

DEPARTMENT OF THE AIR FORCE HEADQUARTERS UNITED STATES AIR FORCE WASHINGTON DC

21 November 2006

MEMORANDUM FOR NRC REGION IV ATTENTION: MS. BROWDER

FROM: AFMOA/SGPR

110 Luke Avenue, Room 405 Bolling AFB, DC 20032-7050

SUBJECT: 30-Day Incident Report: F-16 crash at Hill AFB with Loss of Radioactive Material

On 24 Oct 06, our office was informed that an F-16 aircraft carrying a Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) pod crashed into the mud flats of the western part of the Great Salt Lake Utah on 30 Mar 06. The LANTIRN pod carried two 4 uCi Am-241 sources. IAW 10 CFR 20.2201(a)(1)(i), the incident was in turn reported to NRC Region IV and the NRC Operations Center. The Operations Center assigned the incident number 42931. On 1 Nov 06, the permit Radiation Safety Officer in accordance with reporting criteria of AFI 40-201, Managing Radioactive Materials in the USAF, submitted a final incident report concerning the loss of NRC controlled material (Attachment 1).

The loss of material was first identified by Hill AFB on 6 Oct 06 during a semi-annual inventory by the permit Radiation Safety Officer (RSO). Upon discovery, the RSO contacted the 75 ABW/JA and LANTIRN maintenance shop to locate the sources. The two missing sources were tracked to the LANTIRN pod involved in the 30 Mar 06 crash. On 24 Oct 06, the permit RSO verified that the missing sources were lost and unrecovered as a result of the 30 Mar 06 F-16 aircraft crash and notified our office.

The crash site is in a remote unoccupied area, which can only be accessed with specialized tracked vehicles during drought conditions. Immediately after the crash, an incident response team was assembled to respond and recover the aircraft. Because of miscommunication at the time of the crash, the response team did not realize that the crashed aircraft carried a LANTIRN pod, and subsequently were unaware of the presence of licensed material. The follow-on recovery team extensively searched the area and recovered the majority of the aircraft and LANTIRN pod except for the nose electronics support assembly that contained the two Am-241 sources. Based on the estimated impact point and the geological conditions (very fine silt/mud flats with the water table just below the ground surface) the radioactive sources are estimated to be buried several feet below the surface of the mud flats. The sources are not believed not to present any potential exposure hazard. Additional training is planned for LANTIRN maintenance personnel to assure communication with installation Radiation Safety personnel when any event involving a LANTIRN pod occurs.

If you have any questions or need further input, please contact Dr. Ram Bhat at 202-767-4306 or e-mail at ramachandra.bhat@pentagon.af.mil. Our telefax is 202-404-8089.

RKBrat

Ramachandra K. Bhat, Ph.D., CHP Health Physicist Radiation Protection Division and USAF Radioisotope Committee Secretariat Air Force Medical Operation Agency Office of the Surgeon General

Attachment: Memorandum from 75 AMDS/SGPB dated 1 Nov 06

cc: NRC Operations Center HQ AFMC/SGBR 75 AMDS/SGBP (Capt Goplin) 75 AMDS/SGPB (Mr. Warnes) HQ AFIA /SGI (Lt Col Adams)

R/PERMIT/HILL/MISC/IN20061121



DEPARTMENT OF THE AIR FORCE 75TH AEROSPACE MEDICINE SQUADRON (AFMC) HILL AIR FORCE BASE UTAH

1 Nov 06

MEMORANDUM FOR AFMOA/SGPR

FROM: 75 AMDS/SGPB 7238 6th St. Bldg 249 Hill AFB, UT 84056-5012

SUBJECT: Radioactive Material Incident Investigation for USAF Radioactive Material Permit No. UT-30-336-02/00AFP, Docket No. 030-90257

1. Introduction: The purpose of this report is to provide written notification for the loss of two radioactive sources held under the subject permit as required by AFI 40-201, *Managing Radioactive Materials in The US Air Force*, para. 3.11.2. The lost sources are from the LANTIRN pod Transmitter/Receiver (LTR) and contain a total of 8 microcuries (μ Ci) Am-241. The radioactive material incident report is provided in atch 1 and the permit Radiation Safety Officer's (RSO) findings are provided in atch 2.

