

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Report No. 040-06377/97-001 Program Code 11300

Docket No. 040-06377

License No. SUB-348 Priority 3 E Category E

Licensee: Department of the Army
U. S. Army Armament Research, Development and Engineering
Center (ARDEC)
Picatinny Arsenal, New Jersey 07806-5000

Facility Name: Department of the Army

Inspection At: Picatinny Arsenal, New Jersey

Inspection Conducted: February 12, 1997

Inspectors:

Betsy Ullrich
Betsy Ullrich
Senior Health Physicist

4/1/97
date

Approved By:

John D. Kinneman
John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

4.1.97
date

Inspection Summary: Announced, limited inspection to review the improper transfer of 1468 grams of source material which resulted in the loss of 367 grams of depleted uranium. (Inspection Report No. 040-06377/97-001)

Areas Inspected: Organization and scope of licensee activities; loss of source material; and licensee radioactive material inventory.

Results: One violation was identified: failure to control licensed material.

RETURN ORIGINAL TO
REGION I

9704090157

DETAILS

1. Persons Contacted

- * Tom Perry, Chief, Safety Office
and Chairman, Ionizing Radiation Control Committee (IRCC)
- Jim Elliott, Chief, Systems Safety Office
- * Richard Fliszar, Radiation Protection Officer
- * Dick Moss, Health Physicist
- Andy Kung, Health Physicist
- Jim Reich, Ammunition Surveillance Group

* present at exit interview

2. Organization and Scope of Licensed Activities

The Department of the Army Armament Research, Development and Engineering Center (ARDEC) at Picatinny Arsenal possesses four NRC licenses: License No. 29-00047-02 is a Type A license of broad scope which authorizes research and development activities using byproduct material, License No. 29-00047-06 authorizes use of a radiography source, License No. SUB-348 authorizes use of source material, and License No. SNM-561 authorizes use of special nuclear material. The primary use of licensed materials by ARDEC at Picatinny Arsenal in New Jersey are research and development related to military munitions. This inspection was limited to review of activities authorized by License No. SUB-348 related to the report by the licensee of an improper transfer of 1468 grams of depleted uranium in munitions resulting in the loss of 367 grams of licensed material.

The radiation safety program at Picatinny Arsenal is overseen by the Ionizing Radiation Control Committee (IRCC). The current chairman of the IRCC is also the Chief of the Safety Office. The Ammunition Surveillance Group, whose duties include maintaining safe storage and inventory of munitions at the Picatinny Arsenal, reports to the Chief of the Safety Office. The radiation safety program is managed and performed by the Radiation Protection Staff, who report to the Chief of the Systems Safety Office. The Radiation Protection Staff consists of a health Physicist who is the Radiation Protection Officer, and four additional Health Physicists.

3. Loss of Source Material

On Tuesday, February 11, 1997, the Radiation Protection Officer at Picatinny Arsenal contacted the NRC Region I Office to report that they determined that less than one pound of depleted uranium (DU) in munitions had been lost from their facility. The DU was contained in 100 rounds of 7.62mm small arms ammunition. The missing 100 rounds were discovered on January 31, but it was not until the

following week that the Radiation Protection Office determined that the rounds were spent and could not be recovered. The amount of DU missing did not require a report to the NRC pursuant to 10 CFR 20.2201. The missing DU had been part of 400 rounds of small arms ammunition containing a total of 1468 grams (3.2 pounds) of DU that was transferred to an individual who was not authorized to possess the material by a specific license in 1994, and neither the Army nor the individual were aware at the time of transfer that these 400 rounds contained depleted uranium. Three hundred rounds were returned to the licensee in July 1995, still without being identified as containing depleted uranium. The amount of DU initially transferred could have been possessed legally by the transferee pursuant to the general license in 10 CFR 40.22. However, the licensee was unaware that the transfer had occurred, and Army policy prohibits the transfer of ammunition containing DU, and the individual receiving the material did not request DU. As a result of the Radiation Protection staff investigation beginning on January 31, 1997, the following sequence of events was determined to have occurred.

During the early 1970's, the U.S. Air Force was involved in the testing of small arms ammunition that was manufactured by a company called "Patec", also known as "Pacific Technica". These munitions were a 7.62mm "spin stabilized discarding sabot" round, manufactured specifically for this testing. They contained a 3.67 gram core of depleted uranium, about a millimeter in diameter. In 1984, the Department of the Army Letterkenny Depot determined that they possessed 400 rounds of a 7.62mm small arms ammunition that was not a "field item"; that is, it was not a standard ammunition issued for general use. Instead, they identified the 7.62mm rounds as a research and development item which they were not authorized to possess. Letterkenny Depot shipped the 400 rounds to Picatinny Arsenal, where the rounds could be possessed pursuant to License No. SUB-348.

