRA&L), Services, Agcys
Marine Corps Detail & Summary	Command	OASD(MRA&L), Services, Agcys
DLA Detail & Summary	Command	OASD(MRA&L), Services, Agcys
DoD Detail & Summary (DIS, DNA)	Command	OASD(MRA&L), Services, Agcys
DFSC Detail & Summary	Command	OASD(MRA&L), Services, Agcys

(c) DFSC-CB, OASD(MRA&L), AFLGY/F, AFBCC, AFCOS/LRGX, DA(DCS/L), USAGMPA, CINCPAC, CNET, CINCLANT, CINCEUR, CNO OP-41, NWRC, USMC(HQ)

TABLE B-2. DEIS II REPORT DISTRIBUTION

REPORT NAME	MAJOR SORT SEQUENCE	REPORT RECIPIENTS
MONTHLY		
Overall Region and State Summary	DOE Region	(a)
Utilities report by DOE Region/CINC	DOE Region	(a)
Air Force Utilities	Command	OASD(MRA&L), Services, Agcys
Navy Utilities	Command	OASD(MRA&L), Services, Agcys
Marine Corps Utilities	Command	OASD(MRA&L), Services, Agcys
Activities Not Reporting	DoDACC	OASD(MRA&L)
Activities Not Reporting by Product	DoDACC	OASD(MRA&L)

(a) DFSC, Naval War Research Center/Stanford Research Institute (NWRC), OJCS, Atlantic Command, Panama Canal (Navy), USEUCOM, DALO-TSE-A, AFLGY/F, OASD(MRA&L), USAGMPA

TABLE B-2. DEIS II REPORT DISTRIBUTION - Cont'd.

REPORT NAME	MAJOR SORT SEQUENCE	REPORT RECIPIENTS
QUARTERLY		
Overall Summary	DOE Region	(b)
Conservation and Utilities	DOE Region	(b)
Activities Not Reporting DLA/Army)	Command	OASD(MRA&L)
Activities Not Reporting by Product (DLA/Army)	Product	OASD(MRA&L)
Air Force Utilities	Command	OASD(MRA&L), Services, Agcys
Navy Utilities	Command	OASD(MRA&L), Services, Agcys
Marine Corps Utilities	Command	OASD(MRA&L), Services, Agcys
Army Utilities	Command	OASD(MRA&L), Services, Agcys
DLA Utilities	Command	OASD(MRA&L), Services, Agcys

(b) DFSC-CB, OASD(MRA&L), AFLGY/F, AFBCC, AFCOS/LRGX, DA(DCS/L), USAGMPA, CINCPAC, CNET, CINCLANT, CINCEUR, CNO OP-41, NWRC, USMC(HQ)

18 SEPTEMBER 1978 AS OF 78 237 D E I S MONTHLY SUMMARY REPORT BY PCO REGION/CINC RCS-DD-I&L (M) 1313

WORLD WIDE CATEGORY SUMMARY

		MONTHLY OPENING INVENTORY	MONTHLY TOTAL CONSUMPTION	RECEIPTS FROM CONTRACT	RECEIPTS FROM DOD AND OTHER	MONTHLY ENDING INVENTORY	AVERAGE DAILY CONSUMPTION
AVIATION GASOLINES	TOTAL	1,009,087	71,091	66,714	128,089	992,848	2,936
JET FUELS JP4 & JP8	TOTAL	80,660,470	8,748,482	10,134,591	9,672,718	83,820,434	312,448
DISTILLATES	TOTAL	28,490,618	2,848,185	2,766,826	3,149,781	28,923,503	90,899
AUTOMOTIVE GASOLINES	TOTAL	2,797,086	437,080	567,828	198,171	2,848,745	15,639
RESIDUALS	TOTAL	4,283,811	802,537	637,694	126,909	4,156,885	17,948
HEATING OIL + SPECIAL TOTAL	TOTAL	2,971,586	854,853	839,498	24,043	3,080,304	19,818
ALL PRODUCTS	TOTAL	84,211,640	12,304,369	14,173,339	13,269,869	84,778,213	439,441

TABLE B-3. DEIS I SUMMARY REPORT (EXAMPLE)

Army National Guard data; the Navy tapes contains Navy and Marine data; the Air Force tape includes all DEIS data.

COMPUTER SYSTEM

Hardware

DEIS currently is run on the DLA computer facility at Cameron Station, Virginia. DEIS is run in batch mode on an IBM 370/155. Table B-4 lists the current hardware facilities.

Software

DEIS is programmed in COBOL as a batch-oriented system. The system processes input data and produces periodic reports and tapes for distribution. The software is currently limited to file update, sort, and report formatting functions.

The system software includes an IBM OS operating system and Model 204 data base management system (not currently used by DEIS).

Data Base

The DEIS data base is maintained on tape. The data base contains all data reported since the establishment of DEIS in 1974. This four-year history consists of approximately 33 megabytes of data.

The DEIS file structure is sequential. Each record represents an input card. Approximately 60,000 records are reported each year for DEIS I and 40,000 records for DEIS II. The DEIS records are 150 characters long. DEIS II records are 170 characters.

TABLE B-4. DLA ADMINISTRATION SERVICES CENTER
IBM 370/155 COMPUTER SYSTEM CONFIGURATION
(Source: DASC Data Services Handbook)

QTY. OF MACHINE	TYPE	MODEL OR FEATURE	QTY. OF FEATURE	DESCRIPTION
1	3155	H		Processing Unit
		3950	1	1401/1410 Compatibility
		7844	1	3210 Adapter
		1433	1	Block Multiplexor Channel
1	2821	5		Control Unit
		3615	2	1100 LPM Adapter
		8637	1	Univ. Char. Set - Printer #1
		8638	1	Univ. Char. Set - Printer #2
2	1403	N1		Printer
		8640	1	niv. Char. Set
5	1416	PN3	2	8 LPI Train
		QN2	1	6 LPI
		OAA	1	OCR Train
		TN	1	Upper & Lower Case
1	3210	1		Printer Keyboard
1	2314	B1		Disk Storage Control
1	2319	B1		Disk Storage - 3 Modules
1	2319	B2		Disk Storage - 3 Modules
1	2540	1		Card Read/Punch
		5890	1	Punch Feed Read
10	2316	1		Disk Pack
1	370STOR	1		Processor Storage - 2000K
5	3420	3	1	Tape Drive
		6631	1	Single Density
1	3420	3		Tape Drive
		6407	1	Seven-Track Compatibility
3	3420	5		Tape Drive
		6631	1	Single Density
	3420	5		Tape Drive
		3550	1	Dual Density
1	3803	1		Tape Control
		6408	1	Seven-Track Compatibility

TABLE B-4. DLA ADMINISTRATION SERVICES CENTER
IBM 370/155 COMPUTER SYSTEM CONFIGURATION
(Source: DASC Data Services Handbook)

QTY. OF MACHINE	TYPE	MODEL OR FEATURE	QTY. OF FEATURE	DESCRIPTION
1	3803	1		Tape Control
		3551	1	Dual Density
2	7830			Disk Controller
16	7330			Disk Drives
1	3650	II		COMTEN TP Front End Processor System
4	208A			C&P Modems 4800 BAUD
1	300F			Penril Modem 4800 BAUD
15	113B			Dial-up Modems

APPENDIX C

DEIS USER REQUIREMENTS

DEIS USERS

User requirements have been determined from interviews of the various current and potential DEIS users. Current users are identified as those organizations that presently use or maintain DEIS data. Alternatively, potential users consist of those organizations that are presently secondary users of DEIS data (i.e., users of data derived from DEIS reports) or indicate a need for DEIS data. Few potential users have been identified and are limited primarily to those organizations having budget functions. References to DEIS users in this part of the study infer both current and potential users unless otherwise stated.

A list of users interviewed during this study is presented at the end of this appendix in Table C-5. Those bases and facilities visited are not included in the table.

For functional and organizational reasons, the users in this study are generally classified in the following major groups:

- -- DoD/other Federal agencies
- -- Army
- -- Navy
- -- Marine Corp
- -- Air Force

DEIS users have similar functions (general functions related to energy, not necessarily DEIS) across the various military Services, and therefore, it is useful to identify these users under similar organization groups. These organizational groups, generalized for each military Service, are as follows:

- -- Energy Office

-- Budget Office
-- DFSC Interface
-- R&D Group
-- Major Commands

The energy office performs an overall energy management function for the service and represents the liaison to DoD energy policy organizations. The budget office forecasts costs of energy for the service taking into account energy needs that are input from the major commands. The DFSC interface is the service's representative to the Defense Fuel Supply Center (DFSC) having the function of requesting necessary fuel supplies for which DFSC contracts. The R&D group includes research and development of energy technology, as well as facility engineering and maintenance functions. DEIS users in the military Services are identified by the above organizational groups at the end of this appendix.

The DoD/other Federal agency users have energy management functions and do not require a further breakdown of the organizational differences. The uses of DEIS data for this group and the military Services are given in the following section.

DEIS USES

Identified are six categories in which DEIS data is currently used or may be used. These are:

-- Policy Analysis
-- Budgeting
-- Readiness
-- Conservation
-- R&D
-- Supply Management

These uses of DEIS data are an expansion and further breakout of the uses previously presented in the base case study.

Table C-1 identifies the uses of DEIS for users discussed above (those that have been interviewed to date). A description of these uses is provided below.

