September 21, 1978

SECY-78-404A

COMMISSIONER ACTION

For: The Commissioners

From: Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

Thru: Executive Director for Operations

Subject: RESPONSE TO COMMISSION DIRECTION PROVIDED IN S. J. CHILK'S JUNE 2, 1978 MEMORANDUM TO L. V. GOSSICK CONCERNING COMMISSION REVIEW OF OGC/OIA REPORT, "INQUIRY INTO TESTIMONY OF THE EDO"

Purpose: To respond to the Commission's request that the staff "identify instances of alleged successful thefts or diversions of strategic special nuclear material."

Discussion: In S. J. Chilk's June 2, 1978, memorandum, "Commission Review of OGC/OIA Report, "Inquiry into Testimony of the EDO" to L. V. Gossick (EDO), the staff was directed to "identify instances of alleged successful thefts or diversions of strategic special nuclear material. The list of such instances should include, to the extent possible, those mentioned by Mr. Conran in his July 29, 1977 testimony."

In his July 29, 1977, testimony before the Subcommittee on Energy and Environment, Mr. Conran testified that "There are other instances of theft and material stolen than the NUMEC installation, thefts or suspected thefts. That information is included in an appendix of my draft overview study.... There have been other successful attempts to steal nuclear material - not always a large quantity, not always bomb-grade material. There have been a number of instances in which nuclear material was stolen."

Although the staff has done extensive research into events involving NRC licensees or licensed material, it has been unable to identify instances that can unequivocally be construed as successful thefts or diversions of strategic

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special nuclear material. Mr. Chilk's June 2 memorandum also states, "...with regard to the NUMEC matter itself, an appropriate characterization is that based on information available to the Commission at the present time, there is no conclusive evidence that a diversion of a significant amount of strategic SNM either did or did not take place."

The Staff previously compiled, as a result of a commitment made by Commissioner Gilinsky to Senator John Glenn, a Safeguards Summary Event List (SSEL) which the Commission forwarded to Senator Glenn on April 27, 1978. The SSEL, a copy of which was also placed in the NRC Public Document Room, listed events of interest to safeguards, including instances in which SSNM was misplaced, reported missing, or removed incidental to the taking of non-nuclear items. (The SSEL did not address attempted frauds based on the alleged possession of nuclear material or extortion threats based on the alleged possession of a nuclear device. The attached list also does not address such hoaxes.) All but three items of the attached list were extracted from the SSEL. Since the SSEL encompassed only events relating to NRC licensed material and facilities, we have included these three additional items involving non-licensed activities (9, 10, and 11); these were identified by Mr. Conran in Appendix J of his Draft Overview Study. Information for the three items was obtained from the Department of Energy.

The staff has made a reasonable attempt to compile exhaustive lists of safeguards events, and the lists in the Enclosure and the SSEL are believed to be comprehensive. However, we are dependent on other agencies for much of this information, particularly for events occurring before the formation of the NRC. In dealing with pre-1968 safeguards data it should be noted that such data predate any regulatory staff activity and derive from a period in which safeguards measures were far less stringent than at present.

In February 1978 a report, "Inquiry into the Testimony of the Executive Director for Operations," was published by the NRC Offices of Inspector and Auditor and General Counsel (OIA/OGC report). In that report it was recommended (Recommendation 4) that NRC safeguards experts identify and clarify publicly, the alleged successful thefts or diversions mentioned by Mr. Conran in his July 29, 1977 testimony. Because clarification of Mr. Conran's allegations goes substantially beyond the scope of Mr. Chilk's direction of June 2, 1978, the Office

of Nuclear Material Safety and Safeguards is preparing a separate response to Recommendation 4 of the OIA/OGC report.

Recommendation: This Commission paper with enclosure be placed in the Public Document Room to better service requests for such information.

Coordination: The Offices of Inspection and Enforcement and Nuclear Reactor Regulation concur. The Office of the Executive Legal Director has no legal objection.

Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

Enclosure:
Events Involving Missing or
Misplaced SSNM

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EVENTS INVOLVING MISSING OR MISPLACED SSNM

1. 1960's — NUMEC, Apollo, PA

Inventory differences occurred at NUMEC. In the 6/2/78 memorandum from S. J. Chilk (SECY) to L. V. Gossick (EDO), subject, "Commission Review of OGC/OIA Report, 'Inquiry into Testimony of the EDO,'" it is stated, "based on information available to the Commission at the present time, there is no conclusive evidence that a diversion of a significant amount of strategic SNM either did or did not take place."*

2. 04/26 to 05/02/62 — Westinghouse, Cheswick, PA

Two fuel plates of HEU (40 grams) valued at $1,050 were reported missing. Site management believed that both plates were inadvertently chopped or recycled within the facility.

