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REPORT TO

JOINT COMMITTEE ON ATOMIC ENERGY

REVIEW OF
ACCOUNTABILITY CONTROLS OVER
SPECIAL NUCLEAR MATERIALS
NUCLEAR MATERIALS AND EQUIPMENT CORPORATION

ATOMIC ENERGY COMMISSION

BY

THE COMPTROLLER GENERAL
OF THE UNITED STATES

JUNE 1967

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

JUN 2 0 1967

B-157767

Dear Mr. Chairman:

The General Accounting Office has made a review of policies, procedures, and practices of the Atomic Energy Commission and of Nuclear Materials and Equipment Corporation, a Commission licensee, relating to accountability of special nuclear materials. The review was made pursuant to a request made by letter dated September 7, 1966, from the Chairman of the Joint Committee on Atomic Energy. Also, in accordance with this request we have completed similar reviews of two other licensees and plan to report to you in the near future on the results of these reviews.

The Commission has recently made a number of revisions to its program for domestic safeguarding of special nuclear material, and we have been advised that additional actions are planned which have been designed to strengthen the program. We are therefore making no recommendations regarding existing regulations, contracts, and procedures.

The Commission and the licensee have had an opportunity to comment on the matters presented in this report, and their comments have been considered in the report. The licensee's written comments and our evaluation thereof are included as an appendix to the report.

A copy of this report is being sent today to the Vice Chairman of the Joint Committee on Atomic Energy. As agreed to by your staff representatives, we are making copies of this report available to the Commission and to the licensee. We plan to make no further distribution of this report unless copies are specifically requested, and then distribution will be made only after your approval has been obtained or public announcement has been made by you concerning the contents of the report.

Sincerely yours,

Elmer B. Staats

Comptroller General
of the United States

The Honorable John O. Pastore, Chairman
Joint Committee on Atomic Energy
Congress of the United States

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REPORT ON REVIEW

OF

ACCOUNTABILITY CONTROLS OVER

SPECIAL NUCLEAR MATERIALS

NUCLEAR MATERIALS AND EQUIPMENT CORPORATION

ATOMIC ENERGY COMMISSION

INTRODUCTION

The General Accounting Office has made a review of policies, procedures, and practices of the Atomic Energy Commission and of Nuclear Materials and Equipment Corporation (NUMEC), Apollo, Pennsylvania, relating to accountability of special nuclear materials owned by the Atomic Energy Commission (AEC) and held by NUMEC, an AEC licensee, at its Apollo facility. We did not examine into accountability practices at NUMEC's plutonium facility located at Leechburg, Pennsylvania.

Our review which was made pursuant to a request by the Chairman, Joint Committee on Atomic Energy, dated September 7, 1966, was directed toward an examination of the adequacy of AEC policies, procedures, and practices relating to accountability as they were applied to NUMEC's operations. Also, we examined NUMEC's written accountability procedures, past and current accountability and financial records, and certain production records.

BACKGROUND

During the period from the establishment of the Atomic Energy Commission in 1947 until the enactment of the Atomic Energy Act of 1954 (42 U.S.C. 2011), all special nuclear material in this country was owned by the United States Government and, with certain exceptions, was held by AEC and its cost-type contractors operating Government owned or controlled plants and laboratories. Under these circumstances, AEC, responsible for program direction and contract administration, was in a position to require its cost-type contractors to establish systems for control over special nuclear material.

Therefore, through a body of policies, guides, instructions, and standards, AEC developed a system of control for cost-type contractors, designed to demonstrate, through appropriate measurement and recording of receipts, production, and removals, and through physical inventories, the quantity and location of material on hand at the various facilities. The system was designed to localize, within a given plant, where losses were occurring, in order to provide a basis for investigation and possible corrective action. Additional controls were provided through AEC surveillance activities and personnel and physical security requirements.

One of the purposes of the Atomic Energy Act of 1954 was to provide:

> "*** a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public."

From the time of the passage of the 1954 act until the enactment of legislation in 1964 permitting private ownership of special

nuclear material, all such material within or under the jurisdiction of the United States continued to be under mandatory ownership of the United States Government, even though it was more widely held by cost-type and fixed-price-type Government contractors and licensees who were not Government contractors. Since 1964, private ownership of special nuclear material has been permissible. Although very little of this material has yet passed from Government to private ownership, all special nuclear material produced in privately owned nuclear reactors since the 1964 legislative amendment has been privately owned.