TABLE C-1. USERS AND USES OF DEIS

USERS OF DEIS (AND THE REPORTS USED)	ORGANIZATIONAL GROUP[a]	USES OF DEIS: BUDGETING	POLICY ANALYSIS	READINESS	CONSERVATION	R&D	SUPPLY MANAGEMENT
DoD/OTHER FEDERAL AGENCIES							
DEFENSE ENERGY OFFICE (DEIS I & II)	N.A.		X		X		
COMPTROLLER[b]	N.A.	X			X		
JCS (J-4) (DEIS I)	N.A.		X	X			
MRA&L, INSTALLATIONS, MANAGEMENT AND PLANNING[b]	N.A.		X		X		
DLA, PLANS, PROGRAM AND SYSTEMS (DEIS I & II)	N.A.		X	X			X
DEPARTMENT OF ENERGY, CONSERVATION (DEIS I & II)	N.A.				X		
ARMY							
ARMY ENERGY OFFICE (DEIS I & II)	EO/B	X	X		X		
DAEN, UTILITIES BRANCH (DEIS II)	B	X			X		
DAEN, MILITARY PROGRAMS[b]	R&D				X	X	
DAEN, CIVIL WORKS (DEIS II)	R&D				X	X	
FESA (DEIS II)	R&D				X	X	
FORSCOM (DEIS I & II)	MC			X	X		X
ARMY NATIONAL GUARD (DEIS I & II)	EO	X	X	X	X		X
GENERAL MATERIAL AND PETROLEUM ACTIVITIES (DEIS I & II)	DFSC			X			X
NAVY							
NAVY ENERGY OFFICE (DEIS I & II)	EO		X		X		
NAVY PETROLEUM OFFICE (DEIS I)	DFSC			X			X
CIVIL ENGINEERING LABORATORY (DEIS II)	R&D				X	X	
ENVIRONMENTAL SUPPORT OFFICE (DEIS II)	R&D				X	X	
NEUPAS (DEIS I & II)	R&D		X			X	
NAVFAC ENERGY PROGRAMS BRANCH (DEIS II)	R&D				X	X	X
NAVFAC ENERGY FIELD DIVISION, NORFOLK (DEIS I & II)	R&D/B	c			X	X	X
CINCLANT (DEIS I & II)	MC	c		X	X		X
MARINE CORPS							
REAL PROPERTY MAINTENANCE ACTIVITIES (DEIS I & II)	EO/R&D/B	X	X		X	X	X
HEADQUARTERS PROGRAMS AND FINANCIAL MANAGEMENT[b]	B	X					
AIR FORCE							
ENERGY MANAGEMENT DIVISION (DEIS I & II)	EO/B	d	X		X		
DETACHMENT 29 (DEIS I)	DFSC			X			X
COMPTROLLER, DIRECTORATE OF BUDGET[c]	B	d					
TAC (DEIS I & II)	MC		X	X	X	X	X
AIR NATIONAL GUARD (DEIS I & II)	EO				X		
ENGINEERING & SERVICES CENTER, TYNDALL (DEIS II)	R&D/B	X	X		X	X	X
DIRECTORATE OF ENGINEERING & SERVICES (DEIS II)	B	X					

NOTES:

[a]ORGANIZATIONAL GROUPS (SEE TEXT):
NA: NOT APPLICABLE DFSC: DFSC INTERFACE
EO: ENERGY OFFICE R&D: R&D AND ENGINEERING GROUPS
B: BUDGET OFFICE MC: MAJOR COMMANDS

[b]NOT A CURRENT USER.

[c]DEIS REPORTS ARE NOT USED FOR NAVY BUDGET EXHIBITS. UTILITY COST ANALYSIS DATA, THE SOURCE OF DEIS DATA, ARE USED BY THE MAJOR CLAIMANTS IN BUDGET PREPARATION.

[d]DEIS REPORTS ARE NOT USED FOR AIR FORCE POL BUDGET EXHIBITS. ACCOUNTING SYSTEM DATA, AVISURS, AND STOCK FUND SALES ANALYSIS REPORTS ARE USED FOR BUDGETING.

DEIS data are used in the formulation of energy policies. For this application category, the emphasis is typically on energy conservation, efficiency, alternative energy fuels, and other current energy issues promulgated by executive order, legislation, or directive from within DoD and the Services. The Defense Energy Office (MRA&L), Joint Chiefs of Staff (JSC), DLA, and the Service energy offices are examples of organizations that utilize DEIS data for energy management.

Another use of DEIS data is in budgeting. The various military Services use DEIS to examine historical trends in energy consumption and use this to determine future needs. This information is translated into costs by integrating DEIS data with other energy-related reports (e.g., the Army Technical Data Report). The DoD budget office then utilizes DEIS information indirectly in its aggregation of energy budget information provided by the various services.

DEIS data are also used in determining readiness. This is defined here as the comparison of war reserve requirements with actual inventories. Examples of organizations using DEIS in this matter are the JCS, DLA, the DFSC interfaces, and major commands in the various military Services.

Energy conservation is another application of DEIS data and products. The use of this data, as defined here, is in the actual implementation of formulated conservation policies. This includes measuring and monitoring the effect of energy conservation programs. Energy conservation is required by Executive Order No. 12003, the recent National Energy Act, and other enabling legislation. In addition, directives from DoD and the military Services[1] are a basis for this application. Examples of users with this application are the

[1]The Army, Air Force, and Navy published comprehensive energy plans in 1978 which include short- and long-range goals and specific energy management activities.

Department of Energy, Office of Conservation, and the various R&D groups in the Services, in addition to the users previously presented for the policy analysis application. The budget offices are also interested in historical conservation trends in order to correctly estimate energy budgets.

Another application for DEIS data is for research and development of energy sources and technology. DEIS data may be used to determine areas for future development of alternative fuels or technology that are capable of improving the efficiency of energy consumption or decreasing the dependency on specific fuels. Examples of organizations having such needs are the various R&D groups in the military Services.

Supply management is the final category for application of DEIS data. Supply management, defined here, is the management of the fuel supply necessary to operate the defense supply system under peacetime conditions. Examples of organizations in need of related information are DLA, the DFSC interfaces, a limited number of R&D groups, and the major commands.

SYSTEM FUNCTIONAL REQUIREMENTS

System functional requirements are the processing and operational requirements of the users. These include qualitative requirements such as accuracy, timeliness, and security; specific processing requirements for output reports, applications, etc.; and system management (or control) requirements. Many of these requirements may be derived from others as part of the system design phase, e.g., accuracy requirements may indirectly require interactive data entry, timeliness requirements may require on-line data collection and reporting, etc. These "derived" requirements are design-dependent and usually represent one of many solutions. The following discussion presents those requirements that were specified by DEIS users.

Table C-2 presents a summary of DEIS functional requirements as they relate to the uses described earlier. Specific requirements for each of the uses have been indicated for each of the requirements categories (e.g., accuracy) in the table.

FUNCTIONAL REQUIREMENTS

Accuracy

Most DEIS users did not state specific, quantitative requirements for the accuracy of DEIS data, nor were they certain as to the current level of accuracy in the data. However, many users in the Services (e.g., Service energy offices) have detected specific problems that they are trying to correct. Other users (e.g., JCS, OASD offices) accept the data as the best available (sometimes the only data available), but desire "more accurate" reports. The currently active pursuit of detecting and correcting DEIS errors (and their causes) has led to the conclusion that the users require a greater degree of accuracy than that of the current system. Although no quantitative requirement (e.g., 90%) can be directly derived from our interviews, at a minimum, the users desire the resolution of problems that have been identified. These and some potential solutions mentioned by users are discussed below.

Causes for inaccurate reporting have been identified as procedural and human errors. The procedural problems are of prime concern to most of the users interviewed.

A major procedural problem is the difference between the normal record-keeping (accounting, inventory, etc.) at military installations and the procedures for DEIS reporting. Some specific examples are:

-- At most bases, the data required for DEIS is maintained by many different sources, e.g., the comptroller, supply office, motor gasoline stations, etc. The record-keeping of these offices are often not compatible with what is needed for DEIS reports,

TABLE C-2. DEIS REQUIREMENTS SUMMARY

	USES OF DEIS					
	BUDGETING	POLICY ANALYSIS	READINESS	CONSERVATION	R&D	SUPPLY MANAGEMENT
FUNCTIONAL REQUIREMENTS						
ACCURACY[a]						
MAXIMUM ALLOWABLE SYSTEM ERROR: ± 5%			X			
MAXIMUM ALLOWABLE SYSTEM ERROR: ± 10%	X			X	X	X
MAXIMUM ALLOWABLE SYSTEM ERROR: ± 15%		X				
VALIDATION						
ERROR CORRECTION FEEDBACK LOOP[b]	X	X	X	X	X	X
SYNTAX AND FORMAT ERROR CHECKS	X	X	X	X	X	X
FREQUENCY						
ANNUAL REPORTING WITH MONTHLY BREAKOUT	X					
SEMI-ANNUAL REPORTING WITH MONTHLY BREAKOUT		X				
QUARTERLY REPORTING WITH MONTHLY BREAKOUT				X		
MONTHLY REPORTING					X	X
MONTHLY REPORTING FOR NORMAL OPERATION, AND WEEKLY OR DAILY REPORTING DURING CRISIS[c]			X			
TIMELINESS (TIME LAG)						
DEIS I: 4 WEEKS DEIS II: 8 WEEKS	X	X		X	X	
DEIS I: 2 WEEKS DEIS II: 5 WEEKS			X			X
DEIS I: 1 DAY[c] DEIS II: 1 DAY			X			

[a]Accuracy refers to the allowable error for any particular measurement. Inaccuracies will tend to balance in aggreate measures.

[b]Error correction feedback loop refers to the review of DEIS input data within each service before the data is entered on the data base. Detected errors are corrected by contacting those reporting the data.

[c]For selected geographic areas only.

TABLE C-2. DEIS REQUIREMENTS SUMMARY

	USES OF DEIS					
	BUDGETING	POLICY ANALYSIS	READINESS	CONSERVATION	R&D	SUPPLY MANAGEMENT
FLEXIBILITY						
NO CHANGE	X					
ABILITY TO ADD NEW DATA		X	X	X	X	X
ABILITY TO ADD NEW APPLICATIONS		X		X	X	
FLEXIBLE REPORT GENERATION		X		X	X	
SECURITY						
NO SYSTEM SECURITY REQUIRED	X	X		X	X	X
SYSTEM SECURITY REQUIRED[d]			X			
APPLICATIONS						
SIMPLE DATA COMPUTATIONS (E.G., RATIO COMPUTATION)	X	X		X	X	X
EXCEPTION REPORTING (E.G., COMPARISONS AND RANGE CHECKING)			X			
TREND ANALYSIS CAPABILITIES		X	X	X	X	X
FORECASTING CAPABILITIES		X		X	X	X
MODELING CAPABILITIES					X	
OUTPUT REPORTING						
GRAPHICS CAPABILITIES		X	X	X	X	X
USER CUSTOMIZED REPORT FORMATTING	X	X	X	X	X	X
ON-LINE CAPABILITIES DURING CRISIS ONLY			X			
TAPE PRODUCTION						
NO TAPES REQUIRED	X		X			X
TAPES REQUIRED		X		X	X	
COMMUNICATIONS						
AUTODIN (DATA) AND TELEPHONE (VOICE)	X	X	X	X	X	X

[d] Security required only with the addition of war reserves requirement to the data base.

nor are they always compatible with each other. For example, fuel deliveries may be accounted for in terms of cost and total quantity delivered to the base, supplies of fuel may be recorded as current inventories in storage facilities or the base, and consumption may be recorded based on metered fuel lines and/or recorded distribution at gas pumps.

-- Incompatibilities result from differences in time periods of recording deliveries, measuring inventory/storage, and reporting consumption. Different units of measure (barrels, gallons, Btus) may also be used. Also, the scope of measurements may be different between the reporting of deliveries, e.g., total base; the measurement of inventories, e.g., major storage tanks only; and the consumption of fuels, e.g., at gasoline pumps and from small metered storage tanks.

