Enclosure 2

Frank Arsenault
ERDA - Safeguards and Security

INFORMATION FOR NSSM-254 - ANNUAL REPORT ON STATUS OF SAFEGUARDS PROGRAM

Enclosed for your use in preparing the response to NSSM 254 is a description of the significant events in the safeguards program for licensed special nuclear material and related facilities for the year 1974.

(Signed) R. G. Page

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Enclosure
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Enclosure

SIGNIFICANT ORGANIZATIONAL CHANGES

The Energy Reorganization Act of 1974 (Public Law 93-438), which established the Nuclear Regulatory Commission, also established in the Commission an Office of Nuclear Material Safety and Safeguards under the direction of a Director of Nuclear Material Safety and Safeguards.

The Director of Nuclear Material Safety and Safeguards is to perform such functions as the Commission shall delegate including:

(1) Principal licensing and regulation involving all facilities and materials, licensed under the Atomic Energy Act of 1954, as amended, associated with the processing, transport, and handling of nuclear materials, including the provision and maintenance of safeguards against threats, thefts, and sabotage of such licensed facilities, and materials.

(2) Review safety and safeguards of all such facilities and materials licensed under the Atomic Energy Act of 1954, as amended, and such review shall include, but not be limited to:

(A) monitoring, testing, and recommending upgrading of internal accounting systems for special nuclear and other nuclear materials licensed under the Atomic Energy Act of 1954, as amended;

(B) developing, in consultation and coordination with the Administration, contingency plans for dealing with threats, thefts, and sabotage relating to special nuclear materials, high-level radioactive wastes and nuclear facilities resulting from all activities licensed under the Atomic Energy Act of 1954, as amended;

(C) assessing the need for, and the feasibility of, establishing a security agency within the office for the performance of the safeguards functions, and a report with recommendations on this matter shall be prepared within one year of the effective date of this Act and promptly transmitted to the Congress by the Commission.

(3) Recommending research to enable the Commission to more effectively perform its functions.

UPGRADING OF PROTECTION AT FIXED SITES

In November, 1973, the Commission published comprehensive amendments to its regulations to strengthen the protection of nuclear plants against industrial sabotage and to strengthen the protection of SNM against theft. During 1974, the protection measures called for by these requirements were implemented at 23 licensee sites.

Under the requirements, each person who is licensed to possess or who applies for a license to possess 5,000 grams or more of SNM as computed by the formula:

grams = grams (U-235) + 2.5 [grams (Pu) + grams (U-233)]

where grams (U-235) means grams of U-235 contained in uranium enriched to 20% or more in the U-235 isotope

is required to comply with detailed physical protection requirements as discussed below and to prepare and submit a physical protection plan to the NRC for approval. The protection plan must contain two parts. Part I must address vital equipment, vital areas, and isolation zones and must demonstrate how the licensee will meet applicable requirements. Part II must list the tests, inspections, and other means for demonstrating compliance with the requirements. The licensee is not permitted to make any change which would decrease the effectiveness of his physical protection plan without prior approval of the NRC.

A physical protection plan must clearly demonstrate that the applicant will be able to comply with the following requirements:

- The licensee must maintain a physical security organization, including armed guards to protect his facility against sabotage and the SNM in his possession against theft and diversion. At least one supervisor of the security organization must be onsite at all times. The licensee must establish, maintain, and follow written security procedures which document the structure of the security organization and which detail the duties of guards, watchmen, and other individuals responsible for security. All guards and watchmen must be properly trained, equipped and qualified.

- Any equipment, system, device or material whose failure, destruction or release directly or indirectly endanger public health and safety must be located within a separate structure or barrier designated as a vital area. In addition, SNM must be stored and processed within a controlled area designated as a material access area. All vital areas and material access areas must be located within a larger protected area which is surrounded by a physical barrier. An isolation zone is required on both sides of the outer physical barrier, and it must be kept clear of obstructions, illuminated, and monitored to detect the presence of individuals or vehicles attempting to gain entry

to the protected area so as to allow response by the licensee's security force at the time of penetration into the protected area.