In furtherance of the Government's policy concerning the development of atomic energy, the 1954 act authorized, with certain restrictions, the distribution of special nuclear materials under licenses (Section 53). Regulatory authority is provided under section 161 which authorizes AEC to:

> "b. establish by rule, regulation, or order, such standards and instructions to govern the possession and use of special nuclear material, source material, and byproduct material as the Commission may deem necessary or desirable to promote the common defense and security or to protect health or to minimize danger to life or property;
>
> * * * * *
>
> "i. prescribe such regulations or orders as it may deem necessary *** (2) to guard against the loss or diversion of any special nuclear material acquired by any person pursuant to section 53 or produced by any person in connection with any activity authorized pursuant to this Act, and to prevent any use or disposition thereof which the Commission may determine to be inimical to the common defense and security, ***."

On April 6, 1955, AEC approved, for inclusion in the Code of Federal Regulations, 10 CFR 70. This regulation established the procedures and criteria for issuance of licenses and for the distribution by the Commission of special nuclear material to licensees and the terms and conditions for such distribution. The regulation is directed primarily to the protection of the health and safety of persons working with special nuclear material and of the general public, and provides that licensees maintain records showing the receipt, inventory, and transfer of special nuclear material.

In developing the regulations in 10 CFR 70, AEC considered the question of whether regulatory requirements for accountability and physical security of licensed material should be imposed in addition to the requirements for the protection of health and safety. AEC concluded that the physical protection and accountability controls which licensees, as prudent businessmen, would maintain over special nuclear material because of its intrinsic value and their financial responsibility for its loss or damage and the severe criminal penalties provided by AEC's governing legislation would adequately protect the national interest from the standpoint of unlawful diversion. Therefore, in 1955 a policy was adopted on the basis of this conclusion.

With regard to criminal penalties, the Atomic Energy Act of 1954, as amended, provides that:

> "Sec. 222. VIOLATION OF SPECIFIC SECTIONS.--Whoever willfully violates, attempts to violate, or conspires to violate, any provision of sections 57, 92, or 101, or whoever unlawfully interferes, attempts to interfere, or conspires to interfere with any recapture or entry under section 108, shall, upon conviction thereof, be punished by a

fine of not more than $10,000 or by imprisonment for not more than five years, or both, except that whoever commits such an offense with intent to injure the United States or with intent to secure an advantage to any foreign nation shall, upon conviction thereof, be punished by death or imprisonment for life (but the penalty of death or imprisonment for life may be imposed only upon recommendation of the jury), or by a fine of not more than $20,000 or by imprisonment for not more than twenty years, or both.

"Sec. 223. VIOLATION OF SECTIONS GENERALLY.--Whoever willfully violates, attempts to violate, or conspires to violate, any provision of this Act for which no penalty is specifically provided or of any regulation or order prescribed or issued under section 65 or subsections 161 b., i., or p. shall, upon conviction thereof, be punished by a fine of not more than $5,000 or by imprisonment for not more than two years, or both, except that whoever commits such an offense with intent to injure the United States or with intent to secure an advantage to any foreign nation, shall, upon conviction thereof, be punished by a fine of not more than $20,000 or by imprisonment for not more than twenty years, or both."

In May 1966, after reviewing its policy which was based on the "intrinsic value" concept, AEC concluded that a change should be made in the direction of placing more reliance on positive requirements, with respect to accountability controls over licensees. There was, among the actions taken to strengthen the program since that time, approval by AEC on January 25, 1967, of amendments to 10 CFR 70 which will require certain licensees to establish, maintain and submit to AEC written procedures for the control and accounting for special nuclear material in their possession and to take a physical inventory not less often than annually.

AEC authorized NUMEC to receive and process special nuclear material at its Apollo facility under license number SNM-145. As

an AEC licensee, NUMEC first received material by lease arrangement in December 1957. NUMEC received its first nuclear material as an AEC contractor in August 1959, and since that time has processed nuclear material which was received under lease for commercial work and which was received under various types of contracts and subcontracts with AEC and Government contractors.

