HQ-B-98-01

AUDIT REPORT

THE U.S. DEPARTMENT OF ENERGY'S VALUE ENGINEERING PROGRAM

JULY 1998

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

DEPARTMENT OF ENERGY
Washington, DC 20585

July 17, 1998

MEMORANDUM FOR THE DIRECTOR, OFFICE OF FIELD MANAGEMENT AND THE DEPUTY ASSISTANT SECRETARY FOR PROCUREMENT AND ASSISTANCE MANAGEMENT

FROM: Phillip L. Holbrook
Acting Deputy Inspector General for Audit Services

SUBJECT: INFORMATION: Audit Report on "The U.S. Department of Energy's Value Engineering Program"

BACKGROUND

Value Engineering (VE) is defined as the organized analysis of the functions of a program, project, system product, item or equipment, building, facility, service, or supply of an executive agency. This analysis reduces these functions to their most basic elements and then looks for cost-efficient alternatives. VE contributes to the overall management objectives of streamlining operations, improving performance, reliability, quality, safety and reducing life-cycle costs. Further, it can result in the increased use of environmentally-sound and energy-efficient practices and materials. VE benefits have been documented by the General Accounting Office, which reported that VE usually produces a net savings of 3 to 5 percent of project costs.

The Department of Energy (Department) used the VE methodology primarily in construction related processes, including design reviews, and reported savings of $31.3 million for Fiscal Year 1996. The VE program was primarily executed by the Department's management and operating and other prime contractors. The objectives of this review were to assess the effectiveness of the Department's VE program and test the validity of VE savings reported for FY 1996.

RESULTS OF AUDIT

The Department had not fully developed and implemented an effective VE program. Several major Departmental sites had no formal VE programs or processes in place. Furthermore, some VE savings were not always supported or not truly the result of the formal VE methodology and some field activities had not consistently computed and reported VE savings. The Department's success with VE was limited by inadequate policy and procedures and the lack of annual plans, goals and objectives. As a result, the intended VE goals of reducing costs, increasing productivity, streamlining operations, and improving quality may not have been achieved to the fullest extent possible.

Department officials were aware of deficiencies in the VE program and had taken a number of positive actions to improve its program. However, additional improvements are needed to help ensure an effective VE program within the Department.

MANAGEMENT REACTION

Management concurred with the finding and recommendations and agreed to take corrective action. The Office of Field Management stated that teams of field, Headquarters and contractor personnel were established and will develop an in-depth action plan by November 1, 1998, that is responsive to the OIG recommendations. Management intends to implement as many of the actions as possible by November 1, 1998, or have an established schedule to complete the remaining actions.

TABLE OF CONTENTS

Overview

INTRODUCTION AND OBJECTIVE

Value Engineering (VE)[1] is defined as the organized analysis of the functions of a program, project, system product, item or equipment, building, facility, service, or supply of an executive agency. This analysis reduces these functions to their most basic elements and then looks for cost-efficient alternatives.[2] VE contributes to the overall management objectives of streamlining operations, improving performance, reliability, quality, safety and reducing life-cycle costs. Further, it can result in the increased use of environmentally-sound and energy-efficient practices and materials. VE analysis should be performed by a team of qualified and trained personnel.

VE originated in industry but the concept has also proven successful in the Federal Government. According to the U.S. Army Corps of Engineers (Corps), the methodology has been used on construction projects since 1964 and the Corps has documented over $2.9 billion dollars in savings and cost avoidance. The Corps has reported a $20 return for each $1 spent on the VE effort. VE benefits have also been documented by the General Accounting Office, which reported that VE usually produces a net savings of 3 to 5 percent of project costs.

Typically, a VE program consists of two components, the value engineering proposal (VEP) and the value engineering change proposal (VECP). The VEP is an in-house agency-developed proposal or a proposal developed by a contractor under contract to provide VE studies for a Government project or program. The VECP, in contrast, is a proposal submitted by a contractor that, through a change in a project's plans, designs, or specifications as defined in the contract, would lower the project's life-cycle cost to the Government. Savings identified by contractors are generally shared based on a predefined arrangement.

