

EXHIBIT 3

COORDINATION WITH FEDERAL AVIATION ADMINISTRATION (FAA)

CHEMRING SENSORS AND ELECTRONIC SYSTEMS, INC.

APPLICATION FOR MODIFICATION OF EXPERIMENTAL LICENSE CALL SIGN WG2XMT

FILE NO. 0231-EX-CM-2017

Chemring Sensors and Electronic Systems (“Chemring” or “CSES”) seeks a modification to its existing experimental license (Call Sign WG2XMT, File No. 0327-EX-PL-2013, granted Nov. 26, 2013) to change its testing locations. In particular, Chemring seeks to remove the two testing locations in Charlottesville, Virginia, and replace them with one testing location in Charlotte, North Carolina. (The other testing location in Dulles, Virginia, remains the same.)

Chemring previously filed an application for modification that was dismissed without prejudice due to Federal Aviation Administration (“FAA”) concerns regarding potential interference (Call Sign WG2XMT, File No. 0034-EX-CM-2017, dismissed without prejudice July 24, 2017).

Chemring has coordinated with the FAA regarding its concerns and the FAA has conditionally concurred with Chemring’s application via correspondence dated Sept. 7, 2017. Please see the attached.

In addition, please note that the statement requested by Mr. Murphy (“Due to emission levels exceeding the required limits per FCC Part 15 and NTIA Annex K in the 960-2210 MHz range, the proponent will operate with lower power and/or shielding to reduce risk to nearby FAA operations.”) has been added to Exhibit 1, Testing Location Descriptions, and Exhibit 2, Government Project Description and Public Interest Statement.

EXHIBIT 3

From: rodney.murphy@faa.gov [<mailto:rodney.murphy@faa.gov>]
Sent: Thursday, September 07, 2017 11:56 AM
To: Browne, Maria
Cc: michael.richmond@faa.gov; timothy.j.pawlowitz@faa.gov; John.Kennedy@fcc.gov
Subject: RE: OET Experimental License Dismissal Notification, Call Sign: WG2XMT File Number: 0034-EX-CM-2017

After considerable review (including the Army certification submissions), the FAA will conditionally concurs with 0034-EX-CM-2017.

Please add the following statement:

Due to emission levels exceeding the required limits per FCC Part 15 and NTIA Annex K in the 960-2210 MHz range, the proponent will operate with lower power and/or shielding to reduce risk to nearby FAA operations. This is especially important for Dulles since the location is within the required distance separation.

Rodney Murphy
Federal Aviation Administration
Spectrum Engineering and Policy
Fixed/Land Mobile,UAS, Satellite, Experimentals
FAA FAS Representative
202-267-9501

From: Browne, Maria [<mailto:MariaBrowne@dwt.com>]
Sent: Thursday, August 31, 2017 10:40 AM
To: Murphy, Rodney (FAA) <rodney.murphy@faa.gov>
Subject: RE: OET Experimental License Dismissal Notification, Call Sign: WG2XMT File Number: 0034-EX-CM-2017

Mr. Murphy,

Following up to be sure that you received the email below and to see if there is any additional information we can provide.

Kind regards,

Maria

Maria Browne | Davis Wright Tremaine LLP
1919 Pennsylvania Avenue NW, Suite 800 | Washington, DC 20006
Tel: (202) 973-4281 | Fax: (202) 973-4481
Email: maria.browne@dwt.com | Website: www.dwt.com

Anchorage | Bellevue | Los Angeles | New York | Portland | San Francisco | Seattle | Shanghai | **Washington, D.C.**

From: Browne, Maria
Sent: Tuesday, August 22, 2017 5:55 PM
To: 'rodney.murphy@faa.gov'
Subject: RE: OET Experimental License Dismissal Notification, Call Sign: WG2XMT File Number: 0034-EX-CM-2017

EXHIBIT 3

Mr. Murphy,

Please see attached in response to your questions below. Please do not hesitate to contact me with any additional questions.

Kind regards,

Maria

Maria Browne | Davis Wright Tremaine LLP
1919 Pennsylvania Avenue NW, Suite 800 | Washington, DC 20006
Tel: (202) 973-4281 | Fax: (202) 973-4481
Email: mariabrowne@dwt.com | Website: www.dwt.com

Anchorage | Bellevue | Los Angeles | New York | Portland | San Francisco | Seattle | Shanghai | **Washington, D.C.**

From: rodney.murphy@faa.gov [<mailto:rodney.murphy@faa.gov>]

Sent: Friday, August 11, 2017 2:44 PM

To: Browne, Maria

Subject: RE: OET Experimental License Dismissal Notification, Call Sign: WG2XMT File Number: 0034-EX-CM-2017

Since 2012, the FAA has consistently provided objections to Husky GPR operations at both Dulles, VA, Charlottesville, VA and Charlotte, NC. This was done under NIITEK ownership. Various comments were given, such ensuring that the emissions will be under FCC Part 15 rules for UWB, to notching out critical FAA aviation bands (108-137 MHz, 328.6-335.5 MHz, etc).

