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Report by Elmer B. Staats, Comptroller General.

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The Energy Research and Development Administration (ERDA) is responsible for safeguarding nuclear materials at its facilities, and the Nuclear Regulatory Commission (NRC) is charged with guarding such materials at commercial facilities. Security systems are based on material accountability and physical security. Findings/Conclusions: Problems in accountability systems resulted from technical limitations in measurements and time lags in accounting for missing materials. The NRC could achieve more effective monitoring of materials if it changed procedures to apply to the individual material balance areas rather than to an entire plant. Weaknesses in physical security included testing of alarms, placing of guards, personnel search and access control, and emergency lighting. ERDA has more effective physical security regulations than does NRC, but NRC has more detailed accountability regulations. Security systems should be upgraded to protect against an increased threat level, using the best features of each system. Recommendations: Congress should amend the Energy Reorganization Act of 1974 to provide independent assessments of ERDA nuclear facilities. Three alternatives for achieving this objective are to give authority to NRC, to retain responsibility within ERDA, or to authorize NRC to assess ERDA programs periodically. Under all alternatives, agencies should work together to achieve optimum procedures. ERDA's oversight activities should be insulated from developmental functions by the appointing of the head of oversight activities for a specified term of office with clear-cut responsibilities. (HTW)

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*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*

**An Unclassified Digest Of
A Classified Report Entitled
"COMMERCIAL NUCLEAR
FUEL FACILITIES NEED
BETTER SECURITY"**

Nuclear Regulatory Commission
Energy Research and Development Administration

REPORT OF THE COMPTROLLER
GENERAL OF THE UNITED STATES

COMMERCIAL NUCLEAR FUEL
FACILITIES NEED BETTER SECURITY
Nuclear Regulatory Commission
Energy Research and Develop-
ment Administration

D I G E S T

The development and expanded use of nuclear energy in the United States has resulted in increasingly large amounts of highly dangerous "special nuclear material" being processed by the Government and private industry. The most dangerous of these materials are plutonium and highly enriched uranium.

In addition to being used in the fabrication of bombs, plutonium is an extremely toxic substance, with the potential of causing cancer if inhaled, or exposed to an open wound. Such materials, therefore, are potential targets of terrorist groups, criminals, or agents of foreign countries. The potentially catastrophic consequences of even a single theft of significant quantities of such material and the possible impact such an occurrence could have on the development of nuclear-generated energy makes it essential that special nuclear material be adequately protected.

Two Federal agencies are responsible for properly safeguarding nuclear materials:

- The Energy Research and Development Administration for nuclear materials held by its research and development facilities; and
- The Nuclear Regulatory Commission for establishing and enforcing nuclear materials safeguard requirements at commercial facilities.

This report deals with weaknesses in the nuclear material accountability and physical security systems at commercial fuel fabrication and processing facilities. Unlike commercial nuclear power reactors which use low enriched uranium in the production of electricity, the fabrication and processing facilities employ large quantities of plutonium and highly enriched uranium, consequently these facilities are attractive targets.

The basic systems used at facilities licensed by the Nuclear Regulatory Commission to prevent special nuclear material from being lost or stolen are (1) material control and accountability for detecting and deterring thefts and (2) physical security to prevent or respond to thefts.

ACCOUNTING FOR SPECIAL NUCLEAR MATERIAL

Accounting for special nuclear materials is extremely complex and is based on physical, chemical, and radiometric measurements. Current state-of-the-art limitations in measurement instruments and the difficulties in measuring nuclear materials held up in pipes, machinery, and filters preclude accurate measurements. The accuracy ranges from as high as plus or minus 0.1 percent to as low as plus or minus 80 percent.

The former Atomic Energy Commission and its successor agencies have recognized the uncertainties and limitations of the accountability systems. Since 1968, the Energy Research and Development Administration has had an ongoing research and development program aimed at improving the state of the art of the instruments used to measure and record nuclear materials. Also both agencies are developing a computerized measurement and accountability system that may permit continuous control of such material through automated recording and measurement techniques resulting in more timely special nuclear material data.

Discrepancies normally occur between physical and book inventories. Discrepancies which cannot be reconciled have been termed "material unaccounted for" (MUF), which is a prime indicator of the effectiveness of nuclear materials accountability and control systems.

Since licensed facilities began operating in 1955, the MUF at major commercial facilities has amounted to thousands of kilograms of special nuclear materials. Although these quantities do not necessarily denote lost or stolen material, the fact that it is missing greatly detracts from the integrity of the safeguards system.

