1. EQUIPMENT INFORMATION

Entity Code (CEID)	
Functional Area	
Process	
Supplier	
Model	
Tool Description	
Tool Type (FOK, Upgrade, Legacy)	
Upgrade Description	

2. EQUIPMENT COMPONENTS

Identify components of tool that are in scope of JHA. Include applicable equipment components, such as mainframe, process chambers, factory interface, chemical delivery systems, and support equipment (e.g., chillers, parts clean sinks, pump carts, vacuum pumps, point-of-use abatement, lifting devices).

COMPONENT	SUPPLIER / MANUFACTURER

3. EQUIPMENT SUPPLIER EHS DELIVERABLES

Prior to HVM1 transfer, Intel TD EHS will update form to confirm applicable EHS documentation, as required in Purchase Specification or contract.

DOCUMENT	APPLICABLE (YES / NO)	COMMENTS
SEMI S2 / S8 Report		
Laser Data Sheet		
Ionizing Radiation Device Inventory Sheet		
ISMI Environmental Emissions Report		
Chemicals in Equipment Declaration (Chiller / Heat Exchanger Data)		
ISMI Combustible Materials Test Report		
Hazard Identification and Energy Control Document (i.e., TSP, this form)		
CE Mark Declaration of Conformity		

4. INTEL TD EHS JHA / SUPPLEMENTAL DOCUMENTS

To be completed by Intel TD EHS prior to HVM1 transfer.

DOCUMENT	APPLICABLE (YES / NO)	COMMENTS
Technology Transfer Job Hazard Analysis (JHA) Form (this document)		

DOCUMENT	APPLICABLE (YES / NO)	COMMENTS
PPE Evaluation		
Ergonomics (EDS) Report		
Confined Space Assessment		
Chemical Exposure Qualitative Risk Assessment (QLRA)		
Laser Data Sheet (LSO-approved)		
Ionizing Radiation Device Inventory Sheet (RSO-approved)		
Oxygen Deficiency Assessment (ODA)		
Noise Survey		
Hazardous Waste Profile Document		
Decon Hazard Profile Document		
Process Hazard Analysis (PHA)		

5. JHA SCOPE: IDENTIFY TASKS TO BE EVALUATED

Supplier will list tasks to be performed by Intel employees on a known and routine basis. Tasks performed only by vendor should not be evaluated. Non-standard / Non-documented tasks will not be evaluated.

OPERATIONS (OP) OR MAINTENANCE (PM) PROCEDURE	TASK DESCRIPTION	PROCEDURE REFERENCE (E.G. APPLICABLE MANUAL SECTION)

To be completed by Intel TD EHS & Intel tool owner prior to HVM1 transfer. List tasks evaluated in Appendix A in the table below. Copy/Paste Section 4 of Preventative Maintenance (PM) Spec to Appendix B and Copy/Paste Section 4 of Operation (OM) Spec in Appendix C. Update Spec based on the task-by-task assessment in Appendix A.

SPEC NUMBER - NAME	REV #	TASK DESCRIPTION

6. CHANGE CONTROL

To be completed by supplier for REV0. To be completed by Intel TD EHS & Intel tool owner prior to HVM1 transfer.

DATE	REV #	SECTION	AUTHOR	CHANGE SUMMARY

7. REVIEW AND APPROVAL

To be completed by Intel TD EHS & Intel tool owner prior to HVM1 transfer.

REVIEWER	NAME	DATE REVIEWED AND APPROVED
Tool Owner		
INTEL TD EHS		

EHS Peer Review		

8. JHA ACTION REQUIRED (ARS)

Identify open ARs from JHA review. Non-compliance ranked medium and higher must be closed prior to HVM1 transfer. For any non-compliance issue still open at time of HVM1 transfer, Intel TD EHS will track closure of owner and mitigation plan in the EHS Transfer Tracker Matrix.

#	EHS ISSUE	RISK* RANKING	OWNER

* Refer to SEMI S10 Risk Rankings: Very High, High, Medium, Low, and Very Low

APPENDIX A: TASK BY TASK ASSESSMENT OF HAZARDS AND CONTROLS

Summarize potential hazards and controls recommended during Preventative Maintenance (PM) and Operation (OM) tasks that will be performed by Intel employees. The JHA tables below will be used to develop the safety section of Intel specs. Add rows to tables, if needed.

