

Hangar 481 Special Exposure Cohort Petition Evaluation Report Update

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Hangar 481 Site History

- **Located at Kirtland Air Force Base in Albuquerque, New Mexico**
- **Ross Aviation, with operations based at Hangar 481 during the covered period, was under contractual agreement with DOE**
 - **Provided air transportation of personnel and equipment as using government owned aircraft at government owned facilities associated with DOE operations at the Sandia National Laboratory in Albuquerque, New Mexico**
- **Transported equipment—including packages containing radioactive materials associated with atomic weapons programs**

Petition Overview

- **February 27, 2009: 83.13 petition received**
- **September 8, 2009: Petition qualified for evaluation**
- **December 18, 2009: Evaluation Report issued**
- **February 2010: Evaluation Report presented at Advisory Board meeting**
 - **Delay requested by petitioner until Freedom of Information Act (FOIA) material could be provided**

Petition Overview—cont.

- **July 2010: FOIA completed (DOE and NIOSH)**
- **September 23, 2010: Revised Evaluation Report issued (updated photo of Hangar 481)**
- **November 2010: Evaluation Report re-presented at Advisory Board meeting**
- **January 2011: NIOSH and petitioners tour Hangar 481 and provided a list of follow-up questions to Office of Secure Transport (OST) (DOE)**
- **June 2011: Responses provided by OST**
- **August 2011: Addendum to the Evaluation Report issued for Hangar 481**

Summary of Petitioner Concerns

- 1. Raw data lacking or unavailable**
 - Secondary summary data used for the evaluations
- 2. Contract existed back to 1970**
 - Covered period should be extended
- 3. Newly available documents had not been evaluated**
- 4. Radioactive shipments were delivered to the Hangar 481 building and stored**
 - The “hot pads” were used to load explosive materials
 - Reliance on an interview with one former worker as the basis for determination that all radioactive shipments were handled at the “hot pads” was criticized

Summary of Petitioner Concerns—cont.

5. **Radioactive shipments were made using the AL-R8 container**
 - In 1991, found to be inadequate to shield the contents (shielding for alpha and beta radiations was not disputed)
6. **The Evaluation Report's ambient external methods are not bounding**
7. **One individual states that barrels were stacked at the hangar which may have been nuclear waste and there is no apparent indication of “sweeps” that were done in the hangar building or adjacent areas**
8. **One pilot left his dosimeter in his locker and had an abnormally high dose reading when the badge was processed**

NIOSH Follow-up Actions

- **NIOSH and ORAU were able to work with Landauer (the holder of Eberline's data) to obtain the individual results rather than rely on summary data from REIRS from 1990-1994**
 - **Data were compared to REIRS data and a complete match was obtained except for one year (1994)**
 - **It was determined that an error had occurred in the REIRS database during data entry since the lifetime cumulative dose was entered rather than the annual dose**
 - **This difference explained the one year which had a higher reported annual dose (1994)**
 - **Program Manager for Occupational Exposure and Worker Health – Center for Epidemiologic Research (OEWH-CER) assisted in review of the data to help determine the cause of the discrepancy**

NIOSH Follow-up Actions

- **January 2011: NIOSH and petitioners tour Hangar 481 and provided a list of follow-up questions to OST (DOE)**
- **March 2011: NIOSH received employee data from Landauer (who now owns Eberline, the dosimetry provider to Hangar 481 during the covered period)**
 - **NIOSH has also provided copies of the original dosimetry to DOE**
- **June 2011 : Responses provided by OST**
- **August 2011: Addendum to Evaluation Report issued for Hangar 481**

Update on Claim Data

(as of July 26, 2011)

