Technical and Operational Description

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

E15. 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
E16. 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
E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	No
E18. Is frequency coordination required? If YES, attach a frequency coordination report.	No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours	N/A
E20. 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

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

E15. 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
E16. 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
E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	No
E18. Is frequency coordination required? If YES, attach a frequency coordination report.	No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours	N/A
E20. 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^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	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 * lambda ^ 2 / 4 / pi	0.07910822937	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	0.0003108757	n/a	See Eq. 14 in FCC OET Bulletin 65
Far Field Range	R_ff	.6D^2/lambda	291.7296	m	See Eq. 16 in FCC OET Bulletin 65
Off-axis Power Density in Far Field	S_ff	G*P/(4*pi*R_ff^2)	4.1865775E-05	W/m^2	See Eq. 18 in FCC OET Bulletin 65
			4.1865775E-06	mW/cm^2	
Near Field Range	R_nf	D^2/(4*lambda)	121.554	m	See Eq. 12 in FCC OET Bulletin 65
Max Off-axis Power Density in Near Field	S_nf	16 * eta * P / (pi * D ^ 2)	9.7733144E-05	W/m^2	See Eq. 13 in FCC OET Bulletin 65
			9.7733144E-06	mW/cm^2	
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^2	See Eq. 16 in FCC OET Bulletin 65
			9.7733144E-06	mW/cm^2	
Power Density between Antenna and Ground	S_g	4 * P/A_surface	0.3143801345	W/m^2	See Eq. 11 in FCC OET Bulletin 65
			0.03143801345	mW/cm^2	

Limits for General Population/Uncontrolled Exposure (MPE)			
Frequency Range (MHz)		Power Density (mW/cm^2)	
30-300		0.2	0.2
300-1500		Frequency(MHz) / 1500	0.30013333333
1500-100,000		1	1
Limits for Occupational/Controlled Exposure (MPE)			
Frequency Range (MHz)		Power Density (mW/cm^2)	
30-300		1	1
300-1500		Frequency(MHz) / 300	1.50066666667
1500-100,000		5	5

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 * 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/lambda	1882.12268736	m	See Eq. 16 in FCC OET Bulletin 65
Off-axis Power Density in Far Field	S_ff	G*P/(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*lambda)	784.2177864	m	See Eq. 12 in FCC OET Bulletin 65
Max Off-axis Power Density in Near Field	S_nf	16 * 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 General Population/Uncontrolled Exposure (MPE)			
Frequency Range (MHz)		Power Density (mW/cm^2)	
30-300		0.2	0.2
300-1500		Frequency(MHz) / 1500	0.30013333333
1500-100,000		1	1
Limits for Occupational/Controlled Exposure (MPE)			
Frequency Range (MHz)		Power Density (mW/cm^2)	
30-300		1	1
300-1500		Frequency(MHz) / 300	1.50066666667
1500-100,000		5	5

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.