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*An inventory difference (ID), commonly referred to as material unaccounted for (MUF), is simply the difference between what a licensee's accounting records show should be on hand and what a licensee's physical inventory shows concerning the material on hand. ID's arise when nuclear materials are processed (particularly when chemical operations are involved). These differences can result from a measurement inaccuracy, unmeasured discharges from the process, unmeasured inventory, bookkeeping errors or theft. Although an inventory difference larger than its overall measurement uncertainty (limit of error) may signal an abnormal situation requiring investigation, the fact that a small inventory difference falls within its associated limit of error--even an ID of zero--does not provide automatic or conclusive proof that no loss or theft of material has occurred. Therefore, the NRC relies on information provided not only by the material accounting system but also by the internal control system, the physical security system, NRC inspections and evaluations, and NRC and licensee investigations.

ID's have previously been listed and discussed in two NRC publications which are available to the public (NUREG-0350, Vol. 1, No. 1, titled "Report on Strategic Special Nuclear Material Inventory Differences" and NUREG-0430, Vol. 1, No. 1, titled "Licensed Fuel Facility Status Report"). Accordingly, with the exception of the two largest ID's which occurred at NUMEC-Apollo and Nuclear Fuel Services-Erwin, ID's have been excluded from this document. For a complete current listing and further information concerning ID's, the reader is referred to NUREG-0350 and NUREG-0430. In dealing with pre-1968 safeguards data it should be noted that such data derive from a period in which safeguards measures were much less stringent than those presently in effect. The exclusion of ID's as a general proposition from this document is not meant to imply that possible successful theft or diversion in those instances can be conclusively ruled out.

3. 06/12/64 Pratt & Whitney

One .9 gram (1 inch by .894 inch) four mil foil of 93% enriched U-235 was reported missing.

4. 01/67 Wayne State University
Detroit, MI

The apparent loss of three one-gram uranium oxide reference sources containing a total of 1.38 grams of U-235 was reported. The sources were obtained from the Ford Motor Company's Scientific Laboratory on 08/24/66. The sources had never been used and it was believed that the sources were accidently put in with dry radioactive waste that was stored in the same area. The waste was shipped to the Nuclear Engineering burial site in 12/66. The last accounting of the sources was made in 10/66. During the routine 1/67 inventory the sources could not be located.

5. 04/04/67 Atomics International
San Diego, CA

One aluminum-clad fuel plate believed to contain 21.05 grams of U-235 was discovered missing. Investigation later revealed that the fuel plate did not contain any licensed material.

6. 01/29/68 National Lead Company
New York

Two highly enriched uranium fuel plates consigned by the Idaho Nuclear Corporation to its inspector at the National Lead Company, New York, were reported missing January 29, 1968. The two fuel plates, containing a total of about 53 grams of U-235, were received by the inspector on Friday, January 26, 1968 and left wrapped on his desk over the weekend. The two plate identification numbers and the recipient's name were written on the package. There was no further identification on the package to indicate the nature of the contents. On Monday, January 29, 1968 the plates were missing. Subsequent search of the facility and interview of employees failed to locate the plates. The FBI conducted an investigation of this matter, but developed no suspects. NRC safeguards regulations do not require physical protection for this quantity of HEU.

7. 07/24/68 — Battelle Memorial Institute, Columbus, OH

A subassembly, 208 grams of 93% enriched U-235 as UO_2 (unirradiated), was discovered to be missing during an AEC inspection. The missing subassembly was not found, but the subsequent investigation indicated that it had been accidentally confused with an unfueled subassembly which was to have been sent to Oak Ridge for burial as contaminated waste. The unfueled subassembly was found to have been stored and inventoried as a fueled subassembly since 1962. Value of the subassembly was $2,400.

8. 08/31/68 — Los Alamo Scientific Laboratory, New Mexico

On 8/31/68 it was discovered that 355 grams of material in the form of six thin metal discs approximately 1-1/2" in diameter and weighing about 58 grams each was missing. According to AEC officials, the discs did "not represent a health and safety hazard." LASL personnel reported that the discs were heavily oxidized and possibly were disposed of along with rubber gloves, kimwipes, and other waste during a clean-up of the area. A complete search of the facility was conducted without results.

