


APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:  
Palo Alto Dishes STA

1. Applicant

**Name:** BlackSky Global, LLC      **Phone Number:** 206-399-2325  
**DBA Name:**      **Fax Number:**      **E-Mail:** khloptsidis@SpaceflightIndustries.com  
**Street:** 1505 Westlake Ave. North, Ste 600  
**City:** Seattle      **State:** WA  
**Country:** USA      **Zipcode:** 98109  
**Attention:** Ms Kristina Hloptsidis

File # SES-STA-20191104-01409  
Call Sign            Grant Date 11-13-19  
(or other identifier)  
From: 11-15-19 To: 12-15-19  
Approved: [Signature]

 **GRANTED**  
International Bureau

<b>2. Contact</b>			
<b>Name:</b>	Jonathan L. Wiener	<b>Phone Number:</b>	703-216-9224
<b>Company:</b>	Goldberg, Godles, Wiener & Wright LLP	<b>Fax Number:</b>	
<b>Street:</b>	1025 Connecticut Ave, NW Ste 1000	<b>E-Mail:</b>	jwiener@g2w2.com
<b>City:</b>	Washington	<b>State:</b>	
<b>Country:</b>	USA	<b>Zipcode:</b>	20036 -
<b>Attention:</b>		<b>Relationship:</b>	Legal Counsel
(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)			
3. Reference File Number or Submission ID			
4a. Is a fee submitted with this application?			
<input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).			
<input type="radio"/> Governmental Entity <input type="radio"/> Noncommercial educational licensee			
<input type="radio"/> Other (please explain):			
4b. Fee Classification CGX - Fixed Satellite Transmit/Receive Earth Station			
5. Type Request			
<input type="radio"/> Use Prior to Grant <input type="radio"/> Change Station Location <input checked="" type="radio"/> Other			
6. Requested Use Prior Date			

7. City/Palo Alto	8. Latitude (dd mm ss.s h) 37 24 10.9 N
9. State CA	10. Longitude (dd mm ss.s h) 112 10 26.7 W
11. Please supply any need attachments.	
Attachment 1: Attachment 1 redacted	Attachment 2: Attachment 2 & 3
Attachment 3: Attachment 4	
12. Description. (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.) Special Temporary Authority to communicate with BlackSky's Global satellite constellation from two earth stations located in Palo Alto, CA	
13. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application"; party to the application; for these purposes.	
14. Name of Person Signing Nick Merski	15. Title of Person Signing VP, Space Operations
WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).	

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**THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.**

Applicant: BlackSky Global, LLC  
Call Sign: No Call Sign  
File Number: SES-STA-20191104-01409  
Special Temporary Authority ("STA")



File # SES-STA-20191104-01409  
Call Sign \_\_\_\_\_ Grant Date 11-13-19  
(or other identifier)  
From: 11-15-19 Term Dates To: 12-15-19  
Approved: [Signature]

BlackSky Global, LLC. ("BlackSky") is granted STA, for 30 days beginning November 15, 2019, to operate the 18-m and 45-m fixed earth station antennas located in Palo Alto, CA at geographic coordinates 37°24'10.9"N, 122°10'26.7"W and 37°24'30.9"N, 122°10'46.6"W, respectively, to provide telemetry, tracking and command functions ("TT&C") to the BlackSky's Global-3 non-geostationary orbit ("NGSO") satellite in the frequency bands: 450.177875-450.222125 MHz (Earth-to-space) and 401.477875-401.522125 MHz (space-to-Earth) under the following conditions:

