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REPORT TO THE JOINT COMMITTEE ON ATOMIC ENERGY CONGRESS OF THE UNITED STATES

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Protecting Special Nuclear Material In Transit: Improvements Made And Existing Problems B-164105

Atomic Energy Commission

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

APRIL 12, 1974

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

B-164105

The Honorable Melvin Price, Chairman
Joint Committee on Atomic Energy
Congress of the United States

Dear Mr. Chairman:

Pursuant to arrangements made with your office, this is our report on improvements made in and problems which still exist in the Atomic Energy Commission's (AEC's) program for protecting special nuclear material (SNM) in transit. SNM is fissionable plutonium or enriched uranium used principally in fabricating nuclear weapons and as fuel for nuclear reactors.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Because of the potentially dangerous consequences from a diversion of certain kinds of SNM, an effective program for its protection is essential. Therefore, we reviewed AEC's program for both the in-plant and in-transit protection of such material by organizations authorized to possess it.

SNM is categorized as either classified (top secret, secret, or confidential) or unclassified, depending on its physical and chemical characteristics. In a November 7, 1973, report (B-164105) we informed the Congress of actions needed or being taken by AEC to improve the in-plant physical protection of unclassified and confidential SNM. This report discusses the protection afforded unclassified and confidential SNM while in transit.

SNM can be moved by airplane, truck, ship, and train and has been shipped by AEC, its contractors, and privately owned AEC licensed organizations called licensees. According to AEC about 1,300 shipments of SNM required protection in fiscal year 1972--about 600 classified and 700 unclassified shipments.

During September and October 1972, we observed the protection afforded three large shipments of highly enriched uranium--two confidential and one unclassified--and found that the material was susceptible to a diversion or a diversion attempt. Our observations were limited to the protection afforded SNM shipped by truck and material which was held at an airport terminal and subsequently placed on a passenger airplane. To observe the protection afforded the material, we visited selected organizations authorized to ship SNM. We reviewed legislation, regulations, policies, and practices relating to AEC's protection requirements and interviewed AEC officials responsible for SNM protection.

We had planned to observe the protection afforded SNM shipped under various modes of transportation. However, shortly after our review began, AEC made some and proposed other significant changes in its requirements for protecting SNM in transit; therefore, we decided to curtail our review. We believe, however, that the program for protecting SNM in transit is of such importance that the Committee should be informed of our observations, the actions taken or being taken by AEC, and the problems which still exist.

We have discussed this report with AEC representatives and have considered their comments in finalizing this report.

IMPORTANCE OF PROTECTING SNM

According to AEC, persons with the requisite technical expertise and the necessary resources could make a crude nuclear weapon from about 17 kilograms[1] of certain kinds of uranium or 6 kilograms of plutonium. Since the nuclear material is the principal ingredient in a nuclear explosive, a key question is: How difficult would it be for an organization to convert the material into a workable or a creditable bomb?

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[1] A kilogram is about 2.2 pounds.

A renowned nuclear physicist addressed this question in an article which appeared in the February 4, 1973, issue of the New York Times Magazine. He stated that an organization which had stolen some SNM would not be expected to make a highly sophisticated weapon and that fabricating high explosives into a workable implosion device and arranging for the simultaneous detonation of all the parts was not a job for amateur machinists or television-type electronics men. Nevertheless, he concluded that "a sufficiently dedicated band of bomb makers might fashion a modestly effective implosion bomb."

RESPONSIBILITY FOR INSURING SNM IS PROTECTED

The Atomic Energy Act of 1954, as amended (42 U.S.C. 2011), charges AEC with insuring that SNM is protected against loss or diversion and authorizes AEC to establish rules and regulations necessary to promote the common defense and security or to protect health or minimize danger to life or property.

AEC's requirements for physically protecting SNM while in transit apply to

--all classified SNM,

--unclassified shipments of 5 or more kilograms of Uranium-235 (enriched 20 percent or more), or 2 or more kilograms of Uranium-233 or plutonium,[1] or certain combinations thereof.

AEC has stated that there have been no known diversions or diversion attempts of SNM in transit. AEC recognizes, however, that the probability of SNM being stolen increases as the quantity of SNM and number of organizations authorized to hold and ship it increases.

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[1] The quantities of unclassified Uranium-233 and Plutonium requiring protection were lowered from 5 to 2 kilograms in February 1973 for AEC and AEC contractor shipments and in November 1973 for AEC licensee shipments.