Although no papers were received with the shipment of 400 rounds from Letterkenny Depot and no markings were on the outer container, a receipt record of the incoming shipment was filled out by the ARDEC Radiation Protection Office health physicist. Current ARDEC staff stated that this indicates that the Radiation Protection Office at Picatinny Arsenal was apparently notified of the intended shipment by Letterkenny Depot. The receipt record was reviewed during this inspection. The receipt record describes the incoming shipment, the results of the incoming survey, and the initial storage location of the material at Picatinny Arsenal. The receipt record was dated September 10, 1984. It documented that 400 rounds of 7.62mm munitions arrived at Picatinny Arsenal on September 7, 1984 in a wooden crate that was not marked as radioactive. There is no written statement in the receipt record regarding markings or labeling of the inner packaging. No other records of this material were found in the ARDEC Radiation Protection Office by the current staff. According to licensee representatives, the Radiation Protection Office did not maintain a separate inventory of DU munitions at the time the 400 rounds were received from Letterkenny Depot, but relied on the munitions inventory maintained by the Ammunition Surveillance Group.

An Ammunition Surveillance Group representative completed the standard inventory and tracking form known as a "locator sheet" for this material in 1984, identifying it with the inventory number 130S-00-X77-9847. This locator sheet was reviewed during this inspection. The word "radioactive" was handwritten at the top of the locator sheet. A magazine data card, an identifying tag which stays with the sealed container, was probably prepared at that time but was not kept in past records. According to licensee representatives, the magazine data card would not have identified the material as containing DU, and the outside of the secured wooden crate did not identify the contents as radioactive, according to the receipt record.

The locator sheet for 130S-00-X77-9847 documents an inventory of the material performed by the Ammunition Surveillance Group approximately 2 times per year until 1994. An entry on the locator sheet documents that on April 12, 1994, the 400 rounds of munitions were issued to Individual A in accordance with a standard practice for transfer of unneeded small arms munitions. A separate record of the material transferred to Individual A was made at the time of transfer. This record was reviewed during this inspection. It listed inventory number 130S-00-X77-9847 as 400 rounds of 7.62mm ammunition but does not identify the material as radioactive or as containing DU.

According to licensee representatives at Picatinny Arsenal, it is standard practice to transfer excess small arms ammunition from research projects to other federal agencies for use in activities such as training and target practice. Individual A, who was a Chief Warrant Officer for a National Guard unit in 1994, presented a letter dated November 23, 1992 from a federal agency identifying Individual A as their representative to receive and transport small arms munitions from Picatinny Arsenal for use by the federal agency. This letter was available in licensee records and was reviewed during this inspection. On April 12, 1994, Picatinny Arsenal issued to Individual A 500,000 rounds of small arms ammunition, of which 400 rounds were the 7.62mm ammunition identified by the inventory number 130S-00-X77-9847. At that time, only one individual from the Ammunition Surveillance Group was assigned to collect the locator sheets for each inventory item and document the transfer. Typical inventory items listed on the record of the transfer to Individual A showed that most lots contained 500 to 1000 rounds. The individual who issued the rounds and signed the paperwork had been employed at Picatinny Arsenal only a few months at the time of this transfer, and left this employment shortly after. Licensee representatives believe that either he did not know that the DU ammunition should not have been transferred, or in handling several hundred locator sheets, he did not notice the one sheet marked "radioactive".

Individual A did not transfer the munitions to other federal agencies as stated in the letter he presented to Picatinny Arsenal. Instead, he gave the munitions to a local police department for use in target practice at their firing range. A licensee representative spoke with Individual A by telephone on February 11, 1997. Individual A told the licensee that he had participated in target practice with the

local police in 1994 using the munitions from Picatinny Arsenal. Individual A stated that 100 rounds of the 7.62mm DU munitions were fired from an M14 rifle by himself and local police in 1994. Individual A stated that he had noticed a radioactive label on the outside of the metal ammunition box, and recalled thinking that he was not aware of the use of DU in small arms ammunition. Individual A stated that he did not notice the radioactive labels on the inner cardboard containers.

According to licensee representatives, the local police bartered with the local sporting good store sometime during late 1994 or early 1995, trading some of their extra rounds of normal (non-DU) munitions for equipment. The availability of military munitions to the general public was brought to the attention of the FBI, who performed an investigation which traced the rounds to Picatinny Arsenal. The FBI required that all unused rounds be returned to Picatinny Arsenal in July 1995. The FBI concluded their investigation but apparently did not identify that some of the rounds issued to Individual A had contained DU. As a result of this incident, the Department of the Army at Picatinny Arsenal revised their procedures for issuance of small arms munitions to other federal agencies. Procedures now require additional oversight during issuance of munitions and requiring a second review and signature approval of requests for excess munitions. In addition, inventory records are now maintained by the Ammunition Surveillance Group in an electronic database, in addition to the locator card and magazine data card records.

