



Integrated Work Document (IWD) Part 1, Activity Specific Information

IWD #: 3155			Activity/Task Title Trident Target Area Operations
Work Document #			Planner/Preparer (Name/Z #/Date) Sha-Marie Reid
TA 35	Building 189	Room 108, 120	Other Location(s)(TA) as required

Activity Description/Overview: This IWD covers operation of both Trident target areas including normal maintenance, setting up beam lines, firing laser shots, and other misc activities.

Hazard Analysis (HA) Method Used: Brainstorming Other _____

List Names of HA Team (Attach sheet if necessary): Ray Gonzales, Sha-Marie Reid, Russ Mortensen, Tom Shimada, Randall Johnson Date HA Performed: 10/11/12

The RLM approval indicates Integrated Work Management (IWM) has been applied appropriately, work is authorized, workers are qualified, work will be performed in accordance with Environment, Safety, Health, and Quality (ESH&Q)/Security and Safeguards (S&S) requirements and the IWD, and facility safety basis, aggregate hazards, and collocated hazards were appropriately included in the hazard analysis. RLM acknowledges completion of a peer review.

RLM (Signature/Z#/Date) Required: _____ See JHA Tool

The Facility Operator Director (FOD) approval on [Form 2100](#) indicates work is appropriate to be conducted in this facility (the activity is within the Authorization Basis [AB] and the work is appropriate for the facility), and facility safety basis, aggregate hazards, and collocated hazards will be managed.

Work activities in multiple FOD jurisdictions, e.g., additional facility safety envelopes, require FOD or Representative approval, where applicable.

FODs or FOD Representatives (Signature/Z#/Date/TA) Required: see JHA tool _____

Subject Matter Expert(s) (SME[s]) Review (Signature/Z#/Date) If Required: see JHA tool _____

<p>Hazard Determination by Hazard Grading Table</p> <p><input type="checkbox"/> Low-Hazard</p> <p><input checked="" type="checkbox"/> Moderate-Hazard</p> <p><input type="checkbox"/> High-hazard/Complex</p> <p>IWD Type:</p> <p><input type="checkbox"/> Standing IWD <input checked="" type="checkbox"/> Standard IWD</p>	<p>Expiration Date: <u>10/1/2015</u></p> <p>RLM and FOD or FOD Representative reapproval is required.</p> <p>Annual Review Completed (RLM Initial/Date): _____</p> <p>Name of Primary Person in Charge (PIC) (Print): <u>Russ Mortensen</u></p> <p>Name of Alternate PIC: <u>Randall Johnson, Tom Shimada</u></p> <p>Name of Alternate PIC: <u>Ray Gonzales, Sha-Marie Reid, Cort Gautier</u></p>	<p>Classification review completed, if required.</p> <p>_____ Reviewer Signature/Z#/Date</p>
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Work Tasks/Steps Identify work steps/tasks in sequence when such sequencing contributes to safety, security, and/or environmental protection.	Hazards, Concerns, and Potential Accidents/ Incidents Identify both activity and work-area hazards for each task/step.	Controls, Preventive Measures, and Bounding Conditions Specify preventive measures, controls for each hazard (e.g., lockout/tagout points, specific Personal Protective Equipment [PPE], Tamper Indicating Devices [TIDs], alarms, safes, recycle, waste minimization).	Reference Documents List permits, operating manuals, security plans, and other reference procedures.	Training List training and qualification requirements. (P300. Integrated Work Management, Section 6.1)
Beamline, target, and diagnostic alignment	Lasers of the following wavelengths: 1053 nm (class 3b), 660 nm (class 3b), 532 nm (class 4) , 527nm (class 3b), 440 nm (class 3b), 351 nm (class 3b) See attached List of lasers in use. Fiberoptic delivery of 1053 and 527 nm light (class 3b). Handling hazardous materials Beryllium Exposure: The south target chamber is considered a beryllium contamination area. Tripping and "head bumping" in dark room	Indicate laser eye protection (LEP) requirements on white board outside target area. If necessary, wear appropriate LEP for lasers used. Make sure eyewear has correct OD as specified in hazard analysis and posted outside door. Check for and block stray beams. Confine all beams to table Interlock all class 4 lasers with entry door. Interlock class 3b lasers as necessary with the entry door. Check interlocks monthly. Never look directly up the beamlines. Exercise caution when viewing through light gathering instruments with eye Experiment description of activities and hazard analysis must include MSDS's for all targets used. Handling procedures for all hazardous materials must be attached. An exposure assessment by qualified IHS-IS SME must be performed for all hazardous targets used. Use arm cots and nitrile glove when accessing the interior of the south target chamber. Clean chamber (see procedures below) after experiments using beryllium targets. Avoid cables and cords across walkways. Use cable bridges when necessary. Position equipment to avoid requiring access to awkward spaces. Assess all access areas for hazards before dimming lights.	LANL Laser Safety Program P 101-24 Safe Use of Lasers ANSI Z136.1 Operating procedures and hazard analysis for each diagnostic laser used. Experiment description of activities and hazard analysis. Operations manual for North Target Area. Operations manual for South Target area.	Laser Operator, Class 3b or 4 Training Plan #2641 Trident Site specific training. Trident Stepwise authorization. Trident Visitor Training Plan
Beamline configuration and dismantle.	Lasers listed above.	See controls above Get help or use appropriate mechanical lifts for any	Experiment description of	Trident stepwise authorization

