



DEPARTMENT OF THE NAVY

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IN REPLY REFER TO

8020

Ser B52/6730

11 Oct 18

From: Commanding Officer, Naval Surface Warfare Center,
Dahlgren Division

To: Wireless Communications Consultants (President/Armour)

Subj: HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE,
PERSONNEL, AND FUEL ANALYSIS FOR INSTALLING SPRINT
CELLULAR UPGRADES AT MARINE CORPS BASE, QUANTICO, VIRGINIA

Ref: (a) NAVSEA OP 3565, Volume 2, Nineteenth Revision of
1 Jul 16
(b) NAVSEA OP 3565/NAVAIR 16-1-529, Volume 1, Sixth
Revision of 1 Feb 03
(c) DoDINST 6055.11 of 19 Aug 09
(d) W-C-C e-mail memo W. Armour of 5 Dec 17
(e) NAVCOMPT Form 2276A N0017818SD18016 of 7 Aug 18

Encl: (1) Antenna Locations and Nearest Ordnance Operation
Areas
(2) System Specifications and Hazards of Electromagnetic
Radiation to Ordnance Safe Separation Distances
(3) System Specifications and Hazards of Electromagnetic
Radiation to Personnel and Fuel Safe Separation
Distances
(4) Radiation Hazard Control Measures
(5) Distribution List

1. In accordance with references (a) through (c) and as requested by reference (d) and funded by reference (e), a Hazards of Electromagnetic Radiation to Ordnance (HERO), Personnel (HERP), and Fuel (HERF) analysis was performed to assess the impact of installing Sprint Cellular upgrades at Marine Corps Base (MCB) Quantico, Virginia. The upgrades include adding 2.5 GHz fourth-generation long-term evolution (4G LTE) capability and increasing the output power of the 800 MHz radio units.

2. Enclosure (1) provides a listing of the locations of the antenna/transmitter systems being installed with respect to the

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nearest ordnance operation area. Enclosure (2) provides the system specifications and HERO safe separation distances.

3. Calculated electromagnetic environments (EMEs) that could be produced by these systems indicate that the powers and antenna placements are such that the distances and radiation angles with respect to ordnance locations preclude the need for HERO emission control (EMCON). In a few cases, the calculated HERO safe separation distances appear to be greater than the distance from the antenna installation to the nearest ordnance area. However, these antennas are installed at varying heights above ground, which is not reflected in the distance to the nearest ordnance area. Consequently, the placement of the antenna systems, together with the slant distances and radiation angles with respect to ordnance locations, precludes the need for HERO EMCON.

4. Enclosure (3) provides the system specifications and HERP/HERF safe separation distances. However, calculated EMEs that could be produced by these systems indicate that the power and antenna placement of these systems are such that the distance with respect to normally occupied areas precludes the need for HERP control measures. Since personnel can obtain access to the top of Jefferson Dorm Tower, Geiger Road Water Tower, Mars Tower, Quantico Station Tower, and Stafford Water Tower where the antennas are installed, Type 2 warning signs should be posted at all access points to notify personnel to check with command authority before proceeding. Ensure radiation hazard (RADHAZ) control measures are placed in accordance with the instructions detailed in enclosure (4).

5. The installation of these systems does not present any hazard to any existing fuel handling areas.

6. Based on this analysis, the Naval Surface Warfare Center, Dahlgren Division (NSWCDD), Electromagnetic Environmental Effects (E3) Assessment and Evaluation Branch (B52) recommends that MCB Quantico request RADHAZ (i.e., HERO, HERP, and HERF) certification from the Naval Ordnance Safety and Security Activity (NOSSA) (N8) for the equipment described in the preceding paragraphs. Upon receipt of certification from NOSSA (N8), NSWCDD (B52) recommends incorporating enclosure (2)

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into the installation's HERO Instruction/Bill and enclosure (4) into the installation's RADHAZ HERP/HERF control measures. All updates may be found on the E3 Team Online Knowledge Management System (KMS).

