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REPORT TO THE CONGRESS

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Improvements Needed In The Program For The Protection Of Special Nuclear Material

B-164105

Atomic Energy Commission

*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON DC 20548

B-164105

To the Speaker of the House of Representatives
and the President pro tempore of the Senate

This is our report on improvements needed in the program for the protection of special nuclear material by the Atomic Energy Commission.

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).

We are sending copies of this report to the Director, Office of Management and Budget, and to the Chairman, Atomic Energy Commission.

A handwritten signature in cursive script, reading "James B. Atchefs".

Comptroller General
of the United States

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ABBREVIATIONS

AEC Atomic Energy Commission
AECM AEC Manual
GAO General Accounting Office
NUMS Division of Nuclear Materials Security
SNM special nuclear material

D I G E S T

WHY THE REVIEW WAS MADE

Special nuclear material is fissionable plutonium or uranium used principally in nuclear weapons and as fuel for nuclear power reactors. The Atomic Energy Act charges the Atomic Energy Commission (AEC) with the responsibility for developing regulations, in the interest of national defense and security, for protecting such material against loss or diversion.

Because of the potentially dangerous consequences from a single diversion of special nuclear material, an effective program for its protection is essential. Therefore, GAO reviewed AEC's program for in-plant protection of such material held by organizations authorized to possess it.

FINDINGS AND CONCLUSIONS

About 600 organizations are authorized to possess special nuclear material. Ninety-five are required to comply with AEC's requirements for protecting the material.

AEC has determined that the remaining organizations are exempt from these requirements because they hold small amounts or because it does not consider the material to be of high strategic importance. These exempt organizations, however, must provide the normal protection afforded

radioactive material for health and safety reasons.

Persons with the requisite technical expertise and the necessary resources can make a crude nuclear weapon from about 17 kilograms of uranium or 6 kilograms of plutonium. A kilogram is approximately 2.2 pounds.

AEC has stated that it was not aware of any diversion of special nuclear material from authorized uses. However, it recognized that the probability of the material being stolen, unexplainably or accidentally lost, diverted from authorized use, or used or disposed of in unauthorized ways increases as the quantity and number of organizations authorized to hold such material increases. According to AEC the annual domestic requirement will be over 1 million kilograms by 1980 (See pp. 5 to 7).

AEC's Director of Regulation is responsible for the adequacy of the protection of special nuclear material held by licensees. AEC's General Manager has a similar responsibility for such material held by AEC and AEC contractors. (See p. 7.) A private firm can be both an AEC licensee and an AEC contractor (licensee/contractor).

Physical security systems

GAO reviewed the in-plant protection

systems of three licensee/contractors holding confidential and unclassified special nuclear material. GAO noted several conditions at two of the plants which significantly limited the holders' capability for preventing, detecting, and effectively responding to a possible diversion or diversion attempt.

GAO noted such conditions as

- weak physical security barriers,
- ineffective guard patrols,
- ineffective alarm systems,
- lack of automatic-detection devices, and
- lack of an action plan in the event of a diversion of material (See p. 10)

The extent to which any one of these conditions violated AEC requirements was difficult to assess because AEC's requirements did not always specifically define the type or degree of protection which should be given to special nuclear material. Nevertheless, the capability of the protection systems at these two facilities was so limited that the material was inadequately protected.

AEC agreed that these systems were not adequate and stated that they did not meet its requirements. AEC told GAO that actions had been or were being taken to correct these protection systems.

Examples of physical protection conditions found at one of the facilities were

- Guards did not vary times or routes when touring the plant (See p 15)

- Fencing around the plant had broken locks on gates, holes large enough for a person to gain access to the plant, and several other weaknesses (See p 17.)

- Material was stored in a prefabricated steel structure which could be breached easily. (See p 16.)

AEC's physical protection program

In September 1971 AEC completed an internal study of its physical protection program for special nuclear material, which contained a number of recommendations aimed at strengthening the program. But AEC was slow in implementing them. During GAO's review the Director of Regulation and the General Manager had taken or had begun to take actions to strengthen the program. (See pp 12 and 27.)

AEC's Director of Regulation

- developed broad objectives for protecting special nuclear material and
- published in the Federal Register, for industry comments, proposed amendments to the protection requirements (See p 27.)

AEC's General Manager (1) drafted revisions to clarify and increase the protection requirements for classified material and (2) in June 1973 issued new requirements for unclassified material held by contractors (See p 27)

AEC needs to define in greater detail the expected capability of a protection system by providing more specifics relating to its prevention, detection, and response capabilities

Such a definition should

- place holders in a better position to know what their systems must be capable of doing and
- place AEC in a better position to assess the adequacy of the holders' systems.

Differences in protection requirements

There are differences between the proposed requirements to be imposed on licensees and the recently revised requirements imposed on contractors for the protection of unclassified material.

For example, a licensee would be required to search all individuals, packages, and vehicles entering a protected area or leaving an area containing special nuclear material. On the other hand, individuals, packages, and vehicles at contractors' plants are subject to search. (See p. 30.)

AEC should impose the same requirements on both types of facilities or should justify the differences. AEC told GAO that it is doing so.

Inspection practices

AEC monitors the adequacy of holders' protection of special nuclear material principally through onsite inspections. GAO noted two matters relating to AEC's inspection program which needed improvement.

- The responsibility for assessing the adequacy of the protection at licensee/contractor facilities was divided, i.e., the Director of Regulation assessed the protection of unclassified material held under the licensee and the General Manager assessed the protection of

classified material held under the contract.

- The inspections for the most part were compliance inspections concerned mainly with determining whether AEC's requirements were met rather than with the overall effectiveness of the physical protection systems.

AEC's plans call for a number of improvements in its inspection program. (See p. 30.)

AEC has taken a number of actions aimed at strengthening its protection program for special nuclear material. However, more needs to be done to strengthen the in-plant physical protection over unclassified and confidential special nuclear material and to provide a better basis for assessing the adequacy of the protection afforded such material.

RECOMMENDATIONS

AEC should

- Expedite the formal issuance of the proposed changes to its protection requirements.
- Define in greater detail the expected capability of a protection system designed to prevent, detect, and effectively respond to a possible diversion or diversion attempt and strengthen the protection requirements to the extent necessary.
- Impose the same protection requirements on licensees and contractors holding unclassified material or justify the differences.
- Improve its inspection practices, as planned, by (1) conducting one overall evaluation of the protection

measures employed at licensee/contractor plants covering both classified and unclassified material and (2) developing new inspection procedures which will place increased emphasis on evaluating the effectiveness of the protection at licensed facilities. (See p. 32.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

AEC generally agreed with GAO's rec-

ommendations and said that it has taken, or is taking, actions to implement them. (See p. 33.)

MATTERS FOR CONSIDERATION
BY THE CONGRESS

This report informs the Congress of AEC actions needed or being taken to improve the in-plant physical protection of unclassified and confidential special nuclear material.

CHAPTER 1

INTRODUCTION

Special nuclear material (SNM) is fissionable plutonium or uranium used principally in fabricating nuclear weapons and as fuel for nuclear reactors. The quantities of SNM being processed and planned to be processed by the Atomic Energy Commission (AEC), privately owned, AEC-licensed facilities (licensees), and AEC-contractor facilities are measured in kilograms¹ of plutonium and uranium. AEC has estimated that by 1980 the annual domestic requirement for SNM will be over 1 million kilograms.

The Atomic Energy Act of 1954, as amended (42 U.S.C. 2011), gives statutory authority to AEC for controlling the use and possession of SNM for reasons of national defense and security. Section 1611 of the act (42 U.S.C. 220(1)) authorizes AEC to

"* * * prescribe such regulations or orders as it may deem necessary (1) to protect Restricted Data received by any person in connection with any activity authorized pursuant to this Act, (2) to guard against the loss or diversion of any special nuclear material acquired by any person pursuant to Section 53 [licensees] 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 * * *."

As of March 1973 AEC had authorized, by licenses or contracts, 592 organizations to possess SNM. There were 504 licensees, 56 contractors, and 32 licensee/contractors, i.e., privately owned organizations holding SNM under AEC licenses and contracts.

AEC has determined that 95 of the 592 organizations authorized to possess SNM are required to comply with its

¹A kilogram is approximately 2.2 pounds.

requirements for protecting the material. The remaining 497¹ organizations are exempt from these requirements because they hold less than 5 kilograms of SNM or the isotopic composition of the SNM held is such that AEC does not consider it to be of high strategic importance. These exempt organizations, however, must provide the normal protection afforded radioactive materials for health and safety reasons.

SNM is categorized as either classified or unclassified, depending on its physical characteristics. Classified SNM can be held only by an AEC contractor, while a licensee can hold only unclassified SNM. Contractors and licensee/contractors can hold both classified and unclassified SNM.

Because increasing quantities of SNM are available throughout the country and because of the potentially dangerous consequences of a single unauthorized diversion, an effective program for protecting SNM is essential. To illustrate, according to AEC, persons with the requisite technical expertise and the necessary resources can make a crude nuclear weapon with about 17 kilograms of uranium or 6 kilograms of plutonium.

AEC stated that it was not aware of any diversions of SNM from authorized uses. In 1969 one of the AEC Commissioners mentioned the potential for the development of a black market in SNM, stating that

"Once special nuclear material is successfully stolen in small and possibly economically acceptable quantities, a supply-stimulated market for such illicit materials is bound to develop. And such a market can surely be expected to grow once a source of supply has been identified. As the market grows, the number and size of thefts can be expected to grow with it, and I fear such growth would be extremely rapid once it begins. Such a theft would quickly lead to serious economic burdens to the industry and a threat to national security."