Table 4-1: No. of Hangar 481 Claims Submitted Under the Dose Reconstruction Rule	
Description	Totals
Total number of claims submitted for dose reconstruction	3
Total number of claims submitted for energy employees who meet the definition criteria for the class under evaluation (March 1, 1989 through February 29, 1996)	3
Number of dose reconstructions completed for energy employees who meet the definition criteria for the class under evaluation (i.e., the number of such claims completed by NIOSH and submitted to the Department of Labor for final approval).	1
Number of claims for which internal dosimetry records were obtained for the identified years in the evaluated class definition	0
Number of claims for which external dosimetry records were obtained for the identified years in the evaluated class definition	2

NIOSH/Petitioner Questionnaire

- NIOSH and the petitioner were provided a detailed tour of the Hangar 481 facilities in January 2011
- NIOSH, with input from the petitioner, assembled a series of questions following the onsite tour and submitted these formally to OST
- Topics addressed in the questionnaire included:
 - Facility information
 - Radiological activities
 - External dosimetry program
 - Internal dosimetry program
- The following slides summarize the responses and findings regarding dose reconstruction at Hangar 481

Facility Location

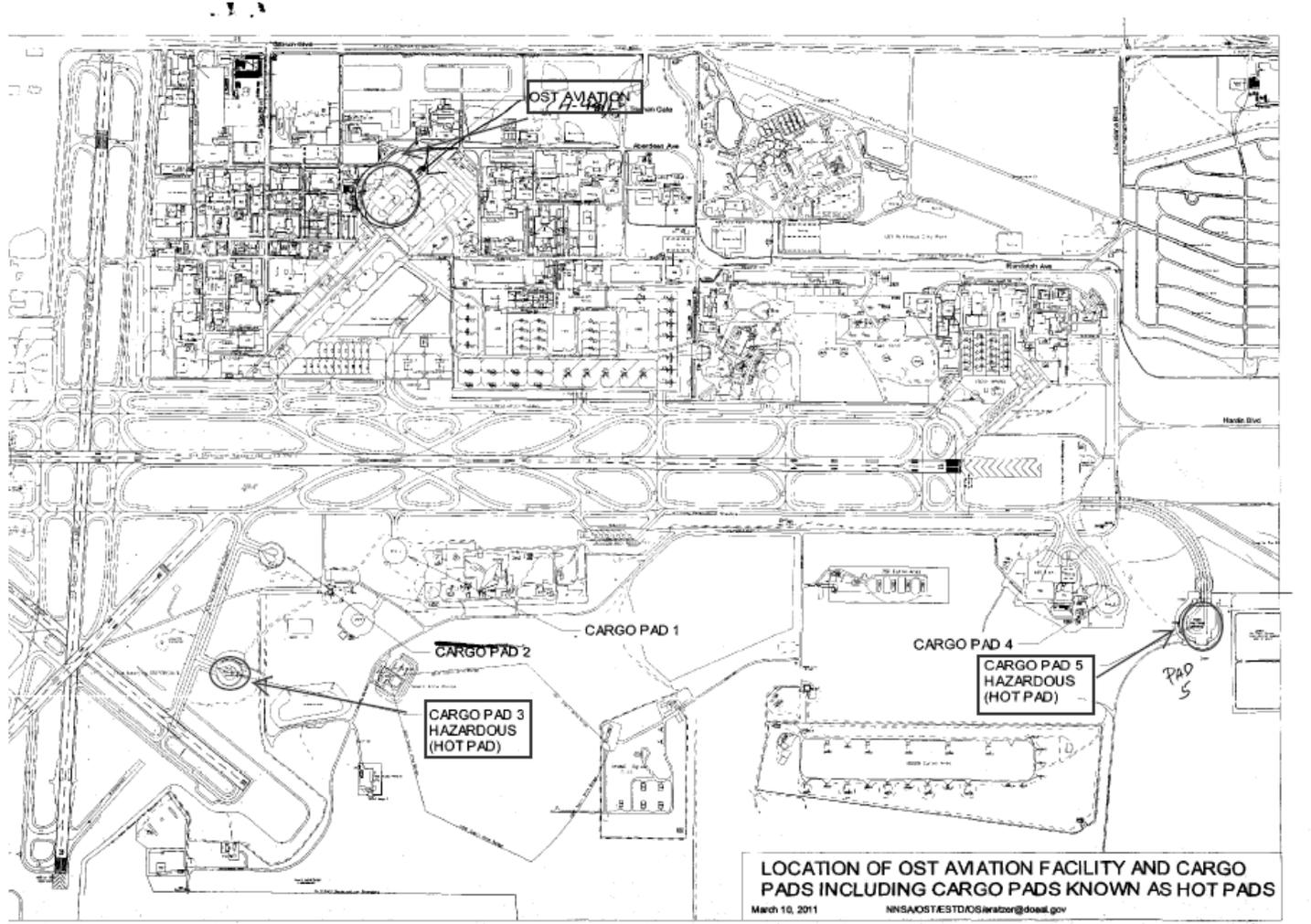


Figure 5-2: Location of OST Aviation and Hot Pads

(Figures 5-1, 5-2, and 5-3 in this Addendum supersede Figure 5-1 in the SEC-00139 Hangar 481 Rev. 1 Evaluation Report)