-- Due to the various sources above and the availability of data required for DEIS reports, there are inconsistencies in what is reported from bases for consumption and inventories. At both an Army and Navy facility visited, consumption for end-users was determined by three different methods: 1) the difference in the inventories of storage tanks between months, 2) actual metered consumption, or 3) deliveries of fuel during the month. The methods resulted from what was practical for monthly reporting. In the case of small, unmetered fuel oil tanks, monthly measurement was not practical (therefore, deliveries are used). Metering of consumption did not always correspond to the reporting activities of DEIS, e.g., electricity may be metered by buildings that do not correspond to the split of DEIS reporting activities.

-- Monthly bills from outside contractors or utilities do not correspond to the DEIS reporting cycles. Some bases estimate the amount consumed during the month, while others use the billing cycle. Also, differences exist between the cycle for DEIS I and DEIS II, making the proper reporting of heating oil difficult if once-a-month measurements of storage tanks are performed.

-- Even where accurate metering and inventory measurement of fuels is recorded daily, e.g., at a base motor gasoline station, the proper accounting for DEIS may be difficult. Personnel may fill lawn mowers and fuel cans with motor gasoline to be used for "facility" consumption (e.g., gas-powered generators, lawn mowers, etc.) rather than for "mobility" consumption. Issues from such stations are usually reported as mobility (primary) consumption of gasoline and diesel fuel.

-- The data required for DEIS reports are sometimes not available. For example, energy consumption is often not metered and inventories are not always measured each month. In some cases estimates are used (which may be of questionnable accuracy), in other cases, no estimates are used, causing known inaccuracies for that month's report.

-- Inconsistencies occur in the Air Force reports between fuel oils that are reported in DEIS I and DEIS II. Heating oil reported in DEIS I may reflect quantities supplied to smaller storage tanks on a base. The consumption reported under DEIS II may reflect the actual consumption by taking monthly inventories of the smaller tanks.

A second area of procedural problems result from the complexity of reporting energy consumption. This is the result of a combination of the procedural inconsistencies discussed above, the relative inexperience of the individuals filling out the DEIS reports, and the lack of explanation or examples in the DEIS instructions. Some specific problems mentioned are:

-- The reporting of Navy activities is currently being investigated to determine if 1) some smaller activities are being double-counted, i.e., being reported under two major reporting activities, and 2) if some activities are not being reported at all. It is expected that both of these may be occurring, but the relative amount of such errors is unknown.

-- The double counting of particular users can be the result of the separate reporting of fuel provided to a National Guard unit on a base (as discovered at some Army bases) and their subsequent reporting of the use of that fuel as consumption.

-- The accounting of waste fuels used is another potential accuracy problem. For example, drained fuels from aircraft may be used elsewhere on a base. Such fuel is already reported as consumed. It is not known whether the use of such fuel is double counted as consumption by other reporting activities, or whether it is merely added to inventories. Those installations who measure their inventories earn "credit" by reusing fuel such as drained motor oil in heating oil tanks, since this second use "reduces" their consumption (due to the increase in inventory). If consumption is metered at the storage tank, such additions to inventory may be double-counted and not provide the incentive that such conservation measures warrant.

-- Inconsistencies between the reporting of energy consumption of non-service energy users on bases occur in all of the Services. For example, the electricity consumption of Veterans Administration hospitals are reported by only some of the Marine Corp and Army bases as part of the base consumption. Others subtract it out of the base usage. A similar inconsistency occurs from the Army Civil Works Districts, where electricity consumption on facilities is sometimes reported even though it is being produced by the Civil Works project

(e.g., hydro-electric dam).[2] Such inconsistencies make even relative comparisons of reporting facilities questionnable.

-- The changes of the military responsibilities of bases in the Air Force make the determination of baseline update difficult. Squadrons and equipment recorded in 1975 represent a different allocation than that of today. Where base closures occurred, the records for detailed baseline consumption may be impossible to obtain. Thus, the baseline consumption for segments of a closed base that are distributed to other bases is not easily determined.

-- The reporting of primary, secondary, and tertiary consumption is another problem area. Differences in their definitions between the services result in one problem for those users of total DoD energy data. The lack of definition for the Marine Corps bases is another source of inconsistency. For example, diesel fuel used for space heating is, by definition, secondary use. However, at a specific base, space heating may be the major use of diesel fuel, resulting in the possibility of it being reported as primary use.

A final problem area is a combination of procedural and human errors. The NAVFAC personnel responsible for validating DEIS II data estimate transmission, keying, and formatting errors to be 30%. Transmission errors occur within the communications facility itself, while the keying and formatting errors are due to improper data entry. Currently, the lack of leading zeroes in input fields and improper alignment of data fields (e.g., due to omitting an entry or a space) are the most common errors. An even higher rate of error was detected on Army National Guard inputs in the final quarter of 1978. This was due to the changes in the inputs as of October 1978. In both cases (NAVFAC and ANG), corrections are made before the data is input to DLA.

In contrast, the Air Force Tactical Air Command (TAC) detected relatively few errors in recent DEIS I inputs. In the near future the Stock

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[2]The reporting of non-purchased electricity is actually a human error rather than procedural, although the instructions for the data input are not explicit. "Purchased" electricity is only specified in the introduction of the DEIS manual, not on the data card instruction for DEIS II.

Fund System on each base will automatically transmit the data to the DLA computer facility. This will decrease errors to a minimum.

It is difficult to determine the extent of human-caused errors in DEIS data. Validation appropriate for such estimation is only recently being initiated.

The accuracy for Navy's DEIS II facility data was estimated at ± 15% by the Civil Engineering Laboratory based on a validation test at the Pt. Mugu, California facility. A recent Air Force study concluded that most DEIS errors are human-caused. Specific errors noted by visits to bases and our interviews were as follows:

-- Propane consumption was not being reported at all on a naval station visited. Also, small amounts of No. 2 fuel oil were not being reported under DEIS II (this was less than 3% of the total fuel oil for the facility). On the other hand, other reporting of energy consumption was extremely accurate, including the prorating of petroleum product usage to four reporting activities based on their metered consumption of electricity and steam produced by the petroleum.

-- The reporting of variance codes at the naval station visited was also done incorrectly. The available codes are inappropriate for their situation and written comments have not been used.

-- The proper units of measure are not always reported or the required computation is sometimes in error on DEIS inputs. Typical errors include: gallons reported instead of barrels, electricity converted to MBtus, errors in the conversion computation for DEIS II energy, and natural gas, coal, steam/hot water, and fuel oil reported without conversion.

-- Due to rough seas, it is sometimes impossible to report an accurate reading of a ship's fuel storage. Although this produces an error in the computer monthly consumption, it will be balanced by the reading for the next month's report.

Other errors occur, but they are difficult to investigate without adequate validation procedures. (The requirements for validation are discussed next.) However, those organizations that have been investigating both the procedural and human errors in DEIS reports suggested a number of solutions to the accuracy problems.

Some of the potential solutions are:

-- More detailed reporting from Naval bases for DEIS II usage by extending the current DODACC/UIC reporting code to include building type and end-usage identification. This would eliminate inaccuracies due to estimates for reporting activity consumption. It would also create the need for increased metering and record keeping at bases. (This is discussed further under data requirements.)

-- Similar to the previous suggestion was to further break-out the current reporting at bases so that non-service users would be more easily identified (e.g., report the VA hospital electricity usage separately).

-- More specific definitions of data are needed including: specific fuels and energy types (e.g., purchased electricity vs. non-purchased electricity); primary, secondary, and tertiary use of fuels; and other issues (transfers of fuel).

-- The differences in the reporting cycles between DEIS I and DEIS II were noted as a source of error, and should be made consistent. Another user suggested the elimination of any specific monthly cycle, i.e., that cycle that is most appropriate for each fuel and accounting system should be used.

-- Data should be reported in units familiar to the person filling out the report (e.g., gallons, tons, cubic feet) was a solution mentioned by many users.

-- The fixed format of DEIS input messages was regarded as a cause of numerous errors. More simple input procedures were suggested.

Validation

Closely related to the accuracy requirements of DEIS is that of validation, the process of determining the extent of data error in the system. The validation requirement indicates the specific means of determining data error of the system, such as the use of auditing, data field and quantity edits, and other analyses.

The requirements for validation mainly fall within the Services responsible for reporting the data. The DoD offices interviewed had no specific validation requirements, leaving that responsibility with the services.

Specific validation requirements for the Army are further decentralized through the chain of command. The Army Energy Office expects the major commands to be performing data validation. In practice, such validation is not being performed by all major commands, although some perform extensive error-checking. An example is that of FORSCOM which receives all DEIS II data monthly and aggregates the command consumption for quarterly reports. FORSCOM also receives message copies of monthly DEIS I data. Data is compared to historical consumption and input formats are checked. Possible errors are resolved by telephone between FORSCOM and the reporting base. Facility inspections conducted by the FORSCOM energy office provides further validation.

The Army's requirement is to maintain the ability to continue such validation points, and to be able to increase such activity as other commands desire validation control. In addition, the feedback of data to those reporting the data was desired for further validation by the source.

The Navy performs a similar validation function for DEIS II data. All Navy DEIS II messages go to three points: DLA (for DEIS input), the NAVFAC Energy Programs Branch, and one of six NAVFAC Energy Field Divisions (EFD). The NAVFAC personnel validate the monthly data, checking for format and accuracy. The EFDs maintain direct communication with the reporting activities. Corrections are entered to DEIS directly from NAVFAC headquarters. Like the Army requirement, the Navy requires the ability to continue their current validation process.

The Marine Corps is recently attempting to validate DEIS data along with the expansion of their energy staff. They desire that the responsibility for syntax and format error checks remain with the DLA computer processing (although better reporting of such errors is needed). The Marine's responsibility would include the validation of data content.

The Air Force is interested in improved validation techniques. These include spot checks on facilities and range indicators on input data that would flag possible errors. Many of the major commands, however, perform their own input editing of monthly data for their bases. This has proven very successful in reducing input errors and preventing their reoccurrence.

In summary, the requirements for DEIS validation are as follows:

-- The current validation processes employed by the Services must remain intact, or be improved with any changes to DEIS.

-- The system should perform format and syntax error checks, and provide range checks on selected data elements.

-- Spot checks and auditing of energy reports are not perceived as a DEIS requirement, but as a requirement of the Services.