¹Of the 497 organizations, 469 are licensees, 10 are contractors, and 18 are licensee/contractors.

AEC mentioned the probability of SNM's being diverted in an August 1971 study which included an evaluation of AEC's physical protection of SNM. The study concluded in part that

"As long as significant quantities of nuclear materials are in active use by the government, by government contractors and by licensed commercial and other interests, there will be a distinct probability that some of those materials will be stolen, unexplainably or accidentally lost, diverted from authorized use or used or disposed of in unauthorized ways. The probability of such happenings is increased by the sheer volume of materials being processed and transferred, the number of licensees and contractors involved, and the technical difficulties of measuring quantities and verifying inventories."

We reviewed AEC's program for protecting classified and unclassified SNM and the adequacy of three licensee/contractors' systems for preventing, immediately detecting, and responding to the SNM diversions or diversion attempts. We reviewed licensee/contractors because they must adhere to AEC's requirements for both classified and unclassified SNM. The scope of our review is described in chapter 4.

We have discussed this report with AEC representatives and have considered AEC's comments in finalizing the report.

AEC ORGANIZATIONAL RESPONSIBILITY

AEC's Director of Regulation and General Manager share responsibility for assessing the adequacy of the physical protection of SNM at licensee/contractor facilities.

The Director of Regulation is responsible for unclassified SNM held under AEC licenses. This responsibility includes

- Developing protection standards.
- Approving the licensees' protection plans.
- Performing periodic inspections to insure that licensees are adhering to protection requirements.

Licensees are generally inspected annually or biennially, depending on the type and quantities of SNM they are authorized to possess. AEC personnel at AEC's five regulatory regional offices conduct these inspections.

Prior to 1966 licensees had no specific requirements to follow in protecting SNM because AEC believed that the relatively high monetary value of SNM¹ provided sufficient motivation to adequately protect it. However, following a 1966 incident in which a licensee was unable to account for substantial quantities of SNM, AEC decided to place more positive requirements on licensees.

Physical protection standards for SNM were published in the Code of Federal Regulations (10 CFR 73) and became effective in July 1970. These regulations apply to licensed facilities if they house more than 5 kilograms of certain kinds of uranium or plutonium, or a combination of both. Additional physical protection requirements may be imposed on a licensee through license conditions which set forth specific protection measures. As of June 1973 five licensees had such specific requirements in their licenses.

AEC's General Manager, through the Division of Security, is responsible for classified and unclassified SNM held under AEC contracts. The security classification assigned to the SNM--top secret, secret, confidential, or unclassified--generally determines the degree of protection required.

The Division of Security conducts onsite security inspections to determine whether organizations holding SNM are complying with the physical security requirements in AEC Manual Appendix 2401 (AECM 2401) for classified SNM and AEC Manual Appendix 2405 (AECM 2405) for unclassified SNM.

DESCRIPTION OF PHYSICAL SECURITY

Physical security generally involves the protection of material, plant, equipment, and other valuable assets against unauthorized access and removal. AEC security officials advised us of the following common physical protection measures which a holder of SNM could use.

¹A pound of plutonium is valued at about \$4,550, a pound of uranium is valued at between \$1,080 and \$6,000, depending on its isotopic composition.

An adequately staffed and trained guard force, with effective instructions and procedures to follow, can provide considerable deterrence and can materially assist in preventing and detecting either forceful or concealed diversions of SNM and in the recovery of the material. Physical barriers, such as fencing, penetration-resistant buildings, and vaults, can aid the guard force in preventing and detecting diversions. Automatic detection devices, such as electromechanical intrusion alarms and doorway monitors, could immediately detect attempted diversions and unauthorized possession of SNM.

A preplanned action/response plan detailing specific actions to be taken in the event of a diversion or diversion attempt and effective internal and external communications could provide the necessary means to resist an attempted diversion or to assist law enforcement officials in recovering diverted SNM.

CHAPTER 2

NEED FOR AEC TO STRENGTHEN ITS PROGRAM FOR INSURING THAT SNM IS ADEQUATELY PROTECTED

Our review of the security systems of two of the three licensee/contractors¹ showed conditions which significantly limited the licensee/contractors' ability to prevent, detect, or effectively respond to a possible SNM diversion or diversion attempt. The security system at the third facility, although needing some improvement, was reasonably adequate to detect a diversion or diversion attempt.

At the two facilities we noted

- weak physical barriers,
- ineffective alarm systems,
- ineffective guard patrols,
- a lack of automatic-detection devices, and
- a lack of a plan of action in the event of an SNM diversion (action/response plan)

The extent to which any one of these conditions violated AEC's requirements was difficult to assess because AEC's requirements did not always specifically define the type or degree of protection which should be given to SNM to constitute adequate protection. Nevertheless, in our opinion, the capability of the systems at these two facilities was so limited that protection was inadequate.

AEC agreed that the systems at these facilities were not adequate and stated that the protection systems for storing SNM did not meet its requirements. AEC said it had taken or was taking actions to correct the systems at these facilities.

Previously, as a result of an internal study completed in September 1971 (see p. 12), AEC had recognized that its

¹These three licensee/contractors stored and used confidential and unclassified SNM.

program for protecting SNM needed improvement. However, it has been slow in implementing the recommendations in its study. During our review, AEC had taken or had begun to take actions aimed at strengthening the protection requirements for classified and unclassified SNM. We believe, however, that AEC should also define in greater detail the expected capability of a system designed to prevent, detect, and effectively respond to a possible SNM diversion or diversion attempt.

Once AEC provides more specifics on the expected capability, SNM holders will be in a better position to know what their systems must be capable of doing and AEC will be in a better position to assess the adequacy of the systems.

AEC SECURITY REQUIREMENTS NEEDED IMPROVEMENT

At the time of our review, the three licensee/contractor facilities were governed by AEC's security regulations (10 CFR 73) applicable to licensees holding unclassified SNM and by AEC's security requirements (AECM 2401) for contractors holding confidential SNM.¹ These regulations and requirements established minimum physical security measures and were determined by an AEC task force as needing to be made more comprehensive and as needing clarification.

The regulations for licensees are reproduced in appendix I. The pertinent specifics they contain address the use and storage of SNM, as follows:

- SNM shall be used only in a protected area, and an authorized individual shall control access.
- SNM, when not in use or transit, shall be stored in a locked security container or in a locked building constructed of stone, brick, cinder block, concrete, steel, or comparable material capable of preventing

¹These licensee/contractors did not hold any unclassified SNM under AEC contracts and therefore were not subject to AECM 2405.

or impeding unauthorized entrance A guard or watchman, who shall patrol at intervals not exceeding 4 hours, or intrusion alarms shall protect the container or building

Similarly, AEC requirements for protecting confidential SNM held by a contractor--confidential was the highest security classification for SNM held at the three facilities included in our review--deal with SNM in storage or in use, as follows

- SNM in storage shall be placed "in a securely locked building of substantial construction" or "in open storage within a security area,¹ provided the classified information is concealed from view and the storage area is subject to guard or watchman patrol and inspection at intervals not to exceed 4 hours "
- SNM shall be used in security areas, unless those using it can "protect it against unauthorized access outside of the security areas " SNM in use (1) must be constantly attended by, or under the control of, cleared personnel and (2) shall be controlled by the personnel attending the SNM to prevent unauthorized persons from gaining access to it.

On September 4, 1970, AEC's General Manager established a task force to study management practices relating to SNM AEC's task force consisted of six subgroups, one of which was concerned with the physical protection of SNM The protection subgroup made a number of recommendations in September 1971, some of which were

- The physical protection program should be strengthened in recognition of the variety of threats to the safeguarding of SNM
- The language of the manual chapters (AECM 2401 and 2405) and regulations (10 CFR 73) regarding physical protection should be clarified and made more comprehensive.

¹A security area is a physically defined space containing classified SNM and is subject to physical protection and personnel access controls

- The use of guides to supplement the licensee program regulations should be considered.
- Controls on access to SNM should be tightened.
- A stronger inspection system should be established.
- A program of research on protective devices should be developed.
- Closer liaison should be established with law enforcement authorities on physical protection matters

AEC has been slow in implementing the above recommendations. It had prepared some drafts of revised requirements, but during our field review, May through August 1972, it had not published any of the clarifications or more comprehensive requirements.

OBSERVATIONS PERTAINING TO PROTECTION SYSTEMS
AT SELECTED FACILITIES

Our observations of each licensee/contractor's physical protection system are presented in four parts

- guard system,
- physical barriers,
- automatic-detection devices, and
- action/response plans.

We assessed the total security systems at the facilities we visited, not just those security measures required by AEC. We believe that the specific needs for strong individual physical security components, such as guards, fences, and alarms, should be measured in terms of the expected capability of the system as a whole to prevent, detect, or respond to an SNM diversion or diversion attempt. To illustrate, if the system should be capable of detecting unauthorized entrance onto the plantsite, then a fence becomes an integral part of the total system. If the system is concerned with preventing or detecting unauthorized intrusions into a building, rather than onto the plantsite, then the importance of the fence is diminished.

At the three selected licensee/contractors' plants, knowledgeable plant personnel accompanied us during our tours and, at our request, took the pictures that appear in this report. All three licensee/contractors had under their control confidential SNM, therefore our report does not disclose their identity or location. In commenting on matters discussed in this report, the licensees generally concurred that the information was factual.