In addition, the accountability systems do not provide timely information on possible thefts so that prompt response and recovery actions can be undertaken. Frequently, quantities of material large enough to make a weapon go unaccounted for from 1 to 2 months. At one of the commercial nuclear fuel fabricators GAO visited, significant quantities of plutonium had gone unaccounted for for about 1-1/2 months. Although physical security procedures such as access and exit controls helped assure that material was not removed from the plant, the licensee and the Commission could not be certain whether the loss was due to clerical error, to measurement inaccuracies or to actual theft. The Commission ultimately attributed the incident to plutonium within the plant piping and machinery that was previously unmeasured.

Because of the inaccuracies and other limitations associated with the accountability and material control systems for nuclear material, the physical security systems must become increasingly responsible for making sure that nuclear material cannot be stolen.

Accountability on plant basis

The Commission imposes accountability constraints upon licensees on a total plant basis to assess the significance of total plant inventory discrepancies. Material unaccounted for within these constraints is attributed to measurement inaccuracies and accepted as normal processing occurrences. The facilities, however, comprise individual process operations, referred to as material balance areas. The material balance areas are intended to localize nuclear material losses or thefts. Because accountability constraints are imposed on an entire plant basis, a problem associated with an individual material balance area may not be isolated since nuclear material losses and gains experienced elsewhere in the plant may cancel it out.

The Commission should change its procedures and monitor the accounting of special nuclear material by individual material balance area.

PROTECTING SPECIAL NUCLEAR MATERIAL

Physical security controls and procedures that the Commission requires its licensees to adopt include such measures as

- armed guards;
- alarmed fences and vaults;
- electronic detection devices;
- liaison with local law enforcement authorities; and
- access and exit controls.

Physical security requirements were significantly upgraded in November 1973 and even since that time, many additional improvements have been implemented.

GAO found specific shortcomings in the physical security systems used at the three licensees visited, these included some items of noncompliance that the Commission inspectors also identified. Weaknesses included:

- security alarms that were improperly tested;
- unclear requirements as to where armed guards should be placed;
- poor personnel search and access control practices; and
- a lack of emergency lighting at certain key security areas.

In commenting on this report, Commission officials informed GAO that all noncompliance items have been corrected.

Increasing threat of terrorism

While threats of terrorism are not uncommon to any industry or institution, the nuclear industry is particularly vulnerable. It is difficult to predict the exact dimensions, nature, and level of sophistication of the terrorist threat to nuclear facilities, however, recent Commission studies suggest that the probable threat has increased and that security systems at commercial fuel processing facilities should be upgraded. The Commission is considering increasing the minimum threat level that security systems are designed to protect against.

The Commission should require security systems be upgraded to protect against an increased threat level.

Guards' authority limited

The Commission has not clearly defined the authority of private guards to use firearms in protecting special nuclear material, due in part to individual State laws which restrict the use of such weapons by private guard forces. For the most part, State laws allow the use of deadly force only in cases involving an imminent threat to life. The rights of guards are no greater than those of private citizens.

Commission regulations require that guards responding to a possible special nuclear material threat determine if a threat really exists, assess its extent, and act to neutralize the threat, either by themselves or by calling for assistance from the local law enforcement authorities. The regulations, however, do not specifically address the issue of when a guard can legally use a firearm to protect special nuclear material. By interposing themselves between special nuclear material and an adversary, actual circumstances may justify the guards using firearms in self-defense. However, circumstances may also be encountered where the use of firearms is necessary

to protect the material but because personal danger is not evident, guards may not be explicitly authorized to use firearms.

The Energy Research and Development Administration rules governing the use of firearms contrast sharply with the Commission's regulations. Agency guards are authorized to discharge their firearms if needed, killing the person or persons being fired upon if such action is necessary to prevent special nuclear material from being stolen.

The Commission believes that its regulations provide for effective guard response within the limits of the law. The text of the Commission's comments and GAO's evaluation are contained in appendix II.

GAO believes that restrictions on the use of firearms by guards at commercial licensed facilities diminishes their ability to protect special nuclear material.

The Commission should seek Federal and/or State legislative authority, as appropriate, to allow guards at licensed facilities to use firearms to prevent the theft of special nuclear material if such action is the minimum amount of force necessary.

Security clearances needed

The keystone to a good security system is reliable and trustworthy employees. The Energy Research and Development Administration and its predecessor agency, the Atomic Energy Commission, have for many years required personnel background investigations and security clearances of its employees and those of its contractors. The Commission, on the other hand, does not require employees of commercial fuel processors to undergo security clearances even though many have access to special nuclear material or have critical safeguard responsibilities. At one of the licensees GAO visited, a security clearance screening program would have prevented a guard from being employed who had a criminal record under another name, including a 20-year sentence for bank robbery. While employed at the licensee, the guard was arrested for alleged involvement in a bank robbery and shooting incident. The Commission has adopted a security clearance program for its employees and has published, for public comment, a proposal to require employees of its licensees to be cleared.