	Lifting over 50lbs. Falling objects.	objects over 50 lbs. Use protective footwear meeting ANSI Z41 standards. Don't store heavy equipment on cable trays or other overhead structures. Secure all heavy objects that present a falling hazard.	activities and hazard analysis.	
Chamber venting	Over pressuring of target chamber. High pressure gas bottles used to provide venting gas	Certified overpressure relief valves must be fixed to pressurized vessels. All gas bottles must be appropriately secured.	Pressure, Vacuum, and Cryogenic Systems P101-34	Gas Cylinders Hazards Requirements Training plan #2302 Intermediate & High Pressure System Requirements Training plan #2300 Trident Stepwise authorization
Performing a laser shot	Amplified laser light 1053 nm up to 500 J 527 nm up to 500 J 351 nm up to 20 J 263 nm up to 1 J 600 nm up to 20 J	Evacuate all personnel from exposure areas. Monitor areas with video cameras. Interlocks prevent propagation of light if area is accessed. Scram buttons located in laser area in case of emergency.	Trident Target Area experiment checklist. Experiment description of activities and hazard analysis	Trident Stepwise authorization
Vacuum operations	Damage to equipment in the event of inappropriate venting. Implosion of glass windows and associated flying glass.	Authorized personnel only allowed to operate vacuum system. Use caution when using tools near windows.	Operations manual for North Target Area Operations manual for South Target area	Trident orientations for visiting experimenters Trident Step-Wise authorization
Installation, removal, and maintenance of the north target area target insertion mechanism	This activity requires climbing to the top of the chamber and lifting heavy objects. There is a risk of falling and dropping items.	A safety approved platform must be built and installed before work can proceed.		
Cleaning of Target Chamber and components especially after shots with hazardous materials.	Exposure to hazardous materials. Environmental contamination	See attached handling procedures for all hazardous materials. Use appropriate PPE as specified in MSDS. Dispose of waste in waste satellite storage if necessary (see MSDS). Consult with STO-FOD WMC for guidance as needed. Contact Process Equipment Maintenance group (NPI-3) for beryllium decontamination and IHS-DS for	Experiment description and hazard analysis. Hazardous materials handling procedures. Chemical Management P 101-14	As specified in attached Hazardous materials handling procedures. Chemical Workers (Hazard Communication) Training plan #4261 Trident Stepwise authorization