Following is a discussion of one of the licensee/contractors' security systems (hereinafter referred to as licensee A). A discussion of the two other licensee/contractors' systems (licensees B and C) is included as appendix II. (See p. 36.)

Licensee A

Licensee A stored and used significant quantities of SNM in portable¹ containers. The facility was operated on a three-shift basis 7 days a week. Licensee A had implemented a badging system for employee identification.

We believe that licensee A's security system was significantly limited in its capability to prevent, detect, and immediately respond to possible SNM diversions or diversion attempts.

Guard system

The security personnel consisted of a part-time security officer and four guards, one of whom was on duty at all times. Their duties consisted principally of checking employee and visitor identification badges, conducting periodic watchclock tours to check the integrity of the plant's physical barriers, and inspecting the perimeter fence monthly.

Each guard on duty carried a 38-caliber revolver. The weapons qualification scores, however, showed that none of the guards had met AEC's requirements. AEC claimed that these guards were "watchmen" and were not required to qualify in weapons proficiency, however, the licensee advised us that these individuals were guards and qualified in the use of weapons.

The watchclock tapes which recorded the guard patrols indicated that the guard on duty did not vary the time or route of his patrol.

When he was not making watchclock checks, the guard was located in a small guard post at one corner of the plant's perimeter. From this position the guard was able to see only two of the four fence sides. Also, since a building

¹"Portable" as used in this report represents that amount which can be carried by one individual without mechanical or other devices.

had been constructed between the guard post and the main plant area, the guard could not observe about 80 percent of the general plant area from his post

To deter and detect the diversion of SNM by employees and visitors, the guards conducted scheduled lunchbucket and container checks. With the exception of top management officials, all employees and visitors were subject to such checks. We were advised that the guards can make checks at their discretion and that they do so when employees and visitors carry out unusual bundles or bags

Physical barriers

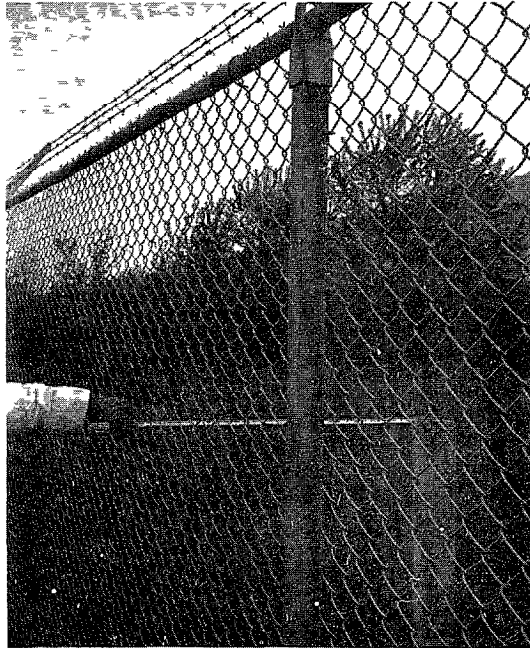
The plant's perimeter was completely enclosed by fencing which was about 8 feet high and more than 4,000 feet long. We noted 13 weaknesses which could allow a potential diverter to easily breach the fence. Pictures showing some of the weaknesses follow. Ten of the deficiencies could not be observed from the guard post. The fence could be easily disassembled because the nuts, bolts, gate hinge pins, and wire used to fasten the fence mesh to the fenceposts were not secured by welding or peening.

Two of the three primary storage areas offered limited protection, although they contained unclassified and confidential SNM in portable containers. They were vulnerable to intrusion because they were located only about 16 feet from the perimeter fence.

One of these storage areas--which housed both SNM scrap and SNM of high strategic importance--was a prefabricated steel structure with a watchclock station within it. The sheet-steel panels forming the walls and most of the roof were about 3 feet by 9 feet and about 0.018 inches thick. Forty translucent plastic panels were spaced in the roof to provide light. All the panels were attached to steel-framing beams by small metal screws with small rivets used to attach adjoining panel sides. Nine metal screws fastened each panel to the steel framing, and six rivets joined the panels.

We tested the impediment value of the panels with an adjustable-jawed wrench. Within 1 minute we were able to remove five metal screws from one of the panels. At this point the only impediment to entry was a small rivet which, in our opinion, could have been forced manually, thus

Weaknesses in licensee A's perimeter fencing¹



Four foot cement post about 1 foot away from fence The cement post could be used as a step to cross the fence



Lock opened when pulled



Weld on fence gate broke when pulled

¹At the time these pictures were taken, AEC did not consider the fencing to be part of the licensee's physical protection system

providing sufficient flexibility in the panel to permit entry

We also tested the impediment value of the sheet-steel panels by cutting a sample of the panel. Within 30 seconds we were able to make a 19-inch cut with an ordinary pair of tin cutters. See photograph below.



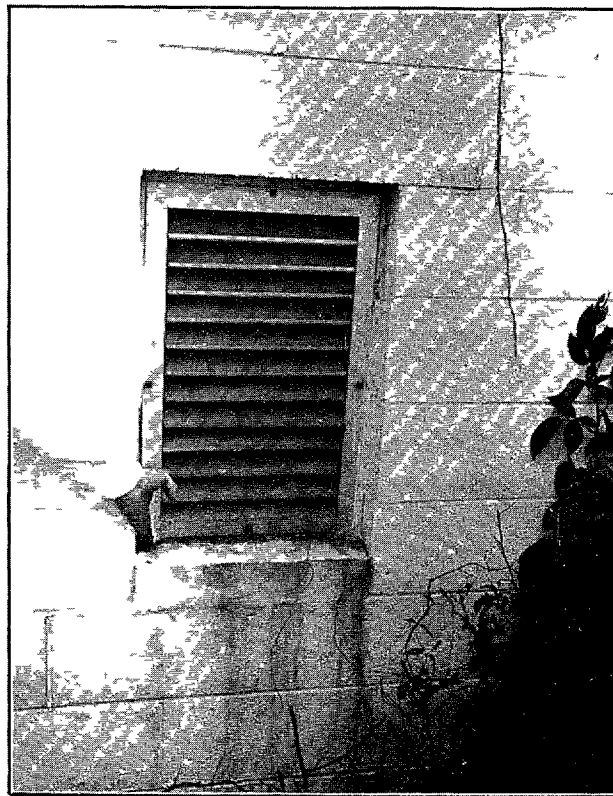
None of the four entrances to this building were visible from the guard post. A vertically rising, garage-type door and an employees door, both of which were alarmed, provided access at one end of the building. Similar doors were located at the opposite end of the building but were not alarmed. The garage-type door could be opened with little effort because its lock had been broken and the door could be opened without activating the alarm. The alarm system is discussed beginning on page 21.

The other storage area, which provided limited protection, was smaller and constructed of cinder block. It had a concrete floor, and the roof was constructed of materials about 3 inches thick. There was no watchclock station in the building, however, a sign-in sheet was available and the watchman had to sign it during his patrols.

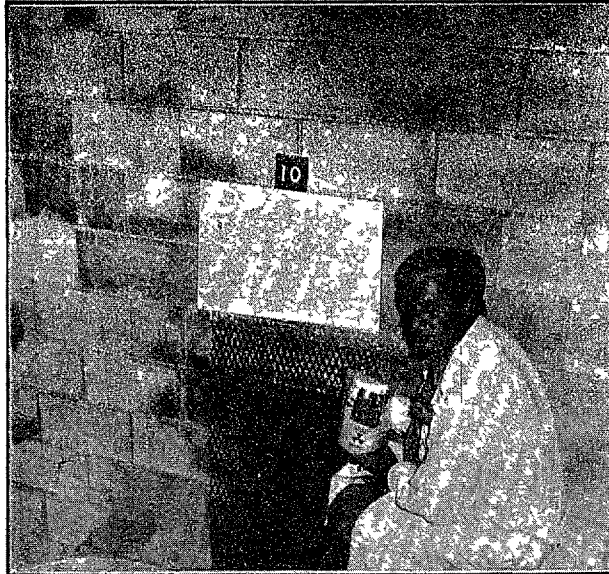
Our inspection of this warehouse disclosed two avenues of easy access to SNM in the building.

On the side of the building facing the perimeter fence were two unalarmed vents leading inside. This side of the building, which was about 16 feet from the perimeter fence, was not visible from the guard post and, according to a licensee official, was inspected only once a month

One of the vents was located about 2 feet from the ground, measured about 18 by 30 inches, and was secured on the outside by louvers and an ordinary window screen bolted to an angle iron frame bolted to the concrete block See photograph below

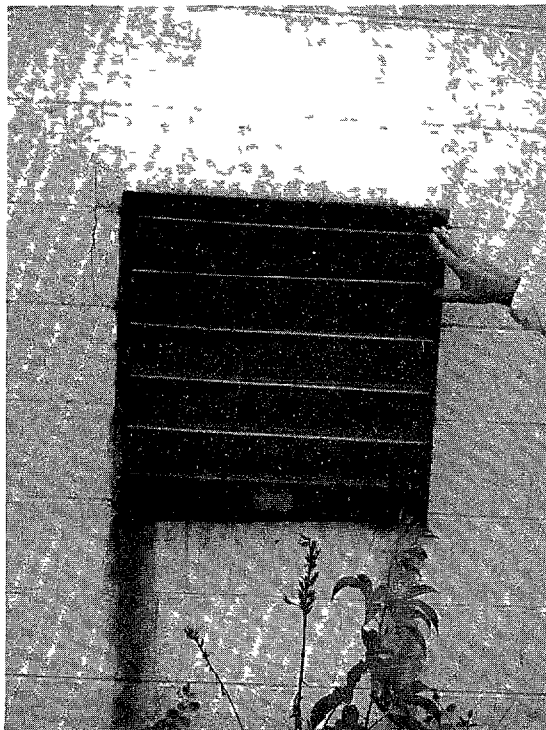


The inside of the vent was secured by a screen with a diamond-shaped mesh as shown on the top of the following page Four bolts passing through the mesh fasten the screen to the cinder block. The licensee's manager for safeguards and accountability concurred that with little effort the louvers could be pulled out by hand and that the inside screen could be manually forced, providing access to the building interior



Inside view of vent shown in the previous picture
(Note the portability of the SNM containers)

The other vent was about 18 inches square, secured on the outside by louvers and on the inside by a piece of thin sheet steel fastened to the cinder blocks by four bolts. See photograph below.