1. Operations may not exceed the operational power levels and parameters requested and coordinated.
2. TT&C earth station only will be operated on a secondary status earth station.
3. Minimum antenna elevation angle for all operations must be at least 5° above the geographic horizon.
4. Operations by BlackSky, shall not cause harmful interference to, and shall not claim protection from interference caused to it by any other lawfully operating station and BlackSky shall cease transmission(s) immediately upon notice of such interference and notify the FCC in writing.
5. Any action taken or expense incurred as a result of operations pursuant to this STA is solely at BlackSky's risk.
6. Grant of this authorization is without prejudice to any determination that the Commission may make regarding any pending or future application filed by BlackSky.
7. Transmitter(s) must be turned off during antenna maintenance to ensure compliance with the FCC-specified safety guidelines for human exposure to radiofrequency radiation in the region between the antenna feed and the reflector. Appropriate measures must also be taken to restrict access to other regions in which the earth station's power flux density levels exceed the specified guidelines.
8. The licensee shall take all necessary measures to ensure that the antennas do not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. The FCC's OET Bulletin 65 (available on-line at [www.fcc.gov/oet/rfsafety](http://www.fcc.gov/oet/rfsafety)) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers.

9. Current 24/7 contact information for the operations: Javier Guzman, phone: 954-636-0147.

10. BlackSky Global shall coordinate transmission from the earth station antennas with the following broadcast auxiliary remote pickup licensee, RADIO LICENSE HOLDINGS LLC, Call Sign WZZ799, that is authorized on 450.2125MHz within the vicinity of the earth station.

<b>Call Sign/Lease ID</b>	<b>Name</b>	<b>FRN</b>	<b>Radio Service</b>	<b>Status</b>	<b>Expiration Date</b>
<u>WZZ799</u>	RADIO LICENSE HOLDINGS LLC	0023190655	RP	Active	12/01/2021

This action is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective immediately.

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**REQUEST FOR CONFIDENTIAL TREATMENT**

November 4, 2019

**ELECTRONIC FILING VIA IBFS**

Ms. Marlene H. Dortch, Secretary  
Federal Communications Commission  
Office of the Secretary  
445 12th Street, S.W.  
Washington, D.C. 20554

Re: BlackSky Global LLC; Request for  
Special Temporary Authority to Operate  
Two Earth Station Antennas in Palo Alto, CA

Dear Ms. Dortch:

BlackSky Global LLC ("BlackSky") has filed an application for special temporary authority (the "STA Request") to use two earth station antennas - each located at the facilities of SRI International ("SRI") in Palo Alto, California - to attempt to remedy anomalous operational circumstances impacting BlackSky's Global-3 satellite. In that connection, BlackSky has submitted to the Commission's public file a redacted copy of the Narrative that accompanies that STA Request. BlackSky is delivering a non-redacted copy of the Narrative to the Commission separately on a confidential basis.

Pursuant to Sections 0.457(d) and 0.459 of the Commission's rules and Exemption 4 of the Freedom of Information Act ("FOIA"), 5 U.S.C. § 552(b)(4), BlackSky hereby requests confidential treatment for the information that has been redacted from the public copy of the Narrative.

**I. THE REDACTED INFORMATION CONTAINS COMMERCIAL OR FINANCIAL INFORMATION AND TRADE SECRETS THAT ARE ENTITLED TO PROTECTION UNDER FOIA EXEMPTION 4 AND PARALLEL COMMISSION RULES.**

FOIA Exemption 4 and Section 0.457(d) of the Commission's rules allow protection from disclosure for "trade secrets and commercial or financial information obtained from a person and privileged or confidential." The information redacted from the public copy of the Narrative falls squarely within this definition.

The redacted information all of which relate to the conditions of Global-3 giving rise to the STA Request is commercially sensitive and confidential. Access to this information is limited to BlackSky and SRI personnel who have a need to know such information in the performance of their duties. BlackSky has also provided relevant information to other federal government agency personnel on a confidential basis.

**II. DISCLOSURE OF THE REDACTED INFORMATION WOULD CAUSE BLACKSKY COMPETITIVE HARM.**

The Commission has recognized that it should not require the public disclosure of information that might put a regulated entity at a competitive disadvantage.<sup>1</sup> That policy clearly applies in the present circumstances.

BlackSky operates in a highly competitive environment. The release of the confidential information that has been redacted would give BlackSky's competitors an unfair competitive edge by revealing operational concerns regarding one of BlackSky's satellites. Such a release could, among other things, dissuade potential customers of BlackSky from employing its services.

