BY THE COMPTROLLER GENERAL

Report To The Chairman, Committee On Energy And Commerce House Of Representatives

OF THE UNITED STATES

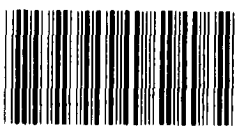
The Department Of Energy's Procurement Information System: Expectations Have Not Been Realized

The Department of Energy's procurement information system (IPMIS), designed to track procurement actions through all contract phases,

- will cost at least 3-½ times the original estimates without fully realizing the expected benefits;
- has not been, and may never be, effective; and
- has been modified to eliminate the system's ability to track proourement planning data.

The problems DOE encountered with IPMIS can be traced to the fact that DOE did not follow normally accepted procedures for developing a management information system. Rather, it often made arbitrary decisions and rushed certain phases of IPMIS' development.

GAO recommends actions to help make IPMIS--now called the Procurement and Assistance Data System (PADS)--an effective and efficient procurement information system. The Department of Energy should follow accepted procedures in developing any future management information system.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-208394

The Honorable John D. Dingell
Chairman, Commmittee on Energy
and Commerce
House of Representatives

Dear Mr. Chairman:

As requested on January 12, 1981, this report addresses the Department of Energy's procurement information system. Included are discussions of the system, its cost, its past, present, and future effectiveness, and the Department's efforts to develop a procurement planning program.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

Milton J. Socolar

Acting Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CHAIRMAN,
COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

THE DEPARTMENT OF ENERGY'S PROCUREMENT INFORMATION SYSTEM: EXPECTATIONS HAVE NOT BEEN REALIZED

D I G E S T

The procurement of goods and services from outside contractors has long been the lifeblood of the Department of Energy (DOE) and its predecessor agencies. In 1976, one of these agencies--the Energy Research and Development Administration (ERDA)--because its procurement activity was not being economically and effectively managed began developing a single computer system to track procurement actions through all phases of a contract's life. These phases were, at the time, being monitored by three separate information systems. The new system--the Integrated Procurement Management Information System (IPMIS I)--was designed to integrate these systems into a single data base that would be used to disseminate accurate and timely procurement information throughout ERDA and to the Congress, other Government agencies, and the public.

While IPMIS I began as an attempt to merge three existing computer systems into a single data base, throughout 1977 and 1978 its scope grew larger. In 1977, for instance, the Congress enacted legislation creating DOE from ERDA, the Federal Energy Administration, the Federal Power Commission, and the energy-related components of several other Federal agencies. As a result of this reorganization, IPMIS I became more complex as additional components were included in its design.

While the requirements of IPMIS I increased, the initial target date of late 1978 for the installation of the system remained fixed. It was not until August 1979, however, that DOE accepted IPMIS I as an operational system. Since that time, DOE has constantly made changes and modifications to the system.

The first major modification began in late 1979, when DOE embarked on a program to reduce the amount of data in IPMIS I by 50 percent, correct the data base, rewrite the computer programs, and redo the computer reports. This effort--IPMIS II--was a complete overhaul of

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Tear Sheet

the system because IPMIS I was generating inaccurate information. (See p. 2.)

Before IPMIS II could be implemented in October 1981, however, DOE, based upon input from its field offices, developed an even simpler procurement information system--the Procurement and Assistance Data System (PADS). This system which is DOE's current procurement information system contains about 50 percent less data than IPMIS II, provides for more DOE field office control of data entry, and was implemented at all DOE locations by March 1982. (See p. 2.)

LESSONS CAN BE LEARNED FROM DOE'S DEVELOPMENT OF THE PROCUREMENT INFORMATION SYSTEM

Overall guidance for acquiring a management information system has been widely established, and various Federal agencies, including DOE, have developed procedures for implementing this guidance. These procedures require the agency to follow certain steps in designing, developing, and installing a system. Adhering to these procedures helps provide assurance that the system's results will meet expectations.

DOE, however, did not always follow these procedures with IPMIS I, IPMIS II, or PADS. Instead it often decided on arbitrary courses of action and rushed the development of the systems. For instance:

--User needs were not identified before designing IPMIS I. According to IPMIS users, their input was not seriously considered in designing the original system. Instead, they said that IPMIS I was apparently designed based on the system developers' perception of user needs. As a result, they said, unnecessary and redundant data was entered into IPMIS I and the system became too complex. (See pp. 5 and 6.)

--DOE did not follow procedures for preparing preliminary and alternative system designs. Once the system developers began to fear that IPMIS I would not be operational by late 1978, DOE skipped the preparation of a "requirements and preliminary design report" which is considered, by various Federal agencies, the cornerstone on which a good information system is built. Similar circumvention of procedures

occurred in the subsequent development of IPMIS II and PADS. (See pp. 6 to 8.)

--IPMIS I, IPMIS II, and PADS may not have been the most cost beneficial alternatives. Before making any investment in a computer system such as IPMIS, it is important--based on Office of Management and Budget and National Bureau of Standards guidelines--for an organization to estimate the costs, benefits, and risks associated with all reasonable alternatives. In developing IPMIS I, DOE favored a particular type of computer system and ignored certain risks associated with that system; for IPMIS II, DOE did not prepare a cost/benefit analysis; and for PADS, DOE did not prepare a true cost/benefit analysis. Instead DOE prepared a report which compared the combined costs of PADS and IPMIS II with the benefits of converting to and operating PADS. This report, which was prepared after the decision on PADS had already been made, showed that the costs for IPMIS II and PADS for fiscal years 1980 through 1984 would be about $14 million and the quantifiable benefits for PADS would be about $8.5 million. DOE believes, however, that certain non-quantifiable benefits (such as increased user confidence in the system) makes PADS cost-beneficial. (See pp. 8 to 10.)