NUMEC owns and operates a uranium processing facility at Apollo, Pennsylvania. The major emphasis of the facility is on the conversion of uranium hexafluoride to uranium oxide or carbides and the fabrication thereof into products for use in nuclear reactors, including commercial power, research and governmental applications. The Apollo facility also recovers uranium from various scrap and residue materials commercially and from its internally generated scrap.

NUMEC is not equipped at its Apollo plant to prepare uranium metal but is equipped for most operations involving uranium compounds. Separate processing and fabrication lines are operated for uranium enriched above 5 percent U-235 and for uranium of 5 percent U-235 or less. Also, NUMEC maintains a scrap reprocessing line for uranium of less than 5 percent enrichment which is separate from the line for uranium above 5 percent enrichment.

Over the years, NUMEC has had significant amounts of special nuclear materials under its control. NUMEC and AEC records show that NUMEC's receipts and shipments of special nuclear materials from start-up through December 31, 1966, amounted to about 21,750 kilograms U-235 and 19,865 kilograms U-235 respectively. NUMEC reported losses during this period amounting to about 260 kilograms U-235, or about 1.2 percent of total receipts, and an ending inventory at December 31, 1966 of about 1,625 kilograms U-235 with a value of about $19.5 million.

During its investigations of NUMEC's loss experience, AEC has noted that NUMEC performed a diversity of processes in its uranium operations, some of which were unique and had been untried commercially. On one "first of a kind contract" where a large loss was experienced, NUMEC described its operation as "an extremely dirty and dusty process." The difficulty of this job was confirmed by an official of Westinghouse Electric Corporation, the Government contractor; he advised AEC that there was insufficient experience with this type of process, none which was really comparable, on which to evaluate NUMEC's processing experience.

A list of the current principal officials of the Atomic Energy Commission responsible for the administration of activities discussed in this report is shown below.

	Tenure of office	
	From	To
Chairman:		
Glenn T. Seaborg	Mar. 1961	Present
Operating and Promotional Functions		
General Manager:		
R. E. Hollingsworth	Aug. 1964	Present
Assistant General Manager for Administration:		
John V. Vinciguerra	May 1966	Present
Licensing and Regulatory Functions		
Director of Regulation:		
Harold L. Price	Sept. 1961	Present

COMMENTS ON ACCOUNTABILITY CONTROLS OVER AEC-OWNED SPECIAL NUCLEAR MATERIALS FURNISHED TO NUMEC

The Commission in 1955 concluded that the accountability controls which licensees, as prudent businessmen, would exercise over special nuclear material because of its intrinsic value and their financial responsibility for its loss or damage and the criminal penalties provided by AEC's governing legislation would adequately protect the Government's interest. In our opinion, the problems regarding accountability of special nuclear materials at NUMEC relate directly to this policy and to the control mechanisms established to carry out the policy.

Under the Atomic Energy Act of 1954, as amended, AEC is authorized to prescribe such regulations or orders as it may deem necessary to guard against loss of special nuclear material. NUMEC's past procedures and practices for the accountability of special nuclear material were not sufficiently adequate to identify losses of uranium with specific jobs or process areas or with the period of time in which such losses occurred. Although NUMEC made periodic physical inventories and AEC performed a number of accountability surveys, a significant quantity of enriched uranium could not be accounted for in the spring of 1965 when NUMEC prepared to close out a large contract.

Because of the condition of NUMEC's records, we were similarly unable to identify the specific disposition of this material. AEC has stated that, although it could not be stated with certainty that diversion had not taken place, no evidence had been found to support the possibility of diversion and that other information did exist to reduce such possibility.

Considering the importance of having a reliable and accurate accounting of the use of special nuclear materials, we believe that, with regard to NUMEC, AEC has utilized its authority for control of such materials in a manner that has been less than clearly effective. Also, it appears to have been incumbent on NUMEC to ensure the effective implementation of system improvements, since, on the basis of the record, it should have been evident to NUMEC that its system was not providing a current and accurate accountability for the special nuclear materials for which it was responsible.

