

**STA REQUEST
AND DESCRIPTION OF OPERATIONS**

1. **Introduction**

By the instant application ("STA Request"), BAE Systems Information and Electronic Systems Integration Inc. ("BAE Systems") requests that the Commission grant special temporary authority ("STA") to permit BAE Systems to operate the facilities (the "Facilities") specified in the instant STA Request. STA is requested for a period of six (6) months, with a commencement date of December 14, 2005.

2. **Purpose of the Operation**

BAE Systems Information and Electronic Systems Integration Inc., will conduct the testing specified in this STA Request at the company's Lansdale, PA, Antenna Test Range. BAE Systems is a major producer of electronic warfare systems, protection systems, and tactical surveillance and intelligence systems for all branches of the armed forces. BAE Systems' lines of business include Platform solutions, Sensor Systems, Advanced Systems & Technology, Electronic Protection, Information Warfare, Communication, Navigation, Identification and Reconnaissance, Center for Transformation and National Security Solutions with products and services spanning the whole electromagnetic spectrum.

The testing at the Lansdale, PA Antenna Test Range is a critical part of the manufacture and delivery of the military system required under a primary contract between Northrop-Grumman Corp. and the U.S. Navy (US Naval Air Systems Command). As a general matter, the purpose of the facilities for which consent is requested herein is to measure the performance of an antenna (i.e., Conical Spiral) on a free-space range. The antenna measurements will consist of four (4) discrete test frequencies for evaluation of antenna pattern coverage. More specifically, the testing under the requested STA is for the purpose of implementing a subcontract awarded to BAE Systems by Northrop-Grumman Corp., for the U.S. Navy for the manufacture and test of antennas for an Airborne Satellite Communication system. This antenna is being procured by Northrop-Grumman for the U.S. Naval Air Systems Command for use in the Fleet. The testing required at the Lansdale, PA Antenna Test Range is in support of this contract. The following information regarding the relevant contract is provided pursuant to Commission requirements:

- **Subcontract - Northrup-Grumman/BAE Systems:**

Company:	Northrup-Grumman
Northrup-Grumman	
Contract No.:	594656
Northrup-Grumman	
Point of Contact and Tel. #.	Lori Torres (516) 346-4955

3. Why STA is in the Public Interest

STA is being requested in order to obtain processing as expeditiously as possible so that the commencement of operation of the proposed facilities can occur as soon as possible. As a leader in technological advancements, BAE Systems continually drives new research efforts in support of the war fighter. Each candidate antenna design is fabricated and tested using the antenna measurement system described in the application. Accordingly, evaluation of the performance of the antenna will be conducted in the near term before integrated into the system. In this particular case, authority to operate the Facilities under STA is necessary so that BAE Systems can demonstrate and verify performance of the subject system in accordance with current testing schedules.

As stated above, the testing at the Antenna Test Range Facilities is a critical part of the manufacture and delivery of military systems required under the specified Navy Contract and BAE Systems is not in a position to delay the commencement of these tests. Commission grant of STA in this case will permit BAE Systems to commence operations under a timeframe that meets current testing schedules. For the foregoing reasons, approval of this STA Request is in the public interest, convenience and necessity.

4. Other Issues

A. Requested Area of Operation

The Lansdale, PA Antenna Test Range is comprised of multiple separate testing locations on the BAE Systems campus at which the subject experiment may be conducted. In addition, depending on the particular requirements of the experiment (i.e., when generating signals at zero degree elevation), it may be necessary to move a given antenna along the bore site line on the range up to a distance of 100 feet. *Accordingly, in order to accommodate these requirements, by this STA Request, BAE Systems is requesting authority to operate all of the specified facilities within a 120 meter radius from the centerpoint geographic coordinates identified in the STA Request (i.e., 40-16-10 N.Lat.; 075-14-46 W.Long. [NAD 83]).* Commission approval of such area of operation will provide BAE Systems with the flexibility it requires to move the specified test equipment to any appropriate testing location on the Lansdale, PA Antenna Test Range during the authorized term of operation, in response to the requirements of the experiment.

B. Directionality and Height of Antennas

A single Antenna Registration has been submitted for the instant STA Request, and such Antenna Registration specifies “Yes” in response to the questions: “Is a directional antenna used?”. However the mounting or location of the antenna will not extend more than 6 meters above the building. The directionality of the antennas involved in the experiment:

Manufacturer	Model #	Quantity	Gain (Nominal)	3dB BW E (Vertical) ²	3dB BW H (Horizontal) ²
BAE	Dipole GP ¹	2	8.2 dBi	63 +/- 5 deg ³	102 +/- 10 deg ³
Note 1: The Dipole GP antenna is a 20” long sleeve dipole antenna mounted 11 inches above a 2’ x 2’ Ground plane. This antenna was designed specifically for the test application to serve as a transmitting Source or receive Gain standard. The Dipole GP is not a commercially available product					
Note 2: During test the Source antenna is rotated to achieve a rotating linear polarization. The beamwidth specification provides for the vertical and horizontal plane is rotated about each plane as the antenna is rotated about its axis.					
Note 3: The stated beamwidth is the nominal characteristic over the test frequency band. The Tolerance covers the performance changes over the frequency band.					