--IPMIS I became operational before it was fully completed. DOE records show that some of IPMIS I's intended capabilities were still undergoing development and that numerous problems still existed when DOE began to operate the system. In fact, these documents show that some problems--occurring because of the way data was inputed--would not be corrected but accepted as part of the system. (See pp. 10 to 11.)

THE COSTS AND EFFECTIVENESS OF IPMIS AND PADS HAVE NOT MET EXPECTATIONS

For several reasons, costs of developing DOE's procurement information system have substantially exceeded original estimates and anticipated benefits have not been fully realized. As of May 1982, this system has conservatively cost about $10.2 million and DOE expects to spend another $5.7 million by the end of fiscal year 1984. This is at least 3-1/2 times the original estimates for the system. These cost increases are due primarily to the many problems experienced with IPMIS I and

II, and the attempts made by DOE to correct the data base and computer programs--problems which might have been minimized if DOE had followed established procedures in designing and implementing the system.

In terms of benefits, DOE expected that IPMIS I (because it combined several computer systems into one) would be simpler and less costly to maintain and operate, and would eliminate information systems being kept by various DOE field procurement offices. Because of inaccuracies in IPMIS I data, however, many of the potential users quickly lost confidence in the system, refused to use it, and continued to maintain separate information systems. Thus, most of the benefits expected by DOE did not materialize. (See pp. 12 and 13.)

DOE, however, believes that PADS is a realistic system which will serve its basic procurement information needs. Unfortunately, PADS will do little more than track active procurement data--the function of one of the three data systems which IPMIS I was originally to replace. It will not handle, for instance, pre-procurement planning data which DOE has decided to eliminate from PADS at the end of fiscal year 1982. In GAO's view, DOE should analyze the costs and benefits of the available alternatives for tracking pre-procurement planning data considering the high degree of importance placed on procurement planning by the Office of Management and Budget. (See pp. 13 to 17.)

GAO also noted that some of the various DOE program and field procurement awarding offices have seemingly lost confidence in the IPMIS system, because of its problems, and have elected to use informal systems to satisfy their procurement information needs. These offices may continue to use the informal systems in the future rather than rely upon PADS. If they do so, this will not only reduce the effectiveness of PADS but also will result in redundant procurement information systems continuing to operate within DOE. Given DOE's substantial financial investment in IPMIS I, IPMIS II, and PADS, GAO believes that DOE should seek ways of increasing user confidence in the system and determine to what extent program or field procurement awarding offices are using informal systems in lieu of

PADS and how best such redundancy can be eliminated. (See pp. 18 to 20.)

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

Given that DOE has already implemented PADS, GAO believes the Secretary of Energy should make it an effective and efficient procurement information system. To help do this, GAO recommends that the Secretary:

--Increase user confidence in PADS by selecting a statistically valid sample of data in the system and tracing it back to procurement source documents. If the sample shows major inaccuracies in PADS data, we recommend that the Secretary take further actions to ensure the accuracy and utility of the system.

--Determine to what extent program or field procurement awarding offices are using informal systems in lieu of PADS and how best such redundancy can be eliminated.

--Analyze the costs and benefits associated with the various alternatives for providing an advanced procurement planning system, including making it a part of PADS.

Equally important, the mistakes that occurred during the development of the IPMIS system should alert the Secretary to the need for DOE to follow established procedures for developing major information systems. GAO recommends, therefore, that the Secretary require that these procedures are followed when DOE develops future information systems.

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This review was performed at the request of the Chairman, House Committee on Energy and Commerce. As requested by the Chairman, a copy of this report was not sent to DOE for official comments.

Contents

ABBREVIATIONS

DOE	Department of Energy
ERDA	Energy Research and Development Administration
GAO	General Accounting Office
IPMIS	Integrated Procurement Management Information System
PADS	Procurement and Assistance Data System

CHAPTER 1

INTRODUCTION

The Energy Research and Development Administration (ERDA)--one of the predecessor agencies to the Department of Energy (DOE)--initiated the first stage of an Integrated Procurement Management Information System (IPMIS I) in 1976 as an economical and effective way of tracking procurement information. As originally intended, IPMIS I was to monitor contract actions from the procurement planning stage, through in-process procurement, to award and eventual close out. These functions, at that time, were being performed by three existing systems. IPMIS I was designed to integrate these systems into a single data base that would be used to disseminate accurate and timely procurement information throughout ERDA and to the Congress, other Government agencies, and the public.

During 1977 and 1978, however, the scope of IPMIS I grew considerably larger. In 1977, the Congress enacted legislation creating DOE from ERDA, the Federal Energy Administration, the Federal Power Commission, and the energy-related components of several other Federal agencies. As a result, IPMIS I became more complex as the procurement operations and data from the additional organizations were included in its design. This growth continued into 1978 when the Congress enacted legislation requiring each Federal agency to furnish data to a Federal Procurement Data System 1/ and when DOE terminated its Procurement Office Management Information System. 2/ IPMIS I was to take over the major data and reporting requirements in these two systems.

Even with substantially increased requirements, however, DOE still attempted to complete installation of IPMIS I by late 1978--the original target date established when the project began in 1976. This occurred primarily because officials of the newly created DOE wanted to get a quick handle on the procurement process. Unfortunately, DOE was unable to install the system until August 1979, a delay of about a year. More importantly, once installed, DOE found that (1) IPMIS I reports were erroneous because inaccurate and incomplete data had been fed into the system; (2) computer programs were poorly written, illogically constructed, and difficult to maintain; and (3) the operation of the system took an excessive amount of computer time.