**III. A BALANCING OF INTERESTS FAVORS NON-DISCLOSURE OF THE REDACTED INFORMATION.**

The nature of the circumstances confronting BlackSky, while informative to the Commission, is not be a matter that should be of material significance to the public examination of BlackSky's legal or technical qualifications for the use of SRI's earth station antennas. Among other things, all technical information regarding BlackSky's proposed operations as would ordinarily appear in an application for regular earth

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<sup>1</sup> See, e.g., *Examination of Current Policy Concerning the Treatment of Confidential Information Submitted to the Commission*, 13 FCC Rcd 24816, 24822 (1998).



station licensing authority is provided in unredacted form. Conversely, revealing such information would cause competitive injury to BlackSky.

Given these circumstances, “a balancing of the interests favoring disclosure and non-disclosure”<sup>2</sup> weighs heavily in favor of allowing non-disclosure of the information that has been redacted. The Commission has made clear that in balancing such interests, it is “sensitive to ensuring that the fulfillment of its regulatory responsibilities does not result in the unnecessary disclosure of information that might put its regulatees at a competitive disadvantage.”<sup>3</sup> BlackSky urges that this policy apply in this case.

#### IV. CONCLUSION

For the reasons stated herein, BlackSky requests that the Commission withhold from public inspection the information that has been redacted from its STA Request. If its request is not granted, BlackSky asks that all non-public materials be returned to it.

Respectfully submitted,

/s/  
Henry Goldberg  
Jonathan Wiener  
*Counsel for BlackSky Global LLC*

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<sup>2</sup> *Id.*

<sup>3</sup> *Id.*

NARRATIVE

BlackSky Global, LLC (“BlackSky”), pursuant to Section 25.120 of the Commission’s rules,<sup>1</sup> hereby requests Special Temporary Authority (“STA”) to operate two earth stations - each located at the facilities of SRI International (“SRI”) in Palo Alto, California - [REDACTED] with BlackSky’s non-geostationary orbit (“NGSO”) Earth Exploration Satellite Service satellite, Global-3. BlackSky seeks an STA for the 30-day period beginning on November 15, 2019. The technical specifications for these operations are set forth in Attachment 2 hereto, which provide the information that would be appear in Schedule B of FCC Form 312, if regular authority were being sought. Expedited action on this matter is requested to allow BlackSky to respond to the emergency conditions described below.

**I. Underlying Circumstances and Proposed Operations**

BlackSky’s Global-3 is currently a degraded satellite. [REDACTED]

[REDACTED]

Timing is critical. The cyclical nature of Global-3’s orbit results in limited opportunities and short periods of access during daylight hours when solar power will be strongest. [REDACTED]

[REDACTED]

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<sup>1</sup> 47 CFR § 25.120.

[REDACTED]  
[REDACTED] BlackSky seeks STA authority to use two of SRI's earth station antennas. These antennas have different features each of which BlackSky would like to employ [REDACTED]

[REDACTED] The 60-foot antenna located at the earth station is more agile and better able to track a low earth orbit spacecraft while the 150-foot antenna located at the earth station has the higher gain of the two. BlackSky's proposed operation would be on transmit and receive UHF frequencies (401.5 MHz or 401.375 MHz (space-to-Earth) and 449.75-450.25 MHz (Earth-to-space) (center carrier frequency at 450.2 MHz) for which Global-3 is licensed.

BlackSky will control all transmissions from the earth stations to Global-3 while SRI will be responsible for the operation and direction of the antenna.

## **II. SRI's Earth Station Facilities Have Been Previously Approved by the Commission on an Experimental Basis for Operation on the Same Frequencies Requested for Use.**

The SRI 150-foot antenna is already licensed by the Commission for use by Blue Canyon Technologies ("Blue Canyon")<sup>2</sup> under an experimental license for the same UHF transmit frequency band that would be employed by BlackSky. BlackSky understands that the 150 foot antenna is also used from time to time for federal government operations..

