DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
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MCHB-IP-OHH

MEMORANDUM FOR Product Manager (SFAE-AV-UAS-GM/Mr. Zachery Zimmerman), Ground Maneuver, Unmanned Aircraft Systems Project Office, 5300 Martin Road, Redstone Arsenal, Alabama 35898-5000

SUBJECT: Health Hazard Assessment Report (RCS MED-388) No. S.0012264-13, RQ-7Bv2 Shadow Unmanned Aircraft System with Tactical Common Data Link, 2 August 2013

1. REFERENCES. The enclosure contains a list of references used in this Health Hazard Assessment Report (HHAR).

2. PURPOSE. To determine the potential health hazards associated with the RQ-7Bv2 Shadow Unmanned Aircraft System (UAS) with Tactical Common Data Link (TCDL) in support of a Full Materiel Release and other related procurement documents.

3. AUTHORITY. The Army's Health Hazard Assessment (HHA) Program is an Army Medical Department initiative in cooperation with and in support of the Army acquisition process. The primary objective of the Program is to identify, assess, and make recommendations to eliminate or control health hazards associated with the life cycle management of weapons platforms, munitions, equipment, clothing, training devices, and other materiel systems. The proponent of the HHA Program is The Surgeon General (TSG) of the Army; however, TSG has designated the Army Institute of Public Health (AIPH) as the Lead Agent. The HHA Program provides support to materiel acquisition programs to ensure compliance with the requirements contained in references 1 through 6.

4. BACKGROUND (references 7 and 8). The RQ-7Bv2 Shadow is a tactical unmanned aerial vehicle capable of providing ground maneuver commanders with reconnaissance, surveillance, and target acquisition data during day or night operations. The RQ-7Bv2 Shadow is currently undergoing an upgrade to Type 1 data encryption mandated by the U.S. Army. This upgrade is underway for all UAS as earlier models did not have data

encryption. The upgrade will consist of the TCDL system, to include the addition of the Universal Ground Control Station, Universal Ground Data Terminal, Portable Ground Control Station, and Portable Ground Data Terminal (PGDT) with a Multiband Directional Antenna System (MDAS). Previous HHAs have been completed on other UASs that have been upgraded with the TCDL system. In addition, previous HHARs have been completed on the RQ-7B Shadow and all health hazards and recommendations provided remain applicable unless addressed by the upgrades presented in this report.

5. ASSESSMENT AND CONCLUSIONS.

a. Based on a review of the HHA request and supporting documentation found in reference 7, we have determined that radiofrequency radiation (RFR) is a potential health hazard associated with the use and maintenance of the RQ-7Bv2 Shadow with TCDL. Department of Defense (DOD) Instruction 6055.11 and Army Regulation 40-5 require that personnel not be exposed to health hazards in excess of the limits specified in either DOD Safety and Occupational Health standards or specialized standards applicable to military-unique equipment, systems or operations (references 9 and 10). Every effort should be made to eliminate or control hazards through design.

b. The potential sources of RFR exposure associated with the RQ-7Bv2 Shadow with TCDL upgrade include both airborne and ground component elements involving the TCDL. The evaluation of these RFR sources was performed as a desktop study based on the technical specifications provided. No measurement data were collected or provided. Descriptions and assessments of the identified RFR sources associated with the RQ-7Bv2 Shadow with TCDL upgrade are provided in the following paragraphs.

(1) The TCDL Airborne Data Terminal/Airborne Data Relay (ADT/ADR) System.

(a) Assessment.

i. The ADT/ADR system is used for command and control, health and status, transmitting payload video data, and can relay communications between aircraft and ground segments for line-of-sight (LOS) operations. The ADT/ADR transmitter operates over the Ku-Band frequency range of 14.4 to 15.35 gigahertz (GHz) at an average output power of 15 Watts (W). The TCDL airborne equipment is equipped with an L-3 Communications 60061411+000 Mini CDL Ku-Band omnidirectional antenna.

ii. For personnel in a controlled environment, the most restrictive maximum permissible exposure (MPE) for the frequency range of operation of the ADT/ADR equipment is 100 watts per square meter (W/m^2) averaged over a contiguous area of 382 square centimeters (cm^2). The MPE for localized exposures is 274 W/m^2.

iii. The ADT/ADR system is equipped with a Ku-band omnidirectional antenna providing 2.5 decibel isotropic (dBi) of gain. Based on analysis, the ADT/ADR system is not able to produce RFR power density levels in excess of the spatially averaged MPEs during LOS operations using omnidirectional antennas.

iv. Physical contact with any bare metal/wire surface of the active elements of the ADT/ADR omnidirectional antenna may produce an RFR shock/burn. Maintenance and operating personnel should be cautioned against making physical contact with any RFR shock/burn producing antenna surface when radiating.

