DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE FOR OPERATIONAL HEALTH (AFMC)
BROOKS CITY-BASE TEXAS

12 Dec 2005

MEMORANDUM FOR 88 ABW/CC
5135 PEARSON ROAD ROOM 218
WPAFB OH 45433-5320

FROM: AFIOH/SDR
2350 Gillingham Drive
Brooks City-Base, TX 78235-5103

SUBJECT: Consultative Letter, IOH-SD-BR-CL-2005- 0087, Long-Term Radon Monitoring due to Past Luminous Paint Operations at Building 207, Wright-Patterson AFB OH

1. INTRODUCTION: HQ USAF/SG directed the Air Force Institute for Operational Health, Radiation Surveillance Division (AFIOH/SDR) to investigate potential radiation exposures to personnel working in and around buildings which historically were involved with luminescent dial painting operations. These operations involved the use of radium (^{226}Ra) based paints. Building 207 at Wright-Patterson AFB OH was identified as one such location. The objective was to ensure compliance with radiation exposure limits set by Air Force Instruction (AFI) 48-148, *Ionizing Radiation Protection*. In November 2003, AFIOH/SDR evaluated internal and external radiation exposure pathways due to radon concentrations inside building 207 at Wright-Patterson AFB using short term methods and, at that time, deployed long-term alpha track monitors to determine the building's average annual radon concentration (results reported in Consultative Letter IOH-SD-SR-CL-2004-0006, Radium/Radon Monitoring and Dose Assessment Due to Past Luminous Paint Operations at Wright-Patterson AFB, 08 Feb 04). The long-term detectors were collected in November 2004 and, consistent with the short-term results, all results for building 207 are below the recommended radon action level of 4.0 pCi/L. Since building 207 meets the goal of the Air Force Radon Assessment and Mitigation Program (RAMP) and complies with AFI 48-148, no further radon monitoring and no radon mitigation is required. Recommendations are provided in Section 6 of this consultative letter regarding the control of any potential future hazard in this facility.

2. BACKGROUND: Historical instrument repair and painting operations in building 207 involved the use of, or exposure to, luminous paint which contained the radioactive material ^{226}Ra. Radon-222 (^{222}Rn) is a naturally-occurring, radioactive gas that is produced by the decay of the ^{226}Ra. Sampling in similar facilities at other Air Force locations confirmed expected residual radioactivity from radium and associated radioactive decay products in areas such as exhaust ventilations systems, waste drains, and floors.

Distribution: Approved for public release; distribution is unlimited.

3. INSTRUMENTATION AND METHODS:

a. Internal Exposure Assessment: In November 2003, alpha track monitors were deployed at various locations to measure the average annual radon concentration. In November 2004, 28 monitors were collected and sent to Radiation Safety Services Incorporated (RSSI) for processing. See Attachment 1 for individual alpha track results.

b. Background Determination: Areas within building 207 where residual radioactivity was neither expected nor detected were sampled for background radon.

4. RESULTS: 28 alpha track monitors were collected from building 207 and analyzed. 23 of those were from areas with detected residual radioactivity and 5 were from background locations. The average radon concentration in areas of residual radioactivity was 1.6 ± 0.4 pCi/L and that in the background areas was 0.1 ± 0.0 pCi/L.

5. CONCLUSIONS: Wright-Patterson AFB is located in EPA Zone 1 (http://www.epa.gov/radon/zonemap.html) and average background radon concentrations in this zone are expected to exceed 4.0 pCi/L in unmitigated buildings. Historical RAMP data for Wright-Patterson AFB from 1987 to 1991 exhibits a radon concentration range from 0.1 to 17.6 pCi/L with a geometric mean of 1.3 pCi/L. Since the average annual concentration in building 207 is below the recommended action level of 4 pCi/L, mitigation is not required IAW AFI 48-148.

6. RECOMMENDATIONS:

a. Ensure continued compliance with the recommendation made in Consultative Letter IOH-SD-SR-CL-2004-0006, Radium/Radon Monitoring and Dose Assessment Due to Past Luminous Paint Operations at Wright-Patterson AFB, 08 Feb 04, regarding the control of the residual radioactivity.

b. Conduct a radon concentration survey after any major changes in building occupancy, ventilation rates, or outside access ways (doors and windows).

c. Before, during, and after any intrusive activities in the impacted areas, perform operational risk management through the use of radiation survey instruments, environmental sampling, personnel dosimeters, and bioassays.

d. If further guidance is needed on environmental investigations, radiological remediation efforts, or radioactive waste disposal, please contact the Health Physics Consulting Branch (AFIOH/SDRH) at DSN 240-3486.

7. If you have any questions or need further assistance, please contact 1Lt James Fyffe via email at james.fyffe@brooks.af.mil or at DSN 240-8508, (210) 536-8508 or the ESOH Service Center at 1-888-232-ESOH.

//signed//

SCOTT M. NICHELSON, Lt Col, USAF, BSC, CHP, CIH
Chief, Radiation Surveillance Division

Attachment:
Alpha track results

cc:
AFMSA/SGPR
AFRPA/EV
88 ABW/EMO
HQ AFMC/SGPB
HQ AFMC/CEV
HQ USAF/ILEV
74 AMDS/SGPB

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

Monitor Number	pCi/l	Test Location	Exposure Start	Exposure End Date	Reprint from
149779	1.7	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149780	2.2	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149781	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149782	2.3	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149783	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149784	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149785	2.2	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149787	2.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149795	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149796	2.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149797	1.6	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	

Continued

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

Monitor Number	pCi/l	Test Location	Exposure Start	Exposure End Date	Reprint from
149798	1.5	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
149800	1.5	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	

Continued

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

Monitor Number	pCi/l	Test Location	Exposure Start	Exposure End Date	Reprint from
150226	34.0 *	WRIGHT-PATTERSON AFB			
150229	1.0	WRIGHT-PATTERSON AFB	11/12/03	11/12/04	
150233	30.1 *	WRIGHT-PATTERSON AFB			
150237	1.6	WRIGHT-PATTERSON AFB	01/14/04	11/12/04	
150240	39.9 *	WRIGHT-PATTERSON AFB			
150242	0.9	WRIGHT-PATTERSON AFB	11/12/03	11/12/04	
150245	1.1	WRIGHT-PATTERSON AFB	11/12/03	11/12/04	
150247	30.9 *	WRIGHT-PATTERSON AFB			
150279	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
150281	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
150282	1.4	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
150284	1.3	WRIGHT-PATTERSON AFB	11/11/03	11/12/04	
150288	1.2	WRIGHT-PATTERSON AFB-MONITOR DAMAGED	11/12/03	11/12/04	
150296	1.5	WRIGHT-PATTERSON AFB-MONITOR DAMAGED	01/14/04	11/12/04	
150300	29.3 *	WRIGHT-PATTERSON AFB			

* Your monitors exposure start date and/or end date was not submitted. To calculate your average radon concentration in pCi/l divide this number by the number of days the monitor was exposed.