

UNCLASSIFIED

MILITARY COMMUNICATIONS ELECTRONICS BOARD (MCEB)

EQUIPMENT FREQUENCY ALLOCATION GUIDANCE

Military Department	Equipment	Stage
Army Air Force	Geographic Synthetic Aperture Radar (GeoSAR)	4 - Operational

Section 1: ENCLOSURES

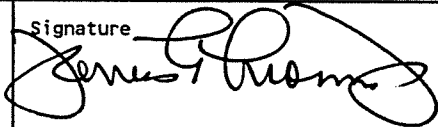
Enclosure Number	Description	Dated
1	J/F 12/7417/2	06 Oct 03

Section 2: OPERATING CHARACTERISTICS FOR WHICH SUPPORT IS CERTIFIED

Frequency	Emission	Power Peak	Stage 4 Type of Service	Operating Location
9625.5 - 9794.5 MHz	169MQ3N	2 kWatts	Radiolocation	US & P
265.5 - 434.5 MHz		1 kWatts		

Section 3: MCEB GUIDANCE

1. The enclosed application as described above is approved for operational use in the US&P, subject to the guidance below.
2. For the intended use in the radiolocation service, the subject system is in accordance with the US and ITU Tables of Frequency Allocations for the 9625.5 - 9794.5 MHz band and over portions of its operating range for the 265.5 - 434.5 MHz band.
3. Based on the information provided,
 - a. the equipment complies with the requirements of the NTIA Manual Section 5.2.
 - b. the equipment complies with the requirements of the NTIA Manual Section 5.5 (RSEC) Criteria C for the 265.5 - 434.5 MHz band.
 - c. the equipment complies with the requirements of MIL-STD-469A Criteria C, Category 1 for the 265.5 - 434.5 MHz band.
 - d. the equipment complies with the requirements of the NTIA Manual Section 5.5 (RSEC) Criteria B for the 9625.5 - 9794.5 MHz band.

Steering Member ESG Working Group MCEB Frequency Panel	Signature 	Date NOV 5 2003	IRAC/SPS Number Doc. 33267/1 SPS-13976	Page 1 of 2
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Downgrading Instructions Classified by: Declassify on:	NA	Distribution J-12 Holders	MCEB J-12 Number J/F 12/7417/3
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MCEB GUIDANCE CONTINUATION PAGE	Equipment Geographic Synthetic Aperture Radar (GeoSAR)		
Section 3: MCEB GUIDANCE (continued)			
e. the equipment complies with the requirements of MIL-STD-469A Criteria B, Category 1 for the 9625.5 - 9794.5 MHz band. f. the equipment does not comply the transmitter 2nd harmonic level and spurious emissions requirements of MIL-STD-461E for the 265.5 - 434.5 MHz band. g. the equipment does not comply with the requirements of MIL-STD-461E for the 9625.5 - 9794.5 MHz band. 4. Continued compliance with the provisions of the standards cited in paragraphs 3a, 3b and 3d above, is mandatory. 5. Frequency assignment request(s) must be submitted using Standard Frequency Action Format (SFAF), and coordinated in accordance with ACP-190 US SUPP-1(C), Guide to Frequency Planning, prior to activation. 6. Coordination with the NTIA Spectrum Planning Subcommittee has been accomplished. 7. Operations of the GeoSAR in the band 265.5 - 434.5 MHz must not exceed a pulse repetition rate of 500 pulses per second. 8. The bands 328.6 - 335.4 MHz, and 400 - 420 MHz must be notched by a minimum of 40 dB. 9. Operations must be 29,000 feet above the mean terrain when transmitting in the band 265.5 - 434.5 MHz. 10. Army and Air Force limit missions not to exceed two separate geographical areas per month. 11. All operations of the GeoSAR must be coordinated at least 30 days prior to each flight with the NTIA, Commerce, FAA, DoE, Homeland Security, Justice, Interior, Veterans Affairs, Air Force, Coast Guard, and Treasury. As part of the coordination, the Army or Air Force will supply the flight path of the GeoSAR aircraft, the specific areas where the GeoSAR radar will be turned on and off, and a local mission stop-point of contact.			
	<table border="1"><tr><td data-bbox="1040 1780 1222 1837"> Page 2 of 2 </td><td data-bbox="1222 1780 1497 1837"> MCEB J-12 Number J/F 12/7417/3 </td></tr></table>	Page 2 of 2	MCEB J-12 Number J/F 12/7417/3
Page 2 of 2	MCEB J-12 Number J/F 12/7417/3		