(b) Recommendations. A risk assessment code (RAC) of Low (hazard severity (HS) 4, hazard probability (HP) D) is assigned. A residual RAC of Low (HS 4, HP E) is assigned for compliance with the following recommendations:

i. Instruct personnel to avoid touching the omnidirectional antennas when transmitting. Include a warning in the system technical manuals instructing personnel to avoid touching the omnidirectional antennas when transmitting.

ii. Affix RFR caution labels near the ADT/ADR omnidirectional antenna alerting personnel to not touch the antenna when transmitting.

(2) The TCDL PGDT.

(a) Assessment.

i. The TCDL PGDT includes the One System Remote Video Terminal (OSRVT) radio and the MDAS with tripod mount assembly that can be installed on a shelter rooftop. The TCDL PGDT OSRVT will provide enhanced situational awareness with near real-time video and metadata downloads from the RQ-7Bv2 Shadow and display the streaming information on a computer display. The OSRVT radio consists of the Rover 6 transceiver and an omnidirectional antenna. The MDAS with 25.4 dBi gain provides the TCDL with extended range capability. The OSRVT radio is capable of bi-directional links in the 14.4-15.35 GHz frequency range with a maximum average output power of up to 2 W.

ii. For personnel in a controlled environment, the most restrictive MPE for the frequency range of operation of the OSRVT radio is 100 W/m². The MPE for localized exposures is 274 W/m². The MDAS antenna is configured as receive only, thus it is not able to produce power density levels in excess of the MPEs. This antenna is not subject to RFR protection controls.

(b) Recommendations. No recommendations are required.

c. No additional HHA action is required by your program; however, modifications to the item or use scenario may result in the requirement for an updated HHAR. Data requirements, health effects, medical criteria, and references specific to the types of health hazards assessed by the HHA Program may be found at the following website: http://phc.amedd.army.mil/topics/workplacehealth/hha/Pages/default.aspx.

d. This memorandum will serve as your HHAR. Provide this HHAR to System Safety, Manpower and Personnel Integration and Environment, Safety, and Occupational Health coordinators. Use the HHAR to update the Programmatic Environment, Safety, and Occupational Health Evaluation and Safety and Health Data Sheets.

6. POINT OF CONTACT. Direct inquiries regarding the HHAR to the HHA Project Officer, Mr. Robert Ehmann, at commercial 410-436-2925, DSN 584-2925, or e-mail: robert.j.ehmann.civ@mail.mil. The AIPH Nonionizing Radiation Program (Mr. Bryan Kobe) contributed to this HHAR.

FOR THE DIRECTOR:

Encl

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MCHB-IP-OHH
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REFERENCES

1. Army Regulation 40-10, Health Hazard Assessment Program in Support of the Army Acquisition Process, 27 Jul 07.

2. Army Regulation 602-2, Manpower and Personnel Integration (MANPRINT) in the System Acquisition Process, 1 Jun 01.

3. Army Regulation 385-10, The Army Safety Program, 23 Aug 07 (Rapid Action Revision 4 Oct 11).

4. Department of Defense Instruction 5000.02, Operation of the Defense Acquisition System, 8 Dec 08.

5. Army Regulation 70-1, Army Acquisition Policy, 22 Jul 11.

6. Memorandum, Under Secretary of Defense, Acquisition, Technology, and Logistics, 23 Sep 04, subject: Defense Acquisition System Safety.

7. Memorandum, Product Manager, Ground Maneuver, SFAE-AV-UAS-GM, 14 Dec 12, subject: Request for a Health Hazard Assessment on the RQ-7Bv2 Shadow Unmanned Aircraft System Equipped with Tactical Common Data Link Systems.

8. Memorandum, U.S. Army Public Health Command, MCHB-TS-OHH, 12 Apr 04, subject: Health Hazard Assessment Report (RCS MED-388) No. 69-MP-7732-04, Shadow 200 Tactical Unmanned Aerial Vehicle System, Block I.

9. Army Regulation 40-5, Preventive Medicine, 25 May 07.

10. Department of Defense Instruction 6055.11, Protection of Personnel from Electromagnetic Fields, 19 Aug 09.