Building Layout

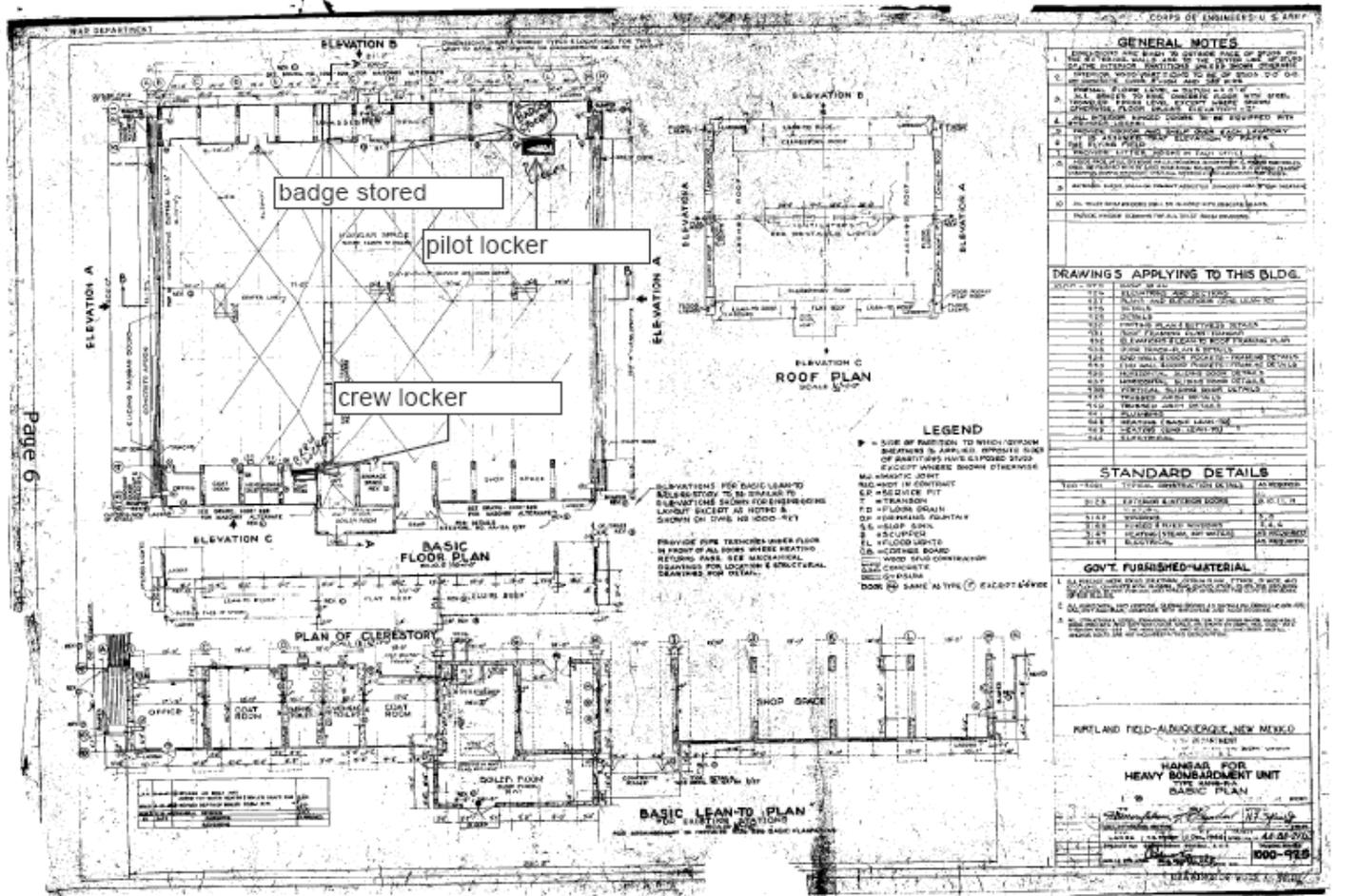


Figure 5-3: Floor Plan for Hangar 481
 (Figures 5-1, 5-2, and 5-3 in this Addendum supersede Figure 5-1 in the SEC-00139 Hangar 481 Rev. 1 Evaluation Report)

Photos Inside Hangar 481

Interior of Hangar 481



Pilot Lockers in Hangar 481



OST Response: Facility Information

- **Contracted activities began around 1970 and remained essentially unchanged**
 - **DOL determines the covered period to be March 1, 1989 through February 29, 1996**
 - **Ross Aviation operations were actually relocated from a different facility to Hangar 481 in April 1984**
- **Separate “hot pads” are shown separate from Hangar 481**

OST Response: Facility Information—cont .

- Drawings provided show the Hangar facility, hot pads, personnel lockers, and location of where non-destructive testing was performed
- Starting in 1985 the facility was operated 24 hours per day, 7 days per week, with approximately 200 employees
 - Per the OST response, administrative personnel were only day shift with no overtime
- After 1987, operations were two shifts per day, 5 days per week, with staffing levels reducing to about 80 employees in 1996

OST Response: Radiological Activities

- **OST stated that no radiological activities were performed in Hangar 481**
 - Radiological packages were handled and loaded only at hot pads 2 and 5
 - Unmonitored personnel were not allowed to come in contact with the packages
 - Packages predominately tritium