Step 1: Document Personal Protective Equipment (PPE)

- List tasks to be performed on a known and routine basis.
- Identify hazards employees will be exposed to in each task (use hazards identified in ECP table).
- Define PPE required to protect employees from hazards in addition to the controls defined in ECP. Refer to Appendix D PPE Pick List.

	TASK	POTENTIAL HAZARDS	PPE REQUIRED
1			
2			
3			

Step 2: Review Emergency Procedures

List any chemical-specific or equipment-specific leak response procedures.

STEP	ACTION	RESPONSE / NOTES

Step 3: Document Chemical Hazards

List all chemical hazards. Include process chemicals, maintenance chemicals and any anticipated or known byproducts. Also, include chemicals that are used in closed loop systems (chillers, etc) and internal to tool.

Process Chemicals

CHEMICAL NAME & SYMBOL/ABBREV.	PROPERTIES	STATE	HAZARDS

PM Chemicals

CHEMICAL NAME & SYMBOL/ABBREV.	PROPERTIES	STATE	HAZARDS

Process Byproducts

BYPRODUCT DESCRIPTION	PROPERTIES	STATE	HAZARDS

Notes for Step 3:

- List chemical as it is listed in ICHEM, or include ICHEM IPN, so the safety data sheet (SDS) can be easily searched.

- Reference SDS and GHS standard to complete properties, state, and hazards sections.
- Under "Properties" indicate whether material is corrosive (acid/base), toxic, oxidizer, flammable, water reactive, pyrophoric, inert, etc. Include odor or color, if known/applicable.
- Under "State" indicate whether material is liquid, gas, or solid.
- Under "Hazard" include applicable GHS Hazard Statements (e.g., “Causes serious eye damage”).

Step 4: Perform Chemical Exposure Qualitative Risk Assessment (QLRA)
Perform a qualitative risk assessment of inhalation hazards.

- Identify any controls that are required to prevent employee exposure. For example: ventilation (e.g., dilution ventilation, Neiderman snorkel, tool exhaust), portable gas monitoring (SPM Flex) alarm setpoints and alarm response, barrier tape used to establish restricted area at specified distance, drop cloths or HEPA-filtered vacuums used to contain/control hazardous particulate. Include PPE required to prevent employee exposure in Step 1.

HAZARD	LOCATION	CONTROL

- Has Intel TD EHS completed/approved QLRA (using QLRA template from the Global EHS Exposure Assessment Standard)? **Yes** ☐ **No** ☐ **N/A** ☐

Step 5: Identify and Evaluate Oxygen Deficient Environments
Identify all “spaces” where inert gases/cryogens are used and provide information to review potential normal operations or accidental release scenarios which could result in oxygen depletion. Rooms, tool cabinets, or other enclosures that can be occupied by person’s breathing zone (head at minimum) are considered inert use “spaces.”

SPACE LOCATION	INERT GAS/ CRYOGEN NAME	INERT GAS/ CRYOGEN SOURCE CONTAINER	INERT GAS/ CRYOGEN MAX VOLUME/ FLOW RATE

- Has Intel TD EHS documented an Oxygen Deficient Assessment (ODA)? **Yes** ☐ **No** ☐ **N/A** ☐
  - If ODA completed, site EHS Inert Gas tracking log needs to be updated. Provide information from applicable ODA in table above.
  - Additional ODA tracking is not required for release to fab/subfab space, or for fab tool minienvironment with FOUP N2 purge.
- Confined space assessments involving potential inert gas hazards are assessed per the Intel EHS Confined Space Entry Standard.
- List required controls (e.g., fab laminar airflow or HVAC dilution ventilation, local exhaust ventilation, oxygen monitor, restricted area):

Step 6: Perform Ergonomic Assessment
Supplier will list all parts over 10 lbs that are lifted manually or with a lifting device.

