



**U.S. Department
of Transportation**
Federal Aviation
Administration

FAA Form 7140-1, Notice of Proposed Outdoor Laser Operation(s)

Who Should Complete and Submit This Form

Any person, entity, or proponent who plans to conduct outdoor laser operations with a visible laser beam exceeding 50 nanowatts per square centimeter in navigable airspace or with any laser beam (visible or non-visible) that exceeds the maximum permissible exposure in navigable airspace. FAA encourages proponents to contact the applicable FAA service center for guidance.

Instructions to Complete

Consult FAA Advisory Circular (AC) 70-1 for detailed instructions to assist with completing and submitting this form. Refer to FAA Order JO 7400.2, Chapter 29 for additional background information. FAA provides public access to these documents via https://www.faa.gov/regulations_policies.

Please print or type on this form and complete all sections prior to submission to the appropriate FAA service center. To enhance clarity, use plain language and numbers, e.g., decimal notation (0.7277) instead of scientific notation (72.77×10^{-2} or 72.77E-02). Failure to provide all requested information may delay processing.

Paperwork Reduction Act Statement

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB control number. The OMB control number for this information collection is 2120-0662. Public reporting for this collection of information is estimated to be approximately 240 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing, and reviewing the collection of information.

The Federal Aviation Administration (FAA) requires all responses to this collection of information if the proponent wishes to obtain or retain benefits available per Title 21 Code of Federal Regulations Part 1010 if projecting into navigable airspace. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, Federal Aviation Administration, 10101 Hillwood Parkway, Fort Worth, TX 76177-1524.

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Notice of Proposed Outdoor Laser Operation(s)

1. General information

a. To (FAA Service Center) Western Service Center	b. From (Proponent) Elinor Gates Lick Observatory
c. Name of event or facility Lick Observatory, 120-inch Telescope	d. Date prepared 2025 Jan 13
e. Customer Same as proponent	f. Site address Lick Observatory, 120-inch Telescope Dome 7281 Mount Hamilton Road Mount Hamilton, CA 95140

2. Date(s) and time(s) of laser operation

a. Testing and alignment 4/15/2025 to 12/31/2025	b. Operation 3 to 7 nights per month
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3. Brief description of laser operation

The laser is part of an astronomical research adaptive optics system. A 12W (maximum average power) sodium D-line (589nm) laser, mounted on the 120-inch Shane telescope is used to create an artificial star at an altitude of 90kn for correction of atmospheric turbulence on images.

4. On-site operation information

a. Operator(s) Jeff Roark, Daren Dillon, Steven Rako, Nathan Woody		
b. On-site phone 1 (primary) 408-238-0652	c. On-site phone 2 (secondary) 408-238-0651	

5. FDA/CDRH information (if applicable)

a. Variance #	b. Variance expiration date	c. Accession #
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6. Brief description of control measures

Control measures consist of two visual plane spotters, stationed on the NW and SE sides of the 120-inch telescope dome with emergency kill switches for fast laser shutdown. A radar system (7.5 degree cone) is boresighted to the laser to shutter the laser when triggered for aircraft safety.

7. Attachments a. Number of laser configurations (state the total number of configurations and complete a Laser Configuration Worksheet (page 2) for each):

b. Attachments: List all attachments (example: maps, diagrams, control measure details, calculation details, or software printouts)


I. Laser Configuration Description

II. Control Measures

8. Designated contact person (if FAA requires further information)

a. Name Elinor Gates		b. Position Specialist	
c. Phone 408-238-9610	d. Fax N/A	e. E-mail egates@ucolick.org	

9. Statement of accuracy: To the best of my knowledge, the information provided in this form (all pages) and corresponding attachment(s) is accurate and correct

a. Name Elinor Gates	b. Signature 
c. Position Specialist	d. Date 1/13/2025

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Laser Configuration Worksheet

10. Configuration information			
a. Configuration number (example: 7 of 9): <u>1</u> of <u>1</u>			
b. Brief description of configuration Arete 589nm Laser beam expanded to 25cm. See Attachment I.			
11. Geographic location			
a. Site elevation, in feet mean sea level: <u>4219</u>		d. Information determined by: <input type="checkbox"/> GPS <input checked="" type="checkbox"/> Map (topo) <input type="checkbox"/> Other:	
b. Laser height above site elevation, in feet above ground level: <u>0</u>		e. Latitude: <u>37</u> degrees, <u>20</u> minutes, <u>34.931</u> seconds	
c. Overall laser elevation (a) + (b), in feet mean sea level: <u>4219</u>		f. Longitude: <u>-121</u> degrees, <u>38</u> minutes, <u>13.689</u> seconds	
12. Beam characteristics and calculations (check only one mode of operation and fill in only that column)			
Mode of Operation	<input type="checkbox"/> Single pulse	<input checked="" type="checkbox"/> Continuous wave	<input type="checkbox"/> Repetitively pulsed
a. Laser and beam characteristics			
Laser type (example: CO ₂ , diode, or Nd:YAG)	diode		
Laser hazard class (example: Class 2, Class 3B, Class 4)	Class 4		
Power Watts (W)	(not applicable)	(maximum power) 12	(average power)
Pulse energy Joules (J)	(not applicable)		
Pulse duration Seconds (s)	(not applicable)		
Pulse repetition frequency (PRF) Hertz (Hz)	(not applicable)		
Beam diameter at 1/e points Centimeters (cm)	25		
Beam divergence 1/e at full angle Milliradians (mrad)	0.002		
Wavelength(s) Nanometers (nm)	589		
b. Maximum permissible exposure (MPE) values (use this value to calculate the NOHD)			
MPE Milliwatts per square cm (mW/cm ²)	(not applicable)	2.6	
MPE per pulse Joules per square cm (J/cm ²)		(not applicable)	
c. Visual effect calculations			
The following items are for lasers with visible wavelengths (400 nm to 700 nm). If the laser has no visible wavelengths, enter "N/A (non-visible laser)" in all blocks.			
Pre-corrected power (PCP) Watts (W)	Pulse energy (J) x 4	Maximum power (W)	Pulse energy (J) x PRF (Hz)
		12	
Visual Correction Factor (VCF) Enter "1.0" or use FAA AC 70-1 Table 3		0.8696	
Visually Corrected Power See FAA AC 70-1		10.4	
13. Beam direction(s)			
a. Minimum elevation angle (degrees, where horizontal = 0 degrees)	45	c. Azimuth (degrees, least to greatest)	0 to 360 <input checked="" type="checkbox"/> True north or <input type="checkbox"/> Magnetic north
b. Maximum elevation angle (degrees, where vertical = 90 degrees)	90	d. Magnetic declination (degrees, if using magnetic north)	
14. Protection distances (fill in the entire NOHD row and the entire column for the applicable mode of operation)			
	Slant range (feet)	Horizontal distance (feet)	Vertical distance (feet)
a. NOHD (based on MPE value)		52775	
The following items are for lasers with visible wavelengths (400 nm to 700 nm). If the laser has no visible wavelengths, enter "N/A (non-visible laser)" in all blocks.			
b. SZED (for 100 µW/cm ²)		269100	
c. CZED (for 5 µW/cm ²)		1203452	
d. LFED (for 50 nW/cm ²)		12034515	
15. Calculation method <input checked="" type="checkbox"/> Commercial software (enter product name and version below) or <input type="checkbox"/> Other (describe method such as a spreadsheet or calculator below)			
Calculator			