The Commission, should require a personnel security clearance program for licensees processing significant quantities of special nuclear material.

NEED TO CONSIDER RESTRUCTURING FEDERAL SAFEGUARDS

While the Commission and the Energy Research and Development Administration both rely on interacting systems of physical security and material control and accountability to achieve nuclear safeguards, they sometimes have different procedures and different requirements. The Nuclear Regulatory Commission's accountability regulations are more formal and detailed while the Energy Research and Development Administration's physical security requirements are stronger.

There is no clear cut indication of which agency's requirements in total are stronger or more effective. Nuclear facilities having similar safeguard needs may have different levels of control and protection and correspondingly present different degrees of vulnerability. There are highly desirable elements of both systems. The best in both systems should be incorporated into an optimum set of national safeguards regulations for consistent and uniform protection.

A prior GAO report entitled "Shortcomings in the Systems Used to Control and Protect Highly Dangerous Nuclear Material" (Classified Secret/Restricted Data) discussed problems with the systems used by the Energy Research and Development Administration to account for and protect special nuclear material at the facilities it sponsors. The Energy Research and Development Administration had identified improvements needed in the physical security systems of its facilities including the need for additional guards, alarms, doorway detectors, night vision devices and improved communications equipment. In view of the inaccuracies and other limitations associated with the systems used to account for special nuclear material, the physical security systems must be made increasingly responsible for making sure that nuclear material cannot be stolen. GAO recommended that the Administrator emphasize to the Congress the need for providing additional funds to correct identified physical security deficiencies and, in the interim, give top priority to reprogramming available funds to make the needed physical security improvements.

Although this and the prior GAO report focus on safeguarding special nuclear materials, the concept of an optimum safeguards program administered by an independent organization applies equally to the broader issue of assuring that the health and safety of the public is adequately protected from the hazards of nuclear power.

The appropriateness of a single Government agency responsible for both promoting and regulating the use of nuclear power has

been questioned for almost two decades. The Energy Reorganization Act of 1974 realigned these responsibilities by separating the Atomic Energy Commission into the Energy Research and Development Administration and the Nuclear Regulatory Commission. The first to promote nuclear development and the second to regulate the industry.

The act, was only partially successful. It was designed, in part, to eliminate the conflict of interest inherent within the former Atomic Energy Commission and to provide the public with a higher degree of confidence that special nuclear materials were protected and that there would be no undue risk to the public health or safety. However, the act did not give the Commission responsibility to regulate the Energy Research and Development Administration's nuclear facilities. As a result, this agency is responsible for building an adequate level of safeguards into its programs as they are developed and operated.

To minimize the risk to the public of subordinating regulatory to promotional functions, to maximize objectivity and impartiality, and to increase public confidence in the safe operation of nuclear facilities, GAO believes it is necessary to assure an independent determination is made that Federal and commercial nuclear facilities are being operated in the best interests of the security, health, and safety of the Nation.

In GAO's view there are three alternative methods to achieve this objective. One alternative is to give the Nuclear Regulatory Commission the authority and responsibility for establishing policies, standards, and requirements with oversight responsibility for all Energy Research and Development Administration nuclear facilities.

A drawback to giving the Commission oversight over Energy Research and Development Administration facilities engaged in the nuclear weapons program is that the number of persons with knowledge of plant layouts, nuclear stockpiles, and, perhaps, how nuclear weapons are made may increase. However, the increase could be minimized by (1) transferring the agency personnel currently inspecting the weapon facilities to the Commission and (2) establishing within the Commission a small group responsible for review of the weapons facilities with access to national security information on a "need to know" basis.

If the Commission is given oversight responsibility, GAO envisions it would start at the point special nuclear material is first produced and continue through the weapon

fabrication, assembly, and storage processes up to the point the completed weapons are turned over to the military.

The second alternative is to place the responsibility and authority within the Energy Research and Development Administration. GAO strongly believes, however, that if the Congress chooses this alternative, it also must enact clear statutory provisions to properly insulate their oversight activities from the developmental aspects of the Administration. A listing of the types of provisions that GAO believes could effectively insulate these oversight activities is on pages x and xi of this digest.

The third alternative is to authorize the Commission to periodically assess the Energy Research and Development Administration's nuclear programs and facilities, including its weapons activities. This alternative should provide that the Commission annually report the results of its assessments, as well as its plans for future assessments, to both the Energy Research and Development Administration and the Congress. We envision that assessments of the Energy Research and Development Administration's weapons programs would cover special nuclear material from the point it is first produced and continue through the weapons fabrication program until the completed weapon is turned over to the military.