The SRI 60 foot antenna is currently licensed by the Commission to SRI under an experimental license for the use of different frequencies than would be employed by BlackSky. Although the UHF frequencies on the 60 foot antenna are not the subject of a current Commission license, the use of that antenna on the frequencies sought to be employed by BlackSky was previously authorized under experimental licenses granted

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<sup>2</sup> See Blue Canyon Technologies, FCC Callsign WJ2XAU, File No. 0238-EM-CM-2018, issued Feb 11, 2019.

to Planet Labs<sup>3</sup> and more recently for use by BlackSky under an experimental license for its earlier Pathfinder program.<sup>4</sup>

Under these circumstances, FAA notification is not required because the earth stations to be employed are already built and operating under other FCC licenses and no new construction is proposed. The frequencies to be used by BlackSky for transmission have also already been licensed by the Commission from these locations and are also used from time to time for U.S. government operations. In addition, from information supplied to BlackSky by SRI: the 150-foot antenna, known locally as the “Big Dish” was built more than 50 years ago, has long been used by pilots as a visual landmark, and is fitted with red beacon lights; the 60-foot antenna is about 40 years old and is also effectively shielded by the 150 foot antenna in the same SRI earth station complex.

BlackSky will coordinate its operations on both of the 150 foot and 60 foot antenna through SRI to ensure there is no conflict in usage, including allowing full priority for any required federal operation of the facilities. In all events, as to the use of each antenna, BlackSky will operate on a non-interference basis.

### **III. Conclusion**

Accordingly, for good cause as shown herein, BlackSky requests that the Commission grant BlackSky’s STA request.

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<sup>3</sup> See Planet Labs Inc, FCC Callsigns WF9XKA, WG2XFY, WG2XKW, WG2XKX.

<sup>4</sup> See BlackSky Global, LLC, FCC Callsign WH2XPS, 0339-EX-RR-2016.

### Technical and Operational Description

<b>E1. Site Identifier:</b>	SRI 60 Foot Diameter Parabolic Reflector
<b>E2. Contact Name:</b>	Javier Guzman
<b>E3. Street Address or Area of Operation:</b>	Stanford University Foothills
<b>E4. State:</b>	CA
<b>E5. Call Sign:</b>	N/A
<b>E6. Phone Number:</b>	954-636-0147
<b>E7. City:</b>	Palo Alto
<b>E8. Country:</b>	United States
<b>E9. Zip Code:</b>	94305
<b>E11. Latitude:</b>	37° 24' 10.9" N
<b>E12. Longitude:</b>	122° 10' 26.7" W
<b>E13. Lat/Long Coordinates are:</b>	NAD 83
<b>E14. Site Elevation (AMSL):</b>	146 Meters

<b>E15.</b> If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide as a technical analysis showing compliance with two-degree spacing policy.	N/A
<b>E16.</b> If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	N/A
<b>E17.</b> Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	No
<b>E18.</b> Is frequency coordination required? If YES, attach a frequency coordination report.	No
<b>E19.</b> Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours	N/A
<b>E20.</b> FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	N/A

**POINTS OF COMMUNICATION**

Satellite Name	
E21. Common Name:	
E22. ITU Name:	
E23. Orbit Location:	NGSO
E24. Country:	United States

**POINTS OF COMMUNICATION (Destination Points)**

E25. Site Identifier	
E26. Common Name	
E27. Country	United States

**ANTENNA**

Site ID	E.28. Antenna ID	E29. Quantity	E30. Manufacturer	E31. Model	E32 Antenna Size (m)	E41/42. Antenna Gain Transmit or Receive (__dBi at __GHz)
531	SRI 60' parabolic dish	1	SRI International	SRI 60'	18m	35.5dBi at 0.4502GHz

E.28. Antenna ID	E33/34. Diameter Minor/Major (m)	E35. Above Ground Level (m)	E36. Above Sea Level (m)	E37. Building Height Above Ground Level (m)	E38. Max Total Input Power at Antenna Flange (W)	E39. Maximum Antenna Height Above Rooftop (m)	E40. Total EIRP for all Carriers (dBW)
SRI 60' parabolic dish	18m	24m	146m	N/A	20	N/A	48.5

