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REPORT BY THE U.S.

General Accounting Office

TVA Needs To Improve Management Of Power Stores Inventories

Weaknesses in the Tennessee Valley Authority's management of material inventories used to support the production and distribution of electrical power have resulted in a substantial accumulation of excess material. The investment in unneeded inventory and the related inventory holding costs can be reduced if material management organizational structure, policies, and procedures are strengthened.

LCD-80-32
JANUARY 25, 1980

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

ENERGY AND MINERALS
DIVISION

B-114850

Mr. S. David Freeman
Chairman, Board of Directors
Tennessee Valley Authority

AOC
00108

Dear Mr. Freeman:

This report identifies ways that your agency can better manage the material inventories maintained to support the production and distribution of electrical power.

The report contains recommendations to you on page 12. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We would appreciate receiving a copy of your statement when it is provided to the congressional committees and being informed of any action taken on our recommendations. We are sending copies of this report to the Director, Office of Management and Budget, and the House and Senate Committees having oversight and appropriation responsibilities for your agency.

Sincerely yours,

J. Dexter Peach
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE
CHAIRMAN OF THE BOARD
TENNESSEE VALLEY AUTHORITY

TVA NEEDS TO IMPROVE MANAGEMENT OF POWER STORES INVENTORIES

D I G E S T

As the material inventories maintained to support the Tennessee Valley Authority's (TVA's) power operations have rapidly increased to a current value of $148 million, the need for improved inventory management has become more apparent. Basic weaknesses, including fragmented management responsibility and lack of emphasis on controlling inventory levels, caused a substantial accumulation of excess material. (See ch. 2.)

Material valued at approximately $51 million exceeds TVA's near-term needs. Much of this material has been inactive for over 2 years and may never be used. The annual cost of holding these excess inventories is about $10 million. (See ch. 2.)

Specific factors contributing to the excess inventories include:

--Stockage objectives being determined by individual plant superintendents rather than being based on past usage.

--Excess stocks not systematically identified and redistributed to locations needing the material to avoid new purchases.

--Inactive items not regularly reviewed and removed from inventory to reduce carrying costs and the risk of obsolescence.

--Material incorrectly classified as standby stock resulting in retention of larger quantities than needed to satisfy demand. (See ch. 2.)

TVA management, recognizing the need for strengthening controls over its material, is currently completing development of a modern automated material management system. However,

it has not yet adopted the organizational structure and material management policies and procedures needed to allow the system to operate effectively. (See ch. 3.)

TVA should establish an organizational entity with responsibility and authority to develop standard material management policies and procedures and direct their application throughout the power stores system. These policies and procedures should be designed to ensure that

--stockage objectives are established at reasonable levels in accordance with an acceptable demand-based formula,

--the power stores system is screened for excess stocks on a regular basis and the excess is redistributed to those activities with a requirement for the material,

--a program is established to regularly and systematically identify inactive items and remove them from inventory, and

--standby stock is properly defined and the definition is consistently applied throughout the power stores system. (See ch. 4.)

This report was discussed with TVA officials. They generally agreed with the findings and recommendations and mentioned a number of actions recently taken or planned to strengthen material management. (See ch. 4.)

Contents

ABBREVIATIONS

GAO	General Accounting Office
TVA	Tennessee Valley Authority

CHAPTER 1

INTRODUCTION

The Tennessee Valley Authority (TVA) is a wholly owned corporate agency of the U.S. Government. In 1933 the Congress established TVA to develop the Tennessee River system and to assist in the development of other resources of the Tennessee Valley and adjoining areas.

TVA supplies electric power at wholesale rates to 160 municipal and cooperative distributors and one privately owned system. They in turn resell power to about 2.7 million customers in seven States--Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. TVA also directly serves 50 industrial customers with large or unusual power requirements and several Federal nuclear, aerospace, and military installations. Financially, the power program is separate from other TVA programs and is required to be self-supporting.

The TVA power generating capacity system consists of 29 hydro plants, 12 coal-fired plants, 4 gas turbine plants, and 1 nuclear plant. The plants have a total of 223 generating units with an installed capacity of 27 million kilowatts. Seven plants (one hydro and six nuclear) are under construction or are planned over the next 7 years which will add 18 generating units and provide an additional capacity of 20 million kilowatts.

The power stores section, under the Office of Power, is responsible for maintaining an inventory of materials, supplies, and spare parts to serve the needs of the power organization. The power stores section has its central office in Chattanooga, Tennessee, and operates 21 major field storerooms consisting of 2 base storerooms, 3 district storerooms, and storerooms at 16 steampower plants. Each of these storerooms has full-time personnel and operates independently of the other storerooms in the power stores system. Inventory items are also stored at 27 hydro plants and 35 area locations. These latter storage sites are not staffed on a full-time basis.