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APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION UNCLASSIFIED	DATE 10/06/2003	J/F 12/07417/2
			Page 1 of 11 Pages
DOD GENERAL INFORMATION			
TO USMCEB		FROM Office of the Army Spectrum Manager Submitted By: (National Imagery and Mapping Agency ATTN: NIMA ATTM)	
1. APPLICATION TITLE (U) Geographic Synthetic Aperture Radar (GeoSAR)			
2. SYSTEM NOMENCLATURE (U) Geographic Synthetic Aperture Radar (GeoSAR)			
3. STAGE OF ALLOCATION (U) ☐ a. STAGE 1 CONCEPTUAL ☐ b. STAGE 2 EXPERIMENTAL ☐ c. STAGE 3 DEVELOPMENTAL ☒ d. STAGE 4 OPERATIONAL			
4. FREQUENCY REQUIREMENTS a. FREQUENCY(IES) (U) 265.5 MHz - 434.5 MHz 9625.5 MHz - 9794.5 MHz b. EMISSION DESIGNATORS (U) 169MQ3N			
5. TARGET STARTING DATE FOR SUBSEQUENT STAGES			
a. STAGE 2 (U) NA		b. STAGE 3 (U) NA	
		c. STAGE 4 (U) NA	
6. EXTENT OF USE (U) Intermittent			
7. GEOGRAPHICAL AREA FOR			
a. STAGE 2 (U) NA			
b. STAGE 3 (U) NA			
c. STAGE 4 (U) US&P			
8. NUMBER OF UNITS			
a. STAGE 2 (U) NA		b. STAGE 3 (U) NA	
		c. STAGE 4 (U) 1	
9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT (U) 1			
10. OTHER J/F 12 APPLICATION ID(S) TO BE (U) ☒ a. SUPERSEDED J/F 12/7417 ☐ b. RELATED		11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11? (U) ☐ a. YES ☒ b. NO ☐ c. NAVAIL	
12. NAMES AND TELEPHONE NUMBERS (U)			
a. PROGRAM MANAGER Dr. Thomas Carson		(1) COMMERCIAL 703-735-3029	(2) DSN NA
b. PROJECT ENGINEER James J. Reis		(1) COMMERCIAL 559-248-1680	(2) DSN NA
13. REMARKS (U) Item 12b: extension 105			
DOWNGRADING INSTRUCTIONS			J/F 12/07417/2
			CLASSIFICATION UNCLASSIFIED

TRANSMITTER REMARK OVERFLOW PAGE

Item 21: The GEOSAR system can operate in either a vertically polarized or horizontally polarized mode.

The output amplifiers and antennas are integrated into the platform and cannot be operated separately. The provided harmonic levels are a combination of HPA attenuation and antenna out-of-band rejection.

	HPA	Antenna
2nd	-51 dB	23 dB
3rd	-69 dB	34 dB
other	-69 dB	34 dB

TRANSMITTER REMARK OVERFLOW PAGE

The output amplifiers and antennas are integrated into the platform and cannot be operated separately. The provided harmonic levels are a combination of HPA attenuation and antenna out-of-band rejection.