Again the licensee's safeguards and accountability manager concurred that this vent could easily be pulled out without tools and that the sheet steel could be forced manually.

Portable SNM was readily accessible within the cinder block warehouse. Additional portable SNM was stored in a cage built of metal fencing material which was readily accessible. To illustrate, a portion of the caging was secured only by wedging between two cinder block walls, and one man, in about 5 seconds and without tools, was able to remove the caging and gain entry into the area.

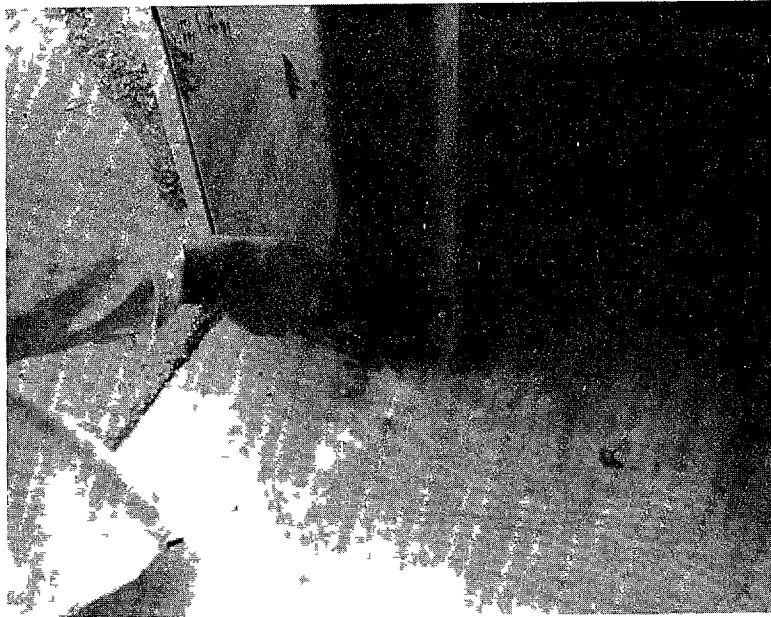
The licensee told us that this caging was never intended as a security barrier but was simply to segregate the storage areas.

The licensee's accountability and safeguards manager advised us that, although plant personnel on the day shift visited these storage areas intermittently they only rarely used them during the evening and night shifts.

Automatic-detection devices

Three of the six doors providing access to the two storage warehouses were alarmed which gave a visual rather than an audio signal. When they were activated, red lights on top of the two SNM warehouses gave a visual signal. When the doors were opened levers were tripped, activating the alarms.

The alarms did not have redundant circuitry, were operated by commercial power, and did not have any backup power supply. The wiring for the alarms was accessible from outside the warehouses. Because of a gap between the door and doorframe, one of the alarm-trip levers was accessible with little effort to persons outside the building with the door closed. By depressing the lever with a pencil as shown below, the alarm was disengaged.



The guards monitored these alarms from a guard shack about 500 feet from the buildings. Only one alarmed door on the cinder block warehouse and none of the alarmed doors on the metal warehouse could be seen from the guard shack. Licensee personnel entering the warehouse did not check with the guard on duty to obtain access clearance, and people entering or leaving these buildings tripped the alarm levers.

The licensee advised us that the purpose of these alarms was to detect intrusions. However, AEC told us that, although they were potentially helpful from a health and safety point of view, they did not qualify as security alarms.¹ Under AEC's requirements a licensee must have either patrolling guards (or watchmen) or intrusion alarms.

Action/response plans

Licensee A had not formulated a plan detailing the actions to be taken in the event of a diversion attempt. The

¹AEC prescribes certain specifications that required alarms must meet

licensee's inadequate communications capability¹ limited its effectiveness in such a situation

All external means of communication at this facility were handled by a single, above-the-ground cable which entered the plant at a point the guard could not see from his post. Severing this cable would eliminate all possible means of timely communication with outside law enforcement agencies.

Internal communications, exclusive of that provided by the commercial cable, consisted of four walkie-talkie radios which could not be used for communication with local law enforcement agencies. The radios were used primarily to communicate with maintenance forces in various parts of the plant.

The guard's only available means of communication was a commercial telephone. The licensee's physical security officer said that the guard did not routinely communicate with anyone.

AEC's inspections

Representatives of the Director of Regulation conducted in September 1971 a physical security inspection for compliance with the provisions of 10 CFR 73, and the Division of Security conducted in June 1972 an inspection for compliance with AECM 2401

The report prepared as a result of the September 1971 inspection stated that "the inspection team determined that the licensee is complying with 10 CFR 73 by properly protecting SNM * * * in use and storage." The report prepared as a result of the June 1972 inspection stated that the "security measures employed for protecting the security interests meet or exceed AEC requirements "

¹At the time of our review, AEC did not require action/response plans, but a requirement to establish liaison with local law enforcement authorities and to establish communications capability has since been included or proposed (See p. 28)

The following schedule shows the ratings given by the Division of Security to certain characteristics of licensee A's physical security program and the applicable comments included in the report.

<u>Physical security characteristics</u>	<u>Rating</u>	<u>Comments</u>
A Physical barriers		
1 Adequacy	Good	"Although the fence contributes to the security of AEC interests, property control and access control, the plant as a whole is not designated a security area "
2 Protection of openings	Good	
3 Soundproofing	Good	
		* * * * *
		"The buildings housing security interests * * * are securely locked when not occupied, controls are established to prevent unauthorized access "
B Protective personnel	None	"Watchmen are uniformed and armed with a 38 calibre revolver All have fired the weapon since the last inspection Deployment is over three 8-hour shifts, 7 days a week providing continuous coverage The watchman is posted at the personnel-vehicle gate during the dayshift During the other shifts the gate is locked while he makes hourly patrols "
C Security of materials in use		
1 Classified material	Good	No comment
2 Strategically important materials	Good	
D Security of materials in storage		
1 Storage containers	Good	"All storage areas are securely locked and physically checked by watchmen twice each offshift They are visually checked hourly by foot patrols "
2 Open storage	Good	
3 Guarding system	Good	
4 Control of personnel access	Good	

In June 1972 we advised AEC regulatory officials of the findings of our review As a result, on July 20 and 21, 1972, regulatory inspectors made a special inspection at licensee A's facility The inspection team found two items of noncompliance with 10 CFR 73 The report also stated

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"* * * there were many noted weaknesses in the overall security program. The guard force was considered to be ineffectively supervised, the primary security barrier, fenceline, is weak and vulnerable to undetected entry, illumination of a segment of the fence line is inadequate, locks and doors on many of the buildings are damaged and inoperative, no secondary off-site means of communication is available and the SNM shipping and receiving records not always accurate or complete."

* * * * *

"With regard to the reported findings of the GAO representatives it was observed that

- "a. A backup communication capability does not exist. Total reliance for off-site communication is the telephone and teletype which also relies on the same telephone cable system.
- "b. The guards would be unlikely to detect an intrusion of the SNM warehouse because of inadequacy of the detection system, considered by licensee to be an alarm.
- "c. Fences had been seriously undermined due to soil erosion but were being repaired.
- "d. In regard to the GAO findings that the storm sewers could be used as entry points, it was observed that metal gratings have been installed over the pipe openings

"The above deficiencies are not items of noncompliance pursuant to 10 CFR 73 "

In commenting on matters discussed in this report, AEC told us that, prior to our visit to licensee A, it had not considered the perimeter fencing (discussed on p. 16) to be part of the licensee's security system. It said the deficiencies in the fencing had been repaired, and it now considers the fence to be part of the security system

Regarding the apparent inconsistencies between our observations and the conclusions in the AEC inspection reports relating to the adequacy of the protection being afforded SNM at this facility, AEC stated

"Conditions could have been different at the time of the GAO review from what they were at the time of the AEC inspections. However, the system in existence for the physical protection of classified or unclassified SNM in storage at the time of the GAO review was not adequate and did not meet AEC standards. If the conditions found by GAO existed at the time the AEC inspections were made, inspectors should have cited the licensee for not meeting AEC minimum requirements.

Our observations regarding the two other licensee/contractor protection systems are included as appendix II (See p 36.)

AEC ACTIONS TO STRENGTHEN ITS
PROTECTION PROGRAM AND
OUR EVALUATION

During our review the Director of Regulation and the General Manager began taking actions to strengthen the program for protecting SNM.

Director of Regulation

Since our visits to the licensee/contractor plants, the Director of Regulation has (1) developed broad objectives for protecting SNM and (2) published in the Federal Register in February 1973, for industry comments, proposed amendments to 10 CFR 73.¹

These broad objectives were prefaced with the following statement.