		monitoring.		
Gas Jet Operations	Explosion due to flammable gas Explosion due to over pressuring components	Analyze gas mixtures for flammability and other hazards before using. Fire safety SME approval is required for flammable mixtures before use. MSDS's are required for all gases used. Use appropriate pressure relief valve. A pressure safety SME approved procedure is required for all gas jet operations. Gas jet apparatus must be approved by a pressure safety officer and RLM before use.	Gas Jet operating procedure. Pressure, Vacuum, and Cryogenic Systems P101-34	See Gas Jet operating procedure. Gas Cylinders Hazards Requirements Training plan #2302 Intermediate & High Pressure System Requirements Training plan #2300 Trident Stepwise authorization
Ten Inch Manipulator Operations	Injury due to inadvertent lid closure. Strain due to heavy objects.	Engineered lid latches to prevent lid closure Get help or use appropriate mechanical lifts for objects greater than 50 lbs. If lift is considered a "critical lift" according to P101-25, refer to Critical lift plan.	TIM operation procedure. Critical lift plan Cranes, Hoists, Lifting Devices, and Rigging Equipment P 101-25	Trident Stepwise authorization
Working with lead.	Lead exposure	No cutting, filing, or abrading of lead allowed in the laboratory, except for cutting of lead tape to shield x-ray diagnostics. Keep lead bricks sealed by wrapping with plastic tape. Wear gloves when handling lead tape or other lead shielding material.	LANL Lead Program RN 0802	Lead Exposure Below the Action Level Training Plan #3675
Work on ladders	Fall from portable ladder	Ladder training is required for use of ladders. Ensure that the ladder's footing is stable and maintain good balance while using ladders.	Fall Protection Program P101-20	Ladder Climbers Training plan #4257
Entering the North target chamber with whole body	Asphyxiation Physical restriction of motion, sharp surfaces	Current chamber configuration prevents entry. If chamber configuration is modified and an entry is required a "Confined Space Evaluation" must be performed with SME approval and an entry procedure developed.	Confined space entry permit (form 1620) Confined Spaces P 101-27 Confined Space Training Clarification RN 0817	Confined Space Entrant/Attendant Training Training plan #8809
Entering the North target chamber with head & arms only. While the optical table is installed in the North	Asphyxiation	The vacuum chamber must be backfilled with room air. Remove at least two large port covers to ensure air fresh air supply.		Trident Stepwise authorization

	<p>Acoustic shock due to sudden exposure to compressor chamber vacuum.</p> <p>Exposure to laser beams.</p> <p>Physical restriction of motion, sharp surfaces.</p>	<p>If the compressor chamber is to remain at vacuum, the gate valve between the two chambers must be disabled by removing its compressed air line.</p> <p>LEP is required if potentially hazardous laser beams are present in the chamber and encouraged at all times.</p> <p>Examine the chamber interior for hazards before entry. Remove jewelry or loose clothing that may cause that may become entangled.</p>		
Performing radiation generating laser shots.	<p>Exposure to prompt radiation.</p> <p>Exposure to activated target chamber or components.</p>	<p>Target area is evacuated during laser shot.</p> <p>Initial entry and experiment must be performed according to RSAA-12-TA35-189-01 and associated procedure.</p> <p>All personnel involved in experiments must wear TLD badges for radiation exposure monitoring.</p> <p>Attenuate particle beams appropriately to minimize the activation of target chamber and associated components.</p>	<p>Radiation Protection P-121</p> <p>RSAA-12-TA35-189-01</p> <p>RWP-12-0181</p> <p>Procedure: Handling Activated Materials Following a High Intensity Target shot</p>	<p>Rad Worker II required for handling activated material.</p> <p>GERT training required for other experimental personnel.</p>
<p>Battery replacement in vacuum controller</p> <p>Steps:</p> <ol style="list-style-type: none"> safe vacuum system unplug vacuum controller. Open vacuum controller and replace batteries. Close vacuum controller and return to service. 	<p>Potential damage to equipment by inadvertent vacuum valve opening</p> <p>Class 4.2a, mode 3 electrical work</p> <p>Thermal burn hazard</p>	<p>Close and verify all vacuum valves controlled by this unit before shutting down controller</p> <p>A Trident qualified, CPR/AED trained safety watch must be present.</p> <p>Wear long sleeve cotton shirt & pants, and face shield or safety glasses.</p> <p>Remove all metal jewelry, including LANL badge, and any pens.</p> <p>Set aside cell phone.</p> <p>Use insulated tools.</p> <p>Insulate battery terminals to avoid accidental shorting.</p>	<p>P101-13.1 sect 6.5, See also P101-13.1 sect 4.2.4</p>	<p>R&D Electrical worker – energized. Training plan 2876.</p> <p>Battery & Battery bank safety, course #16745</p>
Electrical testing and troubleshooting of laboratory	Various types of experimental equipment	Trident qualified, CPR/AED trained safety watch is required for all high voltage trouble shooting activities.	Electrical Safety Program, P101-13	R&D Electrical Worker – Energized TP #2876 or