- **Non-destructive testing of planes was conducted once per year for a very short duration as previously discussed**
 - OST describes strict access controls and also that they were done at night

OST Response: External Dosimetry

- **OST stated that Ross Aviation dosimetry program developed and managed by Eberline and Sandia**
- **No area dosimetry was performed at Hangar 481**
- **Neutron dosimetry was never provided at Hangar 481**
- **No X-rays for medical purposes were conducted at Hangar 481 facilities**

OST Response: Internal Dosimetry

- **OST stated that no bioassay program was ever implemented at Hangar 481**
- **No Ross facilities were monitored for contamination**
 - **There was no need to perform surveys due to lack of use/storage of radioactive materials at the facility**
- **Surveys were performed off site (on the hot pads) where radioactive materials were handled**
- **OST indicated that no radiological accidents occurred at Hangar 481**
- **OST further indicated that thoriated welding rods were not used or present at Ross facilities**

OST Response: General Questions

- **The highest exposed were monitored for external dose (cabin security specialists and pilots) who actually handled the radiological materials**
- **No radioactive containers were ever delivered to the flight line adjacent to Hangar 481**
- **All Air Force and Sandia containers controlled by them until loaded at hot pads**
 - **Any other delivery would have been a security violation**

OST Response: General Questions—cont.