C. Note Regarding Output Power/ERP Figures

For the purpose of completion of the attached form cable loss between the transmitter and antenna have been neglected. In practice the cable loss between the transmitter and the antenna will be considered and will result in lower than stated Power and ERP. The ERP is calculated assuming the maximum power of the transmitter is available at the antenna. The gain of the antenna is included into the calculation which increases the ERP values above the transmitter power. Finally, the impact of modulation is factored into the ERP resulting in an average ERP value which is 50 % less than the peak value. The average ERP is calculated from

$$ERP_{AVG} = \text{Transmitter Power} \times \text{Antenna Gain} \times \text{Modulation Duty Cycle}$$

$$ERP_{AVG} = 10 \times 10^{8.2/10} \times 0.5 = 10 \times 6.6 \times 0.5 = 33 \text{ mW}$$

D. Note Regarding “Mean” Power Designation

In the attached form, the power levels are reported as a “Mean” value. The transmitter will not be left on continuously due to the nature of the experiment and the need to physically reposition the unit under test between measurements, cycle through frequencies, change pattern cut of the antenna-under-test, etc. where the transmit power is reduced to zero. The actual duty cycle of the transmit system is substantially lower than the average ERP value stated above. In Section G a description of the test plan and scenario is given. When the actual ON-TIME of the test is assessed over the period of a Month an ON-TIME Monthly Duty Cycle of 1.3% is achieved. If the

ON-TIME Duty cycle is factored into the average ERP the ERP is reduced to 1.3 % of 33mW or 0.429 mW.

The submission states an average ERP of 33mW. However when the ON-TIME duty cycle is taken into account a substantially lower ERP value is obtained which better represents the applicant's proposed activity.

E. Transmitting Equipment

In response to Item No. 8 in the Administrative portion of the STA Request, the following information is provided with respect to the transmitting equipment to be involved in the experiment. It is noted that each of these transmitters is non-experimental in nature:

Manufacturer	Model	Quantity
Wiltron	6747A-20	1
Agilent HP	8340A	1

F. Note Regarding Emission Data/Bandwidth

The antenna measurements will be performed using analog antenna measurement equipment. Measurements using this equipment are performed using a 1KHz tone Amplitude Modulation. By definition the required Bandwidth for simple Tone Amplitude Modulation is twice the modulation frequency or 2 kHz.

G. Prevention of Interference

BAE Systems hereby advises the Commission that the tests to be conducted under the requested Commission authorization are to be conducted solely on the campus of BAE Systems' Lansdale, Pennsylvania facilities. Such location will result in the separation of the test facilities from other existing transmit or receive facilities. BAE Systems' Michael A. Matsick, department Manager, will be personally responsible for the test and will be available by wireless telephone at (610) 248-3929. Mr. Matsick will act as a "stop buzzer" if any issues regarding interference arise during testing.

H. Additional Technical Information Relevant to Test Plan

BAE Systems hereby advises the Commission that the tests to be conducted under the requested Commission authorization will be performed only over a limited ON-TIME over the duration of the STA. Delivery rates for the Antenna are 1 or 2 per month and are less than quantity 10. A description of the test to be performed and the test duration is described to provide the Commission with an understanding of the effective duty cycle of the test operation. The test scenario is described below.

The test to be performed on the Antenna consists of a pre-test operation that is performed during the final stage of manufacturing and final Acceptance Testing. Final

Acceptance Testing is performed in accordance with a customer approve Acceptance Test Procedure with specified test frequencies.

A typical test sequence is as follows:

- 1) Antenna Range -Pretest: Radiation Pattern Test: 4-Frequencies/ 5 Cuts @ 15 minutes per pattern cut
- 2) Manufacturing - Finalize fabrication of antenna
- 3) Antenna Range - Final Acceptance Test: Radiation Pattern Test: 4-Frequencies/ 4-Cuts @ 15 minutes per pattern cut

During the Pretest operation antenna Step 1 is performed a minimum of 1-time. Antenna tuning is an expected operation and is performed on the antenna before the final fabrication of the antenna, Step 2. Antenna tuning operations may require multiple passes and typically is completed in less than 4 cycles. Final testing will typically be performed 1-time. However a test equipment malfunction or performance failure may require an additional test.

Minimum ON-TIME per Antenna Test per frequency (1-Pretest + 1 Acceptance Test) = 2.25 Hrs

Typical ON-TIME per Antenna Test per frequency (3-Pretests + 1 Acceptance Test) = 4.75 Hrs

On a per Month basis the Typical ON-TIME is based on delivery of two (2) antennas.

The Typical ON-Time per Month per frequency is 9.5 Hrs.

On a Monthly basis of 24 hrs per day and 30 days per month the Typical ON-TIME per frequency is at a Duty Cycle of 1.3%.

Note: Prior to performing antenna testing a Range calibration is required. Calibration of the 4 test frequencies is typically performed within 1 day of test.