NAME OF PART TO BE MANUALLY HANDLED	PART WEIGHT (LBS)	FREQUENCY OF HANDLING (E.G. WEEKLY,	IS LIFTING ASSIST SUPPLIED OR SPECIFIED?	LIFTING DEVICE CAPACITY

		MONTHLY, QUARTERLY, ETC)	(E.G. HOIST, CRANE)	

Supplier will list any accessory equipment used to facilitate access, handle components, or move materials when performing procedures, such as carts, platforms, fixtures, specific hand tools, lifts, hoists, cranes, or step stools. Prior to HVM1 transfer, Intel TD EHS will review/update table.

ACCESSORY	TASK	INTEL OR SUPPLIER OWNED

In-Scope Procedures: To be completed by Intel TD EHS prior to HVM1 transfer. List procedures reviewed by Intel TD EHS for ergonomic risk prior to transfer.

PROCEDURE	SPEC NUMBER	DESCRIPTION

Note: Only include tasks planned to be completed by Intel workers at current or future sites. Non-standard / Non-documented tasks will not be evaluated. Any non-documented tasks require a pre-task-plan to be completed prior to performing work.

Ergonomic Hazards: To be completed by Intel TD EHS & Intel tool owner prior to HVM1 transfer.

PROCEDURE	TASK	DESCRIBE HAZARD	RISK LEVEL	RECOMMENDATIONS

- Has Intel TD EHS completed ergonomic screening calculation sheet? **Yes** ☐ **No** ☐ **N/A** ☐
  - If yes, embed file here:
- Has the Intel TD EHS Ergonomic Documentation & Sharing (EDS) Report been completed? **Yes** ☐ **No** ☐ **N/A** ☐
  - If yes, embed file here:
- Is the station controller an Intel Globals IE standard design? **Yes** ☐ **No** ☐ **N/A** ☐
- Will work require continuous standing work at a computer for longer than 30 minutes? **Yes** ☐ **No** ☐ **N/A** ☐

Step 7: Document Energy Control Procedures (ECP)

ECPs shall be developed for known and routine maintenance activities that will be performed on equipment. Non-standard / non-documented tasks will not be evaluated. Any non-standard / non-documented tasks require a pre-task-plan to be completed prior to performance of work.

Identify Hazardous Energy Types

Yes	N/A	ENERGY TYPE
		Electrical
		• Low Voltage (50-600V)
		• High Voltage (>600V)
		Chemical (e.g. Explosion, pressure, extreme heat, fire, corrosive, solvent, reactive, oxidizer, toxic)

		Pressure (e.g.Hydraulic/pneumatic)
		Vacuum
		Mechanical (e.g. Capable of crushing, pinching, cutting, snagging, striking)
		Thermal - (e.g. high surface temp, hot liquid, steam)
		Thermal - Cryogenic
		Ionizing Radiation
		Non-ionizing Radiation
		• Ultra-Violet
		• Infrared
		• RF/Microwave
		• Laser
		• Magnetic
		Stored (e.g.Flywheels, springs, differences in elevation, elevated parts that could drop, capacitors, batteries)

Hazardous Energies Control Point Listing: Identify energy control procedures for every energy type identified above.

HAZARDOUS ENERGY TYPE	DANGER ZONE	ISOLATION POINT	POINT TO DISCONNECT/ DISSIPATE ANY STORED ENERGY	METHOD/LOCATION TO VERIFY NO RESIDUAL ENERGY EXISTS

- Document the highest arc flash PPE required for CEID installed on site as a reference.

LOTO Exception: Supplier to list any maintenance or servicing task where physical isolation (i.e., LOTO) of serious hazards is not possible. Approved method to protect worker must meet all US and local OSHA CoHE regulations.

LOTO EXCEPTION (E.G., MINOR SERVICING) / TASK	HAZARDOUS ENERGY TYPE(S)	DANGER ZONE	APPROVED METHOD TO PROTECT WORKER (E.G., RELIABLE CONTROL CIRCUIT, MACHINE GUARD)

For tasks approved under Minor Servicing Exception, has Intel TD EHS completed COHE Minor Servicing Exemption Evaluation Form from Global EHS COHE Standard? **Yes** ☐ **No** ☐ **N/A** ☐

Step 8: Identify Energized Electrical Work Hazards

List energized electrical work, including any testing/metering required to verify energy isolation.