As of September 30, 1979, the power stores inventory, excluding fuel, consisted of 217,000 different line items valued at almost $148 million. This inventory has grown from $15 million in 1965 and is expected to continue to grow rapidly as the nuclear plants under construction are completed.

SCOPE OF REVIEW

We made the review to determine how well the power stores inventory was being managed. We looked for ways to optimize inventory levels and reduce material holding costs. The work was done at the Office of Power in Chattanooga, Tennessee, and at selected storage locations.

In doing our review, we used a series of stratified statistical samples of the power stores inventory as of November 13, 1978. We also distributed a questionnaire to all of the major storage units to solicit information on specific inventory items.

CHAPTER 2

WEAKNESSES IN INVENTORY MANAGEMENT

As the power stores inventory has rapidly increased, the need for improved inventory management has become more apparent. Several basic weaknesses, particularly fragmented management responsibility and lack of management emphasis on controlling inventory levels, have resulted in a substantial accumulation of excess material.

The value of the power stores inventory has increased tenfold since 1965 and has more than tripled--from $44 million to $148 million--since 1974. Although much of the increase can be attributed to such factors as expansion of generating capacity, compliance with environmental protection requirements, and inflation, we estimate that material valued at as much as $51 million exceeds TVA's near-term needs.

A number of specific factors have contributed to the accumulation of excess inventories:

--Stockage objectives have not been based on past usage.

--Excess stocks have not been systematically identified and redistributed to locations needing the material.

--Inactive items have not been regularly reviewed and removed from inventory.

--Material has been incorrectly retained as standby stock.

Chapter 3 discusses ways to strengthen the organizational structure and management policies and procedures and reduce the investment in unneeded inventories and related inventory holding costs.

MUCH OF INVENTORY IS EXCESS TO NEEDS

As of November 13, 1978, the power stores inventory consisted of more than 190,000 line items valued at about $120 million. On the basis of our analysis of a random sample of the items in the inventory at that date, we estimate that about $51 million, more than 40 percent of the inventory, is excess to a 24-month supply.

We used the 24-month supply as a conservative means of demonstrating the quantity of excess material onhand. A private utility company considered a 3- to 5-month supply onhand to be sufficient and a consultant firm used a 6- to 8-month supply to estimate potential inventory reductions at TVA. The excess is broken down as follows:

	Number of items	Value of excess
Inactive items (no activity during past 8 quarters)		
Stocked at one location	71,027	$25,532,407
Stocked at two or more locations	7,024	3,175,406
Subtotal	78,051	28,707,813
Active items (stock levels in excess of 8 quarters demand)		
Stocked at one location	30,883	14,358,958
Stocked at two or more locations	9,864	8,205,482
Subtotal	40,747	22,564,440
Total excess	118,798	$51,272,253

Two public utility companies have estimated the annual cost of carrying material in inventory to be about 20 percent of the inventory value. Applying this factor, we estimate the annual cost of carrying the above excess material to be $10 million. In addition to increasing inventory carrying costs, the retention of excess inventories increases the risk of inactive material becoming obsolete.

MANAGEMENT RESPONSIBILITY IS FRAGMENTED

Historically, power stores units have been allowed a great deal of autonomy. Although they are under the administrative control of the power stores central office, functionally, they are responsible to the operating activities they support, and plant personnel ultimately decide which items will be stocked and in what quantities. Because objectives are not based on a standard, systemwide formula, they often are not consistent with demand, but instead

reflect the wishes of the plant superintendents. As a result, stockage objectives for the majority of inventory items are higher than can be justified on the basis of demand.

The autonomy of the power stores units has also prevented the effective redistribution of excess stock to units with greater need for the material. This shortcoming has caused material to be purchased to fill a need at one location while the same material was in long supply elsewhere in the system.

Stockage objectives are not based on demand

Our analysis showed that about 80 percent of all inventory items had stockage objectives at one or more locations which exceeded a 24-month demand. Some of the objectives represented a 20-year or more supply. In contrast, one private utility company has set stockage objectives at a 3- to 5-month supply.

Due to the lack of central direction, stockage objectives and stock levels for common items often varied widely between storage locations. For example, analysis of one item (a lateral for dust piping) stocked at three locations showed the following:

Location	Stockage objective	Stock onhand	24-month demand
A	40	40	0
B	1	1	0
C	8	4	7

Had a standard demand-based formula been used for setting stockage objectives, systemwide stock could have been substantially reduced.