**FREQUENCY**

E28. Antenna ID	E 43/44. Frequency Band (MHz)	E45. T/R Mode	E46. Antenna Pol (H, V, L, R)	E47. Emission Designator	E48. Max EIRP per Carrier (dBW)	E49. Max EIRP Density per Carrier (dBW/4KHz)	E50. Modulation and Services
SRI 60' Dish	450.177875 -- 450.222125	T	R	30K0F1D	48.5	41.5	GMSK, data
SRI 60' Dish	401.477875 -- 401.522125 (TT&C downlink)	R	L, R	30K0F1D	n/a	n/a	GMSK, data
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**FREQUENCY COORDINATION**

E28. Antenna ID	E 51. Satellite Orbit Type	E52/53. Frequency Limits (MHz)	E454/55 Range of Satellite Arc Eastern/Western Limit	E56. Earth Station Az. Angle Eastern Limit	E57. Earth Station Elevation Angle Lower Limit	E58. Earth Station Az. Angle Western Limit	E59. Earth Station Elevation Angle Upper Limit	E60. Max EIRP Density toward the Horizon (dBW/4KHz)
SRI 60' Dish	NGSO	450.177875 -- 450.222125	0.0/0.0	0.0°	6.0°	360°	85.0°	9.5
SRI 60' Dish	NGSO	401.477875 -- 401.522125 (TT&C downlink)	0.0/0.0	0.0°	6.0°	360°	85.0°	n/a

### Technical and Operational Description

<b>E1. Site Identifier:</b>	SRI 150 Foot Diameter Parabolic Reflector
<b>E2. Contact Name:</b>	Javier Guzman
<b>E3. Street Address or Area of Operation:</b>	Stanford University Foothills
<b>E4. State:</b>	California
<b>E5. Call Sign:</b>	N/A
<b>E6. Phone Number:</b>	954-636-0147
<b>E7. City:</b>	Palo Alto
<b>E8. Country:</b>	United States
<b>E9. Zip Code:</b>	94305
<b>E11. Latitude:</b>	37° 24' 30.9" N
<b>E12. Longitude:</b>	122° 10' 46.6" W
<b>E13. Lat/Long Coordinates are:</b>	NAD 83
<b>E14. Site Elevation (AMSL):</b>	152 Meters

<b>E15.</b> If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide as a technical analysis showing compliance with two-degree spacing policy.	N/A
<b>E16.</b> If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	N/A
<b>E17.</b> Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	No
<b>E18.</b> Is frequency coordination required? If YES, attach a frequency coordination report.	No
<b>E19.</b> Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours	N/A
<b>E20.</b> FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	N/A



**POINTS OF COMMUNICATION**

Satellite Name	
E21. Common Name:	
E22. ITU Name:	
E23. Orbit Location:	NGSO
E24. Country:	United States

**POINTS OF COMMUNICATION (Destination Points)**

E25. Site Identifier	
E26. Common Name	
E27. Country	United States

**ANTENNA**

Site ID	E.28. Antenna ID	E29. Quantity	E30. Manufacturer	E31. Model	E32 Antenna Size (m)	E41/42. Antenna Gain Transmit or Receive (__dBi at __GHz)
522	SRI 150' parabolic dish	1	SRI International	SRI 150'	45m	43dBi at 0.4502GHz

E.28. Antenna ID	E33/34. Diameter Minor/Major (m)	E35. Above Ground Level (m)	E36. Above Sea Level (m)	E37. Building Height Above Ground Level (m)	E38. Max Total Input Power at Antenna Flange (W)	E39. Maximum Antenna Height Above Rooftop (m)	E40. Total EIRP for all Carriers (dBW)
SRI 150' parabolic dish	45m	55m	152m	1.5m	20	45m	56