Although general guidance was provided by AEC in the form of recommendations or suggestions, we noted an absence of definitive standards to direct NUMEC in the formulation of an acceptable materials control system. AEC surveys over the years have repeatedly identified a need for improvements to NUMEC's materials control system, and, at various intervals, have resulted in concern as to the adequacy of NUMEC's controls over special nuclear materials. For the most part, in consistence with its policy, AEC has attempted to obtain improvements in NUMEC's system through encouragement and suggestions, rather than by more aggressive efforts to ensure the existence of an accurate and reliable materials control system.

In connection with this, AEC, in establishing its policy in 1955, noted that, if the policy proved inadequate, other means of ensuring adequate protection would be considered. Considering the concern evidenced at times by AEC, we feel that "other means," such as the institution of a resident inspection system at NUMEC, to provide assurance that an effective accountability system was being maintained and material was being adequately safeguarded, would have been appropriate.

AEC records indicate that NUMEC has generally responded to suggestions made as a result of the surveys. It appears, however, that NUMEC did not exert the sustained effort necessary to effect and maintain the accountability system improvements necessary for the localization and timely detection of losses. As late as November 1965, AEC reported that its survey of NUMEC records confirmed the findings of prior surveys that the records which purport to control internal movement of material were incomplete and inadequate.

With respect to the current situation at NUMEC, our review showed that, in the past year, NUMEC has made relatively significant progress in the development of a sound accountability system. We noted that improvements are still necessary in the area of localization and timely detection of losses. Also, on the basis of its most recent survey, AEC has yet to be satisfied as to the adequacy of the implementation of NUMEC's system.

By letter dated January 25, 1967, NUMEC advised AEC of the actions that had been and were being taken to comply with recommendations in AEC's most recent survey report, and NUMEC proposed March 31, 1967, as the date for a physical inventory of special nuclear material at NUMEC. By letter dated February 10, 1967, ORO advised NUMEC that it would observe the taking of the March 31, 1967, physical inventory and would conduct a survey and submitted for NUMEC's consideration a survey plan summary which had been developed by ORO as a means of arriving at a mutual understanding of the survey plans.

We were subsequently advised that, by mutual agreement between AEC and NUMEC, the survey was delayed until April 30, 1967, because it was expected that by that time the uranium inventory would have been reduced and a more accurate physical inventory could be taken. After considering the history of this case, we

expressed the view to NUMEC and AEC that this survey should be utilized as a basis for developing a mutual understanding and agreement on AEC requirements and for establishing jointly a fully acceptable materials control system on a timely basis.

We were subsequently advised by AEC that its planned April 30, 1967, inventory verification had been postponed because of the condition of NUMEC's uranium inventory. NUMEC had advised AEC that approximately half of its uranium inventory was in scrap residues.

NUMEC proceeded with its physical inventory on April 30, 1967, and so advised AEC during a meeting on May 4, 1967. We were informed that it had been agreed during the meeting that NUMEC provide AEC with (1) a detailed description of the steps it used to take the inventory, (2) all sampling, analytical, and other measurement data obtained from the physical inventory and NUMEC's interpretation of such data, and (3) NUMEC's statement of its April 30, 1967, inventory. We were further informed that an AEC survey team had arrived at NUMEC on May 10, 1967, to review the current situation.

AEC REGULATIONS AND PROCEDURES RELATING TO CONTROL OF SPECIAL NUCLEAR MATERIALS BY LICENSEES

AEC's principal regulations applicable to the issuance of licenses for handling special nuclear material are set forth in 10 CFR 70, "Special Nuclear Material," and 10 CFR 20, "Standards for Protection Against Radiation." These regulations are directed primarily to protection of the health and safety of persons working with radioactive material and of the general public and provide that licensees maintain records showing the receipt, inventory, and transfer of special nuclear material.

Under the provisions of the Atomic Energy Act of 1954, as amended, AEC is authorized under Section 53 to issue licenses and to distribute special nuclear material to licensees by sale, lease, or grant. Material distributed to lessees under this provision is generally referred to as Section 53 material. The act also provides that the Commission may make a reasonable use charge for material distributed by lease under Section 53. The act does not require a license for special nuclear material to be held under contract with and for the account of the Commission.