Some excess stock could be redistributed

Analysis of active inventory items common to two or more locations in the power stores system showed that about 85 percent of the items were in long supply (excess to a 24-month supply) at one or more of the locations at which they were stocked. As in the above example, many of the items while active at one location were inactive at others.

While sound material management dictates that stock be redistributed from the inactive to the active locations, no one in the power organization has been given both the responsibility and the authority to direct such redistribution.

As a result, material is often purchased for one location even though it is in long supply elsewhere in the system.

For example, two storerooms purchased an item (electrical contact brushes) when another storeroom had 398 units of the item onhand and experienced only 6 units of demand in 3 years. If such excess stocks were identified and redistributed, systemwide inventory levels could be reduced.

Many inactive items need to be removed

Of the nearly 119,000 inventory items with potential excess, about 78,000 items had been onhand with no issue activity anywhere in the power stores system for 2 years or more. Analysis of our sample items, including response to a questionnaire sent out to storeroom personnel, disclosed that some of these items had been onhand for 20 years or more. It appears highly doubtful that many of these items will ever be needed.

For example, one storeroom had two electrical coils onhand since the 1950s with no issue activity, even though the items were classified as regular stock (not standby). Plant personnel could not say when or how the items might be used. In another instance, a relay onhand since the 1950s was acknowledged to be obsolete, however, no disposal action had been taken or requested.

Although the retention of inactive stock increased inventory holding costs and the risk of loss through obsolescence, TVA has no systematic program for identifying unneeded items and removing them from the system. Storeroom personnel indicated that even when unneeded inventory items are identified and reported as excess they are not always removed from inventory.

Standby material is inconsistently classified

Although a large part of the power stores inventory is classified as standby, much confusion exists among storeroom personnel as to the definition and intended use of standby items. TVA does not have a published definition of standby stock, however, one official informed us that standby items are items which are not subject to normal wear but may break and cause a generating outage. We found that this definition was not universally understood and applied and, as a result, many items were inconsistently classified.

Our analysis showed that items coded as standby ranged from inactive to very active. In some instances, common items were coded as standby at one location and regular stock at another with no apparent relationship to experienced usage. For example, a lifting rod was classified as standby at a storeroom which had used 11 units during the past 24 months, while another storeroom that had used 4 units classified the item as regular stock.

In another instance, 28 storerooms classified an insulator as standby while 8 storerooms classified the item as regular stock. Eighteen of the storerooms classifying the insulator as standby had substantial issue activity, while 7 of the storerooms classifying the item as regular stock had no activity at all.

Inaccurately coding material as standby allows items with little or no demand to be retained in stock in quantities that cannot be justified. It hides material from excess screening and permits improper retention of large quantities of material for reasons other than demand.

CHAPTER 3

ACTIONS TAKEN AND ADDITIONAL ACTIONS NEEDED TO STRENGTHEN MATERIAL MANAGEMENT

Although TVA management has recognized the need for strengthening controls over its materials and is currently completing development of an automated material management system, known as MAMS, it has not yet adopted the organizational structure and material management policies and procedures needed to correct the deficiencies discussed in chapter 2. Until this is done, inventories will not be significantly reduced and the primary benefits expected from the new management system will not be fully realized.

TVA EFFORTS TO IMPROVE MATERIAL MANAGEMENT SYSTEM

Following a feasibility study in early 1960, power stores operations were converted to an electronic data processing system. The program mechanized several aspects of stores inventory control and accounting functions and greatly improved the operation of the system. However, because of resource constraints, the project was never fully implemented.

In 1974, because of the rapidly growing investment in power stores inventory, TVA contracted with a management consultant firm to study TVA's material management needs and to design a material management system. In January 1975 the consultant firm recommended that a TVA-wide material management system be developed which would improve visibility over the material management function, establish accountability for material inventories (based on responsibility for setting inventory levels), consolidate physical storage locations, and tighten control over stock levels using a combination of management and computer surveillance.

The consultant estimated that the power stores inventory could be reduced by nearly $30 million by reducing the average inventory level from the 19-month supply then on-hand to a 6- to 8-month supply. It estimated that such a reduction would save $6 million annually in inventory carrying costs.

The proposed management system was to be developed in two phases. Phase I would cover materials classification, power stores inventory, procurement, transmission planning

and engineering, accounts payable, and plant accounting. Phase II would cover engineering requirement planning, construction materials control, and construction cost accounting.

When reporting on system development in April 1976, the consultant estimated that $42 million or 64 percent of the $65 million power stores inventory value as of November 1975 would not be needed for at least 5 years. The consultant reported that under the existing management system

--material control responsibilities were fragmented throughout TVA,

--none of the line divisions had optimization of inventory levels as one of their formally assigned objectives, and

--the extremely high incidence of inaccurate reorder points and inaccurate maximum stocking levels indicated that these inventory control factors were not being properly maintained.