7. The E3 Team Online KMS is an official Department of the Navy web portal that provides access to HERO, HERP, and HERF E3 data; technical reports; and RADHAZ calculation tools. E3 Team Online can be accessed at <https://e3.nswc.navy.mil>. A valid Common Access Card is required for access to this web portal. To request an E3 Team Online account, visit <https://www.e3teamonline.org>. Upon receipt of account approval, visit <https://e3.nswc.navy.mil> for log-in. Questions regarding E3 Team Online content should be directed to Mr. Richard Magrogan, NSWCDD (B52), at commercial 540-653-3445 or DSN 249-3445, or via electronic mail at richard.magrogan@navy.mil. Questions regarding access to E3 Team Online should be directed to Ms. Rebecca Payne, AECOM, at commercial 540-663-9460 or via electronic mail at rebecca.payne@aecom.com.

8. This project is recommended for HERO/HERP/HERF approval.

9. Enclosure (5) is the distribution list for this letter.

10. If there are any questions or comments, please contact Steven Springer (B52) at commercial 540-653-2931 or DSN 249-2931, or via electronic mail at steven.p.springer@navy.mil.



RICHARD F. MAGROGAN
By direction

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COMMARCORSSCOM QUANTICO VA (ESO/Cassette, Dauksys, Flick,
Holden, Taylor, White)

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NAVORDSAFSECACT INDIAN HEAD MD (N843/Rash, N844/Puffinburger)

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AECOM DAHLGREN (E3 Team Online)

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ANTENNA LOCATIONS AND NEAREST ORDNANCE OPERATION AREAS

ANTENNA LOCATIONS AND NEAREST ORDNANCE OPERATION AREAS

Building Number and Building Name	Latitude	Longitude	Antenna Height Above Ground (feet)	HERO Zone of Antenna	Nearest Ordnance Operation Area	HERO Zone of Ordnance Operation Area	Distance to Nearest Ordnance Operation Area (feet/meters)
CELL TOWER (JEFFERSON DORM CELL SITE WA72XC058)	38.531889	-77.445194	140.4	4	RANGE ROAD (PRIMARY ORDNANCE TRANSPORTATION ROUTE)	4	91/27
CELL TOWER (GEIGER ROAD WATER TOWER CELL SITE WA54XC842)	38.533542	-77.299931	111.3	2	RUSSELL ROAD (PRIMARY ORDNANCE TRANSPORTATION ROUTE)	2	>5000/1524
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	38.529990	-77.327260	196	2	RUSSELL ROAD (PRIMARY ORDNANCE TRANSPORTATION ROUTE)	2	>5000/1524
CELL TOWER (QUANTICO STATION CELL SITE WA73XC367)	38.516119	-77.310510	100.3	2	RUSSELL ROAD (PRIMARY ORDNANCE TRANSPORTATION ROUTE)	2	2010/613
CELL TOWER (STAFFORD WATER TOWER CELL SITE WA54XC851)	38.528750	-77.431319	94.3	3	MCB – 4 (PRIMARY ORDNANCE TRANSPORTATION ROUTE)	3	130/40

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SYSTEM SPECIFICATIONS AND HAZARDS OF ELECTROMAGNETIC RADIATION TO
ORDNANCE SAFE SEPARATION DISTANCES