"The extent to which nuclear materials should be protected against loss or diversion is not clearly defined in the Act or the public record. At one extreme a system of intense physical security and accounting may be prescribed to guard against and promptly detect small losses of material. At the other extreme, a minimum level of accounting may be prescribed to provide a periodic detection mechanism for nuclear material losses or diversions. An effective and credible program of material protection sufficient to discharge the Commission's responsibilities lies between these extremes in a balanced system of physical protection and material accounting "

Two of the objectives relating to the protection of SNM of the highest strategic importance were

--To protect SNM to the extent that it cannot be stolen except by "launching a significant armed attack."

¹The Director of Regulation has also imposed more comprehensive protection requirements on five licensees. However, these additional requirements were not imposed on any of the licensee/contractor facilities we visited because their licenses had not come up for renewal.

--To protect SNM against diversion through a number of thefts of "small quantities" over a "prolonged period of time" from single or multiple sites.

We believe that further steps are needed to more clearly define the expected capability of a protection system. AEC should use more specific terminology than "significant armed attack," "small quantities," and "prolonged period of time." Once AEC defines these terms more specifically, SNM holders will be in a better position to know what their systems must be capable of doing and AEC will be in a better position to assess the adequacy of the systems.

The proposed amendments to 10 CFR 73, published in the Federal Register in February 1973, are aimed at strengthening licensees' SNM protection. Specifically, for in-plant physical security, the proposed amendments call for improved guard systems, physical barriers, and automatic-detection devices. They also require licensees to (1) establish liaison with local law enforcement authorities capable of providing adequate assistance when needed and (2) establish adequate internal and external communications channels.

Two industrial organizations made the following comments in response to AEC's proposed amendments to its regulations.

"The difficulty of identifying the threat to be guarded against greatly complicates the task of developing regulations and of evaluating the necessity for and efficacy of particular proposals. It is our opinion that a great deal more inter-communication between the staff, industry and possible concerned members of the public is necessary to development of truly adequate regulations."

* * * * *

"While we recognize the need for protection of special nuclear material, we have difficulty in understanding the goals and objectives of the AEC program. We accept the need to accurately account for materials and provide a reasonable degree of physical protection and barriers against vandalism and the occasional intruder. However, we find it difficult to accept the need

for excessive physical security measures against an unnamed and ill-defined threat which can never be met with certainty, since there is always the question of the manpower and resources imagined to be behind the threat."

We believe that the adequacy of the proposed regulations could be more properly assessed if AEC defined in greater detail the expected capability of a protection system. Once AEC does so, it may have to strengthen its requirements to achieve the type or degree of protection it considers necessary.

General Manager

Under the General Manager, the Division of Security drafted revisions to AECM 2401 to increase requirements for protecting classified SNM and to clarify the existing ambiguities. On June 22, 1973, the division published revisions to AECM 2405 to increase and clarify the requirements for protecting unclassified SNM held by AEC contractors.

The Division of Nuclear Materials Security (NUMS) is responsible for recommending to the Division of Security additions to, or modifications of, the protection systems of AEC or AEC contractors. NUMS has no responsibility for licensed or licensee/contractor facilities (facilities containing both licensed and contract material).

In April 1973 NUMS developed specific objectives to meet its overall goal of preventing any diversion of SNM held by AEC or AEC contractors. For example, NUMS believes that a protection program should be capable of detecting the unauthorized removal of 1 gram of plutonium or 100 grams of uranium. At the time of our review, NUMS had not submitted the specific objectives to the General Manager or the Commissioners for approval.

The Director, NUMS, said that AEC believes SNM protection should be the same at licensed and contractor facilities for unclassified material. Therefore, AEC intends that the specific objectives to be developed by the Director of Regulation and the General Manager will be applicable to both licensed and contractor facilities.

In this regard, our comparison of the requirements currently imposed on contractors holding unclassified SNM (AECM 2405, as revised in June 1973) and the proposed requirements to be imposed on licensees holding unclassified SNM (proposed amendments to 10 CFR 73) showed a number of differences. For example

- Proposed 10 CFR 73 requires a licensee to search all individuals, packages, and vehicles entering protected areas or leaving an area containing SNM, AECM 2405 states that individuals, packages, and vehicles are subject to search
- Proposed 10 CFR 73 makes no distinction between portable or nonportable SNM. AECM 2405 places different requirements on an SNM holder depending on the portability of the SNM, i.e., if the SNM is stored in portable containers more restrictive requirements are imposed on the holder.
- Proposed 10 CFR 73 requires that a guard or watchman, who shall patrol at intervals not exceeding 4 hours, or intrusion alarms shall protect stored SNM. AECM 2405 requires that, during nonworking hours, protected areas shall be patrolled at intervals not exceeding 2 hours or such areas shall be protected with approved intrusion alarm systems with a guard or watchman response not exceeding 10 minutes.

If AEC intends that the specific objectives be the same at licensed and contractor facilities for unclassified material, the requirements should also be the same or AEC should justify the reasons for any differences. AEC advised us that it is assessing these differences to achieve uniformity or to justify the differences

IMPROVEMENTS NEEDED IN INSPECTION PRACTICES

AEC's principal method of monitoring the adequacy of SNM protection is through onsite inspections. At the time of our review, two matters relating to AEC's inspection program needed improvement.

- The responsibility for assessing the adequacy of the SNM protection at licensee/contractor facilities was

divided, i.e., the Director of Regulation assessed the adequacy of the protection of unclassified SNM held under the license and the General Manager made a similar assessment for the classified SNM held under the contract.

--The inspections for the most part were compliance inspections concerned mainly with determining whether AEC's requirements were met rather than the overall effectiveness of the physical protection systems.

AEC is planning improvements for its inspection program. AEC advised us that the Director of Regulation will make assessments at licensee/contractor facilities for both classified and unclassified SNM. If the facility houses classified SNM, a representative of the Division of Security may assist the Director of Regulation in evaluating the protection program, but it is intended that the Director of Regulation will prepare one overall inspection report.

The Director of Regulation is restructuring the inspection program. One of the features of the program will be to place increased emphasis on SNM protection at licensed facilities. The Director of Regulation is also completely rewriting the inspection procedures.

CHAPTER 3

CONCLUSIONS AND RECOMMENDATIONS

AEC needs to strengthen its program for protecting unclassified and confidential SNM. This is especially true when it is recognized that

--persons with the requisite technical expertise and necessary resources can make a crude nuclear weapon with 6 kilograms of plutonium or 17 kilograms of uranium and

--AEC has estimated that the annual domestic requirement for SNM will be over 1 million kilograms by 1980.

AEC has recognized, at least since September 1971, the need to strengthen its protection program but has been slow in taking the necessary actions. During our review AEC took actions aimed at strengthening the program. We believe that the actions taken represent important steps toward the development of better SNM protection. However, more needs to be done to insure that the physical protection systems developed to protect unclassified and confidential SNM are adequate.

RECOMMENDATIONS TO THE CHAIRMAN, ATOMIC ENERGY COMMISSION

To strengthen the in-plant physical protection over unclassified and confidential SNM and to provide a better basis for assessing the adequacy of the protection, we recommend that AEC

--Expedite the formal issuance of the proposed changes to 10 CFR 73 and AECM 2401.

--Define in greater detail the expected capability of a system designed to prevent, detect, and effectively respond to a possible SNM diversion or diversion attempt and strengthen the protection requirements to the extent necessary.

--Impose the same protection requirements on both licensees and contractors holding unclassified SNM or justify the differences.

--Improve its inspection practices, as planned, by (1) conducting one overall evaluation of the physical protection measures employed at licensee/contractor plants covering both classified and unclassified SNM and (2) developing new inspection procedures which will place increased emphasis on evaluating the effectiveness of the physical protection afforded SNM at licensed facilities.

AEC agreed with our recommendations and said that it has taken, or is taking, actions to implement them.

CHAPTER 4

SCOPE OF REVIEW

We conducted our review at AEC's headquarters in Bethesda and Germantown, Maryland, and at AEC's Operations Office and District II Safeguards Office in Oak Ridge, Tennessee.

We reviewed the protection systems at the three licensee/contractor facilities for preventing, immediately detecting, and responding to SNM diversions or diversion attempts.

We reviewed legislation, regulations, policies, and practices relating to AEC's protection requirements and interviewed AEC officials responsible for SNM protection. We examined AEC inspection reports and files for selected licensee/contractors.