Frequency

Frequency refers to the periodicity of data collection and output reporting. In general, there are no requirements for changing the current DEIS frequencies. The current requirement remains: to maintain varying frequencies of data collection based on the Service and the type of energy (mobility or utility) and to permit different frequencies for output reports depending on the user. Two exceptions to the current frequencies were discussed in our interviews: emergencies and the effects of ad hoc reporting.

During a crisis, DEIS I is currently capable of changing its collection and reporting frequency to weekly. Both the Navy and DLA mentioned the requirement for daily information in selected areas during an emergency. The JCS employs other systems to assist in daily energy reporting during emergencies.

If ad hoc reporting capabilities were added to DEIS, a number of users claim that either less frequent regular reporting or less data would be needed regularly.

The specific change to frequency requirements based on ad hoc reporting can only be determined after it is made available to users. Ad hoc reporting is further discussed below.

One exception to the above requirements are the Army/FESA users, who specify the need for monthly reporting of DEIS II data (Army DEIS II data is currently quarterly). Other Army users were satisfied with the current quarterly frequency.

Timeliness

Timeliness, an indicator of the currency of data is a measure of the time lag from the end of the reporting period to the time the output report is received by the user. Generally, most users specified the desire for a reduced time lag. Those using DEIS I data desired data timely enough to analyze the effects of an energy crisis and to be able to respond. The JCS and Air Force DET-29 users indicated a desire for a more timely receipt of their reports. Other users felt that the current DEIS I reporting was timely enough.

DEIS II users were not satisfied with the time lag of two to three months. Only those users who were looking at only long term conservation goals felt the timeliness to be satisfactory.

Some users also specified that annual reports were sometimes not received and that data tapes were also extraordinarily late.

A time lag of two weeks for DEIS I reports and five weeks[3] for DEIS II reports would be satisfactory for most users.

Flexibility

Flexibility reflects the system's ability to respond to the changing

[3]DEIS II input data are due three or four weeks after the end of the period, depending on the service.

needs of its users. The nature of the energy situation and technology dictates an inherent requirement for flexibility in DEIS. The variations in its users and their uses adds to this requirement. Currently, the system provides some flexibility in frequency and reporting. DEIS users specifically addressed the following areas of increased flexibility:

-- The addition of new data

-- The addition of new applications

-- Further reporting flexibility

The requirement for flexibility in adding data surpasses the present ability to place data in extra data fields on the input cards. First, the users require the system to easily accept the reporting of new energy types. The use of solar, geothermal, wind, etc. must be reported to be able to assess future energy conservation in DoD. Second, the current use of extra fields does not meet the requirements of data reporting. Some Services already use the available fields on the card, not allowing further data to be added. The treatment of these fields in the current system is not adequate for complete reporting purposes.

As users are expanding their analysis of energy data (and their staffs), new applications requirements will be placed on the system. Some of these are discussed below. The current system performs almost no analysis of data and has no provision for adding data analysis (except by the addition of new programs).

The final major area of flexibility is output reporting. The numerous users and uses of DEIS require different reporting formats and data on outputs. Requirements from the addition of historical data to on-line ad hoc reporting were specified by users. More flexible reporting facilities for DEIS was a universal requirement.

Security

Data security is not currently a DEIS requirement since all reported data is unclassified. In the future, however, two types of data may pose security requirements: war reserves/requirements and nuclear data. Including analysis of war reserves versus requirements for readiness would cause the need for the classification of some parts of the data base. Currently, the war reserves are aggregated in the inventories reported.

The inclusion of nuclear fuel usage may also require the classification of segments of the data base. At present, Navy nuclear usage is not reported. However, in the future, such inclusion may be desired, as well as other new technologies (e.g., nuclear powered aircraft, nuclear power generation).

Applications

Applications requirements for DEIS involve the need for modeling and analysis. This may include a range of capabilities from simple computations and processing of information to more sophisticated statistical and modelling packages. Examples of applications are: computations of ratios and indicators; projections of fuel supply, demand, and cost; and analysis, including simple comparisons and the use of more complex criteria.

In part due to the lack of experience in energy data analysis by some users, and due to the lack of current DEIS analytic capabilities, few users had specific requirements for analysis. DEIS currently supports the analytic systems for the Navy (by providing data).

The most appropriate description of DEIS user requirements are that, given the opportunity to manipulate the reporting of data, the users may discover areas for analysis. Many of the users regularly perform some computations on the data when they receive reports. These would all be initial computational requirements for DEIS.

The only users to specify current analytic requirements were the Service energy offices who would like to look at historical (and possibly future) trends and comparisons of reporting activities and major commands. With the addition of data on areas of buildings, costs, and weather data, other analyses should develop.

The analysis of war requirements versus war reserves is desired by the JCS users if DEIS data could be used in conjunction with the Inventory Management of Petroleum system (which is classified). Inventories below war requirements should be brought to their immediate attention.

DATA REQUIREMENTS

The distinction between DEIS I and DEIS II is based on the data each contain. Each system was established based on a need for energy data reporting: DEIS I for reporting petroleum product inventories and consumption after the 1973 oil embargo and DEIS II for reporting energy consumption on DoD facilities (utility energy) to manage conservation programs. In addition to the functional requirements, we investigated the current uses of DEIS data throughout the Services and DoD agencies. Future requirements for data were also explored during interviews with current and potential DEIS users. The findings are presented below in two parts, the overall organization of DEIS data and specific data element requirements of users. A summary of these requirements as they relate to DEIS uses is presented in Table C-3.

DATA ORGANIZATION

Data organization refers to the relationships between data records (and groups of data records) and data elements within data records in a data base. This can be discussed at two levels: the physical data organization, i.e., the way in which records are ordered and stored within the computer system, and the logical data organization, i.e., the data relationships presented to

TABLE C-3. DEIS REQUIREMENTS SUMMARY

	USES OF DEIS					
	BUDGETING	POLICY ANALYSIS	READINESS	CONSERVATION	R&D	SUPPLY MANAGEMENT
DATA REQUIREMENTS						
DATA ORGANIZATION						
ENERGY BALANCE	X	X		X	X	X
AGGREGATIONS BY GEOGRAPHIC REGIONS, MAJOR COMMAND/MAJOR CLAIMANTS	X	X	X	X	X	X
AGGREGATIONS AND DATA SELECTION BY OTHER CRITERIA (E.G., FACILITY TYPE, CLASS OF SHIP)		X		X	X	X
DATA BASE MODIFICATIONS						
FURTHER BREAKOUT OF END-USE ON BASES (E.G., TENANT CONSUMPTION, BUILDING TYPES, ETC.)	X	X		X	X	X
HISTORICAL DATA AVAILABILITY	X	X	X	X	X	X
REPORT DATA (INPUT AND OUTPUT) IN STANDARD UNITS OF MEASURE	X	X	X	X	X	X
NEW DATA						
SQUARE FOOTAGE	X	X		X	X	X
COSTS	X	X		X	X	X
POPULATION	X	X		X	X	X
DEGREE DAYS		X		X	X	X
OTHER ENERGY TYPES (SOLAR, NUCLEAR, GEOTHERMAL)	X	X	X	X	X	X

and/or available to the user. Our concern for DEIS user requirements is the logical data organization: what the user sees. Ideally, this logical "view" is consistent with how the user perceives the energy data relationships.

At the highest level, DEIS data is split in two: DEIS I contains petroleum product data, DEIS II contains utility energy data. (There is overlap between DEIS I and DEIS II since utilities consume petroleum products.) The next level of data organization are the various breakouts of data available through DEIS reports.

Due to the variety of users and uses of DEIS data, there are numerous desired organizations of that data. The current system provides these data organizations through its output reports. Current output reports offer numerous arrangements based on sort sequences.[4] For example, the all-DoD, DEIS I Overall Summary Report presents data in four groups. The first is the world-wide and CONUS summaries. The next level of detail is the monthly report for each "region" world-wide. The next level reports petroleum products by state, territory, and county within each region. The final group of reports are by reporting activity within each state/territory/county within region.

The interviews did not reveal significant differences between the user perspectives and the current DEIS data organization. The users wish to analyze data in terms of an energy balance and aggregated within logical groupings meaningful to the user. These two data organizations, energy balance and levels of aggregation, are discussed below.

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[4] A sort sequence refers to the order in which data is presented based on the data elements (keys) on which it is sorted and aggregated.

Energy Balance Perspective

Energy balance refers to the perspective of a base, vessel, region, etc. as an energy-consuming system. Energy is imported, stored, consumed, and exported from that system.[5] An energy balance allows the user to see the relationship:

Imports - Changes in inventory = Consumption + Exports

This relationship is provided in DEIS by receipts from contract and receipts from DoD/other (Imports), opening and closing inventories (Change in inventory), consumption (Consumption), and issues to other services and DLA (Exports). In some DEIS I reports, consumption and issues are combined. DEIS II does not provide for the breakout of consumption and exports. All consumption of utility fuels at a base is reported as consumption by that reporting activity, including that energy consumed by other tenants, e.g., a VA hospital or an Army base.

In summary, the energy balance perspective is incomplete as provided in the current DEIS data organization. The aggregation of some of the components of the energy balance equation is a concern of some users. This is a problem in the level of detail of DEIS data, discussed below.

Levels of Aggregation

The second perspective of the user is to analyze data in aggregations meaningful to the user's area of responsibility. The energy offices of the services, for example, wish to see data aggregated by their service, by major commands within their service, and by installations within each command. Other users are interested in the numerous other sort sequences offered within the current DEIS reports.

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[5]The terms import and export are used to describe the inputs to and outputs from an energy-consuming system. They do not necessarily refer to imports/exports to/from the U.S.

In general, the current levels of aggregation fit the user's perspectives. However, the very nature of the DEIS data organization allows no flexibility other than the way in which it is presented. Other potential sorting keys are not provided such as reporting bases in descending order of consumption, allowing the selection and totalling of only classes of ships, listing and totalling specific types of facilities within a service, etc. Such data organizations require manual selection and computation from the voluminous reports produced by DEIS. (This requires time and the possibility of human error.)

Additionally, the current aggregations do not always reflect the actual classifications intended. For example, the Joint Chiefs of Staff computes the total Atlantic Command inventories by adding inventories from bases listed under the European Command. These are coastal bases which are reported under the European Command, but supply the Atlantic Fleet with fuel.

Other data organizational requirements not satisfied by current DEIS reports are due to the level of detail in the system. The Navy Civil Engineering Lab and the Naval Environmental Support Office in California desire DEIS II data aggregated by major claimants and/or geographical regions. Data is currently not input by major claimants. Current regional aggregations are based on the location of the reporting activity. The reporting activities may report the energy consumption of smaller activities located in an adjacent region.