SYSTEM SPECIFICATIONS AND HERO SAFE SEPARATION DISTANCES

Antenna Location	Antenna Nomenclature	Antenna Type	Antenna Gain (dBi)	Transmitter Frequency (MHz)	Transmitter Avg. Power (watts)	Transmitter Type	Separation Distances	
							HERO UNSAFE ORDNANCE (feet/meters)	HERO SUSCEPTIBLE ORDNANCE (feet/meters)
CELL TOWER (GEIGER ROAD WATER TOWER CELL SITE WA54XC842)	NOKIA 2.5G MAA-AAHC(64T64R)	PANEL	15.22	2497-2675	160.0	ALCATEL-LUCENT 2.5 RRH	84/26	21/7
CELL TOWER (GEIGER ROAD WATER TOWER CELL SITE WA54XC842)	RFS APXVSP18-C A20 (800 MHZ)	PANEL	15.5	862-869	100.0	ALCATEL-LUCENT 800RRH (2 PORT)	199/61	50/16
CELL TOWER (JEFFERSON DORM CELL SITE WA72XC058)	COMMSCOPE DT465B-2XR	DUALPOL ARRAY	15.8	2497-2675	160.0	ALCATEL-LUCENT 2.5 RRH	90/28	23/7
CELL TOWER (JEFFERSON DORM CELL SITE WA72XC058)	RFS APXVSP18-C A20 (800 MHZ)	PANEL	15.5	862-869	100.0	ALCATEL-LUCENT 800RRH (2 PORT)	199/61	50/16
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	NOKIA 2.5G MAA-AAHC(64T64R)	PANEL	15.22	2497-2675	160.0	ALCATEL-LUCENT 2.5 RRH	84/26	21/7
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	KMW ETCR-654L12H6 (800 MHZ)	PANEL	15.0	862.275-869	14.5	ALCATEL-LUCENT FD-RRH-2X50-800 REMOTE RADIO HEAD	72/22	18/6
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	KMW ETCR-654L12H6 (1900 MHZ)	PANEL	18.0	1850-1995	180.0	ALCATEL LUCENT 4X45 B66A REMOTE RADIO HEAD	166/51	42/13
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	KMW ETCR-654L12H6 (1900 MHZ)	PANEL	18.0	1850-1995	45.0	ALCATEL LUCENT 4X45 B66A REMOTE RADIO HEAD	83/26	21/7
CELL TOWER (QUANTICO STATION CELL SITE WA73XC367)	NOKIA 2.5G MAA-AAHC(64T64R)	PANEL	15.22	2497-2675	160.0	ALCATEL-LUCENT 2.5 RRH	84/26	21/7
CELL TOWER (QUANTICO STATION CELL SITE WA73XC367)	RFS APXVSP18-C (806-869 MHZ)	PANEL	15.5	862-869	100.0	ALCATEL-LUCENT 800RRH (2 PORT)	199/61	50/16
CELL TOWER (STAFFORD WATER TOWER CELL SITE WA54XC851)	COMMSCOPE DT465B-2XR	DUALPOL ARRAY	15.8	2497-2675	160.0	ALCATEL-LUCENT 2.5 RRH	90/28	23/7
CELL TOWER (STAFFORD WATER TOWER CELL SITE WA54XC851)	COMMSCOPE DT465B-2XR	DUALPOL ARRAY	15.8	862-869	100.0	ALCATEL-LUCENT 800RRH (2 PORT)	206/63	52/16

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SYSTEM SPECIFICATIONS AND HAZARDS OF ELECTROMAGNETIC RADIATION TO
PERSONNEL AND FUEL SAFE SEPARATION DISTANCES