1/A comprehensive mechanism for assembling, organizing, and presenting procurement data for the Federal Government.

2/A system for reporting information to DOE procurement management for general oversight of the procurement process.

Because of these problems, DOE decided in late 1979 to make a major revision to IPMIS I. Not only did DOE attempt to simplify the system (by reducing data elements by about 50 percent) but it also undertook special projects to correct the data base, rewrite the computer programs, and redo the computer reports. The new system resulting from these efforts--called IPMIS II--was field tested in mid-1981 and was scheduled to be implemented at all DOE locations by October 1981.

In June 1981, however, DOE surveyed its field procurement offices, asking for additional ways to make IPMIS II more responsive to their needs including decentralized control of the system. The response favored decentralization and a system which would exclude some of the planning data elements and functions of IPMIS II. As a result, DOE decided not to implement IPMIS II but to develop a new system--called the Procurement and Assistance Data System (PADS)--which would provide for more DOE field office control of data entry and contain only about 50 percent of the data elements of IPMIS II. This system would primarily provide data on active contracts. Procurement planning would be accomplished outside of PADS through monthly planning reports submitted by program offices to DOE's Office of Procurement. In-process procurement information would be monitored by PADS but only on a limited basis.

Initial estimates by the DOE staff showed that PADS would realistically take 1 year to 18 months to develop and implement. Because of the potential dismantlement of DOE, however, DOE compressed the schedule to 6 months so that PADS could be on line by March 1982. In fact, beginning in the fourth week of January 1982, DOE field offices began converting to PADS at a rate of about five offices per week.

ERDA originally expected to spend between $2.5 million and $4.5 million on the development and operation of IPMIS I through fiscal year 1984. To date, DOE has already spent about $10.2 million on IPMIS I, IPMIS II, and PADS, and expects to spend another $5.7 million on PADS by the end of fiscal year 1984.

OBJECTIVES, SCOPE, AND METHODOLOGY

Because we expressed concerns about the operation of IPMIS I in a previous report, 1/ the Chairman, House Committee on Energy and Commerce requested that we review the status of the system in detail. More specifically, he asked that we examine

--DOE's rationale for establishing an integrated procurement management information system;

1/"Unauthorized Commitments: An Abuse of Contracting Authority in the Department of Energy," EMD-81-12, Dec. 4, 1980.

--the costs associated with developing, implementing, operating, maintaining, and using the system;

--the past, present, and future effectiveness of the IPMIS system; 1/ and

--DOE's actions to develop and maintain a procurement planning program.

We conducted our review at DOE procurement awarding offices in Washington, D.C., San Francisco, and Chicago--the major users of DOE's procurement information system. We also contacted 18 of the remaining 40 DOE procurement awarding offices. We selected these 18 offices because they did the most procurement activity. Further, we met with several DOE headquarters officials in the program offices which interface with the system.

Outside of DOE, we discussed the system with representatives of the General Services Administration and the Office of Management and Budget. Federal statutes require that each Federal agency, including DOE, report certain procurement information to these agencies. Also, we spoke with outside users of the system to obtain their views on the system's usefulness. These included congressional staffs, various groups within GAO that use the system during the course of their work, and representatives of private energy-related companies. In addition, we interviewed contractor personnel responsible for validating the data contained in the IPMIS system.

During our review, we used several documents to evaluate DOE's efforts to design, develop, and implement the system. These included (1) various GAO publications including Lessons Learned About Acquiring Financial Management and Other Information Systems (Aug. 1976), Guidelines for Accounting for Automatic Data Processing Costs (1978), and Questions Designed to Aid Managers and Auditors in Assessing the ADP Planning Process (Aug. 1979); (2) National Bureau of Standard's Guidelines for Documentation of Computer Programs and Automated Data Systems for the Initial Phase (Aug. 1979); (3) various Office of Management and Budget circulars; and (4) DOE Order 1330.1 regarding Energy and Management Information Systems Review, Coordination, and Integration (Aug. 1978), Submission and Review of Information System Proposals (Mar. 1977), and DOE Guidelines for the Management Information Systems Proposal Review Process (Feb. 1981).

1/Throughout the remainder of the report, the "IPMIS system" refers to all three versions of the system--IPMIS I, IPMIS II, and PADS.

In developing our findings, we interviewed DOE officials and reviewed relevant DOE documents. From these sources, it became apparent that IPMIS I had consistently generated inaccurate information. While we attempted to determine what DOE had done to remedy this situation, we did not compare IPMIS I or PADS system data with source documents or attempt to determine the specific degree of inaccuracy in the system.

We performed our work in accordance with GAO's "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

CHAPTER 2

LESSONS CAN BE LEARNED FROM DOE'S DEVELOPMENT OF THE PROCUREMENT INFORMATION SYSTEM

Overall guidance for developing a management information system has been established by the Office of Management and Budget, the National Bureau of Standards, and GAO. In addition, various Federal agencies, including DOE, have established internal procedures for implementing this guidance. These procedures require the agency to (1) determine the potential users of the system and their information requirements; (2) prepare preliminary and alternative system designs; (3) evaluate the cost/benefits associated with the system before final approval is given; and (4) test the system before operation to ensure that it is complete, efficien and will satisfy user requirements. Adhering to these procedures helps provide assurance that the system's results will meet expecta tions.