In summary, the current data organizations are user-oriented, but incomplete. The energy balance reporting requires a lower level of detail for DEIS II consumption/exports. The levels of aggregation are also incomplete for some users due to the lack of detail in the data collected. Also, the

lack of flexibility in the current data organization does not meet the requirement for flexibility as discussed earlier. Since the data organization is based on the current output reports, change is required to make either the output reporting more flexible or to make the data base more flexible.

DATA ELEMENT SPECIFICATIONS

Specific data requirements were discussed in our user interviews to determine if changes to the current DEIS data base are required. While no users advocated the elimination of currently reported data elements, some users requested additional data. Also, the requirements for data organization above imply some additional data elements to be reported.

These additional data requirements are not necessarily requirements for the DEIS data base. Users described the additional data required to perform their functions, i.e., that data not currently being obtained from DEIS nor from other systems.[6]

The additional data requirements for DEIS can be split into two areas: those changes to the existing DEIS data and new data elements. Both are described below.

Modifications to the DEIS Data Base

Desired modifications to the current data included changes to data definitions, level of detail, units of measure, and historical data.

Data Definitions. In general, the data element definitions of the DEIS data base were acceptable. The most recent instructions are relatively explicit (except as noted below) and users expressed hope that the further definition of petroleum product use would resolve some of the current inaccuracies. One area of concern, however, pertained to the definitions for

[6] In some cases, the required data was being obtained from other systems, but was not satisfactory due to frequency, inconsistency with DEIS data, inaccuracies, etc.

primary, secondary, and tertiary use of fuels. As noted earlier, the lack of definitions for these categories is potentially the source of inaccuracies. The Air Force, Army, and Navy have established specific definitions for these uses. The Marine Corps desires established data definitions for primary, secondary, and tertiary uses to be published in the DEIS manual. Not only will this assist those reporting in the Marine Corps, but it will also allow the integration of usage data on a DoD basis.

Another definitional requirement arises from the many exceptions that occur from base to base. This results in inaccuracies due to inconsistent reporting because of different interpretations of the instructions. Although the definitions of who should report and what should be reported are usually explicit, there are still inconsistencies in the DEIS inputs. For example, one base might report the consumption of a VA hospital while another might not, all factors being equal. The requirement resulting from this problem is for the use of examples and explicit mention of extraordinary situations to reduce errors based on the misinterpretation of data definitions.

Level of Detail. Requirements for more specific detail in the data base come from two sources: requirements for data organization and requirements based on the use of the reports. As discussed above, to completely portray the energy balance for an installation, DEIS II should include a measure of energy supplied to tenants that are not part of that service (or budgeted activity) particularly when such tenants are billed for their energy consumption. This breakout of consumption reporting can assist in proper budgeting, as mentioned by the Naval Environmental Support Office and the Army Energy Office. Naval stations often have energy consumption of tenants from

major claimants (budgeted activities) other than that of the reporting activity aggregated in the station's consumption. The Navy does differentiate between Navy-funded and non-Navy funded consumption (using the extra reporting columns available on DEIS II inputs), but there is no breakout of major claimants. Army reports do not break out Army National Guard or Reserve utility energy consumption on bases, even though they are separately billed.

The Army reports the DEIS I intra-Service consumption of reserve and national guard units using the additional columns provided on the input cards. This provides a more complete energy balance equation (DEIS I only provides reporting columns for inter-Service and non-Service transfers to end users) for mobility fuels budgeting within the Department of the Army. Although the current system provides the facility for reporting this data, it is not "customized" for Army use, i.e., the report headings are "OTHER" and no descriptive information is provided on the outputs.

Also desired was further specification of the types of facilities reporting to DEIS II. The Navy Environmental Support Office desires a more descriptive breakout of the reporting activities adding descriptive building codes and "end-use" descriptors to the current UICs reported. This would require more inputs from the stations since the end-use descriptors differentiate between lighting, air-conditioning, heating, etc. The Army Corps of Engineers desire the separate reporting of "process" energy consumption within civil works districts. Process energy refers to energy used by Army Civil Works facilities to serve the community, i.e., navigational locks, pumping stations for hydro-electric dams, water-providing services to cities, etc. These facilities are currently aggregated with other non-process energy facilities in the civil works districts.

Units of Measure. Users from the Marine Corps, Army Energy Office, and the Army Corps of Engineers suggested that the input reporting of energy data be done in standard units of measure familiar to those providing the data. This will eliminate both errors and time in the input process. Additionally, the Army Energy Office desired both the units and mega-Btus to be included on output reports.

Historical Data. Most DEIS users would like historical data available on the DEIS data base. The Army Energy Office mentioned that summary information from past years would probably be sufficient. The availability of historical data is important from an analysis standpoint since many of the users monitor consumption over time and write reports describing such consumption. It would also permit users to see corrections made to data that are not available on current reports.

New Data Elements

Additional data elements desired by DEIS users include square footage, cost data, population, heating and cooling degree days, and new energy types.

Square Footage of Facilities. To measure the actual conservation of energy at facilities, DEIS II consumption data must be measured with the area of the facility for which it is being used.[7] This allows the measure of Btus per square foot, in accordance with Executive Order 12003.

This data was specifically requested by the users in the Department of Energy/Office of Conservation, the Army Energy Office, the Army Facility Engineers Support Agency (FESA), the Marine Corps, the Navy Energy Office, the Air Force Energy Management Division, and the Naval Facilities Engineering

[7]This is particularly important in measuring consumption over time since a facility's square footage can change.

Command. It is needed for future reporting and for 1975 baseline data. The Marine Corps requested that the 1975 baseline data and current consumption be reported each month in Btus per square foot. Square foot data should be updated on a semi-annual or annual basis. The Air Force, Army and Navy are investigating other systems from which they may obtain this data.

Cost. The cost of fuels was desired by various users. The Department of Energy desires cost per mega-Btu by state or region on a quarterly basis for DEIS I and DEIS II. The Army FESA felt such data would be desirable for DEIS II reporting. The cost by reporting activity is already reported under DEIS II by Naval facilities using the additional columns provided on the inputs. The Air Force Stock Fund System records mobility fuels costs on a regular basis. The Navy and Marine Corps Utility Cost Analysis Report provides DEIS II with its monthly cost, and the Army Technical Data Report provides cost data for all energy types annually.

Population. Another potentially meaningful measure of conservation for utility energy is population. Population changes can significantly impact consumption, particularly at training and other non-industrial facilities. The Army FESA and the Marine Corps felt this data may be useful. Other users warned against the possible misinterpretation of Btu per population data that would show wide variations between industrial installations and non-industrial installations.

Heating and Cooling Degree Days. The Air Force DET-29, Army FESA, the Atlantic Fleet Command, and the Army Energy Office mentioned interest in heating and cooling degree days. FESA suggested that energy managers of major commands may wish to look at degree days compared with their Btu per square foot energy consumption to analyze conservation more accurately. The Army Energy Office suggested the percentage difference in heating/cooling degree

days (compared to a long-term average) be reported quarterly by base. (The current DEIS provides variance codes for degree day reporting as compared to the 1975 baseline year only when conservation goals are not met or exceeded.)

Other Energy Types. All users agreed that DEIS must have the facility to report new energy types in the future. These may include nuclear fuels and alcohol-gasoline mixtures in DEIS I and solar, biomass, recycled-waste fuels, etc. in DEIS II. Without complete reporting of energy consumption, conservation cannot be accurately measured. Recycled fuels are already being used (e.g., mixing used motor oil with heating oil, aircraft waste fuels used by trucks, etc.) but are not being reported. Nuclear fuels are of particular concern since the enrichment of uranium requires other energy. The production of a nuclear core might be measured by the amount of "source" energy required to generate the electricity consumed during the enrichment process.

OTHER DOD ENERGY INFORMATION SYSTEMS

During our interviews with users, and in research of existing reports, numerous other energy-related information systems were identified. These are manual and computerized systems run by various DoD offices. Some of these systems offer data similar to what is contained in DEIS (but not necessarily compatible with DEIS), others offer data useful to energy managers but not currently available in DEIS. A brief description of these is provided in Table C-4.

TABLE C-4. OTHER DoD ENERGY-RELATED INFORMATION SYSTEMS

SYSTEM	MANAGING ORGANIZATION	APPLICABLE DATA	FREQUENCY	MANUAL/ AUTOMATED
DOMESTIC BASE FACTORS REPORT (DBFR)	OSD/MRA&L	ENERGY FACILITY CONSUMPTION, COST, POPULATION, SQUARE FOOTAGE	ANNUALLY	MANUAL
INVENTORY MANAGEMENT OF PETROLEUM (IMP)	DLA/DFSC	PETROLEUM INVENTORIES BY FACILITY, WAR REQUIREMENTS	QUARTERLY UPDATE ANNUAL REPORT	AUTOMATED
PETROLEUM DAMAGE DEFICIENCY REPORT (REPOL)	JCS	ON-HAND INVENTORIES, DAMAGE AND DEFICIENCIES AFFECTING POL SUPPLIES, STORAGE, AND DISTRIBUTION	DAILY DURING CRISIS	MANUAL
REPORT OF PETROLEUM CAPABILITY (POLCAP)	JCS	DETAILED PETROLEUM FACILITY STORAGE, THROUGHPUT, ETC.	AS REQUIRED	MANUAL
DoD BUDGET (OP-26, OP-28)	OSD/OFFICE OF THE COMPTROLLER	CURRENT AND PROJECTED ENERGY COSTS	ANNUALLY	MANUAL
TECHNICAL DATA REPORT (DA 27-88)	ARMY CORPS OF ENGINEERS	FACILITIES ENERGY CONSUMPTION, COSTS, SQUARE FOOTAGE	ANNUALLY	MANUAL
REAL PROPERTY INVENTORY	ARMY CORPS OF ENGINEERS	SQUARE FOOTAGE	ANNUALLY	AUTOMATED
STOCK FUND SYSTEM	AIR FORCE	ENERGY CONSUMPTION, COSTS, FLYING HOURS	CONTINUOUS	AUTOMATED
UTILITY COST ANALYSIS REPORT (UCAR)	NAVY/NAVFAC	FACILITIES ENERGY CONSUMPTION, COSTS	MONTHLY	MANUAL
NAVY ENERGY USAGE PROFILE AND ANALYSIS SYSTEM (NEUPAS)	NAVAL SHIP R&D CENTER	PROJECTED ENERGY CONSUMPTION, FLYING HOURS, STEAMING HOURS, COSTS, MODELLING	ANNUALLY	AUTOMATED
REAL PROPERTY INVENTORY	NAVY	SQUARE FOOTAGE	TBD	AUTOMATED
SUPPLY DATA SYSTEM	NAVY	ENERGY INVENTORIES AND EXPORTS	TBD	AUTOMATED
NAVY ENERGY PLANNING AND OPTIMIZATION MODEL	NAVY CIVIL ENGINEERING LAB.	ECONOMIC ANALYSIS OF ALTERNATIVE FACILITY ENERGY SYSTEMS	AS REQUIRED	AUTOMATED
ARMY CREDIT CARD SYSTEM	CAMP MC COY, WISCONSIN	BASE ENERGY CONSUMPTION BY END-USER	CONTINUOUS	AUTOMATED
STEAMING HOURS REPORT	NAVY/FLEET COMMANDS	STEAMING HOURS, ENERGY CONSUMPTION	MONTHLY	AUTOMATED