Can the proponent provide information about the emissions masking and any possible shielding to ensure that the power levels are not excess and harmful? In other words, how much power will actually be emitted, and can previous conditions (such as frequency notching) be utilized as necessary?

Rodney Murphy
Federal Aviation Administration
Spectrum Engineering and Policy
Fixed/Land Mobile,UAS, Satellite, Experimentals
FAA FAS Representative
202-267-9501

From: Browne, Maria [<mailto:MariaBrowne@dwt.com>]

Sent: Friday, August 11, 2017 1:57 PM

To: Murphy, Rodney (FAA)

Subject: FW: OET Experimental License Dismissal Notification, Call Sign: WG2XMT File Number: 0034-EX-CM-2017

Maria Browne | Davis Wright Tremaine LLP
1919 Pennsylvania Avenue NW, Suite 800 | Washington, DC 20006
Tel: (202) 973-4281 | Fax: (202) 973-4481
Email: mariabrowne@dwt.com | Website: www.dwt.com

Anchorage | Bellevue | Los Angeles | New York | Portland | San Francisco | Seattle | Shanghai | **Washington, D.C.**

From: oetech@fccsun27w.fcc.gov [<mailto:oetech@fccsun27w.fcc.gov>]

Sent: Monday, July 24, 2017 4:39 PM

To: Browne, Maria

Subject: OET Experimental License Dismissal Notification, Call Sign: WG2XMT File Number: 0034-EX-CM-2017

EXHIBIT 3

 [FCC Home](#) | [Search](#) | [RSS](#) | [Updates](#) | [E-Filing](#) | [Initiatives](#) | [Consumers](#) | [Find People](#)

Office of Engineering and Technology



To: Maria Browne, Chemring Sensors and Electronic Systems, Inc
mariabrowne@dwt.com

From: OET Systems Administration (Batch Processing) OET Systems Administration
(Batch Processing)
Bill.Schwartz@fcc.gov

Applicant: Chemring Sensors and Electronic Systems, Inc

File Number: 0034-EX-CM-2017

Correspondence Reference Number: 38082

Date of Original Email: 07/24/2017

This refers to application, File No 0034-EX-CM-2017, for an experimental authorization. Hereby, you are notified that the referenced application has been dismissed without prejudice.

DO NOT Reply to this email by using the reply button.

EXHIBIT 3

August 22, 2017

Rodney Murphy
Federal Aviation Administration
Spectrum Engineering and Policy
Fixed/Land Mobile, UAS, Satellite, Experimentals
FAA FAS Representative

Re: CSES Time Domain Impulse Radar

Mr. Murphy:

Pursuant to your request, attached please find information provided by Chemring Sensors responding to your questions concerning the CSES (formerly NIITEK) Time Domain Impulse Radar ("GPR"). Specifically, the attached includes an explanation of the technology employed by the GPR, as well as a description of the GPR's emissions and power levels, the methods employed by Chemring to minimize the GPR's interference potential, the extensive testing conducted by Chemring in conjunction with its military partners, and its numerous years of experience operating the GPR without any instances of interference, including operation in close proximity to airports.

Please let know if we can provide any additional information to assist in your analysis of the GPR.

Sincerely,

A handwritten signature in cursive script that reads "Maria Browne".

Maria Browne

EXHIBIT 3

Enclosure:

Letter to FCC re CSES GPR

Technical Background: CSES (formerly NIITEK) Time Domain Impulse Radar

The NIITEK GPR is a time domain Impulse radar. Therefore there is no continuous wave (CW) signal and there is no modulation. It emits an extremely short duration baseband impulse ~ 300 picoseconds (3×10^{-10} seconds) with a relatively low duty cycle $\sim 0.5\%$. Our average Pulse Repetition Frequency (PRF) is 16.49 MHz leading to a Pulse repetition interval (PRI) of 6.064×10^{-8} seconds. We further reduce the interference impact by using a pseudo random PRI that ensures a fairly flat frequency distribution above ~ 250 MHz. This results in a 10 dB bandwidth of 500 MHz to 5 GHz (20 dB @ 300 MHz to 10.7 GHz). We effectively operate in the UHF (300-3000 MHz) band and portions of the SHF (3 to 30 GHz) band. Throughout these ranges our signal appears to other receivers as intermittent noise. Primarily because we are a time domain impulse system there is no possibility that we can notch out portions of the spectrum and maintain functionality.

It is important to note that we have done extensive emissions testing on our system and have more than 10 years direct experience interacting with a large variety of systems albeit mostly in military settings.