2. Findings: An F-16 aircraft carrying a LANTIRN pod crashed into the mud flats of the western part of the Great Salt Lake on 30 Mar 06. The crash site is in a remote unoccupied area which can only be accessed with specialized tracked vehicles during drought conditions. Immediately after the crash, an incident response team was assembled to respond and recover the aircraft. Because of miscommunication at the time of the crash, the Bioenvironmental engineering response team and permit RSO did not realize that the crashed aircraft carried a LANTIRN pod. The follow-on recovery team extensively searched the area and recovered the majority of the aircraft and LANTIRN pod except for the nose electronics support assembly which contained the two radioactive sources. Based on the estimated impact point and the geological conditions (very fine silt/mud flats with the water table just below the ground surface), the radioactive sources are estimated to be buried several feet below the surface of the mud flats. Attachments 3 and 4 contain additional details from Bioenvironmental Engineering and LANTIRN shop response personnel.

3. Discussion/Recommendations: No additional recovery efforts are planned based on the location of the lost sources. There is virtually no potential exposure to members of the general public. Additionally, the potential risk to recovery personnel from dangerous natural environmental conditions is considered significantly higher than the probability of potential future exposure to members of the general public in an uninhabited area. Additional training is planned to ensure the potential for miscommunication between the recovery team, LANTIRN Shop and permit RSOs is minimized.

ATTACHMENT 1

4. If you have any questions or need additional information, call me at DSN 777-1182 or e-mail me at <u>bruce.goplin@hill.af.mil</u>.

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BRUCE A. GOPLIN, Capt, USAF, BSC Bioenvironmental Engineering Deputy Flt Commander

4 Attachments:

- 1. Radioactive Material Incident Report
- 2. Permit RSO Investigation Report
- 3. 75 AMDS/SGPB Team Chief Responder's Statement
- 4. 388 CRS/MXMVS Recovery Team Statement

cc: HQ AFMC/SGBR

1st Ind, 388 CMS/CC

I have reviewed the attached investigation and concur with findings and recommendations.

sh.

SCOTT A. GROVER, Maj, USAF Commander, 388 CMS

RADIOACTIVE MATERIALS INCIDENT REPORT

- 1. Date/Time Notified: 24 Oct 06 /1430
- 2. Person Making Notification: Capt Bruce Goplin
 - a. Organization, Office Symbol and Installation: 75 AMDS/SGPB Hill AFB, UT
 - b. Telephone Nos.: (DSN) 777-1182

(Commercial) 801 777-1182

c. TELEFAX Nos.: (DSN) 777-1050 (Commercial) 801 777-1050

A. DESCRIPTION OF INCIDENT/ACCIDENT

- 1. Date & Time of Occurrence or Discovery:
 - a. Discovered Missing: 24 Oct 06 /1200
 - b. Accident Date: 30 Mar 06
- 2. Organization Possessing Source(s): 388 CMS/CC
- 3. Specific Location(s):. Western edge of the Great Salt Lake near Carrington Island, Utah.
- 4. What Happened:

An F-16 aircraft carrying a LANTIRN pod crashed into the mud flats of the western part of the Great Salt Lake on 30 Mar 06. The crash site is in a remote unoccupied area which can only be accessed with specialized tracked vehicles during drought conditions. Immediately after the crash, an incident response team was assembled to respond and recover the aircraft. Because of miscommunication at the time of the crash, the Bioenvironmental engineering response team did not realize that the crashed aircraft carried a LANTIRN pod. The follow-on recovery team extensively searched the area and recovered the majority of the aircraft and LANTIRN pod except for the nose electronics support assembly which contained the two radioactive sources. Based on the estimated i npact point and the geological conditions (very fine silt/mud flats with the water table just below the ground surface) the radioactive sources are estimated to be buried several feet below the surface of the mud flats.