TABLE C-5. DEIS USER ORGANIZATIONS

USERS	ORGANIZATION GROUP*
DOD/OTHER FEDERAL AGENCIES	
OASD, MRA&L Defense Energy Office Pentagon	
OASD, Comptroller** Program/Budget Pentagon	
Joint Chiefs of Staff Logistics (J-4) Pentagon	
OASD, MRA&L** Installations Management and Planning Pentagon	
DLA, Plans, Programs and Systems Management Planning Division Cameron Station, VA	
Department of Energy Office of Conservation 20 Massachusetts Avenue Washington, D.C.	
ARMY	
Army Energy Office Pentagon	EO, B
Department of Army Chief of Engineers (DAEN) Utilities Branch (Facilities Budget) Forrestal Bldg.	B

Note: *Organizational Groups:

EO: Energy Office
DFSC: DFSC Interface
R&D: R&D and Engineering Groups
MC: Major Command

**These organizations are identified as potential users.

USERS	ORGANIZATION GROUP
ARMY (Continued)	
Department of Army** Chief of Engineers (DAEN) Military Programs Forrestal	R&D
Facilities Engineering Support Agency Fort Belvoir, VA	R&D
FORSCOM Energy Office Atlanta, GA	MC
Resource Management Army National Guard Pentagon	EO
General Material and Petroleum Activities New Cumberland Army Depot, PA	DFSC
NAVY	
Navy Energy Office Pentagon	EO
Navy Petroleum Office Cameron Station, VA	DFSC
Navy Civil Engineering Laboratory Port Hueneme, CA	R&D
Navy Environmental Support Office Port Hueneme, CA	R&D
NEUPAS Naval Ship Research & Development Center Annapolis, MD	R&D
NAVFAC Energy Programs Branch Alexandria, VA	R&D
NAVFAC Engineering Field Division Norfolk Naval Base, VA	R&D, B
Fleet Petroleum Office CINCLANT Norfolk Naval Base, VA	MC

USERS	ORGANIZATION GROUP
NAVY (Continued)	
Facilities Acquisition Office CINCLANT Norfolk Naval Base, VA	MC
Naval Sea Systems Command** Code 8 Pentagon	R&D
MARINE CORPS	
Real Property Maintenance Activities Utility Engineer Arlington, VA	EO, R&D
Real Property Maintenance Activities Maintenance Operations Arlington, VA	B
Headquarters Programs and Financial Management** Arlington, VA	B
AIR FORCE	
Energy Management Division Pentagon	EO, B
Detachment 29 Cameron Station VA	DFSC
Tactical Air Command Energy Management Division Langley AFB, VA	MC
Tactical Air Command Civil Engineering Langley AFB, VA	MC
Engineering and Services Center Tyndall AFB, FL	R&D, B
Detachement 29 Kelly AFB, TX	DFSC
Comptroller, Directorate of Budget** Pentagon	B
Directorate of Engineering and Services Pentagon	B

USERS	ORGANIZATION GROUP
AIR FORCE (Continued)	
Air National Guard Logistics Pentagon	EO
Air National Guard Civil Engineering Pentagon	EO

APPENDIX D

EVALUATION OF ALTERNATIVE SYSTEMS CONCEPTS

INTRODUCTION

The development of appropriate DEIS alternatives were derived from extensive interviews with those who report to DEIS and use DEIS reports. Specific alternatives suggested during THESE interviews were included, plus other alternatives from an analysis of the user requirements versus the current system, and what is available using current technology.

The DEIS alternatives fall into two categories: global alternatives, those that impact all parts of the system and must be defined initially; and functional and data alternatives, those that can be categorized into defined system segments, e.g., data collection and reporting, output reporting, etc.

GLOBAL ALTERNATIVES

The primary global alternatives considered were the scope of DEIS and the management of DEIS. Scope relates to the definition of DEIS: its size and content.

Earlier, in THE study of user requirements, the uses of DEIS were broken into supply management, readiness, conservation, policy analysis, research and development,[1] and budgeting. Based on an analysis of these uses according to DoD priorities, the applicability of DEIS to their needs, and the availability of data from systems other than DEIS we have concluded the following. The scope of DEIS should include satisfying the requirements of the first four uses (supply management, readiness, conservation, and policy analysis) and continuing to play a supportive role to the research and development and

[1]This included both R&D and other engineering activities.

budgeting uses. Essentially, this requires an expansion of scope to include fully the needs of conservation and policy analysis (since many of the requirements of supply management and readiness are already met by the current system.) Many of the requirements of the research and development and budgeting users will be satisfied through the requirements of other users, while some of their needs for more detailed data should be obtained from other systems.

Another consideration for the scope of DEIS is the issue of redundancy in data collection and reporting. A seemingly "ideal" approach would be a single DoD energy system, eliminating all unnecessary redundancy. However, the reason for duplication is often due to an inconsistency in the precise definition of seemingly identical data elements. The integration of all DoD energy information is beyond the scope of this project and too ambitious an undertaking for the modification of DEIS. Some of the services are studying the consolidation of energy data reporting.[2] Based on these efforts, the DEIS system alternatives were designed to permit the use of available data and computer systems wherever possible rather than create an additional reporting burden. (This will be discussed further in subsequent reports.)

The second set of DEIS global alternatives deals with its management. In the past, DEIS management has been highly centralized. With the development and expansion of the service energy offices and the increasing interest of the major commands in energy management, there has been a recent shift of energy data management to the services. Various regulations have been issued dealing specifically with energy data collection and reporting at the service and major command levels. This decentralization has resulted in many benefits, including greater accuracy and faster response from those reporting.

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[2]The automated Air Force Stock Fund System to DEIS input is an example of this progress.

The functional and data alternatives have been designed to be consistent with this decentralization. In the future, the service energy offices should play a larger role in the management of DEIS, providing better consistency between DEIS and service-specific systems in DoD.

While the decentralization of Service-specific DEIS management (e.g., the regulations for reporting DEIS data) continues, the need for a centralized decision point for DEIS remains with the Defense Energy Office. Final approval of changes, regulations for reporting, etc. should come from that office as is the current practice. This need for central control includes control over the central data processing of DEIS. Some of the functional alternatives below are directed at this need.

FUNCTIONAL AND DATA ALTERNATIVES

Within the framework defined above, numerous alternatives have been developed. These alternatives have been broken into two sets: functional alternatives, i.e., those that affect the hardware, software, or the administrative and operational procedures of DEIS; and data alternatives, i.e., those that affect what is being collected and reported to DEIS.

Table D-1 illustrates the functional alternatives, categorized by the five system "functions" and three system "components" they affect.[3] The system functions are the five stages of processing that occur from the collection of DEIS data to its distribution of outputs. Within each of these functional subsystems, alternatives were considered that affect either the hardware,

[3]The systems terms used here are understood by the authors to be "ambiguous" systems terms and not meant to confuse the reader. The categorization of the alternatives is provided for a clearer definition of each alternative. It is recognized that other categorizations could be used.

TABLE D-1. FUNCTIONAL ALTERNATIVES

SYSTEM FUNCTIONS \ SYSTEM COMPONENTS	HARDWARE	SOFTWARE	OPERATIONAL AND ADMINISTRATIVE PROCEDURES
DATA COLLECTION AND REPORTING	CREDIT CARD RECORDING MACHINES UTILITY METERING BY REPORTING ACTIVITY ON-LINE DATA ENTRY FOR DEIS REPORTING POINT-OF-SALE TERMINALS AND AUTOMATED METERING	FLEXIBILITY TO PERMIT DATA CONTENT VARIATIONS FLEXIBILITY TO PERMIT DATA INPUT STRUCTURE VARIATIONS UNIT CONVERSION SOFTWARE	EXPLICIT, SELF-CHECKING INPUT FORMS COMPLETE DOCUMENTATION CONSISTENT REPORTING PERIODS FOR DEIS I & II FLEXIBLE REPORTING PERIODS DATA VALIDATION AND AUDITING EXTEND DEIS I INPUT DUE DATE CONSISTENT REPORTING OF DEIS I AND II HEATING OIL INDEPENDENT DATA COLLECTION AND REPORTING FOR EMERGENCIES
INPUT PROCESSING AND COMMUNICATIONS	ALTERNATIVE COMMUNICATIONS NETWORK DISTRIBUTED DATA INPUT PROCESSING OFF-LINE DATA INPUT CAPABILITIES INTELLIGENT TERMINALS AT REPORTING ACTIVITIES	EDITING/VALIDATION CHECKS WITH OFF-LINE FEEDBACK EDITING/VALIDATION CHECKS WITH ON-LINE FEEDBACK FLEXIBLE INPUT PROCESSING FOR EMERGENCIES	DATA INPUT CONTROL AND FEEDBACK
DATA PROCESSING AND ANALYSIS	ALTERNATIVE OSD COMPUTER SYSTEM	STANDARDIZED ANALYTICAL REPORT PROGRAMS FLEXIBLE, USER-ORIENTED ANALYTICAL PROGRAMS PERMIT USER-WRITTEN ANALYTICAL PROGRAMS INTERFACE FOR USE OF EXISTING SOFTWARE "PACKAGES" INTERNAL MODELLING CAPABILITIES INTERFACE FOR EXTERNAL MODELLING MODULARIZATION TO PERMIT UPDATES OF SEGMENTS OF THE DATA BASE ABILITY TO PROCESS NEW DATA TYPES SEPARATE SUBSYSTEM FOR PROCESSING DURING EMERGENCIES	INCREASE PRIORITY IN CURRENT OPERATIONS
DATA BASE MANAGEMENT	DISK STORAGE DISK STORAGE WITH TAPE ARCHIVAL	REDESIGN CURRENT FILE MANAGEMENT SOFTWARE IMPLEMENT DATA BASE MANAGEMENT SYSTEM HISTORICAL DATA ACCESSIBILITY ABILITY TO ADD NEW DATA TYPES INTEGRATE DEIS I & II DATA INTEGRATE SERVICE-SPECIFIC DATA INTO DATA BASE	DATA BASE ADMINISTRATION PROCEDURES
OUTPUT REPORTING	GRAPHICS HARDWARE TERMINALS IN USERS' OFFICES	ON-LINE QUERY CAPABILITIES STANDARDIZED, USER-SPECIFIED REPORTS REPORT GENERATOR CAPABILITIES	PROCEDURES FOR OUTPUT DISSEMINATION AND USAGE

software, or procedural components of DEIS. Each of these alternatives is further described below.