We found, however, that DOE did not always follow these procedures in developing IPMIS I, IMPIS II, or PADS. Instead it often decided on arbitrary courses of action and rushed the development of the systems until they became operational. For instance, the development of IPMIS I was rushed because agency officials wanted to quickly get a handle on the procurement operations of the newly created DOE. When this system was found to have major problems, however, DOE quickly developed and finished a new system--IPMIS II- but never implemented it because of user concerns and other problem With PADS, DOE rushed its development to facilitate the potential dismantlement of the Department.

USER NEEDS WERE NOT IDENTIFIED BEFORE DESIGNING IPMIS I AND II

According to DOE procedures and other existing criteria, the first and one of the most important steps in developing a complex information system is to identify user needs and requirements. This helps the agency define the problems and design an effective and efficient information system. DOE, however, did not make any serious attempt to determine user needs until substantial amounts of time and money had already been spent on designing, implementing, and correcting IPMIS I.

During our review, we spoke with many system users. They indicated that their input was never seriously considered in designing the original system. Instead, they said that IPMIS I was apparently designed based on the system developer's perception of user needs. As a result, they said unnecessary and redundant data was entered into IPMIS I, and the system became too complex.

This is evidenced by two actions which DOE took to correct the system. First, immediately after implementing IPMIS I in late 1979, DOE (recognizing that the system had serious inaccuracies and operating problems) undertook special projects to correct the data base, rewrite the computer programs, and redesign the computer reports. This resulted in a revised system--called IPMIS II--which had about 50 percent less data elements than its predecessor. This reduction in data was due almost exclusively to the elimination of redundant information originally fed into the system. It did not result from any conscious effort by DOE to systematically survey IPMIS I users and examine their informational requirements.

Secondly, before this new system could be fully implemented, DOE began to get feedback from its field offices that IPMIS II was not the most desired system. They favored a much simpler system which would give the field offices greater control to input and revise procurement data. Consequently, in June 1981, DOE seriously sought user input for the first time by sending a questionnaire to each of its 42 field procurement awarding offices requesting their views on IPMIS II and suggestions for further data reductions. Based on the results of these questionnaires, DOE decided not to implement IPMIS II but to develop a new system more in line with the desires of the field procurement offices.

This new system--PADS--has recently been installed throughout DOE. It contains about 50 percent less data than IPMIS II but is not capable of performing all the procurement tracking operations originally planned for IPMIS I. Instead, it will track primarily contract award data (contract numbers, dates, and amounts) and some in-process procurement information such as the type of award action and desired award date. This, according to the Director, Office of Procurement and Assistance Management, is sufficient to satisfy DOE's outside reporting requirements and most of the data needs of DOE's smaller procurement offices. It will not satisfy the pre-procurement planning, in-process procurement or contract closeout data needs of the larger DOE procurement offices such as San Francisco and Chicago. These offices will have to develop this information as the need requires.

SYSTEM DEVELOPERS DID NOT FOLLOW PROCEDURES FOR PREPARING PRELIMINARY AND ALTERNATIVE SYSTEM DESIGNS

Once user needs are determined, DOE procedures require a series of preliminary and detailed design reports to ensure that the information system concept has been thoroughly researched and evaluated. We found, however, that DOE's system developers continually circumvented these procedures during the development of IPMIS I, IPMIS II, and PADS.

For instance, once the system developers began to fear that IPMIS I would not be operational by its initial 1978 target date, they instructed the IPMIS I contractor to skip the first stage of DOE's system development process--the completion of a "requirements and preliminary design report." This report gives the purpose, the equipment to be used, and the conceptual design of the proposed information system. It is a prerequisite for further design according to DOE's criteria, 1/ and the cornerstone on which a good information system is built.

In addition, the system developers--apparently to speed up development of IPMIS I--deferred submission of a general system design report to DOE's Management Information System Review Panel. This Panel, composed of top agency management, is supposed to review each new computer information system costing over $150,000 and give its approval before detailed design can begin. Specifically, the Panel is to ensure that the proposed management information system complies with applicable laws, policies, and directives, and does not duplicate other existing data systems. In this case, however, the system developers did not give the report to the Panel until May 1979. By that time the detailed design of IPMIS I had already been completed, and the system was 3 months away from being implemented. Consequently, to keep IPMIS I on schedule, the Panel approved the system as submitted. While the Panel did raise some concerns about the total impact of IPMIS I on other organizations and the lack of IPMIS I performance measurements, a plan for resolving these concerns was never submitted to the Panel for its approval.

The same type of circumvention of procedures occurred in the subsequent development of IPMIS II and PADS. Because these were major system modifications costing over $150,000, they were subject to the same criteria as IPMIS I. Yet, preliminary and general design reports were not prepared for either system, and the required approvals were not obtained from the Management Information System Review Panel.

In the case of IPMIS II, the system developers thought they already knew what was wrong and concluded that a preliminary design report, as well as other required special studies and internal DOE reviews, were not necessary. For PADS, the system developers were concerned that, if they took the expected 4 to 6 months to prepare the reports and get Panel approval, development of the system would not be completed by the expected dismantlement of DOE. Further, they feared a 4- to 6-month delay would result in a loss of expertise

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1/"Submission and Review of Information System Proposals," ERDA, March 1977.

because of a possible change in contractors. Therefore, the system developers revised the system's approach without preparing preliminary and general design reports or submitting PADS to the Management Information System Review Panel for approval.