SECURITY REQUIREMENTS FOR UNCLASSIFIED SNM

HELD BY AEC LICENSEES

§ 73 3 Definitions

As used in this part

(a) Terms defined in Part 70 of this chapter have the same meaning when used in this part

(b) "Authorized individual" means any individual, including an employee, a consultant, or an agent of a licensee, who has been designated in writing by a licensee to have responsibility for surveillance of special nuclear material

(c) "Guard" means an armed and uniformed individual whose primary duty is the protection of materials and property

(d) "Intrusion alarm" means a secure electrical, electromechanical, electro-optical, electronic or similar device capable of detecting intrusion by an individual into a security container, building, or protected area by means of an actuated visible or audible signal sufficient to summon guards or watchmen immediately so that they arrive at the security container, building, or protected area involved within 15 minutes

(e) "Lock" in the case of security containers means a three-position, manipulation resistant, dial type, built-in combination lock or combination padlock, and in the case of fences, walls and buildings means an integral door lock or padlock which provides protection equivalent to a six-tumbler cylinder lock "Locked" means protected by an operable lock

(f) "Physical barrier" means

(1) Fences constructed of No 11 American wire gauge or heavier wire fabric, topped by three strands or more of barbed wire on brackets angled outward, with an overall height of not less than eight feet, including the barbed wire

(2) Exterior walls constructed of stone, brick, cinder block, concrete, steel or comparable materials with a height of not less than 8 feet

(g) "Protected area" means an area encompassed by physical barriers and to which access is controlled

(h) "Safe" means a burglar-resistant cabinet or chest with a body of steel at least one-half inch thick and a combination locked steel door at least 1 inch thick exclusive of bolt and locking device

(i) "Security cabinet" means a cabinet which is a security container approved by the General Services Administration¹ and which bears a test certification label on the inside of the locking drawer or door and is marked "General Services Administration Approved Security Container" on the outside of the top drawer or door

(j) "Security container" means a safe, vault, vault-type room, or security cabinet

(k) "Vault" means a burglar-resistant windowless enclosure with walls, floor and roof of (1) steel at least one-half inch thick, or (2) reinforced concrete or stone at least 8 inches thick, (3) non-reinforced concrete or stone at least 12 inches thick, or (4) monolithic floor or roof construction of equivalent resistance to entry and with a built-in lock in a steel door at least 1 inch thick, exclusive of the locking mechanism

(l) "Vault-type room" means a room with intrusion alarm protection and with one or more combination locked doors

(m) "Watchman" means a person, not necessarily uniformed or armed, who provides protection for materials and property in the course of performing other duties

[35 FR 6314 Apr 18, 1970]

§ 73 32 Physical protection of special nuclear material in use or storage

Each licensee shall physically protect special nuclear material in accordance with the following requirements

(a) Special nuclear material shall be used only in a protected area and access to the special nuclear material shall be under the control of an authorized individual

(b) Except as authorized in paragraph (c) of this section special nuclear material, when not in use or transit, shall be stored in a locked security container, or within a locked building constructed of stone brick, cinder block, concrete steel or comparable materials which is capable of preventing or impeding unauthorized entrance. Such security container or building shall be protected by a guard or watchman who shall patrol at intervals not exceeding 4 hours, or by intrusion alarms

(c) Special nuclear material in the form of small pieces, cuttings, chips, solutions or in other forms which result from a manufacturing process and which are kept for reprocessing or ultimate disposal contained in 30-gallon or larger containers may be stored within a locked and separately fenced storage area which is within a larger protected area, provided that the storage area is no closer than 25 feet to the perimeter of the protected area. The storage area shall be protected by a guard or watchman who shall patrol at intervals not exceeding 4 hours, or by intrusion alarms

[35 FR 6314 Apr 18 1970]

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OBSERVATIONS ON SECURITY SYSTEMS

OF TWO LICENSEE/CONTRACTORS

LICENSEE/CONTRACTOR B

Licensee/contractor B (hereinafter referred to as licensee B) stored and processed significant quantities of portable SNM in a single, two-story structure of brick and cinder block. At the time of our visit, about half of the facility was operated 24 hours a day, 7 days a week, while the other half was operated on a cycle of three shifts for 10 consecutive days followed by 4 consecutive days of complete shutdown. To restrict access to authorized personnel, the licensee employed a badge identification system.

We believe licensee B's security system was significantly limited in its capability to prevent, detect, and immediately respond to a possible SNM diversion or diversion attempt.

Guard system

Licensee B's guard force consisted of 10 guards, 1 guard lieutenant, and a part-time security officer for the protection of two facilities. At the facility we visited, the licensee deployed his guard force as follows: during the day shift, only the guard lieutenant was on duty, during the evening and night shifts, two guards were on duty during each shift--one at this facility and the other, a roving guard, spent half of his time at the licensee's other facility.

During the day shift the guard lieutenant on duty was stationed in an administrative office about 50 feet beyond the perimeter of the plant. We were advised that he patrolled the perimeter about every 2 hours, however, these were not watchclock tours. During normal business hours a receptionist monitored the main entrance to the plant.

During the evening and night shifts at this facility, a guard was stationed at the main entrance to the plant. Because the guard station was inside the plant building and because of various obstructions around the outside of the building, the guard had only partial visibility of one side

of the plant's perimeter. The other guard on duty--who spent half of his time at the other facility--made scheduled watchclock tours every 2 hours starting at about 6 30 p.m and lasting until about 7 00 a.m. Our examination of the watchclock tapes for 1 month showed that the guard did not vary his route and that his timing generally did not vary by more than 15 minutes.

As to the weapons proficiency of the guards and the guard lieutenant, we found that of the total force of 11, three had qualified, six had not qualified, and two had not fired for qualification for 2 years. AFC required that guards fire for qualification annually.

We were advised that guards did not routinely or randomly search individuals, packages, or lunchbuckets.

Physical barriers

Access to the interior of licensee B's facility was restricted almost exclusively by the building walls with the exception of a fence which provided supplemental protection on almost all of one side of the plant perimeter and a small portion of another side.

We found the following weaknesses in the fencing.

- The nuts, bolts, gate hinge pins, and wire used to fasten the fence mesh to the fenceposts were not secured by welding or peening.
- Objects adjacent to the fence could facilitate climbing over the fence.
- At one gate a seal was used in lieu of a lock--to allow employees to exit rapidly in an emergency--and it was possible to open the gate without breaking the seal.

At the conclusion of our visit, the licensee had started to weld the nuts, bolts, and hinge pins on the fence.

The front wall of the building was encompassed by the fencing and was the perimeter side where the guard station was located. The wall had numerous openings, such as

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windows, doors, and vents, which provided direct access inside the plant. Since the roof at the rear of the facility was about 3 5 feet away from the roof of an adjoining vacant building not owned by the licensee, all openings were accessible from either the roof or the ground.

The integrity of the front wall was impaired in that

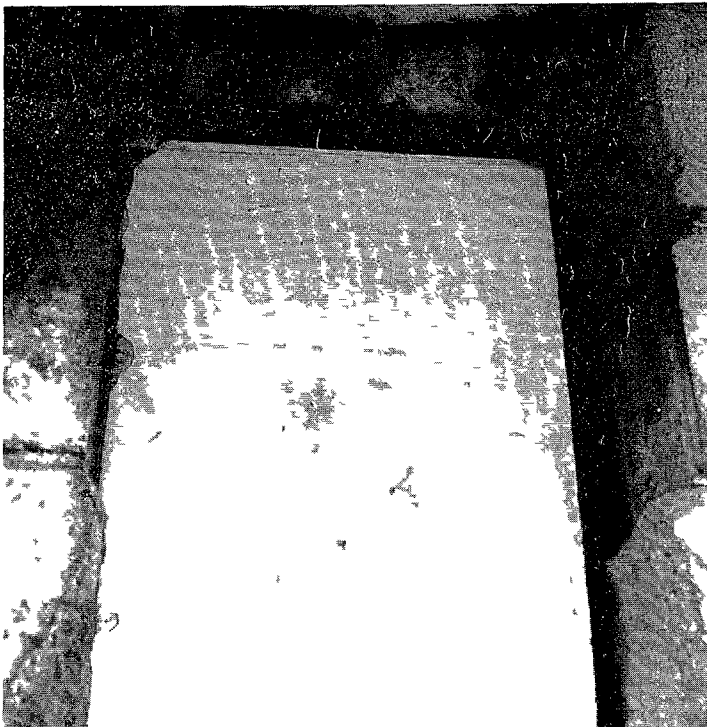
--none of the windows were laminated, sealed, locked, or alarmed,

--windows (frames and glass) were nonexistent at two openings,

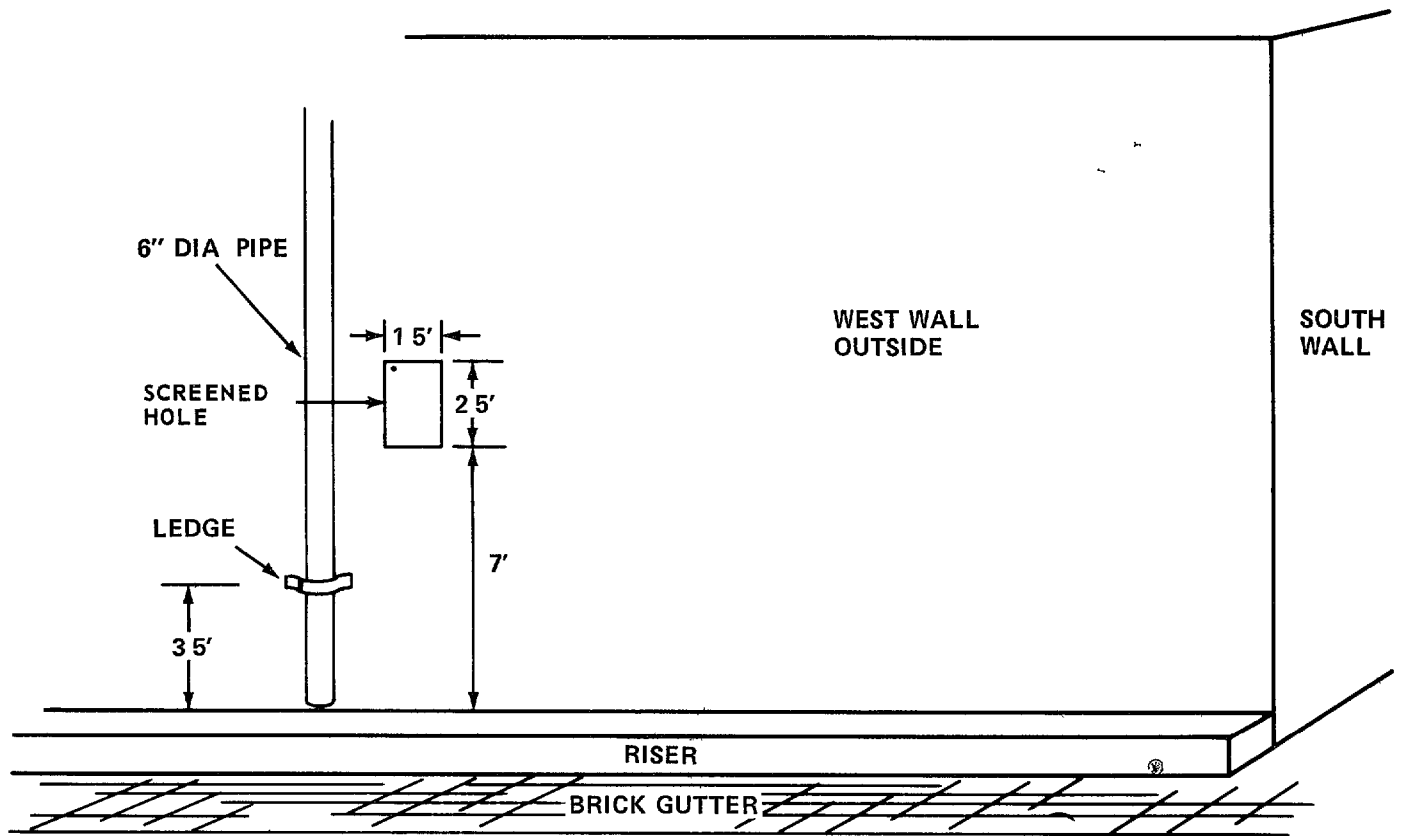
--one of the doors was open with a broken seal attached, and