Included in the returned material was a metal ammunition box that had a partial radioactive material label. This metal box was examined during this inspection. Only the top quarter of a diamond-shaped transportation label remained, showing small parts of the radiation warning symbol but no lettering. The partial label would not be recognized as indicating radioactive material without prior knowledge of transportation labels. The markings on the outside of the metal container identified the contents as "tracer bullets 556" which, according to licensee representatives, is an item that does not contain DU. The metal container was not opened in July 1995 by the licensee when it was returned to Picatinny Arsenal. Therefore, when the material was returned to Picatinny Arsenal, the inventory of incoming material did not list the presence of DU munitions and neither the Ammunition Surveillance Group nor the Radiation Protection staff were aware that this container held DU ammunition.

A physical inventory of the contents of the returned materials was performed in January, 1997 to compare the items returned to Picatinny Arsenal to the list of items issued to Individual A in 1994. On January 31, 1997, the metal ammunition box with the partial transportation label was opened by the Ammunition Surveillance Group and the presence of inner cardboard containers with "radioactive material" labels was discovered. Another label on the cardboard containers identified the contents as "PACIFIC TECHNICA, ARMOR PIERCING, 7.62MM D.U.D.S, 20 ROUNDS". ("DUDS" is the acronym for the formerly-used term "Depleted Uranium Discarding Sabot". The current term used for this type of

ammunition is "Armor Piercing Discarding Sabot (APDS)".) They notified the Radiation Protection Office immediately. A health physicist performed surveys which confirmed that the rounds were radioactive. The metal container held 15 cardboard boxes containing 20 rounds each, a total of 300 hundred rounds out of the original 400 rounds issued. The Radiation Protection Office began their investigation to determine how DU munitions were issued in 1994 without their knowledge, and to determine the location of the missing 100 rounds of ammunition. The Radiation Protection Office also confirmed that the total amount of DU in the 100 rounds would not require immediate reporting or a 30-day report to the NRC, in accordance with 10 CFR 20.2201. When they confirmed that the 100 rounds had been fired at the police range, the Radiation Protection Officer contacted the NRC to inform us of the improper transfer of the material and its disposition.

Corrective actions have been initiated in response to the identification that DU ammunition was transferred to persons against Army policy, and without the knowledge of the Radiation Protection Office. These actions include:

1. The remaining 300 rounds of 7.62mm ammunition in their original cardboard cartons were re-packaged into a new metal ammunition box contained in a wooden crate. During the inspection, the wooden crate and its contents were opened for examination by the inspector. The original cardboard boxes with the 300 rounds of ammunition are in the new metal ammunition box which is correctly marked on the outside to identify the contents. This metal box, along with the empty metal box with the partial radioactive label and incorrect markings that was returned to Picatinny Arsenal, are contained in the wooden crate that is sealed and is marked as radioactive. The same inventory number was used to identify this lot. A new locator sheet and magazine data card were issued, and are marked with the yellow-and-magenta radioactive materials labels. This lot of material was added to the Radiation Protection Office inventory of DU munitions.
2. The Ammunition Surveillance Group reviewed 100% of all current locator sheets to determine if any item in the inventory contained radioactive material which was not listed on the Radiation Protection Office inventory. All material was accounted for. A health physicist from the Radiation Protection Office worked with them on this comparison. Representatives of the Ammunition Surveillance Group interviewed during this inspection described how the review was performed.
3. The Radiation Protection Office held a training session on February 12, 1997, with members of the Ammunition Surveillance Group to review the types of munitions which contain DU and the markings and labelings which indicate DU-containing ammunition and radioactive material.
4. The Ammunition Surveillance Group implemented a new policy on February 12, 1997, of placing yellow-and-magenta radioactive materials labels on all

locator sheets and magazine data cards for inventory items which contain radioactive material. The labels were observed during the inspection on locator sheets and magazine data cards. Representatives of the Ammunition Surveillance Group showed the inspector their stock of spare labels for future use.

5. The Radiation Protection Office requested that the Ammunition Surveillance Group identify any ammunition or other items in inventory which might contain radioactive material but were not marked or listed as radioactive. Some types of items on site, which were identified by the Ammunition Surveillance Group as having contained radioactive material in the past, were confirmed to be of a new design which no longer contains radioactive material and therefore requires no markings.
6. The Radiation Protection Office visited the local police firing range on February 14, 1997, to perform a survey. The licensee reported by telephone that radiation level and contamination surveys were performed of the rifle that the police representative stated was used to fire the 100 rounds of 7.62mm ammunition. The rifle was confirmed to be free of contamination. The licensee also reported that initial measurements did not detect any radiation levels above background but because of snowfall, a return visit was planned. On March 3, 1997, the licensee reported by telephone that a more extensive survey was performed and no contamination or radiation levels in excess of background were identified.
7. The Radiation Protection Office plans to review all inventory records back to 1970, to verify that all radioactive material which arrived at Picatinny Arsenal is confirmed to have been appropriately disposed of, transferred, or still on site.