	HPA	Antenna
2nd	-31 dB	42 dB
3rd	-35 dB	40 dB
other	-35 dB	40 dB

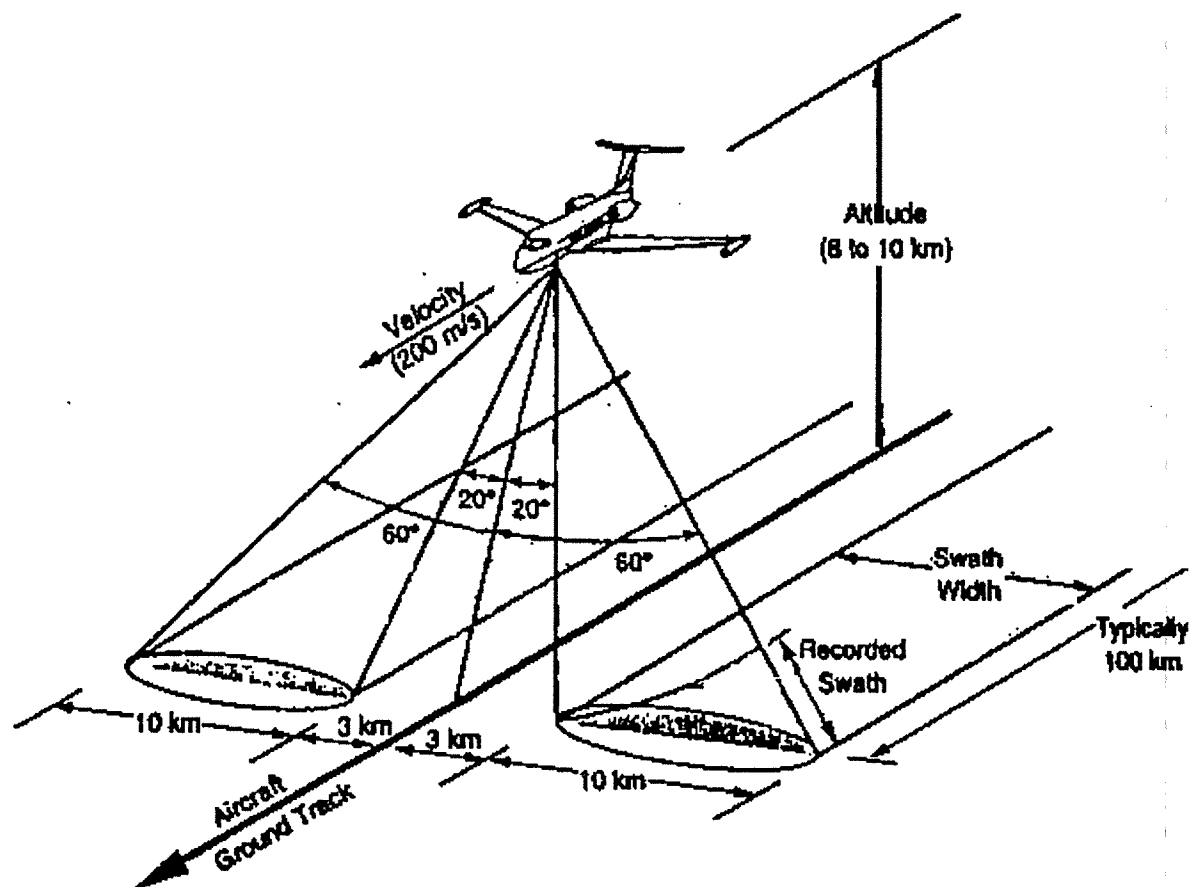
CLASSIFICATION UNCLASSIFIED				PAGE 6	
RECEIVER EQUIPMENT CHARACTERISTICS					
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. (U) GeoSAR UHF Receiver			2. MANUFACTURER'S NAME (U) Jet Propulsion Laboratory		
3. RECEIVER INSTALLATION (U) Gulfstream II Aircraft			4. RECEIVER TYPE (U) Single Conversion Superheterodyne		
5. TUNING RANGE (U) 265.5 MHz - 434.5 MHz			6. METHOD OF TUNING (U) Synthesizer		
7. RF CHANNELING CAPABILITY (U) (See Remarks)			8. EMISSION DESIGNATORS (U) 169MQ3N		
9. FREQUENCY TOLERANCE (U) 0.1 ppm			11. RF SELECTIVITY ☐ CALCULATED ☒ MEASURED		
10. IF SELECTIVITY		1st (U)	2nd (U)	3rd (U)	a. -3 dB (U) 219 MHz
a. -3 dB		181.5 MHz	NA	NA	b. -20 dB (U) 268 MHz
b. -20 dB		217 MHz			c. -60 dB (U) 431 MHz
c. -60 dB		355 MHz			d. Preselection Type (U) Band Pass Filter
12. IF FREQUENCY					13. MAXIMUM POST DETECTION FREQUENCY (U) 170 MHz
a. 1st (U) 90 MHz					14. MINIMUM POST DETECTION FREQUENCY (U) NA
b. 2nd (U) NA					16. MAXIMUM BIT RATE (U) NA
c. 3rd (U) NA					17. SENSITIVITY
15. OSCILLATOR TUNED		1st (U)	2nd (U)	3rd (U)	a. SENSITIVITY (U) -86 dBm
a. ABOVE TUNED FREQUENCY		X			b. CRITERIA (U) 2 dB SINAD
b. BELOW TUNED FREQUENCY					c. NOISE FIG (U) 5 dB
c. EITHER ABOVE OR BELOW THE FREQUENCY					d. NOISE TEMP (U) NA
18. DE-EMPHASIS (U) ☐ a. YES ☒ b. NO					20. SPURIOUS REJECTION (U) 60 dB
19. IMAGE REJECTION (U) 60 dB					
21. REMARKS (U) Items 5, 6 & 7: There is no provision for tuning or channeling per se; a digital synthesizer is employed to produce a 160 MHz linear sweep during pulse. Item 15: Local Oscillator radiation is -50 dBm. Item 17: A processing gain of 38 dB is obtained from the linear FM pulse compression.					
CLASSIFICATION UNCLASSIFIED				J/F 12/07417/2	