Material so held is generally referred to as non-Section 53 material. However, non-Section 53 material may also be held under a Section 53 license when there are circumstances in which the exemption from licensing is not applicable. Thus the same facility might hold at the same time Section 53 material under a Section 53 license, non-Section 53 material under a Section 53 license, and non-Section 53 material under a contract with and for the account of the Commission.

In developing the regulations in 10 CFR 70, approved in 1955, AEC considered the question of whether regulatory requirements for

accountability and physical security of licensed material should be imposed in addition to the requirement for the protection of health and safety. AEC concluded that the physical protection and accountability controls which licensees, as prudent businessmen, would maintain over special nuclear material because of its intrinsic value and their financial responsibility for its loss or damage and the severe criminal penalties provided by AEC's governing legislation would adequately protect the national interest from the standpoint of unlawful diversion.

With respect to accountability, AEC subsequently added provisions to part 70, requiring licensees to submit material transfer reports and periodic material status reports to AEC on forms prescribed by AEC. AEC's procedures provided that the material transfer forms be signed by both the shipper and the receiver to show agreement as to the data recorded. The shipper and receiver must resolve any differences or submit the matter to a referee for settlement.

During the early years of the program, Section 53 material was distributed to licensees under individual lease agreements. Effective May 1, 1960, AEC established a standard "Lease Agreement" for the distribution of Section 53 material. Terms of this agreement included, among other pertinent clauses, a provision that the lessee:

1. Have full financial responsibility for the consumption and loss of materials and for payment of use charges and services as applicable.

2. Submit to AEC transfer documents covering receipts and shipments of material and reports of losses and inventory.

3. Maintain and make available, for AEC inspection, adequate records pertaining to the receipt, possession, transfer, or use of material subject to the lease.

The agreement was revised July 1, 1963, to further provide that the lessee take at least one physical inventory a year and use his best efforts to segregate special nuclear material subject to the lease from any other nuclear material in his possession.

In addition to using the lease arrangements, AEC has over the years contracted with private industry for work related to AEC programs. As discussed previously, the Atomic Energy Act of 1954 provides that contractors holding special nuclear material "with and for the account of the Commission" can be exempted from licensing. AEC field offices and their prime contractors entered into contracts and subcontracts with licensed and nonlicensed facilities, which provided for the furnishing of the material as non-Section 53 material.

Originally, the terms of these contracts and subcontracts, which were for the most part fixed-price, differed from the terms of the Lease Agreement in that they generally did not provide for full financial responsibility or for the payment of use charges. In recent years, however, full financial responsibility has generally been required. Material transfer forms and periodic material balance reports are required by holders of non-Section 53 material.

Under fixed-price contracts, involving the use of non-Section 53 material, accountability and safeguards requirements existed to the extent that such requirements were contained in the contracts. We were informed that the provisions among different contracts varied considerably in this regard. To minimize the resulting problems, in September 1962 AEC issued instructions to field offices providing for the use of uniform terms and conditions

to be employed to the "maximum feasible extent" by the AEC and its cost-type contractors in connection with the furnishing of non-Section 53 material under fixed-price contracts involving the use of special nuclear material.

These uniform terms and conditions were generally similar to those set forth in the Lease Agreement. However, the uniform contract terms and conditions, unlike those of the Lease Agreement, specifically require the contractor to physically segregate material subject to the contract from other material in the contractor's possession and prohibit the blending of materials, unless the parties otherwise agree, and do not require the payment of a use charge.

Licensees who had cost-type contracts were subject to such accountability and safeguards requirements as might be established by the cognizant AEC field office. In these cases the field offices had AEC Headquarters' guidelines relating to accountability systems as well as their own experience with AEC's operating contractors for guidance in establishing requirements.

In addition to using the above lease and contracting arrangements, on July 22, 1964, AEC adopted the use of a standard Supply Agreement which followed closely the terms and conditions of the Lease Agreement. The Supply Agreement is for use in supplying non-Section 53 enriched uranium to contractors for use under AEC fixed-price contracts.

Although NUMEC is licensed and has held material under a lease agreement, the predominant quantities of special nuclear material held by NUMEC have been furnished under various fixed-price contracts either directly with AEC or under subcontract with Government contractors. Therefore, under the fixed-price contracts, NUMEC has been subject to the accountability provisions of each

contract, as well as to the requirements in the license and the regulations.