- Personnel and vehicle access into a protected area, material access area or vital area must be controlled. A picture badge identification system must be used for employees. Visitors must be registered and escorted, except that an individual who requires frequent and extended access to a protected or vital area need not be escorted if he is provided with a picture badge which designates the area to which access is authorized. Individuals and packages entering the protected area are required to be searched. Admittance to a vital area and material access area must be controlled, and access must be limited to those persons who require such access to perform their duties. Methods to observe individuals within a material access area to assure that SNM is not being diverted must be provided and used on a continuing basis. All individuals, packages, or vehicles are searched for concealed SNM before exiting from a material access area. Keys, locks, combinations and related equipment are required to be controlled to minimize the possibility of compromise.

- All emergency exits in the protected area, vital areas, and material access areas must be alarmed against intrusion. Each unoccupied material access area must be locked and alarmed. All alarms must annunciate in a continuously manned central alarm station located within the protected area and in at least one other continuously manned station. All alarms must be selfchecking and tamper-indicating and tested for operability and required functional performance at specified intervals not to exceed seven days.

- Each guard or watchman on duty must be capable of maintaining continuous communications with an individual in a continuously manned central alarm station within the protected area, who is capable of calling for assistance from other guards and from local law enforcement authorities. To provide the capability of continuous communication with local law enforcement authorities, two-way radio voice communications must be established in addition to conventional telephone service. All communications equipment must remain operable by means of independent power sources in the event of loss of primary power, and must be tested for operability and performance not less frequently than once at the beginning of each security personnel work shift.

- Licensees must establish liaison with local law enforcement authorities. In developing security plans, licensees must take into account the probable size and response time of the local law enforcement assistance. The security force must be prepared to take immediate action to neutralize threats to the facility by appropriate direct action and by calling for assistance from local law enforcement authorities.

To aid licensees in carrying out the new protection requirements, the Commission issued a number of new Regulatory Guides which set forth acceptable ways for complying with selected requirements. These are listed in Appendix A.

Also during 1974, persons operating nuclear power reactors were required to submit physical security plans to protect against industrial shortage. Protection plans for 52 nuclear power reactor units were reviewed and approved. Guidance as to the physical protection criteria generally acceptable for the protection of nuclear power reactors against an act of industrial sabotage is provided by Regulatory Guide 1.17 "Protection of Nuclear Power Plants Against Sabotage" which references ANSI Standard N18.17 "Industrial Security of Nuclear Power Plants." The level of security provided is similar to that discussed above for the protection of SNM.

In November, 1974, the Commission published new proposed amendments which would establish new specific requirements for nuclear power reactor licensees to establish a physical security organization to provide access control to and within the nuclear power reactor using qualified and trained guards, and to establish other physical security measures including communications, liaison with local law enforcement authority, and visitor restrictions for non-employees.

UPGRADING OF MATERIAL CONTROL AND ACCOUNTING MEASURES

Commission requirements for the control and accounting of special nuclear material at licensed plants were revised in November, 1973, to provide greater sensitivity and timliness for detecting the theft or diversion of material. Quality specifications were prescribed for performing plant material balances on the basis of measurements.

During 1974, the following material control and accounting requirements were generally applied to 30 facilities which were authorized to possess more than one effective kilogram*of special nuclear material in unsealed form:

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*Effective kilogram of special nuclear material means: (1) For plutonium and uranium -233 their weight in kilograms; (2) For uranium with an enrichment in the isotope U-235 of 0.01 (1%) or above, its element weight in kilograms multiplied by the square of its enrichment expressed as a decimal weight fraction; and (3) For uranium with an enrichment in the isotope U-235 below 0.01 (1%), by its element weight in kilograms multiplied by 0.0001.

- The licensee must maintain and follow written material control and accounting procedures.

- Records must be kept showing the receipt, inventory (including location), disposal, acquisition, import, export, and transfer of all special nuclear material in each licensee's possession, including records of the quantities of material added to or removed from process. Physical inventory and material balance records must be maintained for a period of five years.