EEW PERMIT REQUIRED (Y/N)	TASK DESCRIPTION	HAZARD ZONE/LOCATION	VOLTAGES PRESENT

Step 9: Identify and Evaluate Ionizing Radiation Hazards
List all ionizing radiation sources.

RADIATION SOURCE/TYPE	IONIZING/ NONIONIZING	HAZARD	CONTROLS
	Ionizing		

- List all sources, including those exempt from US Nuclear Regulatory Commission (NRC) licensing and labeling requirements.
- Identify any radionuclide sources, including activity (Ci) and component containing ionizing radiation source.
- Specify interlocks, tool shielding, lock out points, warning labels, annual leak checks, etc. which prevent exposure to radiation.

Has the Intel TD EHS RSO approved the Ionizing Radiation Device Inventory sheet for each source? **Yes** ☐ **No** ☐ **N/A** ☐

List all exempt ionizing radiation sources.

DESCRIPTION OF SOURCE	MAX DOSE (MILLIREM, SV)	EXEMPTION RATIONALE	EXEMPTION CITATION OR GENERAL LICENSE	DOCUMENTATION SHARED WITH RSO

Has the Intel TD EHS RSO approved each exemption listed above? **Yes** ☐ **No** ☐ **N/A** ☐

Identify tasks that require ionizing radiation leak check, including removal of shielding. Intel TD EHS and tool owner will update template wording in table below or delete template rows if not applicable.

REASON FOR LEAK CHECK	PROCEDURE	NOTES/RESULTS
If equipment generates x-rays, perform x-ray leak check survey as required: -Prior to initial tool start-up as part of equipment sign off (ESO) -Annually -If maintenance, troubleshooting, or other tasks require the removal of non-interlocked shielding -If existing shielding is modified in a manner that could affect its effectiveness as a radiation barrier -Tool has been relocated -A significant change in operational conditions has	Follow leak check methodology in OJT training (required for surveyors): Ionizing Radiation Leak Detection (00007912). See Section [0.00]. [Insert tool-specific leak check procedure in Section [0.00], if available.]	No leakage higher than 50 uREM/hr for the peak measurement at distance of 5 cm from accessible tool surfaces minus background measurement. If leakage is found above 50 uREM/hr but less than or equal to 250 uREM/hr, the tool may continue to run but the tool owner must investigate the cause of the higher than expected measurement. Contact tool owner and site EHS. If leakage is found higher than 250 uREM/hr, shut down the power

occurred, including addition of a new ion species with the potential to increase x-ray energies		source. Contact tool owner and site EHS.
If ionizing radiation sealed sources are present, Oregon Only: Perform ionizing radiation source materials leak check as required: Every six months Incoming/outgoing shipping packages	Oregon Only: For ionizing radiation surveys of radioactive source materials and incoming/outgoing shipping packages, contact site EHS.	Non-Oregon Sites: Contact EHS to confirm requirements.

Step 10: Identify and Evaluate Non-Ionizing Radiation Hazards
List all non-ionizing radiation hazards. Non-ionizing radiation includes the spectrum of ultraviolet (UV), visible light, infrared (IR), microwave (MW), radio frequency (RF), and extremely low frequency (ELF).

NON_IONIZING RADIATION HAZARD	LOCATION OF SOURCE	FREQ / WAVE-LENGTH	MAX POWER / FIELD STRENGTH	NOMINAL POWER / FIELD STRENGTH

Identify tasks that require RF/MW leak check, including removal of shielding or RF cables. Intel TD EHS and tool owner will update template wording in table below or delete template rows if not applicable.