We have had exhaustive interaction through the Army spectrum management office with the NTIA, FCC, and FAA regarding our emissions profile. The emissions testing we have done demonstrates that in all ranges except between 960 MHz and 3.1 GHz we meet the unlicensed requirements of 47 CFR § 15.509, "Technical requirements for ground penetrating radars and wall imaging systems" including 47 CFR § 15.209, "Radiated emission limits; general requirements". More specifically in the FAA aviation bands (108-137 MHz, 328.6-335.5 MHz, etc.) we are > 10 dB below the limits.

Through the 10+ years during which we have been testing and operating this system there has never been an instance where interference was noted with other systems. The GPR has been operated in direct proximity to military air traffic control operations, cell phones and a variety of military radios without incident. In addition, our experiences in recent years with our licenses in Dulles and Charlottesville, where both facilities have a close proximity to airports, have yet to yield a complaint.

The emissions concern we now receive from the NTIA, FCC and FAA with respect to our GPR is that the general use will raise the noise floor in that portion of the spectrum essentially impacting the distance over which these communication links are effective. The fact that our system appears in the spectrum as intermittent noise with a low duty cycle makes our signal less of a threat to other systems than is initially perceived. This is important because normal receiver filtering techniques will be very effective against the noise we add.

With regard to the protections we take at our facilities:

EXHIBIT 3

1. We operate the unit inside our buildings. This provides additional attenuation and reduces the emissions that otherwise were over the unlicensed limits in the 960 MHz to 3.1 GHz range back down to the unlicensed limits. For the frequency in the FAA aviation bands (108-137 MHz, 328.6-335.5 MHz, etc.), which are already well below the unlicensed limits, this represents a further reduction.
2. We have developed a reduced power variant of our GPR Array that is below the unlicensed limits for use outside our Dulles facility for integration activities. This makes the GPR marginally functional but is useful for integration. This unit has further suppressed emission by ~ 20 dB.
3. Operations in Charlotte are the same operations that were formerly performed at Charlottesville. The panels are only operated within the building similar to paragraph 1 above.

For more details I have included our original experimental license write-up.

From our experimental license application:

(Note: Charlottesville is now replaced by our Charlotte facility)

There are three aspects of NIITEK's testing operations for which the requested experimental license would apply.

First, NIITEK would operate the GPR during two phases of testing and development at its facilities located in Dulles, Virginia (the "Dulles facility"). During the development and laboratory testing phase, the GPR would be operated inside NIITEK's sensor development laboratory. Shielding would be used around the GPR to ensure that radiation levels outside of the lab are attenuated below the FCC requirements as defined in 47 CFR §15.509. During the system integration testing phase, the GPR would be operated in NIITEK's system lab to confirm proper integration with other components of the Landmine Detection System. During this phase, the GPR parameters are not typically measured. Thus, the GPR can be operated with enclosures placed around and over the panels for shielding. NIITEK may also perform system testing in the surrounding parking lot of the Dulles facility. Such testing would only involve surface laid objects, and, thus, would not require full power operation. Consequently, system testing in the surrounding parking lot would involve lower transmitted power, or a cover placed over the antenna, to attenuate the signal within FCC parameters.

Second, NIITEK would mount the GPR on vehicles for testing on the property surrounding the Dulles facility. During such testing, the GPR antenna would either be in a reduced power mode, or will be covered by an attenuation cover, to ensure that all emissions are below the Part 15 parameters. During testing, the antenna would be intentionally operated about 10 inches above the ground with the center line or focus of the beam directed into the ground. A "background subtraction process" would occur roughly once an hour lasting roughly 10 seconds during which time the GPR antenna would be approximately 1.2 meters above the ground, and directed at about a 65 degree angle to the ground.

Third, NIITEK would perform production testing of the GPR at one of two Charlottesville, Virginia facilities (the "Charlottesville facilities") to ensure proper operational use. Testing would occur inside the production facilities, and involve both GPR performance tests and system tests. Performance testing to measure the performance parameters of the GPR would occur in a room with shielding on the walls and

EXHIBIT 3

ceiling at a reasonable distance to allow for proper operation of the GPR while ensuring that all emissions are below the Part 15 parameters. System integration testing would be performed in a second room accommodated with either an enclosure around the radar to attenuate the transmitted spectrum or through a reduction in transmitted power to ensure the transmitted spectrum is below the FCC limits.

X 

William J. Cummings
GPR Program Manager

Chemring |
Sensors & Electronic Systems

23031 Ladbroke Drive, Dulles, VA 20166

Desk: (703) 574-6048 | Mobile: (571) 230-3085

Fax: (703) 661-0284

Email: wcummings@chemringsensors.com

www.chemringsensors.com