- All transfers of special nuclear material between material balance areas must be documented to show the identity and quantity of material. Means must be provided for the control and accounting of internal transfer documents and for obtaining authorized signatures on each document.

- The licensee must uniquely identify items or containers containing special nuclear material in process.

- The licensee must tamper-safe containers or vaults containing special nuclear material not in process and control access to the devices and records associated with their application. Tamper-safing may be utilized to assure the validity of material measurements performed prior to the time of physical inventory.

- Provisions must be made for accurate cutoff procedures, verification of the integrity of the tamper-safing devices used for securing previously measured material, verification by remeasurement of the quantities of material previously measured but not tamper-safed, and for the accurate listing of the inventory. In addition to the general inventory procedures, specific inventory instructions must be prepared for each inventory.

- All quantities of material on inventory must be based on measurements.

- The licensee must conduct physical inventories bimonthly for plutonium and uranium 233, and uranium enriched 20 percent or more in U-235, except for plutonium containing 80 percent or more by weight of the isotope Pu-238 and plutonium and uranium held in the inaccessible portion of an irradiated fuel reprocessing plant. The licensee must conduct physical inventories for uranium enriched less than 20 percent in the

isotope U-235, and those materials exempted from the bimonthly inventories at least every six months.

- Within 30 days after the start of each physical inventory, the licensee must calculate the material unaccounted for (MUF) and its associated limit of error, reconcile and adjust the accounting records to the results of the physical inventory, and complete the material balance records for each material balance.

- The licensee must maintain a system of control and accounting such that the limits of error for any MUF do not exceed threshhold quantities of 200 grams for plutonium or uranium -233, 300 grams for uranium or the isotope uranium -235 contained in high enriched uranium, or 9,000 grams for uranium -235 contained in low enriched uranium, or 0.5 percent of additions to or removals from material in process, whichever is greater, except for a reprocessing plant where the uncertainty for plutonium and uranium may be 1.0 percent and 0.7 percent, respectively. In accordance with the provisions of the regulations, two plants have been allowed higher limits. Each of these has initiated programs to achieve improvements in his material control system.

In October, 1974, the Commission issued amendments to its regulations which specify fundamental nuclear material controls required to be established, maintained, and followed by licensees authorized to possess at any one time and location more than one effective kilogram of special nuclear material in unsealed form.

These amendments provide the basic criteria for detailed licensee material control and accounting systems. The criteria, in turn, provide the basis for the eventual development of material control and accounting systems utilizing advanced technology such as nondestructive analysis and automatic data processing to provide real-time accurate control of and accounting for special nuclear material.

Also in October, 1974, the Commission published proposed regulations to strengthen the materials control and accounting requirements for special nuclear material in the interest of the common defense and security. Such amendments would provide greater assurance that material balances are based upon current, high quality measurement data, so that a loss of material may be distinguished from measurement uncertainty.

Under the proposed amendments each licensee who is authorized to possess, at any one time and place, a quantity of certain special nuclear material exceeding one effective kilogram in unsealed form would be required to establish and maintain a measurement control program covering all of the

components of measurements used for materials control and accounting purposes. The program would include organizational controls for the management of measurement quality, training and performance qualification requirements, a standards and calibration system, a quality testing system for the determination and the control of systematic and random errors, a records evaluation system for the collection and statistical analysis of the data, and a system of management audits and reviews. If adopted by the Commission the proposed amendments would give licensees three months to submit plans for the measurement control programs. The licensees would be required to follow the plans submitted six months after the deadline date for submission or thirty days after Commission approval whichever is later.

To aid licensees in carrying out the new material control and accounting requirements, the Commission issued a number of new Regulatory Guides in 1974 which set forth acceptable ways for complying with selected requirements. These are listed in Appendix B.

UPGRADING OF PROTECTION OF SNM DURING TRANSPORT

During 1974 the following new rules for the protection of SNM in transit were applied to 10 licensees and 5 transportation companies.