RECOMMENDATIONS TO THE CONGRESS

GAO recommends that the Congress amend the Energy Reorganization Act of 1974 to provide independent assessments of all Energy Research and Development Administration nuclear facilities. Such assessments should cover both the adequacy of safeguarding nuclear material, and assuring the health and safety of the public from nuclear operations.

There are three alternatives, in GAO's view, to accomplish the above assessments. One alternative is to give the Nuclear Regulatory Commission the authority and responsibility for establishing policies, standards, and requirements in cooperation with the Energy Research and Development Administration for carrying out these assessments. The second alternative is to retain this responsibility and authority within the Energy Research and Development Administration. GAO strongly emphasizes, however, that if the Congress chooses this latter alternative, that it also enact clear statutory provisions to properly insulate these oversight activities from the developmental aspects of the Administration's activities. GAO included as an appendix to the report a listing of the types of statutory provisions that it believes could effectively insulate these oversight activities. The third alternative is to authorize the Nuclear Regulatory Commission to periodically

assess the Energy Research and Development Administration's nuclear programs and facilities and annually report the results to the agency and the Congress.

GAO intends that under all alternatives, both agencies work together in assuring that the best available procedures, techniques, and criteria are used to safeguard special nuclear material from theft and to protect the health and safety of the public from the potential hazards of nuclear operations.

In commenting on the first alternative the Nuclear Regulatory Commission stated that they did not disagree with it. They did, however, point out several complex issues that would have to be resolved before the recommendation could be implemented. The Commission's detailed comments are contained in appendix II of the report.

The Energy Research and Development Administration considers that the concept of independent assessment has considerable merit from the standpoint of assuring the Administrator and the public as to the adequacy of its nuclear operations. However, it does not consider that the first alternative of placing this responsibility with the Nuclear Regulatory Commission is viable since it would, in its view, impose extraordinary burdens on both organizations without commensurate benefit. They believe such a recommendation would be tantamount to requiring its facilities to be licensed by the Nuclear Regulatory Commission. Further, the Energy Research and Development Administration contends that added Nuclear Regulatory Commission activities at the Administration's facilities could result in the Nuclear Regulatory Commission having to acquire expertise they do not now have and which would, to a large extent, be duplicative of the Administration's. The Energy Research and Development Administration has undertaken a review to determine how an independent assessment activity could best be structured. The Administration's detailed comments are contained in appendix III to the report.

The Administration's review is a step in the right direction. GAO doubts, however, that ERDA can in fact, structure an organization to independently assess its nuclear operations without Congress enacting amending legislation, as suggested above.

Nuclear development will continue to play an important role in any national energy policy. Because, in GAO's view, the future of nuclear energy depends heavily on the credibility of Federal regulation of this energy source, GAO hopes its recommendation will provide the impetus for dialogue among

the appropriate congressional committees, the Energy Research and Development Administration, and the Nuclear Regulatory Commission on the nature and extent of the Commission's and the Administration's role in independently assuring the public and the Congress that all nuclear facilities are properly protected and that the public is adequately protected from the hazards of nuclear operations. However, while dialogue is important, timely action on this recommendation is crucial and should be expedited.

In view of the Administration's proposed energy reorganization, this may be an especially propitious time to consider restructuring Federal nuclear oversight responsibilities.

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ACTIONS THAT WOULD BE NEEDED TO
INSULATE ERDA OVERSIGHT ACTIVITIES
FROM DEVELOPMENTAL FUNCTIONS

- Give the head of the oversight activities (who would be appointed by the President and confirmed by the Senate) a specified term of office. The term of office should exceed that of the Administrator of the Energy Research and Development Administration.
- Require that the head of the oversight activities report directly to the Administrator of the Energy Research and Development Administration.
- Stipulate by specific legislative provisions the responsibilities of the oversight organization emphasizing its independence from energy policy formulation and development. In this regard, provide through legislative history the intent of the Congress that the head of the oversight activities be able to speak independently on matters relative to the oversight activities, including testimony before the Congress.
- Provide for close congressional monitoring of the oversight organization's activities.
- Vest the oversight responsibilities directly in the head of the oversight organization.
- Require that any request for Energy Research and Development Administration appropriations identify the portion of the request intended for the support of the oversight activities and a statement of the differences, if any, between the amounts requested and the head of the

oversight activities assessment of the budgetary needs of the organization.

- Provide that neither the head of the oversight activities nor the deputy head could be removed from office for purposes other than being permanently incapacitated, guilty of neglect of duty, malfeasance in office, guilty of a felony, or conduct of moral turpitude.
- Establish the oversight activity as a professional organization by requiring its head to be a person who, by reason of professional background and experience, is specially qualified to handle a nuclear oversight activity and be chosen on a merit basis.