Table 2 lists the data alternatives considered. These alternatives include changes or additions to the current data base. They are also described below.

TABLE D-2. DATA ALTERNATIVES

- SINGLE REPORTING OF UTILITY AND MOBILITY PETROLEUM
- MORE DETAILED END-USE DEIS I DATA
- MORE DETAILED END-USE DEIS II DATA
- SQUARE FOOTAGE DATA
- WEATHER DATA
- COST DATA
- POPULATION DATA
- NEW ENERGY TYPES
- STEAMING HOURS DATA
- FLYING HOURS DATA
- STRATEGIC WAR RESERVES DATA

1. Data Collection and Reporting

   a. Hardware

      -- Credit card recording machines - gasoline service station mechanical recorders installed at all POL dispensing stations. Users would require authorized credit cards for receipt of fuel. (Army's Fort McCoy, Wisconsin has recently installed a system similar to that used by the Air Force.)

-- Utility metering by reporting activity - meters for all utility fuel usage to accurately record consumption for all end-users that are reported separately under DEIS II.

-- On-line data entry for DEIS reporting - direct terminal interface to the DEIS computer for immediate editing/validation and data base update.

-- Point-of-sale (POS) terminals and automated metering - real-time energy consumption data collection for all end-users, including on-line POS terminals at POL dispensing locations and electronically monitored utility metering.

b. Software

-- Flexibility to permit data content variations - data input software allowing differences in data entry content (e.g., Navy energy costs) between services and/or major commands. These data elements would be considered integral parts of the data rather than "other" data. Reasonable limits will be placed on the number of such elements.

-- Flexibility to permit data input structure variations - data input software allowing differences in the input format between services and/or major commands.

-- Unit conversion software - data input software that will perform the quantity-to-Btu conversion of each fuel type. This will permit the reporting of units of product (e.g., monthly consumption in gallons of diesel fuel).

c. Operational and Administrative Procedures

-- Explicit, self-checking input forms - input forms designed to define each data entry and automatically cross-check the input

for errors (e.g., verifying that beginning inventory plus receipts minus consumption plus/minus gains/losses equals ending inventory).

-- Complete documentation - including standard data definitions for each data element reported and a description of the procedures for DEIS from input to output. Differences between services must be explicit through detailed explanations or separate documentation for each service. Examples should be provided.

-- Consistent reporting periods for DEIS I and DEIS II - monthly consumption of DEIS I and II reported as of the same date (e.g., end of month).

-- Flexible reporting periods - the reporting periods for DEIS would be set by each service, major command, and/or base, to meet their requirements for recording such data. The monthly period must be consistent from month to month and documented. (This alternative refers to the reporting period, not the date on which the inputs are due.)

-- Data validation and auditing - each service and/or major command will establish data validation/auditing for energy reporting (e.g., random inspections of facilities or automated validation of DEIS data with other automated energy data systems. Such procedures would be subject to the review of the Defense Energy Office.

-- Extend DEIS I input due date - allow extra time for the reporting of DEIS I data (e.g., 5 days).

-- Consistent reporting of DEIS I and II heating oil - this will require consistent reporting periods (see alternative above) and consistent definitions for DEIS I and II heating oil consumption.

-- Independent data collection and reporting for emergencies - separate reporting of energy data during emergencies, including separate procedures and input forms. The data content may also be different from regular DEIS reporting.

2. Input Processing and Communications

a. Hardware

-- Alternative communications network - the utilization of a private system (non-AUTODIN) with requirements established specifically for DEIS.

-- Distributed data input processing - promote the establishment of input processing points external to the DEIS central system that will perform data entry editing/validation checks and consolidate the DEIS data as required. (e.g., AF Stock Fund System and plans in the services for similar, but less distributed computer processing.)

-- Off-line data input capabilities - permit the off-line input of data to DEIS (e.g., cards, tape, etc.) from the services.

-- Intelligent terminals at reporting activities - data entry terminals containing both processing power and data storage capabilities allowing editing/validation to be performed before data transmittal.

b. Software

-- Editing/validation checks with off-line feedback - editing/validation software employing arithmetic, syntax, format, and range checks on data fields. An error report would be sent to the reporting facility.

-- Editing/validation checks with on-line feedback - editing/validation software employing arithmetic, syntax, format, and range checks on data fields. This would be an interactive program, requiring on-line data entry terminals at reporting facilities.

-- Flexible input processing for emergencies - provisions for input of emergency energy data with varying frequencies, format, and content.

c. Operational and Administrative Procedures

-- Data input control and feedback - the establishment of decentralized input control points in each service and/or major command for the review of data inputs, representation for the group's requirements, and to provide assistance and feedback to such group of bases and/or facilities. (e.g., Army FORSCOM, Navy NAVFAC, etc.).

3. Data Processing and Analysis

a. Hardware

-- Alternative OSD computer system - use of a computer system that meets all of the hardware and system software requirements of DEIS (as proposed) and will be under the control of OSD (e.g., the Air Force Data Services Center).

b. Software

-- Standardized analytical report programs - software that will provide data analysis (e.g., trends, percentages, etc.).

-- Flexible, user-oriented analytical programs - software for data analysis that will allow user-specified variables (e.g., year, number of years for trend analysis, level of detail).

-- Permit user-written analytical programs - provisions for user-written software to access the DEIS data base.

-- Interface for use of existing software "packages" - software to allow access to DEIS data for an analytical software "package", e.g., SPSS (statistical). (This usually requires the output of a file that is a user-specified subset of the data base.)

-- Internal modelling capabilities - energy modelling software as an integral part of DEIS (e.g., including NEUPHS in DEIS).

-- Interface for external modelling - software to produce the necessary data output (via disk or tape file) for an energy model that is not an integral part of DEIS (e.g., Navy's NEUPAS).

-- Modularization to permit updates of segments of the data base - software to allow parts of the DEIS data base to be updated when all data for that part (i.e., service and/or major command) is ready for input. This will permit output reports from that segment before the data base is completely updated.

-- Ability to process new data types - software that will allow new data elements to be added to the data base with relative ease.

-- Separate subsystem for processing during emergencies - separate software designed to process emergency energy data, permitting variable frequency and data content requirements.

c. Operational and Administrative Procedures

-- Increase priority in current operations - increase the priority of current DEIS processing to provide more timely production of output reports.

4. Data Base Management

a. Hardware

-- Disk storage - use of on-line disk storage for the DEIS data base.

-- Disk storage with tape archival - use of temporary on-line disk storage for DEIS processing, with permanent storage maintained on tape.

b. Software

-- Redesign current file management system - modify current file management to meet the requirements of on-line data base access and flexible reporting.

-- Implement Data Base Management System (DBMS) - utilize a generalized DBMS for file access.

-- Historical data accessibility - include historical and baseline data (since 1975) on an integrated DEIS data base.

-- Ability to add new data types - utilize file management software that will permit new data elements to be added to the data base with relative ease.

-- Integrate DEIS I and II data - include DEIS I and II data on an integrated data base.

-- Integrate service-specific data into data base - include service-specific data (e.g., Navy energy costs) on an integrated data base.

c. Operational and Administrative Procedures

-- Data base administration procedures - establish procedures for data base access, maintenance, security, restart/recovery, etc.

5. Output Reporting

a. Hardware

-- Graphics hardware - plotters for producing graphic output of DEIS data.

-- Terminals in users' offices - availability of on-line terminals to the Defense Energy Office, services' energy offices, and other users requiring such access to DEIS data.

-- Microfiche hardware - hardware to produce microfiche copies of reports.

b. Software

-- On-line query capabilities - software for on-line access to the DEIS data base (e.g., on-line query commands as part of a DBMS).

-- Standardized, user-specified reports - report programs written to the specification of major DEIS users.

-- Report generator capabilities - generalized software allowing user-created (or with programmer assistance) report programs in a short time frame (e.g., report generator facility of a DBMS).

c. Operational and Administrative Procedures

-- Procedures for output dissemination and usage - establish procedures for the frequency, timeliness, and means of report distribution and rules for the access and usage of DEIS data.

6. Data

-- Single reporting of utility and mobility petroleum - reporting of utility POL (e.g., heating oil) under DEIS I in its proper usage category (e.g., secondary). DEIS II reporting could access these data elements.

-- More detailed end-use DEIS I data - reporting specific usage of all mobility fuels (e.g., aircraft type, type of flight (training, reconnaissance, etc.), truck usage, etc.).

-- More detailed end-use DEIS II data - reporting specific usage of all utility fuels (e.g., type of building, type of use (lighting, heating, etc.)).

-- Square footage data - include square footage data with utility energy consumption data on the DEIS data base.

-- Weather data - include heating/cooling degree days with utility energy consumption data on the DEIS data base.

-- Cost data - include energy cost data in the DEIS data base.

-- Population data - include the population of each reporting base, facility, and/or ship in the DEIS data base.

-- New energy types - include energy data on new energy types (e.g., nuclear, solar, geothermal, etc.).

-- Steaming hours data - include steaming hours data for Naval vessels in the DEIS data base.

-- Flying hours data - include flying hours for aircraft energy consumption in the DEIS data base.

-- Strategic war reserves data - include strategic war reserves requirements in the DEIS data base.

EVALUATION OF ALTERNATIVES

The evaluation selected functional and data alternatives suitable for DEIS modification based on a cost/benefit evaluation. This evaluation also provided a measure of the relative effectiveness of alternative system modifications. The evaluation consisted of the following five steps:

- Identify functional and data alternatives evaluation criteria
- Evaluate each alternative in terms of the criteria
- Select alternatives based on a cost/benefit analysis
- Align the remaining viable functional and data alternatives into alternative system designs
- Evaluate the alternative system designs in terms of the criteria.

The first step entailed identifying evaluation criteria which will be used to determine the relative impact of functional and data alternatives on the existing DEIS. Evaluation criteria were derived by grouping the DEIS users' requirements into categories of accuracy, timeliness, flexibility, utility, system control, and cost. The first five are defined as criteria to measure the benefits of each alternative.