IPMIS I, IPMIS II, AND PADS MAY NOT HAVE BEEN THE MOST COST BENEFICIAL ALTERNATIVES

Before making any investment in a computer system such as IPMIS, it is important--based on Office of Management and Budget and National Bureau of Standards guidelines--for an organization to estimate the costs, benefits, and risks associated with all reasonable alternatives. If done properly, this gives the organization a legitimate basis for making a decision and provides some assurance that its investment will yield a reasonable rate of return. With the procurement systems, however, we found that DOE has not consistently considered alternatives, realistically estimated costs and benefits, or weighed the risks before making investment decisions. In developing IPMIS I, for instance, DOE favored a particular type of computer system and ignored certain risks associated with that system; for IPMIS II, DOE did not prepare a cost/benefit analysis; and for PADS, DOE did not prepare a true cost/benefit analysis. Instead, after the decision to install PADS had already been made, DOE prepared a report comparing combined costs of IPMIS II and PADS to the benefits of converting to and operating PADS.

In 1976, when ERDA first envisioned IPMIS I, it had a contractor prepare a cost/benefit analysis for a single, integrated procurement management information system; alternatives were not considered. This analysis concluded that such a system was highly cost beneficial and would pay for itself during its first year of operation, primarily because it would combine three systems into one and eliminate some duplicative field office and headquarters information systems.

By mid-1977, however, the scope of IPMIS I had grown substantially larger. ERDA was being combined with other Federal agencies to form DOE, and IPMIS I had to satisfy the procurement information needs of a much larger organization. Consequently, in July 1977, DOE (through its IPMIS I contractor) prepared another cost/benefit analysis. This one compared three alternatives: one leaving the three separate information systems essentially as they were but with some improvements and two variations of an integrated procurement information system. The results of this analysis showed that an integrated procurement information system (such as IPMIS I) would be the most cost/beneficial alternative. As in the first cost/benefit analysis, the benefits expected from eliminating duplicative information systems far outweighed the expected costs of the new system.

Nevertheless, the contractor which prepared this analysis recommended that DOE not develop an integrated procurement system. Instead, it suggested that DOE improve upon the information systems it already had. According to the contractor, not only did this involve the least investment cost, but also no real need existed for DOE to develop a new "integrated" system at that time because (1) it was unclear what the future held for DOE; (2) there would be a large workload on the Office of Procurement during the period of transition to DOE, and leaving the systems as they were would cause the least disruption; and (3) the systems with which IPMIS I was to interface were in a state of evolution and were not yet well defined. In short, the contractor thought that converting to an integrated procurement system during the transition from ERDA to DOE might be far too risky.

DOE, however, was convinced that it needed a new procurement information system which not only integrated all procurement information of the new Department but also had an on-line reporting capability. Therefore, it directed the contractor to redo its cost-benefit report including its recommendations to support DOE's decision to develop an integrated procurement system. The contractor subsequently prepared another cost/benefit analysis which described only the preferred DOE alternative and did not discuss other options.

Similar situations occurred with IPMIS II and PADS. In the case of IPMIS II, DOE made major system modifications and undertook efforts to reduce and validate the IPMIS I data base. DOE, however, did not attempt to identify alternatives or evaluate their cost/benefits before undertaking the effort. Instead, DOE was intent on making IPMIS II operational and was willing to do whatever it could to "fix the system."

When DOE, in October 1981, decided to bypass IPMIS II in favor of PADS, DOE's Deputy Assistant Secretary for Management and Administration told us that PADS was obviously cost beneficial when compared to IPMIS II because of its reduced scope and lower number of data elements. Although he did not have any specific information to support this position, the Deputy Assistant Secretary said that a cost/benefit analysis would be prepared, and he was confident it would support DOE's decision to convert to PADS.

In April 1982, DOE completed a report comparing the combined costs of IPMIS II and PADS to the benefits of converting to and operating PADS. By this time, PADS had already been designed and implemented at most DOE locations. This report is not a true cost benefit analysis for PADS because it also includes the cost of developing IPMIS II.

The report was done this way, according to a DOE official, because the costs of developing the two systems could not be clearly separated, and substantial amounts of money had been spent on

IPMIS II which will benefit PADS. Thus, IPMIS II and PADS costs were combined in the report.

The results of this report showed that from fiscal year 1980 through 1984, the total development and operating costs for IPMIS II and PADS will be about $14 million. 1/ On the other hand, total quantifiable benefits for such things as discontinuing the reporting and processing of planning data will be about $8.5 million. According to DOE, non-quantifiable benefits will also accrue from such things as correction of bad data which will result in a lower risk of incorrect processing and higher confidence in the system.

In reviewing the results of this DOE report, DOE procurement officials told us that the report, in their view, did not properly capture the benefits that were derived from converting to the PADS system. These benefits included reduced operating costs (in comparing IPMIS II and PADS) and increased satisfaction with a system that more closely meets the needs of DOE headquarters, DOE field offices, and outside Federal agencies to which DOE must provide procurement data.

IPMIS I BECAME OPERATIONAL BEFORE IT WAS FULLY COMPLETED

According to DOE procedures, an information system must pass a formal acceptance test before it becomes operational. This is supposed to assure that the system is complete, efficient, and will satisfy user requirements. DOE records show that IPMIS I passed the formal acceptance test even though it was not yet complete or ready to be implemented. The DOE acceptance report, for instance, includes six attachments which suggest that some of IPMIS I's intended capabilities were still undergoing development and that numerous problems still existed. In fact, these attachments show that some problems--occurring because of the way data was inputed--would not be corrected but accepted as part of the system.