Public Law 104-106 and Office of Management and Budget (OMB) Circular A-131 require Federal agencies to use VE. OMB also requires Inspectors General to evaluate how well the agencies have done. The Department of Energy (Department) used the VE methodology primarily in construction related processes, including design reviews,

[1] Value Analysis, value management and value control are terms synonymous with VE.

[2] The VE methodology includes six phases: information gathering, creation of alternatives, analysis of alternatives, development of alternatives, presentation, and implementation.

and reported savings of $31.3 million for Fiscal Year 1996. The VE program was primarily executed by the Department's management and operating and other prime contractors. Each Departmental field office had designated a VE representative who was responsible for coordinating the VE efforts of its contractors. For the most part, these representatives worked part time on VE efforts. The objectives of this review were to assess the effectiveness of the Department's VE program and test the validity of VE savings reported for FY 1996.

CONCLUSIONS AND OBSERVATIONS

The Department had not fully developed and implemented an effective VE program. Several major Departmental sites had no formal VE programs or processes in place. Furthermore, some VE savings were not supported or not the result of the formal VE methodology and some field activities had not consistently computed and reported VE savings. The Department's success with VE was limited by inadequate policy and procedures and the lack of annual plans, goals, and objectives. As a result, the intended VE goals of reducing costs, increasing productivity, streamlining operations, and improving quality may not have been achieved to the fullest extent possible.

Department officials were aware of deficiencies in the VE program and had taken a number of positive actions to improve its program. In May 1997, the Department held a Value Management workshop to discuss topics that posed challenges to effective VE. Workshop participants, including both VE experts and subject matter experts, identified a number of actions needed to overcome these challenges and implement a viable program. One outcome of the workshop was the issuance of a Departmental "Good Practice Guide" in September 1997 which provides guidance on the Department's VE process. Management advised that other positive actions have been taken or planned which will improve the Department's future VE efforts. However, additional improvements are needed to help ensure an effective VE program within the Department.

The matters discussed in this report should be considered when preparing the yearend assurance memorandum on internal controls.

/SIGNED/
Office of Inspector General

The Department Had Not Implemented an Effective Value Engineering Program

The Department had not fully developed and implemented an effective VE program. Departmental participation in the program was limited, some VE savings were not supported or the result of the VE methodology, and field activities had not consistently computed and reported VE savings.

Several Department sites did not formally participate in the VE program or participated to only a limited degree. The Department's FY 1996 VE report to OMB included VE activities reported by ten major field locations. According to the VE reports submitted by these field locations, one of the ten, the Rocky Flats Field Office, reported no VE savings in FY 1996. A Rocky Flats official advised that there is very little VE at that site. Another location, the Albuquerque Operations Office, reported that one of its major components, Los Alamos National Laboratory, had not reported VE savings and that VE was only applied on high visibility projects.

Participation was also limited at several other major Department sites. For example, at the Chicago, Nevada, and Richland Operations Offices, VE was performed only informally without the specified structure normally expected as part of a mature VE program. Based on our review of VE documentation at the Chicago Operations Office and subsequent interviews with responsible officials, we determined that:

- Brookhaven National Laboratory had no formal VE program and no system in place to track VE statistics;
- Argonne National Laboratory had no formal VE program; and,
- Fermi National Laboratory had an informal VE program that covered various projects and activities in the normal course of engineering design.

A responsible VE official from the Nevada Operations Office reported during the May 1997 workshop that one study was conducted in FY 1996 but none since due to the lack of funds for studies. This VE official believed that Nevada should do more studies and was trying to obtain funding in FY 1998 in order to institute a more comprehensive VE program.

At the May 1997 workshop Richland officials also advised that no structured VE program existed at the site. A responsible Richland official told us that the FY 1996 VE savings for that site were not the

result of VE but instead were based on critical analysis reviews. The critical analysis reviews are part of the independent review process of projects and include assessing the need for the project and the validity of the projects scope and cost. However, management believed that the critical analysis review has some processes and practices in common with the VE methodology even though the analyses do not follow the complete VE technique.

The Ohio Field Office and the Oak Ridge and Oakland Operations Offices also reported that their VE programs were limited. Idaho Operations Office officials believed they had an established VE program but VE could be used more.