AEC maintains records concerning all Government-owned special nuclear material. Further, all special nuclear material licensees, except for a few which possess negligible quantities of material, are subject to periodic on-site accountability surveys under the terms of the regulations, the license, an AEC contract, or a lease agreement. The surveys were designed primarily to protect the proprietary interest of AEC, and they also provided a measure of protection against loss or unlawful diversion.

Criteria and procedures for conducting proprietary accountability surveys are in AEC Immediate Action Directive (IAD) 7400-4, "Surveys of Leased SS Material," dated May 12, 1962, and IAD 7400-8, "Surveys of Fixed Price Contractor and Subcontractor Facilities," dated July 18, 1963. The purpose of such surveys is to obtain an independent opinion on the validity of the data reported.[1] Each survey is to include an audit of the material records, a review of internal control measures, and independent verification of the special nuclear material inventory, including the element and isotopic content. Although general guidance was provided by AEC Headquarters, the specific procedures that were to be applied in carrying out the surveys were largely left to the discretion of the operations offices responsible for making the surveys.

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[1] In consistence with the determination to strengthen controls over special nuclear material in the hands of licensees, AEC by IAD 7402-11 dated April 5, 1966, provided for the expansion of the scope of surveys of special nuclear material, held under lease and under fixed-price contracts and subcontracts, to include a determination of the quantities and the probable causes of process losses, accidental losses, wastes, write-offs, and material unaccounted for, and an evaluation of the significance of these quantities.

In consistence with its philosophy of relying on the intrinsic value concept and severe criminal penalties for unlawful diversion, AEC did not promulgate to licensees specific criteria or standards of performance by which AEC would evaluate the licensees' operations. AEC had adopted the view that prudent business, having its own money invested, would take all necessary actions to ensure that its assets were appropriately known and utilized for the purposes acquired. In consistence with this philosophy, on the matter of licensee accountability surveys, a document prepared by the Division of Nuclear Materials Management and forwarded to field offices in January 1966 provided in part:

> "The opinions of the survey team may be affected by the type facility being surveyed. At an AEC-owned and controlled facility, inventory control deviations might not be permitted that could be tolerated at a fixed-price contract facility where the [licensee] is financially responsible for the material. At a fixed-price facility or a facility having leased material, the survey team may find itself in the position where overall control is adequate but some areas need improvement. Unless the survey team can demonstrate loss of control or other violation of contractual terms and conditions the facility may take the position that changes and improvements in the control system are not required or needed. However, the survey team may suggest changes that would improve control and at the same time assist the facility to reduce effort or provide more useful data. Also, at facilities other than cost-type contractors opinions, recommendations, and suggestions regarding inventory management are not appropriate."

CHRONOLOGICAL DESCRIPTION OF AEC
SURVEYS OF NUMEC'S APOLLO FACILITY

The New York Operations Office (NYO) performed the initial accountability survey of the Apollo plant in September 1960. In a letter dated October 26, 1960, the Director, Technical Services Division, NYO advised NUMEC that:

> "I am disturbed by the report of the survey made by our SS Nuclear Materials Management group of your plant, September 26-30, 1960. The report indicates that you did not have adequate control over the nuclear material, both licensed [Section 53] and accountable [non-Section 53], held at your site."

The letter thereafter enumerated a number of "suggestions and comments" regarding the need to establish responsibility for controls by material balance area, to maintain records to show the material inventory in each area, to improve inventory taking, and to improve weighing and labeling practices.

NYO, in concluding the letter, advised NUMEC that, because of the excellent cooperation received from NUMEC's staff in seeking to establish nuclear material control, the survey would be set aside and another survey would be made early in the spring of 1961. It was stated that, at that time, NUMEC would be expected to have established workable procedures that would meet AEC standards. In this connection, NYO did not advise NUMEC, except by virtue of its suggestions and comments noted above, of the standards by which NUMEC procedures would be evaluated; the standards were those developed to apply primarily to AEC cost-type contractors.