--none of the doors were alarmed.

The rear of the building was windowless, did not have protective fencing, was not visible from the guard station, and was not routinely patrolled by the guard. During our tour around the building, we observed a screen covered with plasterboard which was used to secure an opening. See picture below and schematic on page 39.



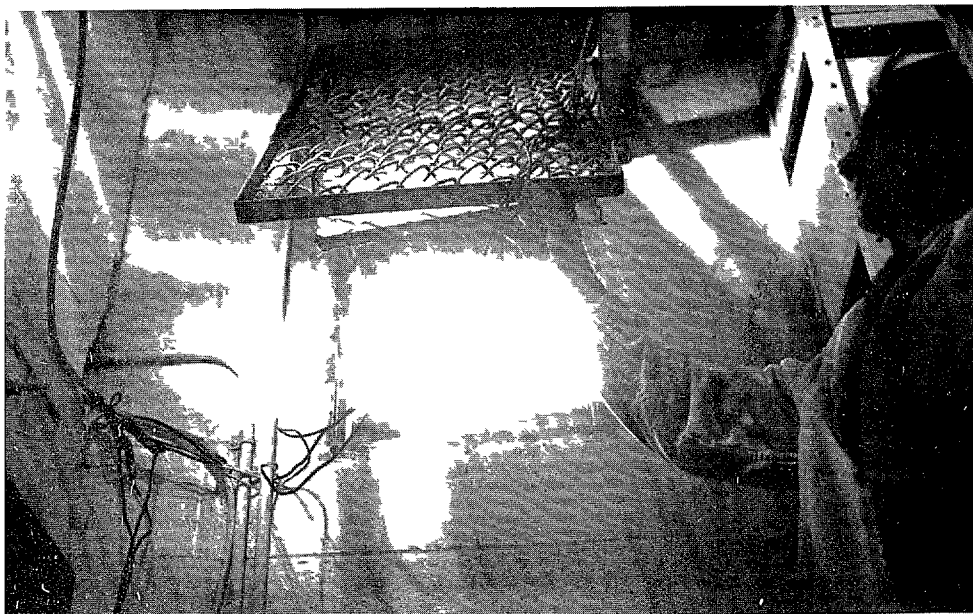
SCHEMATIC OF SCREENED HOLE AT REAR OF BUILDING PROVIDING ACCESS TO A VAULT CONTAINING PORTABLE AND STRATEGIC SNM



• = APPROXIMATE LOCATION OF TOGGLE BOLTS

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The screen was held in place by three toggle bolts. Within 15 seconds and using no tools, one person was able to remove the bottom toggle and open the screen to about a 45° angle as shown below



The above picture was taken from inside the licensee's vault

The opening led directly into an SNM storage room which was locked but not alarmed and which contained significant quantities of SNM stored in easily portable half-gallon containers. The opening was cemented and sealed within 1 hour after our tour

The interior of the storage room was not visible from any point outside the room and, according to the vault foreman, was not visited by anyone on some work shifts and only very infrequently (about three or four times daily) on other shifts.

During our tour of the rear wall, we observed a door with a broken seal attached and held open with a brick. This door led to a boilerroom which in turn led inside and into various areas containing SNM AEC officials subsequently advised us that this opening had been blocked

On another side of the building perimeter--not visible from the guard station or routinely patrolled--we observed a very large screened duct which was not secured to its frame and which led directly into the plant See photograph below.



The duct was about 2 feet by 4 feet and was accessible from the roof of a small shed adjacent to it

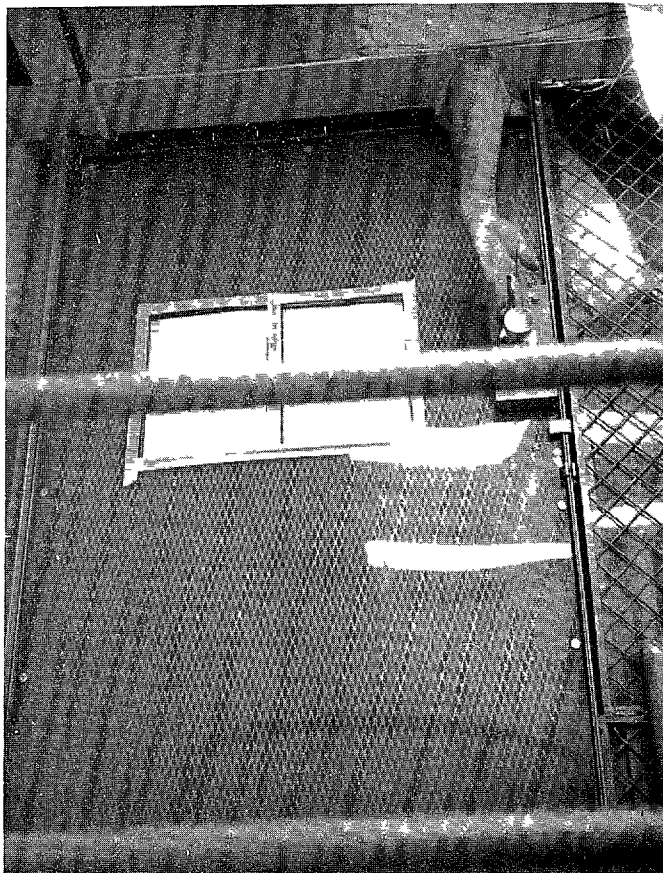
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During our tour of the facilities' interior, we examined the four vaults used to store SNM. The physical security afforded by three of the vaults, two of which are described below, was deficient in a number of respects. The fourth vault contained SNM which was not of high strategic importance.

One of the vaults, located on the second floor, was unoccupied for 4 consecutive days every 2 weeks. The storage areas were surrounded by wire fencing mesh ranging in height from 5 feet to 8 feet. There was no covering or ceiling on the storage area, and there were numerous objects adjacent to the fence which could facilitate climbing over it. The storage area was not alarmed, and the nearest watchclock station was about 50 feet away. SNM was stored in the area in portable plastic bottles, each weighing about 30 pounds.

Another storage area, located on the first floor, was accessible by an opening over the door as shown below.



Beyond this door SNM was readily accessible. Inside this particular storage area, another door led to a small room used to store SNM. The hinge pins on this door were not welded or peened and, without tools, a man was able to remove one of the hinge pins as shown below.



Neither of the doors discussed above was alarmed or sealed. Further, the storage rooms did not contain watchclock stations and were shut down 4 consecutive days every 2 weeks.

Licensee B employed seals rather than locks on eight doors and two gates for safety reasons, in the event of an emergency, a seal could be broken quickly to permit rapid evacuation. Licensee B officials believed that, although these seals could be easily broken, they provided assurance, if properly accounted for, that the integrity of a door or gate had not been violated.

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We tested the accounting controls by comparing seal numbers provided by the guard lieutenant with those on the doors and gates and found that only 5 of the 10 were correct. On the basis of this test and our observation of two broken seals, we concluded, and the licensee's security officer concurred, that seals at this facility were not effective detection devices for a door or gate

Automatic-detection devices

The licensee did not use alarms in any of the SNM storage or production areas. The only alarms were on two doors leading into a room which stored uncontaminated refuse. The alarms, when activated, lit a small light locally and triggered a visual and audible signal at the guard station. We tested the effectiveness of the monitoring of the doors by activating the alarm. Although we waited for about 30 minutes, no one responded

Action/response plans

The licensee did not have an action/response plan in the event of an SNM diversion or diversion attempt. The security officer advised us, however, that the licensee was developing such a plan. The licensee was planning to use the services of a commercial emergency organization which takes emergency calls from its clients and directs the appropriate agencies to the aid of the client. The security officer also advised us that the licensee had ordered a radio to improve its capability to communicate with the emergency organization

The licensee's internal communications consisted of telegraph, commercial telephone, intercom system, and radios. The radios in use at the time of our review could be used for interplant communications only, however, the licensee planned to acquire another radio which should permit it to communicate with the emergency organization. The licensee's security officer said that hourly communication checks were made during the evening and night shifts between this facility and another of the licensee's facilities

In commenting on our observations, the licensee informed us that

- Senior management officers were concerned over the physical condition of the facility.
- Management attempts to acquire adjoining property to improve production capability and insure tighter security were unsuccessful.
- A program was underway to transfer operations on strategic material from the present plant to a new facility under construction.
- The need to provide improved security weighed heavily in the decision to relocate the present operation.