One of the major problems with IPMIS I was that it contained inaccurate information. This was caused primarily by DOE's failure to adequately verify the procurement data either before or after it was entered into the system. For instance, data from the "Contract Information System" (one of the predecessors of IPMIS I) was fed directly into IPMIS without first being verified and corrected. This was done even though an internal audit had previously found that the

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1/This report does not include the total costs associated with the IPMIS system which will be about $15.9 million through fiscal year 1984. The development of the system began in fiscal year 1977.

system was seriously incomplete and inaccurate. According to an IPMIS I contractor representative, because DOE wanted IPMIS I operational by October 1978, it directed the contractor to cut short its validation efforts and get the data into IPMIS I regardless of whether it was accurate or not.

This type of attitude continued even after IPMIS I became operational and was found to be full of errors. In its first major attempt to correct and validate IPMIS I data in October 1980, DOE sent each field procurement office a printout of all active awards issued from October 1979 to present for which it was responsible. It directed these offices to compare the information with the contract files and to make corrections as necessary. However, DOE only gave the field offices about 1 month to accomplish this task. The officials at the larger offices, which had several thousand contracts, told us this was nearly an impossible task.

Nevertheless, officials of these larger offices told us that they recruited other personnel from their staff (primarily clerks and typists) to help validate the data. These people, however, were untrained in contract and procurement work and were not equipped to track computer data back to contract files and make the necessary corrections. At best, the field office personnel said that data in the system was left unchanged; at worst, incorrect data was substituted for the correct data. Equally as important, the IPMIS I computer program was illogically constructed and caused data to be changed or lost. Therefore, even if the field offices properly corrected the data, once it got back into the system there was no assurance that it would remain correct.

As a result, DOE has continued its validation work on IPMIS II and PADS. This work--which has largely consisted of spot-checking the data for obvious errors--has not been as extensive as the first validation attempt but has served to improve the data base, particularly after efforts were completed to correct the computer programs. We do not know, however, whether enough improvements have been made to make PADS a viable information system. PADS was only recently implemented, and for that reason, we were unable to determine the accuracy or acceptability of the information in its data base.

DOE officials, on the other hand, have stated that the accuracy of and user confidence in the PADS system has improved over the last few months. However, DOE has not attempted to compare PADS data with source documents in the contract files. Only by doing this can there be reasonable assurance that PADS contains accurate data.

CHAPTER 3

THE COSTS AND EFFECTIVENESS OF IPMIS AND PADS HAVE NOT MET EXPECTATIONS

The Chairman, House Committee on Energy and Commerce, asked specifically that we examine certain aspects of the IPMIS system. This included the costs of developing and implementing the IPMIS system; the past, present, and future effectiveness of the system; and DOE's efforts to develop a useful program for procurement planning. In summary, we found that (1) IPMIS I, IPMIS II, and PADS will cost at least 3-1/2 times the original estimates while expected benefits of installing the system were never fully realized; (2) the IPMIS I system has not been effective in the past, and it is unknown (at this stage) whether PADS will be in the future; and (3) DOE is developing an alternative procurement planning system separate from PADS without analyzing the best way to track procurement planning data.

COSTS HAVE FAR EXCEEDED BENEFITS IN DEVELOPING DOE'S PROCUREMENT INFORMATION SYSTEM

As discussed in the previous chapter, DOE prepared several cost/benefit analyses for the original IPMIS I concept. These early analyses showed that the benefits (in terms of reduced operating and user costs) would outweigh the cost of installing, operating, and maintaining the system. For several reasons, however, actual costs have substantially exceeded original estimates and anticipated benefits have not been fully realized. In fact, based on a DOE, April 1982 report for the period fiscal year 1980 to fiscal year 1984, costs for IPMIS II and PADS may approach $14 million while benefits are about $8.5 million. 1/

As shown in the following table, actual costs as of May 1982 are substantially higher than estimated by DOE contractors in 1977 and 1978 cost/benefit studies.

1/Ibid p. 10.

Cost category	July 1977 estimate (note c) (thousands)	September 1978 estimate (note c) (thousands)	Actual costs as of May 1982 (thousands)
Investment (note a)	$ 199	$ 894	$ 2,847
Operating (note b)	2,281	3,625	7,357
Total	$2,480	$4,519	$10,204

a/investment - costs to develop and implement the computer program.

b/operating - costs (1) for computer time, (2) to make needed changes to the computer programs, and (3) for users to prepare documents and enter data into the system.

c/Estimates include costs through fiscal year 1984.

In addition, DOE expects to spend another $5.7 million on PADS by the end of fiscal year 1984, bringing the total for the IPMIS system to about $15.9 million. These cost increases are due primarily to the many problems experienced with the IPMIS system and the attempts made by DOE to correct the data base and computer programs--problems which could have been minimized if DOE had followed established procedures in designing and implementing the system.

In particular, IPMIS required an inordinate amount of computer time. For instance, the three information systems which IPMIS I replaced were using about 10 percent of DOE's computer time. After becoming operational in late 1979, IPMIS I required almost 30 percent of DOE's computer time. This not only contributed to the huge costs associated with IPMIS I but also affected, according to a staff member of DOE's Office of Computer Services and Telecommunications Management, other DOE programs that were deprived of computer time.

In terms of benefits, DOE expected that IPMIS I (because it combined several computer systems into one) would be simpler and less costly to maintain and operate, and it would eliminate information systems being kept by various DOE field procurement offices. Because of inaccuracies in IPMIS I data, however, many of the potential users quickly lost confidence in the system, refused to use it, and continued to maintain separate information systems. Thus, most of the benefits expected by DOE did not materialize.