The failure to control licensed material is an apparent violation of 10 CFR 20.1801 and 20.1802. Specifically, 400 rounds of 7.62mm ammunition containing 3.67 grams of depleted uranium each, a total of 1468 grams of depleted uranium, were transferred to persons who were not aware they were receiving radioactive material and who did not request radioactive materials. In addition, the transfer occurred without the Radiation Protection Office and the Ionizing Radiation Control Committee being made aware of the transfer of licensed material.

4. Radioactive Material Inventory

The ARDEC Ammunition Surveillance Group is responsible for maintaining an inventory of all munitions at the Picatinny Arsenal. The ARDEC Radiation Protection Office is responsible for maintaining an inventory of all radioactive material at Picatinny Arsenal. Prior to 1987, the Radiation Protection Office maintained only an inventory of sealed sources and other similar radioactive material used for research and development. This inventory was maintained

principally to track those sources which required leak-testing in accordance with the NRC licenses. They did not maintain a separate inventory of munitions containing licensed material, but relied on the Ammunition Surveillance Group inventory. In 1987, the Radiation Protection Office decided to improve their inventory to account for all licensed material, including that in munitions. They believed that, by about 1990, they had a very good inventory of all radioactive material. However, the Radiation Protection Office inventory did not include the inventory number 130S-00-X77-9847 lot of 400 rounds of 7.62mm ammunition which was received in 1984. The licensee is uncertain as to why this lot was never included on their inventory, because they have routinely compared their inventory of munitions to the inventory maintained by the Ammunition Surveillance Group. They believe it is possible that no one from the Radiation Protection Office reviewed the locator sheet, which was the only document which recorded this lot as "radioactive". This information was not included on other inventory documents including the computer inventory which was eventually developed and used by the Ammunition Surveillance Group. In addition, the use of DU in small arms ammunition is uncommon in the Army and was not familiar to current licensee personnel most of whom have worked at Picatinny Arsenal since the late 1980's.

Most radioactive material shipped to Picatinny Arsenal results from transfer from other military facilities for testing or storage, with prior notification to the ARDEC Radiation Protection Office. This is necessary, in part, because ammunition and some other items are not required to be marked as "radioactive" on the outer containers and may not be handled or tracked appropriately without the prior notice. Licensee personnel stated that incoming shipments known to contain radioactive material are held at the delivery gate for surveys by the Radiation Protection Office. If a shipment of radioactive material is not expected or not identified at the gate, the truck may deliver the material to the storage facilities, where it is identified when outer containers are opened. Licensee representatives interviewed during the inspection stated that, if they open an outer container and see any inner containers identified as containing radioactive material, they immediately contact the Radiation Protection Office. Radioactive material may also be ordered by personnel at Picatinny Arsenal. The order must be pre-approved by the ARDEC Radiation Protection Office and a copy of the paperwork describing the incoming material must be submitted with the proposed order. The Radiation Protection Office is notified when radioactive material arrives on site so that a health physicist can perform the receipt survey at that time. Information from the receipt survey is used to update the Radiation Protection Office inventory database.

The Radiation Protection Office maintains a database for ammunition containing radioactive material. This database was reviewed during the inspection. It lists the type, quantity, lot number identification, and location of the material. The inventory is revised when shipments are received or transferred. It is also cross-checked with that of the Ammunition Surveillance Group every 6 months, at which time it is revised to show any new locations of lots of munitions that are still on site but may have been moved. A physical verification of the location of

items is performed at this time for a sample of the munitions. The ammunition inventory shows only that material which is at Picatinny Arsenal at the present time. A second database, also reviewed during the inspection, lists all radioactive material in munitions, research and development items, sealed sources, and other items. Licensee representatives stated that fielded commodities are not stored at Picatinny Arsenal, only items used in research and development projects or for use by licensee personnel. This second database contains records of all material which has ever been present at Picatinny Arsenal since the start of this database, when the material arrived and when it was transferred or disposed of.

As a result of this incident, records were reviewed as described in the previous section. Based on this review, the Radiation Protection Office believes that their ammunition database and the radioactive materials database include all licensed material currently present at Picatinny Arsenal. In addition, they plan further review of past records to confirm that all radioactive material, known to have been received at Picatinny Arsenal, has been properly transferred or still exists on their inventory.

5. Exit Interview

Licensee representatives confirmed that they would inform the NRC of the results of their surveys at the local police firing range. They also confirmed that they would provide to the NRC a written summary of the incident and their corrective actions.