AEC's inspections

Because of manpower limitations within the regulatory organization, the Division of Security was the only AEC organization that had assessed the adequacy of licensee B's protection program before our visit.

The division had assessed the adequacy of licensee B's protection program in March 1971 for unclassified SNM and in March and May 1972 for classified SNM.

The report prepared as a result of the March 1971 inspection against the provisions of 10 CFR 73 stated

"The protection afforded SNM at this facility in certain respects exceeds the requirements of 10 CFR Part 73. This is true with respect to the frequency of guard patrols and also in that all authorized individuals are either 'Q' or 'L' [designations for security clearances] access authorized. However, the procedures are not designed or geared to prevent an employee from removing the quantities of SNM from the facility. To strengthen the physical protection at the facility, it is suggested that the use of some electronic detection equipment be considered for screening individuals as they depart from buildings where SNM is worked on and/or stored."

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The report covering the March and May 1972 inspections stated that "the security program in effect at the facility is considered to be satisfactory."

The following schedule shows the ratings given by the General Manager's representatives to certain characteristics of the licensee's security system and excerpts from the comments included in the report.

<u>Physical security characteristics</u>	<u>Rating</u>	<u>Comments</u>
A Physical barriers		"The description of the * * * building * * * remains essentially unchanged from that described in previous surveys "
1 Adequacy	Good	
2 Protection of openings	Good	
3 Soundproofing	Does not apply	
		* * * * *
		"The only other entrance [other than the main entrance] is in the * * * end of the building and this door has no exterior hardware "
B Protective personnel		"The guard force had not qualified with their sidearms since August 1970, however, at the time of the survey, the guards were attempting to qualify in accordance with AEC Manual Appendix 2401 "
1 Strength and deployment	Good	
2 Qualifications	Good	
3 Training	Good	
4 Weapons and other equipment	Good	
5 Orders	Good	
6 Protective communications	Does not apply	
7 Supervision	Good	
8 Emergency plans	Good	
9 Efficiency	Good	
C Protective alarms	None given	"The facility does not have an alarm system meeting AEC standards, however, alarms are located as follows * * * A contact alarm on the door in the * * * end of the building rings into the reception area which is constantly attended by either a receptionist or a guard "
D Security of materials in use		No comment
1 Classified materials	Good	
2 Strategically important materials	Good	
E Security of material in storage		Highly enriched SNM "is stored in the fuel vault which is under the control of 'Q' cleared nuclear material personnel. When the vault is unattended, it is secured with an S&G combination lock and subject to bihourly guard patrols "
1 Storage containers	Good	
2 Open storage	Does not apply	
3 Guarding system	Good	
4 Control of personnel access	Good	

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On June 22, 1972, we advised AEC regulatory officials of our findings. As a result, on July 24, 25, and 26, 1972, a special inspection was made by regulatory inspectors at licensee B's facility. The inspection team found one item of noncompliance with the in-plant security requirements contained in 10 CFR 73. The report also stated that "* * * there were several weaknesses noted in [licensee B's] Physical Protection Program in regard to key and lock control, inadequate barriers, poor exterior lighting and guard patrols."

AEC's comments, regarding the apparent inconsistencies between our observations of licensee B's security systems and the conclusions of the AEC inspection reports, were the same as for licensee A. (See p. 26.)

LICENSEE/CONTRACTOR C

Licensee/contractor C stored and processed significant quantities of SNM. SNM in process was for the most part extremely heavy and bulky while SNM in storage was easily portable. Operations were conducted in a multibuilding complex on day and evening shifts, 5 days per week. To restrict access to authorized individuals, the licensee used a badge identification system.

We believe that licensee C's physical security measures would be more likely to detect SNM diversions or diversion attempts than those of licensee A or B. However, we believe that the effectiveness of licensee C's measures could be enhanced.

Guard system

Licensee C employed 16 guards and a full-time security officer, all of whom met AEC's qualification standards for using a .38-caliber revolver. During the day shift two guards were on duty, and during the evening and night shifts three guards were on duty. A guard was also stationed 24 hours a day at another of the licensee's facilities approximately a half mile away and was available if needed. The security staffing for weekends and holidays was the same as for the night shifts.

During the day shift the two guards' duties consisted principally of clearing visitors to enter and leave the plant. From these checkpoints, approximately 40 percent of the plant's perimeter was visible.

The guards did not check personnel, packages, or lunch-buckets routinely or randomly for possession of SNM. Licensee C officials advised that employees were not checked because of the potential adverse impact on their morale.

The guards' duties during the evening and night shifts were essentially the same as for the day shift, however, the additional guard on duty was instructed to make random watchclock tours inside and outside the plant perimeter.

Physical barriers

Perimeter protection of the plant was provided for the most part by chain-link fencing topped with barbed wire

totaling 8 feet, the remainder of the perimeter protection was provided by a building wall. A hole, caused by erosion, under the perimeter fencing was large enough to admit an average-sized person. The licensee told us that this deficiency would be corrected. Also, the fence could be easily disassembled because the nuts, bolts, gate hinge pins, and wire used to fasten the fence mesh to the fenceposts were not secured by welding or peening.

The windows in the wall were not alarmed but consisted of two-plate, heavy-gauge laminated glass and could not be opened. The doors along the wall were alarmed with a contact switch which activated an audible alarm locally and in the guard shack.

Licensee C maintained two primary storage vaults for the protection of portable SNM which had several safety features (1) the vault walls were made of concrete 1 foot thick, (2) the vault floor consisted of concrete 9 inches thick, (3) the roof consisted of 1-1/2 inches of metal decking topped with 5-1/2 inches of concrete and various materials required for weather protection, and (4) the door to the vault was made of steel 4 inches thick. The vaults were also monitored by ultrasonic alarms.

Automatic-detection devices

Licensee C had eight doors used by employees and two roll-up garage doors, all of which were equipped with contact switches that activated audible alarms locally and in the guard shack. Licensee C's three SNM storage vaults were also equipped with ultrasonic alarms that detected movement and were so sensitive they could be activated by a slight air current. The alarms had redundant circuitry and auxiliary power, and, if the circuitry were cut, the alarms would activate.

When the alarms in the material storage areas were set off, an audioalarm was activated in the main guard shack which was manned 24 hours a day. Further, before anyone entered the vault, the guard was notified by phone. If someone entered without calling, the guard was required to investigate.

The licensee did not employ any devices which would have detected the unauthorized possession of SNM on

APPENDIX II

employees leaving the facility. The licensee said it would consider the use of detection monitors

Action/response plan

Licensee C had not formulated a formal action/response plan concerned with responding to a diversion or diversion attempt of SNM. Licensee C had established liaison with local law enforcement authorities and had developed an informal plan intended to provide assistance in the event of an emergency.

The licensee's arrangements called for hourly communication checks to the local police. If the police failed to receive the call at the designated time, they were to contact the licensee by radio or telephone and, if contact could not be made, were to respond by dispatching a squad car.

In a test of the effectiveness of this arrangement, we found that the local police attempted to call the licensee within 15 minutes after the licensee failed to call at the appointed time, the squad car which was dispatched, however, went to the wrong facility 14 miles away. The guard sergeant on duty said that, on some occasions, hourly calls were not made to the local police and the police did not respond. He said, however, that the police had always called if two successive calls were not made.

Licensee C had commercial telecommunications consisting of telephones, teletype, and a telecopier. A constantly monitored base-station radio was also available and capable of communicating with the local security force and outside law enforcement authorities. Portable communications consisted of 11 walkie-talkie radios and a vehicular-mounted radio which was capable of communicating with outside law enforcement authorities.

The vehicular-mounted radio was battery operated, the base-station unit was run by commercial power, and diesel auxiliary power was available in the event of a commercial power outage. The functioning of the auxiliary unit was tested monthly.

AEC's inspections

Representatives of AEC's General Manager made a security inspection at this licensee's plant on February 14 to 16, 1972. Security inspections were made only by these representatives because most of the SNM at the facility was classified, and it was AEC's policy to treat all SNM at the facility as classified. Accordingly, the Director of Regulation made no physical security inspections at the facility.


The report prepared as a result of AEC's inspection stated that "the security program is administered by a competent and conscientious security officer. A rating of satisfactory is continued."

Inspectors' ratings of the various characteristics of the security program were all "good."

APPENDIX III

PRINCIPAL OFFICIALS
 OF THE ATOMIC ENERGY COMMISSION
 RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES
 DISCUSSED IN THIS REPORT

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
CHAIRMAN		
Dixy Lee Ray	Feb. 1973	Present
James R. Schlesinger	Aug. 1971	Feb. 1973
Glenn T. Seaborg	Mar. 1961	Aug. 1971
GENERAL MANAGER		
Robert E. Hollingsworth	Aug. 1964	Present
DIRECTOR OF REGULATION		
L. Manning Muntzing	Oct. 1971	Present
Harold L. Price	Sept. 1967	Oct. 1971



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