By letter dated May 12, 1961, NYO advised NUMEC that it had completed its second survey of NUMEC and that its review had been made in accordance with principles intended primarily to govern operations of cost-type contractors. In a summary paragraph, the Director, Technical Services Division, NYO advised NUMEC:

"I am pleased with the great improvement in your operations since our earlier review last September. The comments made in my letter to you dated October 26, 1960 have been acted upon and implemented by your staff. As a result of the current survey, I find that NUMEC meets the AEC requirements for nuclear material accountability."

The letter also made several suggestions to assist NUMEC in its nuclear material control, which concerned the need for a current procedures manual, records for material controls, better weighing and labeling practices, and the need to recover uranium from waste on a more current basis.

During the period from May to August 1962, the AEC Headquarters staff, with assistance from NYO, performed a survey at NUMEC. In its survey report, which was not provided to NUMEC, AEC stated that NUMEC's system of internal control was extremely limited and did not provide a degree of control sufficient to meet AEC standards required for contractors of AEC-owned facilities. The report cited the following matters, among others, which were of concern to the survey team:

1. Losses could not be localized to specific process areas.
2. Ledgers were incomplete.
3. Records did not support monthly material balance reports.
4. A sizable backlog of internally generated uranium residues existed, much of which were not readily identifiable by contract and were stored without an assigned uranium content.
5. Physical inventories were not scheduled on a routine basis; no inventory had been taken between March 1961 and May 1962.

The survey report was reviewed in draft form by NYO. One of the more pointed comments by NYO was that Headquarters' criticism of NUMEC's internal control system appeared to be based upon AEC standards for contractor operation of AEC facilities under

cost-type contracts. NYO stated that it would be more meaningful to compare the internal control system "with that of generally accepted business standards." The precise significance that could be attached to this suggestion is not readily apparent inasmuch as such standards, as they relate to special nuclear materials, were, to our knowledge, nonexistent. The second facet appropriate for consideration is that the operations office, in conducting its survey made in 1961, in order to make the evaluation of NUMEC's activities, used the AEC standards intended primarily for its cost-type contractors.

AEC did not formally advise NUMEC of the results of the 1962 survey until October 26, 1962. For the interim, AEC records show that in a meeting early in October 1962, the Director, Division of Nuclear Materials Management (DNMM), informed a NUMEC official that he "was quite concerned over the situation which existed at NUMEC" and advised him of the principal corrective actions considered necessary.

The Oak Ridge Operations Office (ORO) had been made responsible for reviewing NUMEC activities effective June 30, 1962. Prior to the aforementioned October meeting, the Director, DNMM, forwarded the report to ORO for appropriate action. In transmitting the report, the Director advised ORO that the survey indicated that little further improvement seemed to have taken place since the 1961 survey and that "*** in fact, we suspect there has been retrogression." The Director also stated that the findings had been discussed with NUMEC but that no recommendations had been made by AEC.

In a letter dated October 26, 1962, communicating the Headquarters survey results to NUMEC, ORO stated:

"The recent survey of nuclear materials management *** disclosed a number of points which, if corrected by you, would improve your knowledge and control of special nuclear materials within your plant.

"It is suggested that your internal control system should be based on data developed during processing which would thus provide current and accurate information readily disclosing all special nuclear material physically on hand and all losses as they occur."

ORO suggested specific actions, including suggestions to install a general ledger to summarize accounts monthly and annually, maintain transfer journals currently, develop a subsidiary ledger to account for special nuclear material by job and by material balance area, establish control over internal transfer documents, and take periodic physical inventories and record the results thereof.

NUMEC responded in November 1962, advising ORO that a complete system of internal checks was being incorporated and that the functions of maintaining control records were being separated from the physical accountability functions.

On February 7, 1963, two AEC representatives visited NUMEC to review the progress made by NUMEC toward accomplishing the suggestions made in October 1962. On the basis of the representatives observations during this 1-day visit, ORO, by letter dated April 18, 1963, informed NUMEC:

"In view of the significant progress already made, and the work currently underway to achieve all of the objectives, we consider the performance to date as very commendable."

In July and August 1963, a detailed survey was made by ORO. The report prepared on this survey did not state the basis or standards which were used in performing the evaluation of NUMEC's controls over special nuclear materials. By letter dated July 12, 1963, ORO rejected NUMEC's June 30, 1963, inventory. NUMEC