**FREQUENCY**

E28. Antenna ID	E 43/44. Frequency Band (MHz)	E45. T/R Mode	E46. Antenna Pol (H, V, L, R)	E47. Emission Designator	E48. Max EIRP per Carrier (dBW)	E49. Max EIRP Density per Carrier (dBW/4KHz)	E50. Modulation and Services
SRI 150' Dish	450.177875 -- 450.222125	T	R	30K0F1D	56	49	GMSK, data
SRI 150' Dish	401.477875 – 401.522125 (TT&C downlink)	R	L, R	30K0F1D	n/a	n/a	GMSK, data

**FREQUENCY COORDINATION**

E28. Antenna ID	E 51. Satellite Orbit Type	E52/53. Frequency Limits (MHz)	E454/55 Range of Satellite Arc Eastern/Western Limit	E56. Earth Station Az. Angle Eastern Limit	E57. Earth Station Elevation Angle Lower Limit	E58. Earth Station Az. Angle Western Limit	E59. Earth Station Elevation Angle Upper Limit	E60. Max EIRP Density toward the Horizon (dBW/4KHz)
SRI 150' Dish	NGSO	450.177875 -- 450.222125	0.0/0.0	0.0°	5.0°	360°	85.0°	14
SRI 150' Dish	NGSO	401.477875 – 401.522125 (TT&C downlink)	0.0/0.0	0.0°	5.0°	360°	85.0°	n/a

**RADIATION HAZARD STUDY  
FOR 60' AND 150' DISHES IN PALO ALTO, CA**

The FCC adopted new guidelines and procedures in 1996 for evaluating environmental effects of radio frequency (RF) emissions. In order to provide assistance in determining whether proposed or existing transmitting facilities comply with the new guidelines, the FCC Office of Engineering and Technology revised OET Bulletin 65. The revised version updates limits for Maximum Permissible Exposure (MPE) in terms of electric and magnetic field strength and power density for transmitters operating at frequencies between 300 kHz and 100 GHz. This bulletin was adopted by the FCC in their General Docket No. 97-303 on August 25, 1997. In order to comply with the requirements of the Report and Order, calculations to determine the power flux densities in the far field, near field, and reflector regions of the earth station antenna have been made and are contained in this study.

The FCC guidelines incorporate two separate tiers of exposure limits that are dependent on the situation in which the exposure takes place and the status of the individuals who are subject to exposure. The earth station transmitting equipment and antenna are located within a controlled area and not accessible to the general public. Entry is restricted to employees who have been made fully aware of the potential for human exposure and can exercise control over their exposure. Therefore occupational / controlled exposure maximum power density limits are used in this study.

The FCC Office of Engineering and Technology suggests a method for calculating the maximum values of the power densities emanating from an aperture antenna in OET bulletin 65. This method is used to determine the power densities associated with the 60' and 150' satellite antennae as follows:

Main

Parameter	Symbol	Formula	Value	Units	Notes
Dish Diameter	D	Input	18	m	
Dish Surface Area	A_surface	$\pi * D^2 / 4$	254.469004941	M <sup>2</sup>	
Frequency	F	Input	450.2	MHz	
Wavelength	lambda	300/F	0.666370502	m	
Transmit Power	P	Input	20	W	
Max Antenna Gain (dBi)	G_max	Input	35.5	dBi	
Off-axis Antenna Gain (dBi)	G_es	Input	3.5	dBi	Per SRI, off-axis gain is 32 dB down at horizon when dish at lowest elevation (6 degrees)
Off-axis Antenna Gain (factor)	G	$10^{(G\_es/10)}$	2.23872113857	n/a	
Effective Aperture	A_e	$G * \text{lambda}^2 / 4 / \pi$	0.07910822937	M <sup>2</sup>	See Eq. 14 in FCC OET Bulletin 65
Pi	pi	Constant	3.14159265359	n/a	
Off-axis Antenna Efficiency (approximate)	eta	A_e / A_surface	0.0003108757	n/a	See Eq. 14 in FCC OET Bulletin 65
Far Field Range	R_ff	$.6D^2/\text{lambda}$	291.7296	m	See Eq. 16 in FCC OET Bulletin 65
Off-axis Power Density in Far Field	S_ff	$G^2 P / (4 * \pi^2 * R\_ff^2)$	4.1865775E-05	W/m <sup>2</sup>	See Eq. 18 in FCC OET Bulletin 65
			4.1865775E-06	mW/cm <sup>2</sup>	
Near Field Range	R_nf	$D^2 / (4 * \text{lambda})$	121.554	m	See Eq. 12 in FCC OET Bulletin 65
Max Off-axis Power Density in Near Field	S_nf	$16 * \text{eta} * P / (\pi * D^2)$	9.7733144E-05	W/m <sup>2</sup>	See Eq. 13 in FCC OET Bulletin 65
			9.7733144E-06	mW/cm <sup>2</sup>	
Transition Region Range	R_t	assumed to be R_nf	121.554		
Max Transition Region Power Density	S_tz	$S\_nf * R\_nf / R\_t$	9.7733144E-05	W/m <sup>2</sup>	See Eq. 16 in FCC OET Bulletin 65
			9.7733144E-06	mW/cm <sup>2</sup>	
Power Density between Antenna and Ground	S_g	$4 * P / A\_surface$	0.3143801345	W/m <sup>2</sup>	See Eq. 11 in FCC OET Bulletin 65
			0.03143801345	mW/cm <sup>2</sup>	