The second step involved the evaluation of each alternative in terms of the criteria. Next, a weighted cost/benefit calculation was performed as a basis for comparing alternatives. The evaluations were either positive or negative and were designated as either low, medium, high, or very high. In this way we measured the extent to which the alternatives satisfy system requirements.

The third step involved selecting suitable alternatives based on a cost/benefit analysis. Decision rules were developed for eliminating alternatives surpassing a specific cost/benefit ratio threshold, i.e., alternatives having exceedingly high cost/benefit ratio either a very high cost, very low benefit, or both.

The fourth step focused on the acceptable functional and data alternatives (those alternatives that will improve DEIS while keeping costs at a reasonable level) and aligned these into alternative system designs as described earlier.

The final step entailed the overall evaluation of the alternative systems. The evaluation performed was similar to that discussed in step (2) except that for each alternative system design the aggregate cost/benefit of all functional and data alternatives were considered. The total scores were recalibrated to reflect the relative low, medium, high, and very high effects of the alternative systems on each criteria. Thus, a comparison of the relative value of the alternative systems on the evaluation criteria was made.

ALTERNATIVE SYSTEM CONCEPTS

The implementation of alternatives functional and data was considered in addition to their cost/benefit evaluation. Some alternatives are appropriate modifications to the existing system, while others require new system development. To evaluate how such alternatives should be implemented, the functional and data alternatives selected above were aligned with three system design/development concepts. From these concepts, further evaluation is made to determine the best approach for system modification.

The system design/development concepts were defined based on the impact of alternatives on the modification of DEIS. For some alternatives, it would be more cost effective to modify the current DEIS, while others would be more effectively implemented by redesigning the system. Alternative System 1, Modifications to the Existing System, consists of those alternatives that could be affectively installed in the current DEIS. Alternative System 2, Additions to the Existing System, are those that could be added to the current DEIS. Alternative System 3A, New System Development (Existing Hardware),

includes those alternatives that would be most effectively implemented through a new design and development of DEIS, using the current hardware. Alternative System 3B, New System Development (Other Hardware), includes those alternatives that would require both a new system design and development and a different computer installation.

Each of the system concepts consists of a different set of functional and data system alternatives (System 3B is a variation of 3A). The four alternative design/development concepts are described below. Differences between the Military Services in the implementation of system alternatives are indicated.

ALTERNATIVE DESIGN/DEVELOPMENT CONCEPTS

1. Alternative System 1 - Modifications to the Existing System

   a. Hardware

      -- None

   b. Software

      -- Unit Conversion Software (where appropriate)

   c. Operational and Administrative Procedures

      -- Explicit, Self-Checking Input Forms

      -- Complete Documentation

      -- Flexible Reporting Periods (where appropriate)

      -- Data Validation and Auditing

      -- Consistent Reporting of DEIS I and DEIS II Heating Oil (Navy, Army)

      -- Increase Priority in Current Operations

   d. Data

      -- None

2. Alternative System 2 - Additions to the Existing System

a. Hardware

-- Credit Card Recording Machines[4] (Army)

-- Distributed Data Input Processing

b. Software

-- Editing/Validation Checks With Off-Line Feedback[5]

c. Operational and Administrative Procedures

-- Data Input Control and Feedback

d. Data

-- None

3. Alternative System 3A - New System Development (Existing Hardware)

a. Hardware

-- Disk Storage With Tape Archival

-- Graphics Hardware

-- Terminals in users Offices

-- Microfiche Hardware

-- Off-line Data Input Capabilities

b. Software

-- Flexibility to Permit Data Content Variations

-- Flexibility to Permit Data Structure Variations

-- Editing/Validation Checks With Off-line Feedback

-- Flexible Input Processing for Emergencies

-- Implement Data Base Management System

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[4]These devices are already installed by the Air Force and are being considered for Army and Navy implementation. They are recommended here for more widespread use in the Army.

[5]This function would be provided through the distributed data input processing (2a, above).

- -- Historical Data Accessibility
- -- Ability to Add New Data Types
- -- Integrate Service Specific Data Into Data Base
- -- Flexible, User-Oriented Analytical Programs
- -- Permit User Written Analytical Programs
- -- Interface for Use of Existing Software "Packages"
- -- Interface for External Modelling
- -- Modularization to Permit Updates of Segments of the Data Base
- -- Ability to Process New Data Types
- -- Separate Subsystem for Processing During Emergencies
- -- On-line Query Capabilities
- -- Standardized, User Specified Reports
- -- Report Generator Capabilities

c. Operational and Administrative Procedures

- -- Independent Data Collection and Reporting for Emergencies
- -- Data Input Control and Feedback
- -- Data Base Administrative Procedures
- -- Procedures for Output Dissemination and Usage
- -- Extend DEIS I Input Due Date

d. Data

- -- Single Reporting of Utility and Mobility Petroleum (Army)
- -- More Detailed End-Use DEIS II Data (Air Force)
- -- Square Footage Data
- -- Weather Data
- -- Cost Data
- -- New Energy Types
- -- Flying Hours Data (Air Force)

4. Alternative System 3B - New System Development (Other Hardware)

a. Hardware

-- Disk Storage With Tape Archival

-- Graphics Hardware

-- Terminals in Users' Offices

-- Microfiche Hardware

-- Alternative OSD Computer System

-- Off-line Data Input Capabilities

b. Software

-- Flexibility to Permit Data Content Variations

-- Flexibility to Permit Data Structure Variations

-- Editing/Validation Checks With Off-line Feedback

-- Flexible Input Processing for Emergencies

-- Implement Data Base Management System

-- Historical Data Accessibility

-- Ability to Add New Data Types

-- Integrate Service Specific Data Into Data Base

-- Flexible, User-Oriented Analytical Programs

-- Permit User Written Analytical Programs

-- Interface for Use of Existing Software "Packages"

-- Interface for External Modelling

-- Modularization to Permit Updates of Segments of the Data Base

-- Ability to Process New Data Types

-- Separate Subsystem for Processing During Emergencies

-- On-line Query Capabilities

-- Standardized, User Specified Reports

-- Report Generator Capabilities

c. Operational and Administrative Procedures

-- Independent Data Collection and Reporting for Emergencies

-- Data Input Control and Feedback

-- Data Base Administrative Procedures

-- Procedures for Output Dissemination and Usage

-- Extend DEIS I Input Due Date

d. Data

-- Single Reporting of Utility and Mobility Petroleum (Army)

-- More Detailed End-Use DEIS II Data (Air Force)

-- Square Footage Data

-- Weather Data

-- Cost Data

-- New Energy Types

-- Flying Hours Data (Air Force)

-- Strategic War Reserves Data

ALTERNATIVE SYSTEM EVALUATION

The four alternative system design/development concepts have been evaluated using the evaluations of the functional and data alternatives that comprise them. Table D-3 presents these aggregate evaluations for the criteria defined earlier. Each of the alternatives is implicitly compared relative to the current system. A value for the criteria represents an improvement over the current system. The evaluations are independent, i.e., if Systems 1 and 2 are implemented, the resultant impact on criteria would be additive (e.g., the accuracy evaluation of both would be very high.)

Since those functional and data alternatives deemed inappropriate for DEIS have already been eliminated, the evaluation of these concepts involved determining the extent of DEIS modification and the time frame. Either an

TABLE D-3. ALTERNATIVE SYSTEM EVALUATION

ALTERNATIVE SYSTEM	DECISION CRITERIA*						
	ACCURACY	TIMELINESS	FLEXIBILITY	UTILITY	SYSTEM CONTROL	COST	DEVELOPMENT TIME**
CURRENT SYSTEM	--	--	--	--	--	NONE	NONE
1. MODIFICATIONS TO EXISTING SYSTEM	HIGH	LOW	LOW	LOW	LOW	MEDIUM	1 YEAR
2. EXTERNAL MODIFICATIONS TO EXISTING SYSTEM	MEDIUM	LOW	LOW	LOW	MEDIUM	LOW	1-2 YEARS
3A. NEW SYSTEM DEVELOPMENT ON DLA COMPUTER	MEDIUM	HIGH	VERY HIGH	VERY HIGH	HIGH	VERY HIGH	2-3 YEARS
3B. NEW SYSTEM DEVELOPMENT ON OSD COMPUTER	MEDIUM	HIGH	VERY HIGH	VERY HIGH	VERY HIGH	VERY HIGH	2-3 YEARS

*The alternatives were evaluated independently. An implementation of two or more alternative systems would result in a combined effect on the decision criteria; e.g., implementing System 1 and System 2 would yield a greater accuracy than either system taken alone.

**Development time ranges indicate that initial development can be implemented in one year, completion will take 2 or 3 years, depending on the alternative.

incremental-development approach or an all-at-once modification can be performed. The alternative systems have been specifically designed to permit an incremental development approach. System 1 can be implemented immediately to provide some benefits (particularly a higher degree of accuracy) in a short time frame at a moderate cost. System 2 can add to these benefits (providing even greater accuracy) in a slightly longer time frame, with a relatively low cost. System 3 (A and B) can then be developed, adding the essential capabilities in the form of flexibility, timeliness, and analytic capabilities; while including the specific functional and data alternatives of Systems 1 and 2. Although new system development (System 3) could be initiated immediately, incorporating the alternatives of Systems 1 and 2, no user benefits would be seen until development was completed. The incremental approach will provide near-term benefits for users, without sacrificing consistency with the longer-range redevelopment of the system.

An alternative choice, to implement only System 1 and/or System 2 would not permit important modifications to the system: increased timeliness, flexibility, and analytical and data access capabilities. The selection of Alternative 3A or 3B has long-range benefits (implemented via a redesign and redevelopment of DEIS) that would meet or exceed the consensus of user requirements.

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The Defense Energy Information System (DEIS) is a worldwide, automated, management information system. It provides data on petroleum products used as mobility fuels by the military departments as well as most energy sources used for utility services at DoD installations.

DEIS consists of two related information systems. DEIS I reports the disposition and consumption of petroleum products, notably aviation gasoline, jet

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20. Abstract

fuels, motor gasoline, distillate and residual oils within DoD. DEIS II reports the consumption of utility energy, i.e., electricity, natural gas, purchased steam/hot water, fuel oil and coal.

Accuracy and timeliness problems in the current DEIS have resulted in a lack of confidence and reduced usefulness of DEIS data. Recent developments in national energy policy, changing energy technologies, and decreasing fuel supplies have created additional user requirements that are not satisfied by the current DEIS.

This report examines the existing DEIS, describes current user requirements, analyzes alternative system concepts, and recommends an updated system design and implementation plan for the modification of DEIS. The study focuses on the entire system from data collection at military bases and facilities to the uses of DEIS by the Services, OSD, and the Department of Energy.