AEC's General Manager, through the Division of Security, is responsible for developing standards for the physical protection of SNM shipped by AEC and AEC contractors. The protective standards which must be followed for such shipments are contained in AEC Manual Appendix 2401 for classified shipments and AEC Manual Appendix 2405 for unclassified shipments. AEC's Division of Waste Management and Transportation is responsible for developing procedures to implement the standards developed by the Division of Security.

AEC's Director of Regulation is responsible for developing requirements for the physical protection of SNM shipped by licensees. The regulations governing these shipments are contained in the Code of Federal Regulations (10 CFR 73). The licensees are responsible for providing the physical protection measures called for in the regulations.

IN-TRANSIT PROTECTION REQUIREMENTS

The objective of AEC's safeguard program is to prevent or quickly detect a diversion or diversion attempt. However, at the time of our review, AEC had not fully defined the expected capability of a physical protection system. This weakness was recognized in an AEC internal study completed in September 1971 which stated

> "* * * there is a strong need to update and define more fully the objectives of the AEC safeguard program. Equally important is the need to define more fully and bring to a current basis the threats that the AEC should safeguard against. Moreover, there is a need to develop quantitative standards of performance needed to meet the safeguards objectives once they are defined. This is not to say that there is any evidence material has been diverted; however, we believe these changes are necessary to bring about greater confidence that material will not be diverted in the future."

AEC's regulatory organization expressed a similar concern in a June 1972 Transportation Policy Analysis Paper which stated

"* * * existing policy gives only the most general guidance as to what constitutes adequate protection, particularly on the question of defending a shipment against an overt theft attempt."

Until December 1972 the protection requirements imposed on organizations authorized to transport SNM--with the exception of SNM classified as top secret or secret[1]--permitted such material to be transported

--in the personal custody of an authorized person[2] designated by the shipper or

--under the established procedures of a common or contract carrier which (1) provide for the protection of valuable material in transit and (2) require the exchange of hand-to-hand receipts whenever there is a change of custody.

In addition, a shipper was required to notify the receiver of the estimated time of arrival and, if the material was classified confidential, the material had to be packaged in such a manner that attempted opening or unauthorized inspection could be readily detected en route or upon arrival at the destination.

In December 1972 AEC began issuing changes to its requirements which, in part, were aimed at strengthening the protection of confidential and unclassified SNM in transit.

--The Division of Security issued two directives which required, among other things, that all SNM shipments

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[1]The protection requirements for these shipments were more stringent than those for confidential and unclassified shipments. For example, top secret shipments were required to have at least two armed escorts.

[2]For AEC and AEC contractors' shipments, this person must possess an AEC access authorization or a security clearance granted by another Federal agency.

by AEC and its contractors be in the continuous personal custody of a cleared person and prohibited the en route transfer of SNM. (Published in December 1972.)

--The Division of Security has proposed that all SNM shipments transported by AEC or its contractors via ground transportation be made in the custody of AEC armed guards. (Proposed requirement issued for internal AEC comment in October 1973.)

--The Director of Regulation published in the Federal Register proposed amendments to 10 CFR 73. (Proposed amendments issued for public comment in February 1973.[1])

The regulations issued for public comment in February 1973 were finalized on November 6, 1973. Licensees had until January 7, 1974, to submit plans outlining their procedures for meeting the new requirements and until March 6, 1974, to fully implement their plans. Some of the new protection requirements imposed on licensees were:

--Truck and trailer shipments must be accompanied by armed escorts traveling in separate vehicles unless trucks and trailers specifically designed to protect against loss or diversion are used.

--Shipments by truck must be made on a point-to-point basis with no loading or unloading of other cargo between these points.

--Periodic calls en route between the truck driver and the shipper or his agent must be made.

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[1] The Division of Security and the Director of Regulation also issued instructions in January 1973 and February 1973, respectively, which limited the amount of SNM which could be placed on board passenger airplanes.

--All air shipment transfers en route shall be monitored by a guard.

--Routes shall be preplanned.

--Trucks must be marked on the top, sides, and rear with identifying letters or numbers.

PREVIOUS GAO REPORT

In a report entitled "Improvements Needed in the Program for the Protection of Special Nuclear Material" (B-164105, Nov. 7, 1973), we discussed AEC's program for SNM in-plant protection. We recommended that, among other things, AEC (1) define in greater detail the expected capability of a protection system designed to prevent, detect, and immediately respond to a possible diversion or diversion attempt and strengthen the protection requirements to the extent necessary and (2) impose the same protection requirements on licensees and contractors for unclassified material unless different protection standards for these holders of SNM could be justified.

These two recommendations are also applicable to the conditions we observed relating to SNM in transit. AEC has told us that, in implementing these recommendations, action has been or will be taken to resolve these problems for the in-transit and in-plant protection of SNM.