Each person who is licensed or who applies for a license to possess more than 5000 grams of special nuclear material as computed by the formula given above, except SNM contained in irradiated fuel, must submit a plan to the NRC for review and approval outlining the methods to be used for the protection of the SNM while in transit. The licensee is not permitted to make any change which would decrease the effectiveness of his transportation security plan without prior approval of the NRC. The plan must demonstrate the means to be used in meeting the following requirements:

- If a common or contract carrier is used, the SNM must be transported under the established procedures of the carrier which provide a system for the physical protection of valuable material in transit and require a hand-to-hand receipt at origin and destination and at all points in route where there is a transfer of custody. Transit times of all shipments must be minimized, and routes must be selected to avoid areas of natural disaster or civil disorders. SNM must be shipped in containers which are sealed by tamper-indicating type seals. The outer container or vehicle is required to be locked and sealed. No container weighing 500 pounds or less may be shipped on open vehicles, such as open trucks or railway flatcars.

- All shipments by road must be made without any scheduled intermediate stops to transfer SNM or other cargo between the point of origin and destination. All motor vehicles are required to be equipped with a radiotelephone. Calls must be made at predetermined intervals normally not to exceed two hours; and if calls are not received when planned, the licensee or his agent must immediately notify an appropriate law enforcement authority and the NRC. Shipments by road must be accompanied by at least two people in the transport vehicle. If the transport vehicle is not specially designed with penetration-resistant and immobilization features, the vehicle is required to be protected by an armed escort consisting of at least two guards in a separate escort vehicle. In addition, transport vehicles are required to be marked on top, sides, and rear with identifying letters or numbers.

- Large shipments of SNM are prohibited on passenger aircraft. Shipments on cargo aircraft are required to be arranged so as to minimize the number of scheduled transfers; guards must be present during transfer and at all scheduled stops.

  Rail shipments must be escorted by two armed guards in the shipment car or in an escort car. Continuous onboard radiotelephone communications capability must be provided with conventional telephone backup. Periodic calls are required to the licensee or his agent.

- Shipments by sea must be made on vessels making the minimum ports of call. Transfer at domestic ports from other modes of transportation must be monitored by a guard. Shipments must be placed in a secure compartment which is locked and sealed. Export shipments must be escorted by an authorized individual, who may be a crew member from the last port in the U. S., until it is unloaded in a foreign port. Ship-to-shore communications must be made every 24 hours to relay position information and the status of the shipment as determined by daily inspections.

- A licensee who makes a shipment must notify the consignee of the shipment schedule and details, including the estimated time of arrival of the shipment. A licensee who receives a shipment must immediately notify the shipper. Shipments which fail to arrive at the destination on time must be traced, and the NRC must be notified.

To aid licensees in carrying out the new requirements for the protection of SNM in transit, the Commission issued a number of new Regulatory Guides which set forth acceptable ways for complying with selected requirements. These are listed in Appendix C.

In November, 1974, the Commission published new proposed regulations to further strengthen the protection of nuclear material in transit. The regulations propose, among other things, a significant strengthening of the armed escort which accompanies the shipments.

INSPECTION AND ENFORCEMENT

As in previous years, the Regulatory materials and plant protection inspection program assured through inspections that licensees have established and are maintaining an effective program to protect the health and safety of the public against the release of radioactive materials that could result from industrial sabotage and to protect against the diversion of SNM which could be used to manufacture nuclear weapons. During 1974, 219 safeguards related inspections were conducted, of which 86 were reactor inspections and 133 were fuel cycle facility inspections. There were 9 incidents of serious safeguards violations, for which a total of approximately $70,000 in civil penalties was imposed.

EFFECTIVENESS OF SAFEGUARDS--ADEQUACY OF COVERAGE

The upgraded physical security and material control and accounting systems implemented during 1974 have been effective in protecting nuclear facilities and special nuclear material at licensee sites in that no incidents of sabotage or theft have been recorded. Nonetheless, protection systems must be reviewed and upgraded periodically to protect against new threats and against new technology which becomes available to adversary forces.