There also was little evidence that eligible contractors performing work for M&O contractors were participating in the VE program even though the contracts reviewed included a clause encouraging submission of VECPs. Based on our review of VE efforts reported by Kansas City and Chicago, only one such contractor had submitted a VECP. This proposal was submitted by a construction contractor under contract with the Kansas City Plant and resulted in savings of about $11,000. VE personnel from Idaho advised that only two VECPs had been processed during the time they worked at the site. Both Department and M&O contractor staff acknowledged that contractors were not participating in the VE program.

Validity of Savings

The Department did not accurately report VE savings for FY 1996. We reviewed $23.7 million of the $31.3 million for reported FY 1996 savings and found that $9.1 million, or 38 percent of the amount reviewed, was unsupported as VE savings**.** The following table shows the VE proposals and cost savings reported to the Office of Management and Budget for Fiscal Year 1996.

FY 1996 DOE Value Engineering Savings
(In Thousands)

Office	InHouse Proposals	InHouse Savings	Contractor Proposals	Contractor Savings	Total Proposals	Total Savings
Albuquerque	2	$ 0	4	$10,746	6	$10,746
Chicago	7	3,913	1	140	8	4,053
Idaho	0	0	32	5,340	32	5,340
Nevada	2	1,624	9	1,680	11	3,304
Oak Ridge	0	0	63	934	63	934
Oakland	0	0	90	2,112	90	2,112
Ohio	2	0	0	0	2	0
Richland	1	0	9	4,061	10	4,061
Rocky Flats	0	0	0	0	0	0
Savannah River	7	750	0	0	7	750
Total	21	$6,287	208	$25,013	229	$31,300

The audit included testing of the amounts reported by the Albuquerque (Kansas City Plant); Chicago; Idaho; Richland and Savannah River Operations Offices. The Chicago and Richland Operations Offices' support did not appear to be the result of the VE methodology. In addition, the Chicago and Idaho Operations Offices had no support for some of their reported savings.

The $31.3 million in reported VE savings included about $5.3 million of savings that did not appear to meet the criteria for a VE effort because these savings did not result from a study that had been identified as a VE effort nor was there sufficient documented evidence of the application of the elements of the VE discipline. Of the $5.3 million:

- about $1.2 million reported by Chicago resulted from refining cost estimates and project scopes when contract bids exceeded available funding; and,

- the remaining $4.1 million reported by Richland resulted from critical analyses of projects to determine whether activities could be reduced in scope or eliminated.

Finally, we were unable to obtain adequate documentation to support approximately $3.8 million of the savings reported by Chicago and Idaho to determine the acceptability of the claimed savings as resulting from the VE process.

In summary, $ 9.1 million may not qualify as VE savings. However, because the Department had not established criteria and guidance on what other cost reduction initiatives would be acceptable as VE as well as the lack of support documentation for some reported savings, we were unable to make a clear determination on this amount. Despite the fact that all reported savings may not qualify as VE savings, we view as positive all actions taken to prudently reduce the cost of Department operations.

Inconsistencies in Reported Data

In addition to inconsistencies in what initiatives constituted VE, we also found disparities in how data was reported. For example, some sites reported VE savings that had not been realized while other sites only reported savings once realized. The Kansas City Plant reported $9.5 million of VE savings based on two VE studies conducted in FY 1996. The savings were reported even though the activity had not decided which proposals, if any, would be accepted and implemented. In contrast, the Ohio Field Office advised that a VE study had previously been completed which identified potential savings of over $79 million. However, the activity did not report these potential savings because they had not been realized. It was evident that the policy was not consistent with regard to when savings were claimed.

Inconsistencies also existed with regard to reporting proposal statistics. Some sites counted individual VE study reports as one proposal while others counted each recommendation contained in the study as a proposal. For example, Kansas City reported that three proposals were developed in FY 1996---two VE studies that supported its $9.5 million of savings and one VECP. In contrast, Idaho's reporting of 32 proposals represented the 32 recommendations contained in six VE studies. Some Departmental personnel also were uncertain whether to report VE statistics as in-house effort or contractor effort. Consistency is needed among field offices to ensure accurate reporting of VE statistics to OMB.