CLASSIFICATION UNCLASSIFIED				PAGE 7																	
RECEIVER EQUIPMENT CHARACTERISTICS																					
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. (U) GeoSAR X-Band Receiver			2. MANUFACTURER'S NAME (U) Jet Propulsion Laboratory																		
3. RECEIVER INSTALLATION (U) Gulfstream II Aircraft			4. RECEIVER TYPE (U) Dual Conversion Superheterodyne																		
5. TUNING RANGE (U) 9625.5 MHz - 9794.5 MHz			6. METHOD OF TUNING (U) Synthesizer																		
7. RF CHANNELING CAPABILITY (U) (See Remarks)			8. EMISSION DESIGNATORS (U) 169MQ3N																		
9. FREQUENCY TOLERANCE (U) 0.1 ppm			11. RF SELECTIVITY ☒ CALCULATED ☐ MEASURED																		
10. IF SELECTIVITY <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th></th> <th>1st (U)</th> <th>2nd (U)</th> <th>3rd (U)</th> </tr> </thead> <tbody> <tr> <td>a. -3 dB</td> <td>295 MHz</td> <td>181.5 MHz</td> <td>NA</td> </tr> <tr> <td>b. -20 dB</td> <td>522 MHz</td> <td>217 MHz</td> <td></td> </tr> <tr> <td>c. -60 dB</td> <td>775 MHz</td> <td>355 MHz</td> <td></td> </tr> </tbody> </table>				1st (U)	2nd (U)	3rd (U)	a. -3 dB	295 MHz	181.5 MHz	NA	b. -20 dB	522 MHz	217 MHz		c. -60 dB	775 MHz	355 MHz		a. -3 dB (U) 295 MHz b. -20 dB (U) 522 MHz c. -60 dB (U) 775 MHz d. Preselection Type (U) Band Pass Filter		
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c. -60 dB	775 MHz	355 MHz																			
12. IF FREQUENCY <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tbody> <tr> <td>a. 1st (U)</td> <td>350 MHz</td> </tr> <tr> <td>b. 2nd (U)</td> <td>90 MHz</td> </tr> <tr> <td>c. 3rd (U)</td> <td>NA</td> </tr> </tbody> </table>			a. 1st (U)	350 MHz	b. 2nd (U)	90 MHz	c. 3rd (U)	NA	13. MAXIMUM POST DETECTION FREQUENCY (U) 170 MHz												
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	1st (U)	2nd (U)	3rd (U)																		
a. ABOVE TUNED FREQUENCY		X																			
b. BELOW TUNED FREQUENCY	X																				
c. EITHER ABOVE OR BELOW THE FREQUENCY																					
			17. SENSITIVITY <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tbody> <tr> <td>a. SENSITIVITY (U)</td> <td>- 85 dBm</td> </tr> <tr> <td>b. CRITERIA (U)</td> <td>3 dB SINAD</td> </tr> <tr> <td>c. NOISE FIG (U)</td> <td>5 dB</td> </tr> <tr> <td>d. NOISE TEMP (U)</td> <td>NA</td> </tr> </tbody> </table>			a. SENSITIVITY (U)	- 85 dBm	b. CRITERIA (U)	3 dB SINAD	c. NOISE FIG (U)	5 dB	d. NOISE TEMP (U)	NA								
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21. REMARKS (U) Items 5, 6, & 7: There is no provision for tuning or channeling per se; a digital synthesizer is employed to produce a 160 MHz linear sweep during pulse. Item 10: The first IF is employed as a frequency translator. Item 15: Local Oscillator radiation is - 50 dBm. Item 17: A processing gain of 38 dB is obtained from the linear FM pulse compression.																					
CLASSIFICATION UNCLASSIFIED				J/F 12/07417/2																	