REASON FOR LEAK CHECK	PROCEDURE	NOTE/RESULTS
[Include this row only if there are RF or MW sources] Perform RF/MW Survey after the occurrence of any procedure that comprises the integrity of the RF/MW containment such as: Opening a chamber or breaking a seal intended to contain RF/Microwave energy (unless opening the chamber for routine operations)	Follow leak check methodology in OJT training (required for surveyors): Non Ionizing Radiation Leak Detection (00019280). See Section [0.00]. [Insert tool-specific leak check procedure in Section [0.00], if available.]	No significant leakage per limits specified in Section 4.10.3 at distance of 20cm. If leakage is found above limits in Section 4.10.3, shut down the power source. Contact tool owner and site EHS.

If maintenance, calibration or troubleshooting requires the disconnecting of RF connectors If shielding is modified or removed		

Step 11: Identify and Evaluate Noise Hazards
Identify all noise sources at or above 80 dB.

TYPE	SOUND LEVELS (dBA)	LOCATION

- Did Intel TD EHS complete noise survey and file to EHS Portal? **Yes** ☐ **No** ☐ **N/A** ☐

List required controls if routine tasks result in high noise above 85 dB. E.g., Shut or adjust settings, enclosure, shielding, limit access, hazard sign, hearing protection, hearing conservation program.

Step 12: Identify and Evaluate Laser Hazards:
List all laser sources.

LASER NAME/ TYPE	LOCATION	OPERATING LASER CLASS	MAINTENANCE LASER CLASS	POWER/ ENERGY	WAVE-LENGTH

Note: The operating laser class refers to the laser product, while maintenance laser class refers to the laser source embedded in the tool.

Is the laser data sheet completed and approved by the INTEL TD EHS Laser Safety Officer (LSO) for tools with embedded Class IIIB / IV laser? Yes ☐ No ☐ N/A ☐

- Does open beam work (with laser powered on and interlocks defeated) need to be performed? **Yes** ☐ **No** ☐ **N/A** ☐
- If open beam work will be performed on site, list requirements for laser open beam work (e.g., laser controlled area, laser curtain, eyewear).

LASER TYPE/ WAVELENGTH	EYEWEAR MINIMUM OPTICAL DENSITY (OD)	RESTRICTED AREA RADIUS (DEFAULT 3-FT)	PROTECTIVE CURTAIN RATING	OTHER

Does laser data sheet include summary of hazard analysis and requirements for laser open beam work, approved by Intel TD EHS LSO? **Yes** ☐ **No** ☐ **N/A** ☐

Step 13: Identify and Evaluate Fire Hazards
List specific potential fire / pyrophoric hazards:

FIRE HAZARD	LOCATION	TASK	PRECAUTIONS

Identify any required inspection or maintenance for fire safety systems (e.g., CO2 fire suppression).

ONBOARD LOCATION	MAINTENANCE PROCEDURES/ TEST REQUIREMENTS	FREQUENCY

Step 14: Identify and Evaluate Waste Hazards
Identify type of wastes that may be generated as a result of the PM or Operations. Examples are: IPA and IPA wipes, contaminated debris, lead contaminated debris, arsenic contaminated debris, vacuumed material*, etc.

WASTE GENERATED	CHEMICAL CONTAMINATION	SAFE HANDLING PRACTICES	DISPOSAL LOCATION

** Vacuum use should be determined as House Vac, Nilfisk or Arsenic. The general house vacuum system must generate a non-hazardous waste. No liquids (solvents/corrosives) nor metal-bearing material (Ag, As, Ba, Ca, Cr, Hg, Pb, Se) shall be allowed in the house vacuum system.*

Has Intel TD EHS Environmental Hazardous Waste Owner completed Hazardous Waste Characterization (e.g. new waste streams)? **Yes** ☐ **No** ☐ **N/A** ☐

Step 15: Identify and Evaluate Decontamination Hazards
List parts that may be shipped for rebuild, off site parts clean, disposal on a routine basis.

ITEM #	PART NAME OR INTEL PART #	CHEMICAL CONTAMINATION	EXISTING CONTAMINATION (INCL. BYPRODUCTS)	ESTIMATED AMOUNT OF CONTAMINATION REMAINING
1				
2				

Units of measure to be used for remaining contamination estimates-Liquids-mL/L, Solids-mg/g/kg, Gas-cm3/kPa, Radioactivity-Ci/Bq, Magnetized material-(A/M)/gauss

ITEM #	PART NAME OR INTEL PART #	DECON PROCESS	PREPARATION FOR TRANSPORT

Is Intel Decon Hazard Profile recommended (e.g. frequent part/component decon)? **Yes** ☐ **No** ☐
Tool Owner to coordinate Decon Hazard Profile with Intel TD EHS Environmental Decon Program Owner.