Limits for General Population/Uncontrolled Exposure (MPE)	
Frequency Range (MHz)	Power Density (mW/cm <sup>2</sup> )
30-300	0.2
300-1000	0.0011333333
1000-10000	1
Limits for Occupational/Controlled Exposure (MPE)	
Frequency Range (MHz)	Power Density (mW/cm <sup>2</sup> )
30-300	1
300-1000	1.5006666667

Summary					
Expected Radiation levels for Uncontrolled Environment					
Region	Symbol	Value	Limit	Hazard Assessment	Notes
Far Field	S_ff	4.1865775336718E-06	0.30013333333	Satisfies FCC	Assumes person at antenna level; but dish several meters off ground so power densities actually lower. Applies to other regions as well.
Near Field	S_nf	9.77331435545065E-06	0.30013333333	Satisfies FCC	
Transition Region	S_tz	9.77331435545065E-06	0.30013333333	Satisfies FCC	
Between Antenna and Ground	S_g	0.031438013450249	0.30013333333	Satisfies FCC	
Expected Radiation levels for Controlled Environment					
Region	Symbol	Value	Limit	Hazard Assessment	Notes
Far Field	S_ff	4.1865775336718E-06	1.50066666667	Satisfies FCC	
Near Field	S_nf	9.77331435545065E-06	1.50066666667	Satisfies FCC	
Transition Region	S_tz	9.77331435545065E-06	1.50066666667	Satisfies FCC	
Between Antenna and Ground	S_g	0.031438013450249	1.50066666667	Satisfies FCC	

Results of this hazard study indicate that the antenna does not exceed the MPE limit for Occupational/ Controlled Exposure in the 300 – 1,500 MHz range for both controlled and uncontrolled regions of the antenna.

Based on this study of predicted radio frequency levels, the conclusion is that the operation of this satellite earth station meets OET Bulletin 65 maximum permissible exposure limits and that no harmful effects will occur to station personnel or anyone within proximity of the station. Whenever they are required to work on the radiating or reflecting parts of the antenna structure, the transmitter will be turned off.

Therefore, in accordance with 47 CFR § 1.1307 (b) of the Commission's Rules, preparation and submission of an Environmental Assessment (EA) is not required.