DD FORM 1494, MAY 91 S/N 0102-LF-001-4941

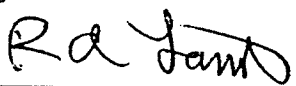
CLASSIFICATION UNCLASSIFIED		PAGE 9	
ANTENNA EQUIPMENT CHARACTERISTICS			
1. (U) ☐ a. TRANSMITTING ☐ b. RECEIVING ☒ c. TRANSMITTING AND RECEIVING			
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. (U) GeoSAR X-Band Antenna		3. MANUFACTURER'S NAME (U) Jet Propulsion Laboratory	
4. FREQUENCY RANGE (U) 9630 MHz - 9790 MHz		5. TYPE (U) Slotted Waveguide Array	
6. POLARIZATION (U) Vertical		7. SCAN CHARACTERISTICS a. TYPE (U) FIXED	
8. GAIN a. MAIN BEAM (U) 26.5 dBi		b. VERTICAL SCAN (U) NA (1) Max Elev (U) (2) Min Elev (U) (3) Scan Rate (U)	
b. 1st MAJOR SIDE LOBE (U) 6.5 dBi		c. HORIZONTAL SCAN (U) NA (1) Sector Scanned (U) (2) Scan Rate (U)	
9. BEAMWIDTH a. HORIZONTAL (U) 45 deg		d. SECTOR BLANKING (U) ☐ (1) YES ☒ (2) NO	
b. VERTICAL (U) 1.5 deg			
10. REMARKS (U) Item 8b: EL: -3.5 dBi @ ± 80° AZ: +6.5 dBi @ ± 2.3°			
CLASSIFICATION UNCLASSIFIED		J/F 12/07417/2	

Geographic Synthetic Aperture Radar (GeoSAR)



Geographic Synthetic Aperture Radar (GeoSAR)

APPLICATION FOR SPECTRUM REVIEW	CLASSIFICATION UNCLASSIFIED	PAGE 11
NTIA GENERAL INFORMATION		
1. APPLICATION TITLE (U) Geographic Synthetic Aperture Radar (GeoSAR)		
2. SYSTEM NOMENCLATURE (U) Geographic Synthetic Aperture Radar (GeoSAR)		
3. STAGE OF ALLOCATION (U) ☐ a. STAGE 1 CONCEPTUAL ☐ b. STAGE 2 EXPERIMENTAL ☐ c. STAGE 3 DEVELOPMENTAL ☒ d. STAGE 4 OPERATIONAL		
4. FREQUENCY REQUIREMENTS a. FREQUENCY(IES) (U) 265.5 MHz - 434.5 MHz - 9625.5 MHz - 9794.5 MHz b. EMISSION DESIGNATORS (U) 169MQ3N		
5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS (U) GeoSAR is a dual frequency, interferometric foliage penetration and terrain mapping airborne radar system. (WARTIME USE) ☒ a. YES ☐ b. NO		
6. INFORMATION TRANSFER REQUIREMENTS (U) None		
7. ESTIMATED INITIAL COST OF THE SYSTEM (U) \$70 million		
8. TARGET DATE FOR		
a. APPLICATION APPROVAL (U) 09/15/2003	b. SYSTEM ACTIVATION (U) 10/15/2003	c. SYSTEM TERMINATION (U) NAvail
9. SYSTEM RELATIONSHIP AND ESSENTIALITY (U) GeoSAR will provide a capability to map the ground surface through foliage in order to meet future DOD and other government agency mapping needs.		
10. REPLACEMENT INFORMATION (U) NA		
11. RELATED ANALYSIS AND/OR TEST DATA (U) Out-of-Band Justification and EMC/EMI (See Remarks)		
12. NUMBER OF MOBILE UNITS (U) 1		
13. GEOGRAPHICAL AREA FOR		
a. STAGE 2 (U) NA		
b. STAGE 3 (U) NA		
c. STAGE 4 (U) US&P		
14. LINE DIAGRAM (U) See Page(s) 10		15. SPACE SYSTEMS (U) See Page(s) NA
16. TYPE OF SERVICE(S) FOR STAGE 4 (U) Radiolocation		17. STATION CLASS(ES) FOR STAGE 4 (U) MR
18. REMARKS (U) Item 11: (cont.) Measurements are provided in SPS-12008, May 20, 1999; Measurements On GeoSAR Effects To An ILS Glide Slope Receiver As Performed By the JSC, January 2002; GeoSAR Spectrum Plot for the ILS Glide Slope, SPS-13935, August 22, 2003.		
DOWNGRADING INSTRUCTIONS		JIF 12/07417/2
		CLASSIFICATION UNCLASSIFIED