Accordingly, the AEC had initiated a planned further upgrading actions relating to safeguards. The plans will be reevaluated by NRC as to adequacy and scheduling. These include such actions as:

1. Automated processing, material handling and inventory data aquisition and analysis.

2. Design basis incident analysis to identify and analyze the safeguarding of SNM.

3. Vulnerability analysis to identify weaknesses in safeguards systems and to develop mechanisms for overcoming such weaknesses.

4. Threat analysis and level of protection studies to provide a continuing analysis of possible terrorist activities that might affect the nuclear industry.

5. Design criteria studies to evaluate concepts of facility design for safeguarding SNM.

6. Response mechanism studies to identify the roles to be performed by various groups and agencies in response to safeguards incidents.

7. Diversion path analysis studies to identify process changes which serve as indicators of possible or attempted diversion of SNM.

In addition to the actions listed above, NRC is conducting a study as called for in the Energy Reorganization Act of 1974, to assess the need for, and the feasibility of, establishing a Federal security agency to maintain safeguards against threats, thefts and sabotage of licensed materials and facilities. This study will be prepared and transmitted to the Congress by the Commission within approximately one year.

APPENDIX A

Regulatory Guides Issued in 1974 which Relate to Protection of Fixed Sites.

5.15 Security Seals for the Protection and Control of Special Nuclear Material. 1/74

5.20 Training, Equipping, and Qualifying of Guards and Watchmen. 1/74

5.27 Special Nuclear Material Doorway Monitors. 6/74

5.30 Materials Protection Contingency Measures for Uranium and Plutonium Fuel Manufacturing Plant. 6/74

APPENDIX B

Regulatory Guides Issued in 1974 which Relate to Materials Accounting.

5.16 Standard Methods for Chemical, Mass Sectrometric, Spectrochemical Nuclear, and Radiochemical Analysis of Nuclear-Grade Plutonium Nitrate Solutions and Plutonium Metal. 1/74

5.18 Limit of Error Concepts and Principles of Calculation in Nuclear Materials Control. 1/74

5.19 Methods for the Accountability of Plutonium Nitrate Solutions. 1/74

5.21 Nondestructive Uranium -235 Enrichment Assay by Gamma-Ray Spectrometry. 4/74

5.22 Assessment of the Assumption of Normality (Employing Individual Observed Values). 4/74

5.23 In Situ Assay of Plutonium Residual Holdup. 5/74

5.24 Analysis and Use of Process Data for the Protection of Special Nuclear Material. 6/74

5.25 Design Considerations for Minimizing Residual Holdup of Special Nuclear Material in Equipment for Wet Process Operations. 6/74

5.26 Selection of Material Balance Areas and Item Control Areas. 6/74

5.28 Evaluation of Shipper-Receiver Differences in the Transfer of Special Nuclear Materials. 6/74

5.29 Nuclear Material Control Systems for Nuclear Power Plants. 6/74

5.33 Statistical Evaluation of Material Unaccounted For. 6/74

5.34 Nondestructive Assay for Plutonium in Scrap Material by Spontaneous Fission Detection. 6/74

5.35 Calorimetric Assay of Plutonium. 6/74

5.36 Recommended Practice for Dealing with Outlying Observations. 6/74

5.37 In Situ Assay of Enriched Uranium Residual Holdup. 8/74

5.38 Nondestructive Assay of High-Enrichment Uranium Fuel Plates by Gamma Ray Spectrometry. 9/74

5.39 General Methods for the Analysis of Uranyl Nitrate Solutions for Assay, Isotopic Distribution, and Impurity Determinations. 12/74

APPENDIX B (continued)

5.40 Methods for the Accountability of Plutonium Dioxide Powder

5.45 Standard Format and Content for the Special Nuclear Material Control and Accounting Section of a Special Nuclear Material License Application. 12/74

APPENDIX C

Regulatory Guides Issued in 1974 which Relate to Protection of SNM During Transportation.

5.15 Security Seals for the Protection and Control of Special Nuclear Material. 1/74

5.17 Truck Identification Markings. 1/74

5.31 Specially Designed Vehicle with Armed Guards for Road Shipment of Special Nuclear Material. 6/74

5.32 Communication with Transport Vehicles. 6/74