SYSTEM SPECIFICATIONS AND HERP/HERF SAFE SEPARATION DISTANCES

Antenna Location	Antenna Nomenclature	Antenna Type	Antenna Gain (dBi)	Transmitter Frequency (MHz)	Transmitter Max. Avg. Power (watts)	Transmitter Type	Separation Distances		Control Measures
							Controlled HERP (feet/meters)	HERF (feet/meters)	
CELL TOWER (GEIGER ROAD WATER TOWER CELL SITE WA54XC842)	NOKIA 2.5G MAA-AAHC(64T64R)	PANEL	15.2	2497-2675	160	ALCATEL-LUCENT 2.5 RRH	7.5/2.3	9.8/3	GEIGER TOWER - 1
CELL TOWER (GEIGER ROAD WATER TOWER CELL SITE WA54XC842)	RFS APXVSP18-C A20 (800 MHZ)	PANEL	15.5	862-869	100	ALCATEL-LUCENT 800RRH (2 PORT)	3.6/1.1	9.8/3	GEIGER TOWER - 1
CELL TOWER (JEFFERSON DORM CELL SITE WA72XC058)	COMMSCOPE DT465B- 2XR	DUALPOL ARRAY	15.8	2497-2675	160	ALCATEL-LUCENT 2.5 RRH	7.9/2.4	9.8/3	JEFFERSON TOWER - 1
CELL TOWER (JEFFERSON DORM CELL SITE WA72XC058)	RFS APXVSP18-C A20 (800 MHZ)	PANEL	15.5	862-869	100	ALCATEL-LUCENT 800RRH (2 PORT)	3.6/1.1	9.8/3	JEFFERSON TOWER - 1
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	NOKIA 2.5G MAA-AAHC(64T64R)	PANEL	15.2	2497-2675	160	ALCATEL-LUCENT 2.5 RRH	7.5/2.3	9.8/3	MARS TOWER - 1
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	KMW ETCR-654L12H6 (800 MHZ)	PANEL	15.0	862.275-869	20	ALCATEL-LUCENT FD-RRH-2X50-800 REMOTE RADIO HEAD (LTE 800)	4.3/1.3	9.8/3	MARS TOWER - 1
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	KMW ETCR-654L12H6 (1900 MHZ)	PANEL	18.0	1850-1995	180	ALCATEL LUCENT 4X45 B66A REMOTE RADIO HEAD	12/3.8	9.8/3	MARS TOWER - 1
CELL TOWER (MARS TOWER SPRINT CELL SITE WA90XCJ75)	KMW ETCR-654L12H6 (1900 MHZ)	PANEL	18.0	1850-1995	45	ALCATEL LUCENT 4X45 B66A REMOTE RADIO HEAD	6.2/1.9	9.8/3	MARS TOWER - 1
CELL TOWER (QUANTICO STATION CELL SITE WA73XC367)	NOKIA 2.5G MAA-AAHC(64T64R)	PANEL	15.2	2497-2675	160	ALCATEL-LUCENT 2.5 RRH	7.5/2.3	9.8/3	QUANTICO TOWER - 1
CELL TOWER (QUANTICO STATION CELL SITE WA73XC367)	RFS APXVSP18-C (806-869 MHZ)	PANEL	15.5	862-869	100	ALCATEL-LUCENT 800RRH (2 PORT)	3.6/1.1	9.8/3	QUANTICO TOWER - 1
CELL TOWER (STAFFORD WATER TOWER CELL SITE WA54XC851)	COMMSCOPE DT465B- 2XR	DUALPOL ARRAY	15.8	2497-2675	160	ALCATEL-LUCENT 2.5 RRH	7.9/2.4	9.8/3	STAFFORD TOWER - 1
CELL TOWER (STAFFORD WATER TOWER CELL SITE WA54XC851)	COMMSCOPE DT465B- 2XR	DUALPOL ARRAY	15.8	862-869	100	ALCATEL-LUCENT 800RRH (2 PORT)	10/3.2	9.8/3	STAFFORD TOWER - 1

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RADIATION HAZARD CONTROL MEASURES

RADHAZ CONTROL MEASURES

ITEM	BUILDING	SOURCE	CONTROL MEASURE	QTY	INSTALLATION METHOD
GEIGER TOWER - 1	CELL TOWER - GEIGER ROAD WATER TOWER CELL SITE WA54XC842	VARIOUS	TYPE 2 SIGN(S)	A/R	POST SIGN(S) AT EYE LEVEL AT TOWER BASE.
JEFFERSON TOWER - 1	CELL TOWER - JEFFERSON DORM CELL SITE WA72XC058	VARIOUS	TYPE 2 SIGN(S)	A/R	POST SIGN(S) AT EYE LEVEL AT TOWER BASE.
MARS TOWER - 1	CELL TOWER - MARS TOWER SPRINT CELL SITE WA90XCJ75	VARIOUS	TYPE 2 SIGN(S)	A/R	POST SIGN(S) AT EYE LEVEL AT TOWER BASE.
QUANTICO TOWER - 1	CELL TOWER - QUANTICO STATION CELL SITE WA73XC367	VARIOUS	TYPE 2 SIGN(S)	A/R	POST SIGN(S) AT EYE LEVEL AT TOWER BASE.
STAFFORD TOWER - 1	CELL TOWER - STAFFORD WATER TOWER CELL SITE WA54XC851	VARIOUS	TYPE 2 SIGN(S)	A/R	POST SIGN(S) AT EYE LEVEL AT TOWER BASE.

A/R = As Required

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DISTRIBUTION LIST

DISTRIBUTION LIST FOR HERO, HERP, AND HERF ANALYSIS FOR THE
INSTALLATION OF SPRINT CELLULAR UPGRADES

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