On 6 Oct 06 during the semi-annual inventory, it was discovered that two sources were identified as belonging to a crashed jet. The permit Radiation Safety Officer then contacted the 75 ABW/JA and Lantirn Shop to locate the radioactive sources. On 24 Oct 06, the permit RSO verified that the missing sources were lost and unrecovered as a result of the 30 Mar 06 F-16 aircraft crash.

B. RADIOACTIVE MATERIALS INVOLVED

۵	Radiaisatane(s) Involved: Am-24	1 Activity (microCuries (uCi)
3.	Commodity (i.e., compasses, etc): LANTIRN laser transmitter/receiver (LTR)		
2.	Applicable USAF RAM Permit:	UT-30336-02/00AFP	Docket: 030-90257
1.	USAF Master Materials License:	42-23539-01AF	Docket: 030-28641

5. Sealed Source Model/Serial No.: LTR number 50041, sources 1161 and 1183

6. Commercial Carrier: N.A.

7. Radiopharmaceutical Supplier: N.A.

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Atch 1 P. 1 of 3

C. DESCRIPTION OF CORRECTIVE ACTIONS

1. Actions Taken to Correct or Abate:

The Hill AFB response and recovery teams extensively searched the crash site and the recovered aircraft residue with no success in locating the two radioactive sources. The sources are suspected to be located several feet below the ground surface of the mud flats of the Great Salt Lake.

2. Additional Actions Planned and Estimated Time to Complete:.

No addition recover effort is planned based on the location of the lost sources. There is virtually no potential exposure to members of the general public. Additionally, the potentially risk to recovery personnel from dangerous natural environmental conditions is considered significantly higher than the probability of future exposure to members to of the general public in an uninhabited area.

3. Recommendations/Administrative Guidance Given or Follow-up Actions Required:

Additional training is planned to ensure the potential for miscommunication between the recovery team, LANTIRN Shop and permit RSOs is minimized.

D. CONTAMINATION INVOLVED

1. Monitoring Results/Radiation Levels (mR/hr, cpm): Not detectable above background.

2. Surfaces and Dimensional Area Contaminated: Buried in mud/silt. No surface or area contamination.

No surface contamination. Two sources located several feet below the mud flats of the Great Salt Lake.

3. Concentrations Released (Known or Estimated): The total activity of the two sources of Am-241 is 8 uCi.

4. Instruments and Method Used for Survey/Estimate:

Response and recovery team visually searched crash site for LANTIRN pod components as well as other aircraft parts.

E. PERSONS INVOLVED/EXPOSED

NAME GRADE SSAN TELEPHONE NO

1. Military: No exposures.

2. Civilians: No exposures.

3. Estimated Levels/Concentrations to which Exposed:

No exposures. Small sources located several feet below ground surface. Potential radiation exposure from the lost 8 uCi Am-241 sources is attenuated by silt/mud flats.

F. BASE PERSONNEL RESPONDING

1. Command Element: Col Steven Robinette

2. BEE/HP: Capt Eric Maresh 4. Medical: None

3. RSO: Mr. Roger Warnes 5. DP: Unknown

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G. NOTIFICATIONS

3. State:

4. Local:

No Notifications made at the time of the F-16 aircraft crash since RSO was unaware of the LANTIRN pod being involved in this accident.

1. Air Force:

2. Federal:

5. Press Aware/On Scene/Press Releases Made:

6. Reportable to NRC:

IAW 10 CFR

Region IV (817/860-8116)

7. Telephone: Ops Center (301/816-5100)

8. Written:

H. ADDITIONAL/FOLLOW-UP INFORMATION

See attached report and statements.