- **No radiation monitoring was performed inside Hangar 481 or the adjacent flight line**
- **The circumstances and locations related to the pilots' lockers and radiographic activities (done only during off hours) provide the only available explanation for elevated personnel dosimeter readings as described by the petitioner**

Internal Exposures

- On August 7, 1997, the Transportation Safety Division (TSD) of DOE's Albuquerque Operations Office issued the Technical Basis for Radioactive Material Intake Potential regarding activities performed by Ross Aviation at Hangar 481
- Based on:
 1. The TSD special agents tasks (i.e., no contact with package contents)
 2. The TSD's operational history with confirmatory surveys (i.e., no package breach or leakage)
 3. The use of DOT compliant shipping packages and programs
- The document concluded there is no credible path for an intake of radioactive materials during normal operations

Dosimetry Updated Results

Table 7-1: REIRS Annual Dose Summaries for Kirtland AFB, Hangar 481

Year	Total Monitored	Maximum Individual Shallow Dose (mrem)	Maximum Individual Deep Dose (mrem)	Total Person-mrem
1989	95	77	58	246
1990	89	89	89	201
1991	87	61	44	207
1992	70	51	48	203
1993	67	47	37	163
1994	66	83	172	1501
1995	56	77	54	445

Table 7-2: Corrected Annual Dose Summaries for Kirtland AFB, Hangar 481

Year	Total Monitored	Maximum Individual Shallow Dose (mrem)	Maximum Individual Deep Dose (mrem)	Total Person-mrem
1989	95	77	58	246
1990	89	89	89	201
1991	87	61	44	207
1992	70	51	48	203
1993	67	47	37	163
1994	66	83	49	224
1995	56	77	54	445

Summary of External Dose Feasibility

- External dose records exist for many Ross Aviation personnel and have the REIRS reported data been verified using Eberline data from 1990-1994
- Data from the 1994 REIRS report was found to be incorrectly entered into the database (lifetime total instead of annual dose) and has been corrected in this addendum and DOE notified
- The individual results of these records or use of the highest dose received by monitored personnel adequately bounds unmonitored worker external dose

Summary of External Dose Feasibility_{-cont.}

- **Data from 1996 was not included in REIRS (covered period ends February 29, 1996)**
 - **NIOSH will use the highest annual dose for previous years for this 2-month period**
- **NIOSH will use the highest dose received in the entire year previously to bound any external dose for all employees**
- **The circumstances and locations related to the pilots' lockers and radiographic activities (done only during off hours) provide the only available explanation for elevated personnel dosimeter readings as described by the petitioner**

Summary of External Dose Feasibility_{-cont.}

- **There is no credible potential for neutron exposures**
- **Potential doses from off-hour radiographic testing would be included in the reported personal monitoring data**
- **Ambient environmental external doses are included by using the existing personnel external monitoring data**
- **X-ray examinations are not included because medical X-rays were not performed on-site at Hangar 481**

Summary of Internal Dose Feasibility

- **No radioactivity was stored or handled at the Hangar 481 facility**
- **Radioactive materials handled by workers at Hangar 481 were in sealed DOT-compliant containers and monitored in accordance with DOT regulations to verify radiation and contamination levels on package exteriors**
- **Results of available radiological surveys performed on the packages and in the transport aircraft support this premise**

Summary of Internal Dose Feasibility—cont.

- Based on the available information on the radiological program and potential for internal exposure sources, NIOSH concludes that internal radiological exposures to Ross Aviation employees resulting from services rendered for the DOE at Hangar 481 are unlikely to have occurred
- Sandia National Laboratory, being an adjacent facility, was used to provide a bounding estimate of the dose from ambient environmental internal dose during the covered period

Feasibility Summary

Feasibility Findings for SEC-00139		
Source of Exposure	Dose Reconstruction Feasible	Dose Reconstruction NOT Feasible
Internal		
	X	
External		
- Beta-Gamma	X	
- Neutron	N/A	
- Occupational Medical X-ray	N/A	