9. 09/18/68 — Chalk River, Canada

On 9/18/68 a Zircaloy-clad enriched UO_2-ThO_2 unirradiated fuel rod was reported missing at Chalk River. The rod contained 176.8 grams of 93% enriched uranium plus 109 grams of ThO_2. The rod was a backup rod for an irradiation experiment and was never installed in a reactor and hence was unirradiated.

The investigation was conducted by Atomic Energy of Canada, Ltd., Chalk River personnel, Westinghouse Bettis and personnel from Atomics International and General Atomics of California through Bettis, and the AEC through its resident engineer at Chalk River.

Presence of the fuel rod was verified upon receipt. Nuclear materials surveys made during the term of storage evidently considered the rod present in the container. The fuel rod was definitely last seen on or about 4/28/66 when it was removed from the container for tests. It was assumed that the rod was returned to storage. The investigation revealed that the rod crew had discovered the rod container to be empty sometime in July 1968. An extensive search of the Chalk River installation was conducted without results.

10. 12/68 Nuclear Fuel Services
Erwin, Tennessee

An excessive inventory difference occurred at Nuclear Fuel Services (NFS) and resulted in an investigation and a reinventory. The failure of NFS to bring the book inventory into agreement with the results of each physical inventory conducted from 1957-1968 is considered a contributing cause of the December 1968 inventory difference; however, there is no way to assign this difference solely to a reconciliation of the book and physical inventory nor is there a basis for prorating the difference over the eleven year period from 1957 to 1968. The primary causes of the excessive inventory difference were believed to be (1) unmeasured effluent streams, (2) inaccurate measurements, and (3) an inadequate material control program. Based on information available to the Commission at the present time, there is no conclusive evidence that a diversion of a significant amount of SSNM either did or did not take place.*

*An inventory difference (ID), commonly referred to as material unaccounted for (MUF), is simply the difference between what a licensee's accounting records show should be on hand and what a licensee's physical inventory shows concerning the material on hand. ID's arise when nuclear materials are processed (particularly when chemical operations are involved). These differences can result from a measurement inaccuracy, unmeasured discharges from the process, unmeasured inventory, bookkeeping errors or theft. Although an inventory difference larger than its overall measurement uncertainty (limit of error) may signal an abnormal situation requiring investigation, the fact that a small inventory difference falls within its associated limit of error--even an ID of zero--does not provide automatic or conclusive proof that no loss or theft of material has occurred. Therefore, the NRC relies on information provided not only by the material accounting system but also by the internal control system, the physical security system, NRC inspections and evaluations, and NRC and licensee investigations.

ID's have previously been listed and discussed in two NRC publications which are available to the public (NUREG-0350, Vol. 1, No. 1, titled "Report on Strategic Special Nuclear Material Inventory Differences" and NUREG-0430, Vol. 1, No. 1, titled "Licensed Fuel Facility Status Report"). Accordingly, with the exception of the two largest ID's which occurred at NUMEC-Apollo and Nuclear Fuel Services-Erwin, ID's have been excluded from this document. For a complete current listing and further information concerning ID's, the reader is referred to NUREG-0350 and NUREG-0430. In dealing with pre-1968 safeguards data it should be noted that such data derive from a period in which safeguards measures were much less stringent than those presently in effect. The exclusion of ID's as a general proposition from this document is not meant to imply that possible successful theft or diversion in those instances can be conclusively ruled out.

11. 01/13-31/69 — Idaho Nuclear Corp., Idaho

On 1/13/69, 194 grams of 93% enriched uranium in 80 plates were discovered missing. On 1/24/69, 195 grams of U-235 in 72 platelets were discovered missing and on 1/31/69, 8 grams of enriched uranium foil was discovered missing.

In a 4/23/69 letter from the AEC Director, Office of Safeguards and Materials Management, to E. J. Bauser, Executive Director for the Joint Committee on Atomic Energy, it was concluded:

1) The 80 nickel-clad fuel plates containing about 194 grams of U-235 were included in the subassembly when it was buried, and not recorded, in the National Reactor Testing Station (NRTS) burial ground in 1964.

2) The 72 platelets containing approximately 195 grams of U-235 were disposed of, but not recorded in the NRTS burial ground.

The metal foil was found in a measurement chamber on 2/1/71. AEC also concluded that the material involved did not pose a significant health hazard.

12. 03/69 — Unknown (Files did not identify location)

Two metal foils (each 4 grams 93% enriched uranium) reported missing and were located.