equipment including laser power supplies	<p>used in the target area may contain high voltage and/or high current. This includes 110/220 line voltages as well as high voltage supplies and capacitor banks.</p> <p>Highest electrical hazard classification: AC: 1.2a mode 2 DC: 2.1d mode 2 Capacitors: 3.3d mode 2</p>	<p>A written procedure approved by an ESO & an RLM is required for all high voltage / high current testing or troubleshooting operations.</p> <p>Use appropriate PPE</p>		<p>Electical Safety Officer TP #2959</p> <p>HV Eclective: Course #16747</p> <p>CPR AED TP # 9099</p> <p>Demonstrate Proficiency with grounding hook When training is available</p> <p>Demonstrate Proficiency with Voltage Meter when Training is Available.</p> <p>Trident step-wise authorization</p>
Liquid nitrogen transfer Operations	<p>Exposure to cryogenics (A cryogenic system is a system operating at temperatures where cryogenic fluids could be condensed, or containing cryogenic liquids or solids. A cryogenic liquid is a liquid with a normal boiling point below approximately 120 K (-244 F, -153 C.) (85.30.0)</p>	<p>Follow attached list of Cryogen Handling Safe Work Practices and industrial hygiene approved "Procedure for Liquid Nitrogen Transfer Operations at the Trident Laser Facility"</p> <p>Consult with Industrial Hygiene personnel before implementing any cryogen operations beyond the scope of the procedure listed above.</p>	<p>Cryogen handling safe work practices.</p> <p>Procedure for Liquid Nitrogen Transfer Operations at the Trident Laser Facility.</p> <p>P101-5, Cryogenic Fluids or Cryogenics</p>	<p>Recommended training: Cryogen Safety, course #8876:</p>
General Cleaning of South Target Area	<p>Potential for beryllium contamination from target handling and chamber clean up.</p>	<p>Use only a HEPA filtered vacuum to clean floor – do not sweep or use other vacuums. Floor may be mopped after vacuuming.</p>		

Insert Rows above for additional Tasks/Steps or attach pages to clearly communicate ES&H/S&S hazards and associated controls.



**Integrated Work Document (IWD) Part 2,
FOD Requirements and Approval for Entry and Area Hazards and Controls**

**Tenant
Activity Form**

IWD No./Work Request No: P-24-Trident-DU

Revision #: 1

FOD must determine the facility entry and coordination requirements and identify the ESH/S&S hazards and controls associated with the activity location.

FOD STO	TA 35	Bldg. 189	Room 108, 120	Other Location
FOD Designated Facility Point-of-Contact	Name Bobby Romero	Phone 667-2718	Pager 664-8601	Email brromero@lanl.gov

Entry and Coordination Requirements (Check one or more of the following):

<input type="checkbox"/> No Entry/Coordination Requirements	<input type="checkbox"/> FOD designated facility point-of-contact must sign IWD Part 3
<input checked="" type="checkbox"/> POTD/POTW	<input checked="" type="checkbox"/> Check in at Start of Work
<input checked="" type="checkbox"/> Work must be Scheduled	<input type="checkbox"/> Check in Daily
<input checked="" type="checkbox"/> Co-located Hazards/Concerns	<input checked="" type="checkbox"/> Check out at End of Work
<input type="checkbox"/> Review under AB/Safety Basis/USQ	<input type="checkbox"/> Check out Daily

<input type="checkbox"/> Work-Area Training Required	<input type="checkbox"/> Security Clearance Requirements
<input checked="" type="checkbox"/> Escort Required	<input type="checkbox"/> Other Security Requirements
<input type="checkbox"/> Quality Issues	
<input type="checkbox"/> Other Bounding Conditions _____	

Instructions: In the block below, provide facility or work-area information needed by the workers on this activity. (Things to consider include specific work-area hazards and controls, potential conflicts with co-located activities, or any facility restrictions on the activity.) Identify relevant reference documents and any training required.