OBSERVATIONS PERTAINING TO PROTECTION AFFORDED SNM IN TRANSIT

AEC has recognized--at least since 1967--that the weakest link in protecting SNM from a diversion or diversion attempt was probably when SNM was being transported. Numerous articles and papers have been written by knowledgeable organizations and individuals enumerating their concerns regarding the protection afforded SNM in transit.

For example, the Institute of Nuclear Materials Management[1] stated in a study completed in May 1970 that (1) a credible threat existed for a possible diversion of SNM, (2) the likelihood of a diversion appeared great, and (3) AEC's accomplishments in the area of safeguards in transportation have seemingly been minimal. The study contained the following conclusion:

> "As a professional society, the Institute of Nuclear Materials Management can do no less than follow objectively where professional responsibility and logic leads. When logic applied by calm and reasonable men leads to alarm, as in the matter of safeguards for nuclear materials in transportation, then the Institute must be alarmist. Further, professionalism demands that the Institute report facts, logically and systematically arrived at, without regard to their palatability to all groups concerned. The situation with regard to safeguarding nuclear materials in transportation is itself unpalatable. The solutions to the problems, to which this situation gives rise, are likely to be unpalatable to many. The committee hopes that this report will influence national policy to the extent that prevention of diversions of nuclear materials in transportation will be accepted as a goal of the highest priority. At the very least, the committee trusts that the report will lead others to share our sincere concern, to motivate others to think through and explore the issues in depth, to pose constructive alternatives to government, to become vocal in demanding results, and to become nonparochial in their assault of this cogent issue." (Underscoring supplied.)

[1] A professional organization, composed of persons from the Government and the private nuclear industry, with the objective of encouraging the advancement of nuclear materials management.

During September and October 1972, over 2 years after the Institute's study, we observed segments of three large SNM shipments--two confidential and one unclassified--by AEC licensee-contractors, which are privately owned organizations holding SNM under AEC licenses and contracts. Two shipments were moved by vehicles owned or leased by the licensee-contractor and the third was delivered by the licensee-contractor in his own vehicle to an airport terminal, where the packages were dispatched via a passenger aircraft.

Our observations showed that, although the shipments were made in accordance with AEC's requirements in effect at the time, the protection afforded the material was inadequate to prevent, or quickly detect, a diversion or a diversion attempt.

Brief descriptions of the deficiencies we observed follow:

Shipment A (82 kilograms of highly enriched uranium shipped over 200 miles)

--The shipment was made in a flatbed truck with an open cargo compartment. (See picture 1A in app. I.)

--The truck was not equipped with an alarm or communications equipment.

--The truck driver was alone and unarmed.

--There was no preplanned routing (the driver chose his own route).

--There were no periodic call-in points to let the shipper or receiver know the truck's whereabouts and to confirm that no problems had been encountered en route.

Shipment B (144 kilograms of highly enriched uranium shipped about 250 miles)

--The shipping vehicle was a van-type truck which was not equipped with any type of communications equipment or alarm devices.

--The truck driver was alone and unarmed.

--The seals used on the shipping containers could be easily duplicated thus defeating the purpose of the seals, which was to detect unauthorized tampering.

Shipment C (48 kilograms of highly enriched uranium shipped over 400 miles)

We did not observe this shipment en route, but we did observe the material while at an airport terminal and observed that:

--The material was shipped in portable containers. (Containers which could be carried by one individual without the aid of mechanical devices.)

--At the airport the material was stacked on a dolly in an open bay area. (See picture 1B in app. I.)

--No special security measures were taken to protect the material while at the airport terminal.

The shipper said that the material was transported to the airport

--in a truck which had no communications equipment or alarm devices and

--by a driver who was alone and unarmed.

In commenting on our report, AEC stated that these shipments were not typical. AEC pointed out that about

80 percent of its and its contractors' shipments have been made via exclusive-use vehicles escorted by armed couriers. AEC stated, however, that a significant number of the SNM shipments (about 20 percent of its contractors' shipments and the majority of its licensees' shipments) appeared to have been made under minimum protection requirements.

PROBLEMS IN USING COMMON CARRIERS TO TRANSPORT SNM

In September 1971 AEC completed an internal study which covered the protection afforded shipments of SNM in transit. The study[1] stated that "Common carriers do not offer the degree of protection needed in the Safeguards Program." The study further stated that:

> "The problems faced by the transportation industry, particularly truckers, in terms of carelessness, inefficiency, and outright thievery, especially in terminal operations, have been so fully publicized elsewhere as to need no further discussion here."