13. 04/21/69 — Nuclear Fuel Services, West Valley, NY

An irradiated fuel assembly containing 6 kilograms of depleted uranium and plutonium was incorrectly transferred to the waste burial ground where it was encased in concrete and buried. The burial site is within the fenced area of NFS designated for this purpose.

14. 07/01/69 — Massachusetts Institute of Technology (MIT), Boston, MS

On July 1, 1969, MIT reported the loss of four depleted uranium plates weighing 2.45 kg in addition to the loss of 20 grams of

14. cont.

highly enriched uranium. These materials were subsequently found on a desk following police questioning of a suspect. The consensus of MIT personnel knowledgeable of this incident was that access to the material was probably gained through the use of an unauthorized MIT master key. (As a result of this event, material was stored in a lead safe and locks on the door leading to the storage area and safe were no longer part of the Institute's master lock and key system. Locks leading to the reactor area were also changed.) Prosecution was not sought after the FBI investigation was unable to develop sufficient evidence of criminality.

15. 07/11/69 Mound Laboratory

On 7/11/69, a shipment, 15-gallon steel drum containing a Plutonium-238 Beryllium neutron source as PuO_2 powder milled with Beryllium powder and encapsulated in a stainless steel capsule (four curies in 1/4 gram of Pu-238), was in a truck that was stolen. The truck with the source intact was recovered on 7/12/69. All the truck's cargo except the source had been stolen. No radiation exposures involved.

16. 08/01/69 JFK or Newark Airport

Two calibration sets each containing a total of 818.1 micrograms Plutonium-239 were reported stolen or missing. Sets were to be used in mining and prospecting.

17. 06/15/70 United Nuclear Corp.
New Haven, CT

Four samples (16.1 grams of U-235 enriched substrate material) were received from United Nuclear Corp., Hematite, Missouri, on June 1, 1970, and the fifth sample was received on June 6. All five were signed for by the guard receiving them, but were not logged in by the laboratory. United Nuclear Corp. became aware that the samples were missing after a phone call from Hematite on June 15. One of the containers used for the first shipment was found half filled with soap powder in a washroom, where the janitor put it after retrieving it (empty) from a waste basket in the chemistry laboratory. An extensive investigation was carried out.

18. 02/16/71 — NUMEC, Apollo, PA

On 2/16/71 thirty-five pounds of depleted uranium and less than three grams of HEU were found in a NUMEC employee's home. Material was scrap and waste of no apparent use in weapons or nuclear reseach. The employee wanted an oak crate that was identified for disposal. The employee claimed that he took the crate because he wanted the crate and found the material in it when he got the crate home. He was afraid to return it, so he hid it in his home. The material was all recovered.

19. 04/19/71 — Babcock & Wilcox Co., Lynchburg, VA

On 04/27/71, B&W reported that a metallographic mount containing 1.6 grams of U-235 (97% enriched) could not be located. It was believed that the material was placed in a regular waste can and disposed of. Value of material approximately $20.19.

20. 05/28/71 — General Electric, Vallecitos, CA

Loss of four pellets of PuO_2UO_2 (Pu-mixed oxides). Suspected that items had been disposed of in waste generated during the clean-up of a spill that occurred on 05/11/71. The barrels of waste which apparently contained the four samples were picked up by Nuclear Engineering on 05/19/71 and taken to the burial grounds in Beatty, Nevada. Total fissile content was .84 grams.

21. 08/31/71 — General Atomics, San Diego, CA

On 8/31/71, the AEC was informed that a quantity of platinum had been stolen by an unknown person or persons from the Fuel Operations Department. A platinum boat and several platinum crucibles had been stolen. The crucibles had been decontaminated and the platinum boats cleaned in preparation for repairs. He estimated that the maximum contamination on the crucible was about 0.5 grams uranium (93% enriched) and 1-1/2 grams of thorium. Site management believed that these quantities did not present a public health hazard.

The Gulf official stated that the three platinum buyers in the San Diego area had been alerted to the theft and requested to inform Gulf if an attempt was made to sell material of its description. The value of the platinum was approximately $1,800.00.

21. cont.

On 9/13/71, Gulf stated that approximately 400 grams of platinum in the form of the small crucibles had been found in a paper bag located at the bioassay sample container pick-up station in the Fuel Operations Department and an arrest had been made.

22. 11/19/73 — Walter Reed Hospital, Washington, DC

Two fission chambers (total 0.69 grams of U-235) reported missing. Probably inadvertently disposed of.