During our review, we were told that phase I of the project was nearly completed and phase II was scheduled for completion in March 1980. We found, however, that while TVA has accomplished much to automate and improve visibility over material management functions, it has done little to correct the basic management deficiencies noted above. In summary, TVA had developed a valuable management tool in the automated material management system but had not adopted the sound material management policies and procedures required to achieve the benefits the consultant contemplated for the system.

ADDITIONAL IMPROVEMENTS ARE REQUIRED

To correct the deficiencies in material management identified by the consultant and in chapter 2 of our report and to realize the savings expected from the automated system, TVA needs to adopt certain basic organizational and material management policy changes. First, TVA should establish an organizational entity with responsibility and authority to develop standard material management policies and procedures and direct their application throughout the power stores system. This entity should be knowledgeable of and responsive to the needs of the entire stores system but should be removed from the parochial outlook and subjective pressures brought by operating personnel.

The policies and procedures should ensure that

--stockage objectives are established at reasonable levels in accordance with an acceptable standard demand-based formula,

--the power stores system is screened for excess stocks on a regular basis and the excess stock is redistributed to those activities with a requirement for the material,

--a program is established to regularly and systematically identify inactive items and remove them from inventory, and

--standby stock is properly defined and the definition is consistently applied throughout the power stores system.

Realistic stockage objectives should be based on a formula (1) reflecting administrative and procurement leadtime plus a reasonable safety level and (2) utilizing recent demand data. Logically, the computer would centrally perform this computation. Requests for material to meet extraordinary demands should be considered and documented as exceptions. Deviations from the indicated stockage objectives to achieve economic order quantities should not be arbitrary but should be based on formula computations which compare the cost of procurement actions to the cost of holding material in inventory.

Inventories should be screened for excesses on a regular basis in conjunction with periodic stockage objective reviews and also each time procurement action is considered. This will allow excess items of one plant to be redistributed to another with greater need. The screening also will facilitate the identification of material that should be considered for disposal because it is obsolescent or excess to a reasonable systemwide retention level. The success of such a program will require the designation of item managers with authority to direct redistribution or disposal of material as is appropriate.

An effective inactive item program should periodically identify items that have been in the system for a specified period of time without activity. Plant managers and other operating personnel should be required to justify holding the material in inventory or else the material should be released for disposal in total or in part.

Standby items generally should be those items with insufficient demand to warrant stocking but which are critical to the operation of a plant. In identifying standby items, TVA should consider stocking a limited number of items at central locations rather than at each plant where an item might be used.

CHAPTER 4

CONCLUSIONS, RECOMMENDATIONS, AND AGENCY COMMENTS

CONCLUSIONS

Basic weaknesses in TVA's management of power stores inventories have resulted in a substantial accumulation of excess material. Retention of this excess inventory has increased inventory holding costs and the risk of inactive material becoming obsolete. Although TVA management has recognized the need for improved material management and has developed a new automated material management system, the objectives set for the new system cannot be achieved and the expected benefits will not be fully realized unless the organizational structure is strengthened and sound management policies and procedures are adopted.

RECOMMENDATIONS

To strengthen control over material in the power stores inventory and to optimize inventory levels, we recommend that the Chairman of the TVA Board of Directors require that an organizational entity be established in the Office of Power with responsibility and authority to develop standard material management policies and procedures and direct their application throughout the power stores system. We further recommend that these policies and procedures be designed to ensure that

- --stockage objectives are established at reasonable levels in accordance with an acceptable standard demand-based formula,
- --the power stores system is screened for excess stocks on a regular basis and the excess stock is redistributed to those activities with a requirement for the material,
- --a program is established to regularly and systematically identify inactive items and remove them from inventory, and
- --standby stock is properly defined and the definition is consistently applied throughout the power stores system.

AGENCY COMMENTS

We furnished a draft of this report to TVA officials and obtained their informal comments. The officials generally agreed with our findings and recommendations. They stated, however, that material management policies and procedures had not yet been revised because they wanted to wait until the new automated material management system became fully operational and gained credibility with operating personnel.

While these events certainly would enhance material management, we do not believe that action on our recommendations should await their completion. The rapid growth of the inventories, the continuing accumulation of excess materials, and the high cost of holding inventories make immediate corrective action a necessity.

The officials also stated that a recent reorganization in the Office of Power should facilitate centralization of control over material management. A new position, Assistant Manager of Power (Administration), has been established which will be responsible for the material management function.

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