The study discussed a number of problems in using common carriers to transport SNM such as (1) the unpredictable selection of drivers, (2) the uncontrolled assignment of cargoes to carriers at transfer points, and (3) the practical impossibility of installing and enforcing a workable system of personnel security clearances. According to AEC these conditions suggested that the use of common carriers for carrying material that requires safeguarding was probably not realistic.

The AEC study group concluded that the realistic alternatives available for providing an effective system for safeguarding SNM in transit were (1) a selected small group

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[1] AEC told us that its study involved the protection of small shipments of SNM weighing about 600 to 800 pounds, which moved in "less than truckload service."

of carriers (either contract carriers or specialized common carriers) subject to specific safeguard controls or (2) a transportation system owned and operated by the Government.

It was the study group's belief that

> "* * * If the small group of existing carriers does not have the capability, or is not able and willing, to move every SNM shipment for which there is a demand, the creation of a government-owned and operated system would offer the similar protective features and represent the only viable alternative since it is important to assure shippers of an adequate means of transporting SNM to any destination."

The AEC study group recommended that the Division of Waste Management and Transportation be directed to make a detailed study of the feasibility of using a Government-operated or Government-controlled (licensed) transportation system for shipping SNM. Instead of making a formal study, AEC decided to strengthen SNM in-transit protection by placing more stringent requirements on organizations shipping or receiving SNM (not the carrier) rather than establishing a Government-operated or Government-controlled system.

Authority to license carriers

Common carriers are not licensed by AEC, and AEC's regulations (10 CFR 70.12) exempt common carriers from its transportation safeguard requirements. Therefore, in those instances where SNM is shipped via common carrier,[1] AEC must enforce its requirements on the organization shipping or receiving the material not the carrier.

The Department of Transportation regulates carriers with regard to safety in transit. The Interstate Commerce Commission regulates rail and highway carriers concerning

[1]There were no firm figures available at AEC regarding the number of SNM shipments made via common carrier.

economic matters and the Civil Aeronautics Board similarly regulates air transportation. The Department of Transportation makes studies and issues advisory standards and guides for cargo security. No Federal agency, however, has assumed or has been assigned statutory responsibility for directly regulating carriers in safeguarding SNM against a diversion. AEC has concluded that it has such authority from the provision of the Atomic Energy Act of 1954 which requires AEC to promote the common defense and security (42 U.S.C. 2201(b)).

In July 1970 AEC met with representatives of the Department of Transportation, the Interstate Commerce Commission, and the Civil Aeronautics Board to discuss what arrangements could be made to regulate the transportation industry in safeguarding SNM. All those present at the meeting believed that, in view of the relatively small volume of shipments requiring safeguard measures, AEC should not pursue any course of action that would involve the necessity for overall upgrading of the performance of common carriers.

The memorandum prepared as a result of this meeting stated that

> "* * * it was unanimously agreed that AEC should consider a course of action whereby its requirements for transportation safeguards would be made known to the nuclear and transportation companies that would be involved and that AEC should specifically license and perform compliance inspections on those carriers selected to carry materials requiring safeguards."

Industry comments on new protection requirements

In commenting on the amendments to 10 CFR 73, which were proposed in February 1973, some industrial organizations suggested that the Government should provide protective services for SNM and others suggested that AEC license

the carriers because the organizations shipping or receiving the material have no control over the carriers. The following comments were made by two industrial organizations.

> "If the Commission concludes that the security requirements as proposed should be implemented, even though the Commission agrees that they are of little value in the face of a significant armed attack, we submit that the security functions should be performed by the armed forces, in the name of the common defense and security."

* * * * *

> "Regulations of transportation of special nuclear material via the licensee who has little control over the material in transit appears to be inadequate. Government licensing of the carrier would appear to resolve this difficulty, and we believe that such licensing action should be taken."

The problems of licensing carriers to ship SNM have been discussed in a number of AEC internal studies and the general consensus has been that shipments of nuclear materials represent such a small part of the business of most carriers that they would prefer not to handle nuclear material if it were to mean more regulation or a change in normal day-to-day services.

In view of the uncertainty surrounding the degree of (1) protection which can or would be provided by common carriers and (2) control which a shipper or receiver would have over a common carrier, we proposed that AEC determine the practicality of licensing carriers pursuant to its authority under the Atomic Energy Act of 1954.

AEC's views on licensing carriers

In commenting on our report, AEC said that it had decided, for the time being, not to license carriers. AEC stated that:

"* * * The [new] regulations define requirements that those now licensed to possess and use special nuclear material must comply with. Although it is our view that very few common carriers will be able to or want to comply with these recent amendments, if they are willing to make the investments necessary to transport special nuclear material and do comply with these regulations, the common carrier industry should remain available to licensees."