FORM NTIA-44 (3/91)		U.S. DEPARTMENT OF COMMERCE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION		Classification UNCLASSIFIED	Control Number SPS-13976 FAS-1287
CERTIFICATION OF SPECTRUM SUPPORT					
Recipient Agency Army		System Geographic Synthetic Aperture Radar (GeoSAR)			Stage of Review 4 – Operational
Section 1: OPERATING CHARACTERISTICS FOR WHICH SUPPORT IS CERTIFIED					
Frequency (MHz) 9625.5 - 9794.5 265.5-434.5	Emission 169M0Q3N	Peak Power 2 kW 1 kW	Station Class MR	Operating Location US&P	
Section 2: SOURCE DOCUMENTS					
Docket Number SPS-12298/2 SPS-13846 SPS-13881 SPS-13935 SPS-13963	Description of Document NTIA Certification of Spectrum Support, Stage 2 Army Request for Stage 4 System Review Army Additional Spectrum Data Additional Data NTIA Preliminary Assessment			Dated February 24, 2000 June 30, 2003 July 22, 2003 August 22, 2003 September 4, 2003	
Section 3: SPS RECOMMENDATIONS					
The Spectrum Planning Subcommittee has reviewed this system under the provisions of Chapter 10 of the NTIA Manual. The SPS recommends that: 1. NTIA certify operation of the GeoSAR only for US Army applications. 2. NTIA certify Stage 4 spectrum support for a single Geographic Synthetic Aperture Radar (GeoSAR) in the frequency bands listed in Section 1. 3. Army notch the bands 328.6-335.4 MHz and 400-420 MHz by a minimum of 40 dB. 4. Army not operate the GeoSAR with pulse repetition rates greater than 500 pulses per second when transmitting in the band 265.5-434.5 MHz. 5. Army not operate the GeoSAR below 29,000 feet altitude above the mean terrain when transmitting in the band 265.5-434.5 MHz. 6. Army coordinate all operations of the GeoSAR at least 30 days prior to each flight with the NTIA, Commerce, FAA, Energy, Homeland Security, Justice, Interior, Veterans Affairs, Air Force, Coast Guard, and Treasury. As part of the coordination, the Army shall supply the flight path of the GeoSAR aircraft, the specific areas where the GeoSAR radar will be turned on and off, and a local mission stop-point of contact. 7. Army limit missions not to exceed two separate geographical areas per month. 8. Army ensure that personnel are protected from radiation levels that exceed generally accepted exposure criteria.					
Name/Title of Recommending Official Richard A. Lancaster, Chairman Spectrum Planning Subcommittee		Signature 		Date SEP 29 2003	
Section 4: NTIA VERIFICATION					
The Office of Spectrum Management certifies Stage 4 spectrum support for this system. This office concurs with the SPS recommendations in Section 3.					
Name/Title of Certifying Official Karl B. Nebbia Deputy Associate Administrator		Signature 		Date SEP 29 2003	
Downgrading Instructions			Classification UNCLASSIFIED	Distribution IRAC, SPS, FAS	