Main

Parameter	Symbol	Formula	Value	Units	Notes
Dish Diameter	D	Input	45.72	m	
Dish Surface Area	A_surface	$\pi * D^2 / 4$	1641.73223228	M^2	
Frequency	F	Input	450.2	MHz	
Wavelength	lambda	$300/F$	0.666370502	m	
Transmit Power	P	Input	20	W	
Max Antenna Gain (dBi)	G_max	Input	43	dBi	
Off-axis Antenna Gain (dBi)	G_es	Input	8	dBi	Per SRI, off-axis gain is 35 dB down at horizon when dish at lowest elevation (5 degrees)
Off-axis Antenna Gain (factor)	G	$10^{(G\_es/10)}$	6.3095734448	n/a	
Effective Aperture	A_e	$G * \text{lambda}^2 / 4 / \pi$	0.22295728338	M^2	See Eq. 14 in FCC OET Bulletin 65
Pi	pi	Constant	3.14159265359	n/a	
Off-axis Antenna Efficiency (approximate)	eta	$A_e / A\_surface$	0.00013580612	n/a	See Eq. 14 in FCC OET Bulletin 65
Far Field Range	R_ff	$.6D^2/\text{lambda}$	1882.12268736	m	See Eq. 16 in FCC OET Bulletin 65
Off-axis Power Density in Far Field	S_ff	$G^2P/(4*\pi*R\_ff^2)$	2.8348121E-06	W/m^2	See Eq. 18 in FCC OET Bulletin 65
			2.8348121E-07	mW/cm^2	
Near Field Range	R_nf	$D^2/(4*\text{lambda})$	784.2177864	m	See Eq. 12 in FCC OET Bulletin 65
Max Off-axis Power Density in Near Field	S_nf	$16 * \text{eta} * P / (\pi * D^2)$	6.6176989E-06	W/m^2	See Eq. 13 in FCC OET Bulletin 65
			6.6176989E-07	mW/cm^2	
Transition Region Range	R_t	assumed to be R_nf	784.2177864		
Max Transition Region Power Density	S_tz	$S\_nf * R\_nf / R\_t$	6.6176989E-06	W/m^2	See Eq. 16 in FCC OET Bulletin 65
			6.6176989E-07	mW/cm^2	
Power Density between Antenna and Ground	S_g	$4 * P/A\_surface$	0.04872901831	W/m^2	See Eq. 11 in FCC OET Bulletin 65
			0.00487290183	mW/cm^2	

Limits for Occupational/Uncontrolled Exposure (MPE)	
Frequency Range (MHz)	Power Density (W/m^2)
300 - 1,500	0.00487290183
Limits for Occupational/Controlled Exposure (MPE)	
Frequency Range (MHz)	Power Density (W/m^2)
300 - 1,500	1.50066666667

Summary					
Expected Radiation levels for Uncontrolled Environment					
Region	Symbol	Value	Limit	Hazard Assessment	Notes
Far Field	S_ff	2.83481206261804E-07	0.30013333333	Satisfies FCC	Assumes person at antenna level; but dish several meters off ground so power densities actually lower. Applies to other regions as well.
Near Field	S_nf	6.6176988730675E-07	0.30013333333	Satisfies FCC	
Transition Region	S_tz	6.61769887306749E-07	0.30013333333	Satisfies FCC	
Between Antenna and Ground	S_g	0.004872901830592	0.30013333333	Satisfies FCC	
Expected Radiation levels for Controlled Environment					
Region	Symbol	Value	Limit	Hazard Assessment	Notes
Far Field	S_ff	2.83481206261804E-07	1.50066666667	Satisfies FCC	
Near Field	S_nf	6.6176988730675E-07	1.50066666667	Satisfies FCC	
Transition Region	S_tz	6.61769887306749E-07	1.50066666667	Satisfies FCC	
Between Antenna and Ground	S_g	0.004872901830592	1.50066666667	Satisfies FCC	

Results of this hazard study indicate that the antenna does not exceed the MPE limit for Occupational/ Controlled Exposure in the 300 - 1,500 MHz range for both controlled and uncontrolled regions of the antenna.

Based on this study of predicted radio frequency levels, the conclusion is that the operation of this satellite earth station meets OET Bulletin 65 maximum permissible exposure limits and that no harmful effects will occur to station personnel or anyone within proximity of the station. Whenever they are required to work on the radiating or reflecting parts of the antenna structure, the transmitter will be turned off.

Therefore, in accordance with 47 CFR § 1.1307 (b) of the Commission's Rules, preparation and submission of an Environmental Assessment (EA) is not required.