AEC pointed out that its concerns regarding the degree of protection provided SNM in transit will no longer exist if the regulations are followed because all SNM shipments will be constantly protected. AEC stated that

"* * * the principal elements for safeguarding nuclear material in transit are: (1) armed guard protection; (2) direct point-to-point shipment (no intermediate cargo stops); (3) pre-selected routing; (4) frequent communication with the shipment escorts during transit; and (5) a mechanism to pre-determine the trustworthiness of transport vehicle drivers and escorting guards.

"[The new regulations which were finalized on November 6, 1973] * * * provide for the first four of the above listed five elements. The fifth element is not achievable until the Atomic Energy Act is revised to provide statutory authority for it. Such revision has been recommended by the Commission in past years and is currently included in the legislative proposals for this year. Neither the elimination of 'common carriers' nor the application of direct AEC licensing prerogatives would facilitate a government clearance program for carrier employees. This can be accomplished only by enactment of the legislative authority discussed above or by the establishment of a government-owned and operated transportation system."

CONCLUSIONS

The protection afforded the SNM shipments we observed was inadequate to prevent or quickly detect a diversion or a diversion attempt. AEC has been slow to strengthen the protection of SNM in transit. We believe, however, that the actions taken by AEC since December 1972 represent important steps toward accomplishing the objective of the safeguard program.

We believe that it is important that AEC closely monitor SNM shipments and strictly enforce its new requirements to insure that SNM is given the protection AEC considers necessary consistent with the critical nature of the material.

AEC's decisions not to license carriers and not to establish a Government-operated transportation system were made without a formal study. If AEC finds that its new requirements do not result in the protection considered necessary, AEC should, as recommended in its September 1971 internal study, undertake a detailed study of the feasibility of using a Government-operated or Government-controlled (licensed) transportation system for the shipment of SNM.

MATTER FOR CONSIDERATION BY THE COMMITTEE

In the absence of AEC establishing a Government-operated transportation system for SNM, AEC's lack of specific authority to predetermine the trustworthiness of SNM transport drivers and escorting guards is a weakness in the SNM protection system. In view of this weakness the Committee may wish to consider amending the Atomic Energy Act to give AEC the authority to predetermine the trustworthiness of the vehicle drivers and escorting guards. This authority would provide AEC with what it considers a principal element for safeguarding SNM in transit.

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Copies of this report are being sent to the Vice Chairman of your Committee; the Director, Office of Management and Budget; and the Chairman, Atomic Energy Commission.

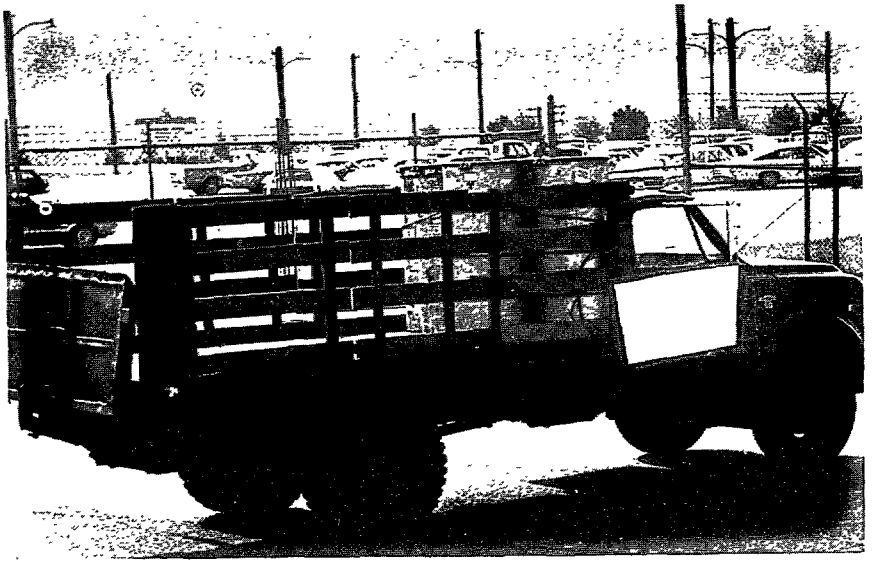
Because we believe this report will be of interest to other committees and Members of Congress, we are distributing it to them, as agreed to by your Committee.

Sincerely yours,

Elmer B. Staats

Comptroller General
of the United States

AFSC—Andrews AFB Md 1974



Picture 1A--82 kilograms of highly enriched uranium was shipped in this truck.

Picture 1B--48 kilograms of highly enriched uranium which received no special protection at the airport terminal.

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