Facility/Work-Area Information Relevant to this Activity	
CHECK-IN REQUIREMENTS	Individuals performing work must check-in with Maintenance Coordinator and sign the log book located at TA-35-0238-101. All facility work must be scheduled through the POTW for approval.
CO-LOCATED HAZARDS/CONCERNS	mix of offices and high-power laser laboratory
ELEVATED WORK SURFACES	Flat roof with a Short parapet edge. There are no facility controls present to control hazards associated with roof work. Additional hazards may be present for elevated work.
FOD REPRESENTATIVE	Operations Manager: TA-35-0002-B112, Office: 667-2718, Pgr: 664-8601, Cell: 231-2510 Operator: TA-35-0213-B123, Office: 667-2145, Pgr: 664-5159 Maintenance Coordinator: TA-35-0238, Office: 667-6809, Pgr: 664-4721 Maintenance Coordinator: TA35-0213-D103, Office: 667-1373, Pgr: 664-4883
Reference Documents:	STO-FSP-0448,RO
Training Requirements:	

FOD Approval

I have verified that the hazards identified above adequately identify the area hazards and that the IWM process has been applied appropriately.

FOD or Representative (Signature/Z #/Date) **Approval Required** _____

Date Approval Expires: 10/20/2013



**Integrated Work Document (IWD) Part 3,
Validation and Work Release**

By signing below, I verify this activity is compatible with current facility configuration and operating conditions.
FOD designated Ops Mgr or other facility point-of-contact for work area
 Signature/Z#/Date (If required by FOD): _____
Note: For Standing IWD, release may be given concurrently with signatures on Part 2.

By signing below, I have verified the following:

- I have verified authorization by ensuring approval signatures of the RLM and FOD.
- I have jointly conducted a validation walkdown with workers to confirm the IWD can be performed as written, required initial conditions and other prerequisites are in-place.
- The assigned workers are authorized and are qualified to perform the work in a safe, secure, and environmentally responsible manner.
- I have conducted the pre-job briefing, and all workers have been briefed.
- I have ensured coordination with any required FOD work-area representatives (e.g., area work coordinators).

Primary PIC (Signature/Z#/Date) Required: _____

Alternate PIC Signatures **acknowledges** PIC authority is assumed for the first time (*Note: Alternate PICs are required to sign only once, but formal handoff includes conferring with previous PIC to obtain all required information associated with the handoff*).

Alternate PIC (Signature/Z#/Date) Required: _____

Alternate PIC (Signature/Z#/Date) Required: _____

Pre-Job Brief Content

- What are the critical steps or phases of this activity?
- How can we make a mistake at that point?
- What is the worst thing that can go wrong?
- What controls, preventive measures, and bounding conditions are needed?
- What work permits are required and how will we meet their requirements?
- What are the handoffs and coordination requirements among workers and multiple PICs?
- Are there hold-points including those that require sign-offs?
- What are the pause/stop work responsibilities and expectations (e.g. for unanticipated conditions or hazards)?
- How would we respond to alarms and emergencies?
- Are there lessons learned from previous similar work?
- Is other information needed to perform this activity in a safe, secure, and environmentally responsible manner?
- Does everyone agree to the work tasks/steps, hazards, and controls and commit to follow them?

Pre-Job Brief Attendance Roster

By signing below as required , I agree to the following:	
<ul style="list-style-type: none"> • I agree to follow the work steps and implement the controls as written as applicable to my work assignments. • I agree to pause/stop work when conditions or hazards change or when I encounter unexpected conditions during the execution of work, or when work cannot be performed as written, or instructions become unclear during execution. • I confirm that I am authorized, qualified, and fit to perform the work. 	
Worker (Signature/Z#/Date)	Worker (Signature/Z#/Date)



Integrated Work Document (IWD) Part 4, Feedback/Post Job Reviews

IWD #: P-24-Trident-DU **Revision #:** 1

Feedback of ongoing activities/post job review with the workers and Person in Charge (PIC) should include the following:

- identify inefficiencies, problems during the activity, coordination issues, unanticipated conditions, near misses; and
- develop recommendations for improvement.

A post-job review with the workers and PIC should include the following:

- verify that the activity is complete and make notifications in accordance with Facility Operations Director (FOD) requirements; and
- ensure that follow-through actions (e.g., clean-up, recycle, waste disposal, equipment removal, and secure storage) are completed.

Lessons learned; safety, security, and environmental issues; coordination issues; and unexpected conditions.

Suggested improvements to enter into the Job Hazard Analysis (JHA) Tool, FootPrints, or other Integrated Work Control data bases supported by [Lessons Learned](#).

Other recommendations for improvements to performing this activity. State the positive attributes of this activity.

Completion Statement

Name (print) of PIC/Z #:	Signature	Date
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