Step 16: Identity Handling Systems and Lifting Devices
Identify required inspections for any hoist and/or crane systems.

HOIST / CRANE MANUFACTURER	ID #	EXTERNAL / INTERNAL TO EQUIPMENT	TYPE (HOIST, CRANE,SLING, END EFFECTOR)	INSPECTION FREQUENCY (e.g.ANNUAL, MONTHLY)

Complete the following table for any fixtures or lifting systems.

TYPE OF FIXTURE OR LIFTING DEVICE	EXTERNAL/INTERNAL TO EQUIPMENT	INSPECTION FREQUENCY

Step 17: Identity and Evaluate Confined Space Hazards:
A space must meet all three of the following requirements to be considered a confined space. If the space meets these requirements, a confined space evaluation must be documented.

1. A space is large enough and so configured that an employee can bodily enter and perform work.
2. The space has a limited or restricted means of egress.
3. The space is not designed for continuous human occupancy.

DESCRIPTION OF SPACE	NON-PERMIT REQUIRED	PERMIT REQUIRED	ALTERNATE ENTRY IS POSSIBLE

Has Intel TD EHS completed Confined Space Evaluation Form? **Yes** ☐ **No** ☐ **N/A** ☐

Step 18: Identify and Evaluate Working from Height Hazards:
Identify all work activities performed from a ladder or other work platform. Also identify any work performed at or above 4 feet.

LOCATION	ACTIVITY / TASK	LADDER / WORK PLATFORM REQUIRED	PERSONAL FALL PROTECTION SYSTEM REQUIRED

APPENDIX B: DOCUMENT INTEL EHS REQUIREMENTS FOR THE PM SPEC

SPEC NUMBER - NAME	REVISION EVALUATED

Cut and Paste Safety Section of Intel PM Spec into JHA document and provide recommended edits for incorporation into the next revision of the tools PM Spec.

APPENDIX C: DOCUMENT INTEL EHS REQUIREMENTS FOR THE OPS SPEC

SPEC NUMBER - NAME	REVISION EVALUATED

Cut and Paste Safety Section of Intel OPS Spec into JHA document and provide recommended edits for incorporation into the next revision of the tools OPS Spec.

APPENDIX D: PPE PICK LIST

<table>
<tr><th colspan="3">Pick list of potential PPE that may be required.</th></tr>
<tr><td rowspan="2">Eye/Face Protection
• Safety Glasses
• Chemical Goggles
• Face shield
• Laser safety glasses*
• Laser safety goggles*

*For laser eyewear, specify wave length & optical density</td><td>Head protection
• Hard hat
• Bump cap</td><td>Fall protection
• Full-body harness
• Lanyard</td></tr>
<tr><td>Hearing protection
• Earmuffs
• Earplugs

Electrical Safety PPE
Refer to Electrical Safety Standard</td><td>Foot Protection
• Chemical resistant boots
• Non-porous shoes
• Shoe Booties
• Steel-toe boots/shoes or toe caps</td></tr>
<tr><td>Hand Protection
• Clean room glove
• Double clean room gloves
Cut Resistant Glove
• Chemical Resistant Glove
• Silver Shield Glove
• Leather/Abrasion Protection Glove
• Cryogenic glove
• Thermal glove</td><td>Respiratory Protection
• Air-purifying respirator (APR)*
• Airline respirator
• SCBA
• Powered Air Purifying Respirator (used as splash protection only)

*For APR, specify half-face or full-face mask, and cartridge required</td><td>Whole Body Clothing
• Chemical resistant clothing
• Disposable clothing (dry particulate)
• Chemical flame resistant clothing
• Flame resistant clothing
• Cryogenic clothing
• Lab coat

*Specify type of clothing: coveralls, suit, apron, sleeve covers</td></tr>
</table>