PADS MAY HAVE LIMITED USES

From our discussions with DOE, it is clear that the original IPMIS I system was not effective. It consistently generated

inaccurate information and was not used to any great extent to manage or control DOE's procurement operations. Instead, procurement and program offices continued to rely on alternative information systems. DOE, however, believes that PADS is a realistic system which is supported within the Department and will serve its basic procurement information needs. Unfortunately, PADS was only recently implemented, and thus, we do not know whether it will be effective in the future. On the other hand, we noted that DOE field procurement offices were reluctant to rely on PADS because of their bad experience with IPMIS I. In addition, PADS will do little more than track active procurement data--the function of one of the three data systems which IPMIS I was originally to replace. It will not require procurement officials to submit pre-procurement planning, most in-process tracking, or procurement close out information. 1/ In effect, DOE has almost gone full circle in its attempts to develop a procurement information system. Unfortunately, it will spend about $15.9 million in completing that circle.

One of the biggest problems with IPMIS I was the users' lack of confidence in the system. This developed primarily as a matter of frustration from seeing the system continue to generate inaccurate information despite repeated attempts to correct it. Unfortunately, this lack of confidence among users may carry over to PADS.

From DOE, we obtained lists of internal sources that both input data to and request information from IPMIS I. We generally found that the offices which input the most data were making little or no use of the system. Smaller offices, however, were using the system extensively. After contacting about half of the input sources, we found that the larger offices usually had some other alternative for obtaining the procurement information. They explained that inaccuracies in IPMIS I have been so obvious and commonplace, it had become difficult to rely upon that system. Instead and to the extent they could, they used alternative means to provide them with correct information.

In discussing PADS, these input sources had mixed optimism. They indicated that recent attempts to validate the data would hopefully mean the PADS system contained accurate information, but there was no guarantee of it. One procurement official said just because IPMIS I showed one amount for a particular

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1/Except for pre-procurement planning, these functions are being handled informally on an as needed basis. Pre-procurement planning data will be included in PADS up through fiscal year 1982. After that, pre-procurement planning will be accomplished outside PADS through monthly reports which the program offices will submit to DOE's Office of Procurement.

contract and PADS suddenly shows a different amount does not mean the first was wrong and the second is right. It could be the reverse or it could be that both systems are wrong. In any case, the larger input sources told us they would be inclined to use alternatives to PADS, where possible, rather than take a chance with possibly inaccurate data.

Despite the accuracy problems with IPMIS data and user distrust, DOE officials have no plans to further validate the PADS data by comparing it with source procurement documents. As mentioned in the last chapter, this was done for IPMIS I, but on a rushed basis, and before the computer programs were adjusted to prevent the system from losing or changing the data. Instead, DOE has compared PADS information with data entry cards 1/ and computer printouts looking for potential or obvious mistakes. This is enough, DOE believes, to make PADS reasonably accurate. To do a comparison directly to source documents, DOE said, would cost between $1 million and $2 million and would not justify the marginal improvements that would be made in the accuracy of the system.

In effect, DOE has apparently decided to check the validity of PADS' data but in less extensive ways. PADS may be everything DOE intended it to be, but if the latest validation efforts were not completely successful in purging inaccurate data from the system (or if potential users simply believe this to be the case and continue to retain their alternative information systems), PADS will not justify the huge financial investment made by DOE.

DOE IS DEVELOPING AN ALTERNATIVE PLANNING SYSTEM SEPARATE FROM PADS

In an earlier report, 2/ we noted that DOE relies heavily on contractors to help carry out its mission but that often these contractors perform work for DOE without a contract. This occurs because agency personnel, who do not have the authority to bind the Government, make unauthorized commitments to contractors. These commitments avoid competition and circumvent procurement regulations. To help correct this situation, we recommended that DOE require effective procurement planning from all program offices as a means of reducing the number of unauthorized commitments. Ideally, through effective planning, procurement actions would be prioritized and submitted far enough in advance

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1/Cards used to record information from the source procurement documents for input into the computer.

2/"Unauthorized Commitments: An Abuse of Contracting Authority in the Department of Energy," EMD-81-12, Dec. 4, 1980.

of the program need to obtain necessary approvals and to allow procurement officials to set up the most advantageous contract for the Government.

DOE officials responded to that report by saying that DOE would improve its planning and correct the problem with unauthorized commitments through the IPMIS I system. At that time, IPMIS I, although operational, was not yet fully completed; therefore, we could not evaluate whether it was an effective tool for procurement planning.

Once IPMIS I became fully operational, however, it never lived up to its expectations for planning procurement actions. According to a DOE official, this occurred because the system contained only preliminary budget data and did not reflect the final amounts that would be allocated among the various programs and projects. Further, the program offices considered the system to be very burdensome and required more input data than they needed for their individual purposes. Consequently, program offices only entered preliminary planning data into IPMIS I and never updated it. Instead, these officials relied on their own internal systems which they said were updated as necessary to satisfy their procurement planning information needs.

Therefore, when implementing PADS, DOE's system developers decided not to include planning data in the system beyond fiscal year 1982. Instead, the developers said they would evaluate other ways that procurement planning could be accomplished to satisfy both internal requirements and those in Policy Letter 81-1 from the Office of Federal Procurement Policy. 1/

Subsequently, DOE established a task force to consider future procurement planning needs. In a February 1982 report, the task force endorsed the view that a centralized procurement planning module should not be continued in PADS. It recommended that advanced procurement planning be accomplished through monthly planning reports submitted by program offices to DOE's Office of Procurement.