Report taken by: NDM

Entered into database:

File: Permit folder:

17-34:

Rev: 17Jan 94

Atch 1 P. 3 of 3



DEPARTMENT OF THE AIR FORCE 75TH AEROSPACE MEDICINE SQUADRON (AFMC) HILL AIR FORCE BASE UTAH

31 October 2006

MEMORANDUM FOR AFMSA/SGPR ATTENTION: DR. RAM BHAT

FROM: 75 AMDS/SGPB 7238 6th St. Bldg 249 Hill AFB, UT 84056-5012

SUBJECT: Investigation of Lost Am-241 Sources, USAF RAM Permit UT-30-336-02/00AFP

1. Introduction: On 30 March 2006, one of the 388^{th} Fighter Wing's F-16 aircraft crashed on the edge of the Great Salt Lake. Unknown at the time, the aircraft was carrying a LANTIRN pod that contained two Americium 241 radioactive sources. Each source contains 4 microcuries (μ Ci) of Am-241 plated to a metal component in the pod's Laser designator.

2. Background:

a. The crash site is located at approximately N 41 00.395 W 112 37.155. It's a remote site, located on the western edge of the Great Salt Lake near Carrington Island and consists of very fine silt/mud, which at the time, was covered with approximately one inch of standing water. The ground water at this site is just below the surface and is very saline (25% by weight).

b. Upon notification of the crash, the Bioenvironmental Engineering (BE) emergency response team was activated as part of the Hill AFB initial incident response team. Once on the crash site the BE response team lead, Capt Marsh, asked the On Scene Commander if the aircraft was carrying a Lantim pod and was told that the aircraft did not have a Lantim pod. Approximately two weeks after the crash, we learned that the aircraft was carrying a Lantim pod. I immediately contacted the 388th CMS Lantim Shop supervisor and was told that they had recovered the pod and that it was in their possession. No further action was taken since the pod had been recovered, and the crash investigation board still required access to all of the aircraft's pieces as their investigation had not been completed.

c. 3 October 2006, as part of our semi-annual radiation safety program assessment of the 388 CMS Lantim Shop's radioactive materials permit, we asked the Lantim Shop supervisor for a current laser transmitter/receiver (LTR) source inventory. The inventory, received on 6 October 2006, showed one pod as missing and was assumed to have been on the crashed aircraft. Further investigation revealed the missing pod was indeed on this aircraft. Follow-on discussions with the 75 ABW/JA and the Lantim Shop personnel indicated that all of the recoverable F-16 components had been removed from the crash site and moved to the Hill AFB aircraft crash residue storage lot. The impact crater had also been filled and the area leveled.



d. The 388 Lantrin Pod Shop personnel conducted a thorough search of the crash residue now located on Hill AFB. They recovered most of the pod's important and classified materials. However, they were not able to locate and recover the Lantirn pod's Nose Electronics Support Assembly (NESA), which contains the targeting laser (LTR) and its two Am-241 sources. It is assumed the NESA remain at the crash site. We did not learn these facts until 24 October 2006. At that time, Capt Bruce Goplin reported the loss of the sources to the USAF Radioisotope Committee (RIC).

3. Discussion: The Lantim Shop personnel made a good faith effort to recover the Lantim pod components at the crash site during the initial recovery and by searching the crash residue after it had been moved to the crash residue storage lot on Hill AFB. Our experience with F-16 crashes on the soft Great Salt Lake mud flats shows that objects similar to the pod's front section tend to penetrate the mud to a depth of eight feet or more. In this situation, the sources can only be located using a radiation meter with a large sodium iodide detector and source to detector distances less than twelve inches. The 59.5 KeV gamma emitted by Am-241is effectively attenuated by the mud and ground water, as a result the sources can't be located and the general public exposure risk is zero. Additional investigation findings are as follows:

a. Due to miscommunication, we were lead to believe that the Lantim pod carried by the F -16 had been recovered and was still under the control of the 388 CMS Lantrin Shop, including the two permitted Am-241 sources. After determining that the sources had not been recovered, we notified the RIC and the Permittee (388 CMS/CC) about the situation.