Agencies Are Required To Implement Effective Value Engineering Programs

The Federal Acquisition Reform Act of 1996 (PL 104-106) requires that all executive agencies establish and maintain cost effective VE procedures and processes in order to reduce program and acquisition costs. OMB Circular A-131, dated May 21, 1993, placed certain responsibilities on Departments and agencies. These include, among other things, designating a senior manager to monitor and coordinate agency VE efforts, developing criteria and guidelines for project selection, and developing annual plans that identify projects, programs, and systems to which VE techniques will be applied in the following fiscal year.

Despite the codification of the VE requirement, the Departmental order does not appear to require VE. DOE Order 430.1, "Life-Cycle Asset Management," (LCAM), issued in August 1995, prior to PL 104-106, requires the use of a "...process tool, such as Value Engineering, to improve efficiency and cost effectiveness." However, DOE's "Good Practice Guide" (GPG-FM-011), issued in September 1997 during the audit, specifies that the Department considers VE a statutory requirement.

DOE's Value Engineering Program Needed Better Guidance and Procedures

The Department's VE program was not fully effective because responsible officials had not developed adequate policy and procedures, and annual plans as required by A-131, or established goals and objectives for the program. This lack of policy and guidance led to uncertainty among field office staff as to program requirements, the nature of the VE process and how to apply it properly in the DOE model, and how best to report VE results.

The matter of insufficient Departmental direction and the resulting uncertainty was discussed in great detail at the Department's May 1997 Value Management conference. For example VE representatives were concerned that there was no policy relative to VE. Others expressed concern that the LCAM, which addressed VE, was not definitive and muddied the issue on the requirement to use VE. Some even believed that based on LCAM, VE application was not required.

Another reason the Department may not have had an optimum VE program was that most M&O contracts did not directly require VE or contain the VE clauses specified in the Federal Acquisition Regulation. From a sample of nine M&O contracts, we found that the VE clause had been included in only one. When we inquired why VE application was not a requirement under all M&O contracts, Procurement officials advised that there was limited opportunity for VE in the Department

and therefore, the requirement had not been included as a contract clause. Other DOE officials expressed the view that VE application was appropriate and that specifically including the requirement in each contract would ensure optimum program participation. These differences of opinion indicate an uncertainty in the Department as to the application of VE principles to DOE's operations.

Departmental site and project personnel responsible for VE implementation also cited that the lack of guidance which clearly defined and differentiated VE from other cost-saving initiatives and clearly explained how to compute and report savings led to inaccurate and inconsistently reported VE savings. Managers were unsure whether only realized cost savings should be reported or whether expected savings should be reported. In the absence of guidance, DOE managers appear to have instituted their own determination in data accumulation.

To ensure full participation in the VE program and accurate and consistent reporting of VE data, certain actions need to be taken. First, the Department needs to clarify the requirement for VE in LCAM, and should consider including the VE requirement as a specific clause in the M&O contracts. Further the Department needs to establish guidance on computing methodologies and reporting practices. In particular it needs to determine, for reporting purposes, whether the VE approach will be strictly adhered to or whether other cost savings activities such as those reported by Chicago to bring costs in line with budgets and critical analysis reported by Richland are acceptable VE efforts whose savings are acceptable VE savings. Guidance is also needed concerning the maintenance of sufficient documentation to support such data.

In addition to the lack of policy regarding the program, the Department had not prepared annual plans, or established goals and objectives to measure program success. Corps officials believed that one of the primary reasons for the success of its VE Program was that it established study and dollar-savings goals each year to measure success. For example, the Corps VE goal was to save 6 percent of the agency's construction costs. Other Department of Defense (DOD) components had established a VE savings goals of 1 percent of the total obligation authority. Corps personnel told us that they customarily achieve their goals. The development of annual plans and similar goals and objectives would encourage use of VE analysis and provide data needed to measure the success of the program. Further such data will enable the Department to meet the requirements of the Government

Performance and Results Act of 1993 which requires Federal agencies to establish long-term strategic goals, measure performance against those goals, and report publicly on how well they are doing. We noted that the Good Practice Guide includes several model performance measures for VE.

Other observations made during the review that impacted the Department's program were the lack of training in the VE methodology (field/worker level; program level; and procurement/contracting community); lack of direction on how to fund VE efforts; inadequate personnel devoted to the program; and insufficient management support for the program.