While the task force briefly considered various alternatives for satisfying planning requirements, it did not perform a cost/benefit analysis on any of them. According to a member of the task force, this was not done because the task force was aware that a decision had already been made to eliminate procurement planning data from the PADS system. Therefore, this alternative

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1/Policy Letter 81-1 dated Aug. 13, 1981, requested each executive department or establishment to implement management controls concerning procurement procedures, advanced procurement planning, and end-of-year purchases.

was eliminated at the outset without further consideration. From the remaining alternatives, the task force was sure that the recommendation they made was the most efficient.

During our review, DOE was still devising a way of implementing the chosen recommendation of having the program offices submit monthly planning reports to DOE's Office of Procurement. Therefore, neither we nor DOE, in our view, knows what impact this recommendation will have on the various program offices. This approach--of reaching a decision and then analyzing the impact sometime later--was also exhibited by DOE when it decided to implement PADS.

More importantly, it is worth noting that, by eliminating planning data from PADS, DOE has nullified one of the principal reasons for creating the IPMIS system. DOE had intended that IPMIS I would replace three existing systems, one of which was specifically set up to perform procurement planning. To reverse directions now by taking planning data out of the PADS system and having it collected by some other means is questionable unless there is sufficient support to show that it is the most effective and efficient way to satisfying procurement planning requirements. We found no evidence that DOE had such support.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

During our review, we discovered many problems with the way ERDA and DOE developed the IPMIS system. The many mistakes that plagued IPMIS I and II were repeated when DOE decided to implement PADS. PADS is only the latest in a succession of DOE attempts to correct a system that has consistently generated inaccurate information. The primary reason for this inaccuracy was the rushed development of certain phases of the system. IPMIS I was implemented in a hurry because ERDA became DOE, and DOE officials wanted to get a quick handle on the procurement process. PADS was implemented in a hurry because DOE officials feared the agency would soon be dismantled. In both situations, DOE officials acknowledge that they were aware of the risks associated with speeding up system development but that the circumstances justified their actions.

We do not agree. IPMIS I was an ambitious attempt to track procurement activity from cradle to grave. This system was designed without active user participation, was developed contrary to established system procedures, and was made operational although the system still had problems and was not yet complete. In the final analysis, IPMIS I was not an effective system because it generated inaccurate information and was inefficient. As a consequence, total system costs have far outweighed expected benefits.

With respect to PADS, we have similar reservations. While user requirements for this system were apparently more clearly known, DOE

--established an arbitrary and possibly unrealistic deadline for system implementation;

--circumvented normally accepted procedures for system development;

--did not prepare a true cost/benefit analysis, but prepared a report after the fact comparing combined costs of IPMIS II and PADS to benefits of converting to and operating PADS; and

--did not explore available alternatives before making changes to the system.

The basis for DOE's decision to implement PADS, however, is not completely without merit. Because IPMIS I has, in the past, generated inaccurate information, DOE reasoned that it was necessary to have some type of effective and efficient procurement information system in place so that DOE could be

dismantled in a reasonable and orderly manner and satisfy its external reporting requirements. As PADS has only recently been implemented, however, it is too soon to tell whether it will be capable of generating accurate DOE procurement information.

During our review, we noted that some of the various DOE program and field procurement awarding offices have seemingly lost confidence in IPMIS I because of its problems, and they have elected to use informal systems to satisfy their procurement information needs. Although DOE has done some work to correct the bad data in PADS, this has been on a limited basis. Therefore, PADS may also have its problems, and these offices may continue to use the informal systems in the future rather than rely upon PADS. If they do so, this not only reduces the future effectiveness of PADS but also raises the question of redundant procurement information systems operating within DOE. Given DOE's substantial financial investment in IPMIS I, IPMIS II, and PADS, we believe that DOE should seek ways to increase user confidence in the system, including the possibility of further testing the reliability of the data in PADS.

The proper way to test data reliability is by selecting a statistically valid sample of data items for verification. This would, if properly done, give DOE a better understanding of the system's accuracy and help to determine the need for further data verification efforts. This, we believe, will help restore user confidence in the PADS system.

At the same time, we believe that DOE should determine whether any program or field procurement awarding office is using an informal information system in lieu of PADS and how best such redundancy can be eliminated. Until these redundant systems are eliminated, the various DOE offices will be reluctant, in our view, to use PADS.

In addition, PADS may not be the optimum system that DOE is seeking. We noted that DOE elected to delete procurement planning data from PADS without seriously analyzing the costs and benefits of the available alternatives. We believe that DOE should do such an analysis considering that the Office of Federal Procurement Policy has placed a high importance on each Federal agency developing a good advanced procurement planning system.

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

Given that DOE has already implemented PADS, we believe the Secretary of Energy should make it an effective and efficient procurement information system. To help do this, we recommend that the Secretary:

--Increase user confidence in PADS by selecting a statistically valid sample of data in the system and tracing it back to procurement source documents. If the sample shows major inaccuracies in PADS data, we recommend that the Secretary take further actions to ensure the accuracy and utility of the system.

--Determine to what extent program or field procurement awarding offices are using informal systems in lieu of PADS and how best such redundancy can be eliminated.

--Analyze the costs and benefits associated with the various alternatives for providing an advanced procurement planning system, including making it a part of PADS.

Equally important, the mistakes that occurred during the development of the IPMIS system should alert the Secretary to the need for DOE to follow established procedures for developing major information systems. We recommend, therefore, the Secretary require that these procedures are followed when DOE develops future information systems.

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