b. The aircraft's impact site on the Great Salt Lake mud flats is remote and very difficult to access. Depending on precipitation, this area is routinely flooded by rising lake levels, while wave action removes all identifying surface markings. This will make the crash site difficult to locate. Also, the mud's consistency along with a high ground water table makes any excavation extremely difficult, if at all possible. These soil conditions allowed the pod's NESA to penetrate to a depth at which it could not be located or recovered. The high ground water rapidly fills any excavation and makes the sides unstable. We do not plan any additional source recover actions because of the environmental conditions described and low probability of source detection.

d. Based on the crash site's remote location, access difficulty, lack of crash site identifiers and soil conditions; it is unlikely that anyone from the general public will ever recover these sources. In addition, the NESA's expected penetration depth, and the mud and saline ground water's shielding effectively eliminates any possible exposure to the general public.

4. Please contact Mr. Roger Warnes. Permit RSO, at DSN 775-2091 or Capt Bruce A. Goplin at DSN 777-1182, if you have any questions regarding this permit amendment request.

ROGER A. WARNES Radiation Safety Officer



DEPARTMENT OF THE AIR FORCE 75TH AEROSPACE MEDICINE SQUADRON (AFMC) HILL AIR FORCE BASE UTAH

26 October 2006

MEMORANDUM FOR RECORD

FROM: CAPT ERIC MARESH 75 AMDS/SGPB 7238 6th St. Bldg 249 Hill AFB, UT 84056

SUBJECT: F-16 Crash, Am-241 Recovery

1. On 30 March, 2006, I was the Bioenvironmental Engineering (BE) representative to the Hill AFB Disaster Control Group (DCG). The Hill AFB DCG was notified to assemble in response to an F16 crash that had occurred that day. According to recall procedures, I immediately responded to the primary DCG assembly point at bldg 133. Once there, I began gathering the details of the crash. Aware of the radioactive component of targeting pods, I asked the DCG commander if a Lantirn/Sniper targeting pod was on-board the aircraft during the crash to which the response was "No". At that point, the pod was not included as an interest item in our response checklists.

2. The BE response team and I responded to a rally point approximately 1-2 miles from the crash site the following morning. The crash site was located on a mud/sand flat area of the Great Salt Lake. Specialized tracked vehicles were needed to access the actual crash site. The disintegrated aircraft was scattered across the mud flat, many large and small pieces were also buried in the mud. The mud/sand flat was at nearly the same elevation as the Great Salt Lake water level. The mud/sand flat area was quite damp and spongy due to the water table being only an inch or two from the ground surface. The weather conditions were rain showers with much wind. The water table fluctuated throughout the day, at times creating a shallow water layer on top of the mud/sand flat. The conditions were close to being unsafe, considering the wet sand. The BE team conducted monitoring activities on-site to determine if chemical hazards still existed within the wreckage.

3. If you have any questions, please contact me at DSN 777-9840 or email eric.maresh@hill.af.mil.

ERIC G. MARESH, Capt, USAF Bioenvironmental Engineer

ATCH 3



DEPARTMENT OF THE AIR FORCE HEADQUARTERS 388th FIGHTER WING (ACC) HILL AIR FORCE BASE, UTAH

25 Oct 2006

MEMORANDUM FOR THE BASE RAIATION SAFETY OFFICE

FROM: 388 CRS/MXMVS

SUBJECT: Crash Targeting Pod

1. This letter is to identify the LANTIRN sections part in the recovery of crash pod 10396 which contained Laser Transmitter 50041 with source numbers 1161 and 1183.

2. During the first week of April 06, the LANTIRN pod recovery team went out to Salt Lake to an aircraft crash site located 30 miles west of Hill AFB near Carrington Island. Several parts were recovered from the crash site, but the NESA (Nose Electronics Support Assembly) parts were not present at that time. The Laser Transmitter, serial number 50041 was located inside the NESA. The pod has been disposed of according to Depot guidance.

Christian D. Sanchez

CHRISTIAN D. SANCHEZ, SSgt, USAF Sensors Section Radioactive Material Monitor

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Received 25 Ect 06