Task Hazard Analysis (THA) Worksheet

(See ES&H Manual Chapter 3210 Appendix T1
Work Planning, Control, and Authorization Procedure)

THA must be accompanied by a LOSP

Author:	Marc McMullen	**Date: 10/20/2022**	
Task Title:	Operation of the DIRC 3B laser	**Task Location:**	EEL 108 DIRC laser lab

Engineering Control requirements:	**Administrative requirements:**	
Laser enclosure with interlocks for tooled housing. Interlocked Laser Controlled Area (LCA) for room with multiple laser hazards not inside a Class 1 enclosure.	Training: • SAF114O Laser Safety Orientation • MED02 Laser eye exam • Laser Specific Training for the DIRC Laser • SAF104 Lock, Tag, Try for service & maintenance	Postings/Labels/Warning systems: • LCA warning signs at entrance • Laser Class and aperture labels • Laser on indicator (yellow flashing light)

Laser Process	Potential Hazards Select hazard applicable to your LCA (delete non-applicable or add other hazard if not listed)	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2) Select control applicable to your LCA (delete non-applicable or add other mitigation if not listed)	Safety Procedures/ Practices/Controls/Training Select control applicable to your LCA (delete non-applicable or add other mitigation if not listed)	Risk Code (after mitigation)
OPERATIONS	Temporary or permanent eye damage	M	M	3	Standard operation (quartz crystal measurement) is done from outside LCA For alignment of components done inside LCA, the interlock system requires a filter to be positioned which reduces the laser power to less than MPE.	Engineered controls: Interlock system includes a sweep function latching switch inside the laser room to ensure the room has been verified clear for laser output Standard operation (data taking with laser on) is an automated process operated from outside the LCA Authorized admittance Required laser training Laser specific protective eyewear	1
	Specular reflection hazard	M	M	3	The LCA is a closed room with interlocked controls. Standard operations are done from outside the LCA. No exposure is possible due to the interlock system.	Engineered controls: interlock system includes a sweep function latching switch inside the laser room to ensure the room has been verified clear for laser output No jewelry, watches, portable electronics, or reflective clothing	1
	Exposure to high voltages (i.e. pockel cells)	M	L	2	Electrically insulated connections	Installation of electrical components will be done by QEW	1
	Human Error	M	M	3	A robust interlock system is designed prevent the human error factor Apply the hierarchy of controls Identify and manage error precursors	Prevention through design should be applied up front to eliminate or reduce hazards Incorporate one or more of the HPI tools (such as Three-way Communication, Independent Verification, Pre-task Brief, Procedure Use & Adherence, Job Site review, etc.)	1

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ALIGNMENT	Specular reflection hazard	M	M	3	The controls prevent beam-on exposure without a power reducing filter that lowers the laser power to ≤ Class 3R Optical beamline layout, beam stops	Engineered controls: interlock system with low power filter Laser specific protective eyewear	1
	Manual measurement: Specular reflection hazard, human error	M	M	3	The controls are set to expert mode. Only personnel designated by the LSS and approved by the LSO may configure the set-up for manual measurements Expert mode measurements are only to be done after the alignment procedure (in low power configuration)	Laser specific protective eyewear Additional training provided by the LSS Manual measurement procedure adherence	2
	Trip/fall due to low light or limited vision due to laser PPE	M	L	2	Clear walkways and effective housekeeping Walkway lighting	LSS will ensure walkways are clear	1
	Cleaning of laser components and optics	M	M	3	All manipulations of optical table equipment will be done with the laser off .	Less than 1L of solvents inside laser lab. Store solvents in flammables cabinet when not in use. Engineered controls: interlock system with low power filter DIRC laser alignment procedure	2

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	Replacement of components of parts	M	M	3	All manipulations of optical table equipment will be done with the laser off or in Low Power mode which reduces the laser output below MPE	Engineered controls: interlock system with low power filter DIRC laser alignment procedure	2
			Highest Risk Code before Mitigation:	3		**Highest Risk Code after Mitigation:**	2