Economic Benefits May Not Be Achieved

Based on historical trends and comparisons with other agency practices, there is great potential for savings through the application of the VE methodology to construction projects. Further, industry standards literature has shown that there is great potential for savings from the application of VE to environmental projects. However, because the Department's participation in the program was limited, few VE analysis were performed and only $31.3 million of potential savings was reported in FY 1996. These potential savings, which represented about two-tenths of one percent of the Department's FY 1996 appropriation, are minimal based on benchmarks established by DOD, the Corps and the General Accounting Office. Thus the Department may not have realized the full benefits of the VE methodology which include reducing acquisition and program costs, increasing productivity, streamlining operations, and improving quality.

RECOMMENDATIONS

1. We recommend that the Director, Office of Field Management work to improve the Department's VE program by:

   a. Clarifying the requirement for VE application in LCAM 430.1 and other Departmental guidance.

   b. Ensuring that recently developed Departmental guidance on VE application adequately addresses:

      - procedures on processing proposals;
      - guidance on those cost saving initiatives that will be acceptable as VE efforts;
      - methodologies for computing and reporting savings; and,
      - documentation required to support such savings.

   c. Establishing annual and long-term goals and objectives and performance measures for the DOE VE program.

   d. Developing, in conjunction with program offices, a strategy/ annual plan which includes those programs and projects which may better benefit from the application of VE techniques. Application of VE should be expanded beyond construction projects in order to realize the full benefit of the VE methodology.

   e. Developing VE competencies and training requirements and ensuring that agency staff involved with VE application are adequately trained.

   f. Working with the Office of the Deputy Secretary to ensure sufficient guidance to implement a VE program is provided to the program offices consistent with OMB Circular A-131. The approach for funding the VE program shall be included in this guidance.

2. We recommend that the Deputy Assistant Secretary for Procurement and Assistance Management work with the Office of Field Management to identify procurement policy changes necessary to implement the Department's VE program.

MANAGEMENT REACTION

Management concurred with the finding and recommendations and agreed to take corrective actions. The Office of Field Management stated that teams of field, Headquarters and contractor personnel had been established and will develop by November 1, 1998, an in-depth action plan responsive to the OIG recommendations. Management intends to implement as many of the actions as possible by November 1, 1998, or have an established schedule to complete the remaining actions.

AUDITOR COMMENTS

Management's comments are responsive to the audit report recommendations.

APPENDIX A

SCOPE

The audit was performed from June 1997 to December 1997, at the Department's Headquarters in Washington, DC. Audit work was also conducted at the Albuquerque, Chicago, Idaho, Richland and Savannah River Operations Offices. We made site visits to the Albuquerque Operations Office (Kansas City Plant) and the Chicago Operations Office. These sites reported 43.1 percent of the $ 31.3 million of Fiscal Year (FY) 1996 VE savings. Idaho, Richland and Savannah River, which reported 32.6 percent of FY 1996 VE savings provided documentation to support their savings and other information as requested concerning their programs. In addition, we contacted other DOE offices' VE representatives to obtain information about the operation of their VE programs.

METHODOLOGY

To accomplish the audit objectives, we:

- reviewed applicable laws and/or regulations for performance and compliance criteria;
- interviewed Departmental VE staff at Headquarters and field office and contractor locations;
- analyzed documentation in support of reported Value Engineering savings; and,
- interviewed Value Engineering officials at other Federal agencies.

The audit was conducted in accordance with generally accepted Government auditing standards for performance audits, and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objectives. Because our review was limited, it would not necessarily have identified all internal control deficiencies that may have existed. We did not conduct a reliability assessment of computer-processed data because only a limited amount of computer-process data was used during the audit.

APPENDIX B

PRIOR REPORTS

The Department's Value Engineering program had not been previously audited. However, the OIG initiated an audit during Fiscal Year 1996, but was unable to conduct the review because the Department had not prepared its FY 1995 report of VE savings. This is addressed in report AS-L-96-01, Audit of DOE's Implementation of Office of Management and Budget Circular A-131, Value Engineering. While DOE was not included in the President's Council on Integrity and Efficiency's August 1991 audit of VE in the Federal Government, the Council concluded that more could and should be done by Federal agencies to realize the benefits of VE.

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