TABLE OF CONTENTS

COHE/LOTO

I. Purpose
II. Scope
III. Program Requirements
   A. General Requirements
   B. Lockout/Tagout (LOTO) Procedures
      1. LOTO Preparation
      2. LOTO Application
      3. LOTO Preparation for Re-energization
      4. LOTO Lock and Tag Removal
      5. LOTO Lock and Tag Temporary Removal
      6. LOTO Equipment Used
IV. Training
V. Roles and Responsibilities
   A. Employees
   B. Supervisors and Managers
   C. Site Environmental Health and Safety
   D. Global Environmental Health and Safety
   E. Intel Contractor Sponsor
   F. System or Tool Owner
VI. Definitions
VII. References
VIII. Change Control
IX. Appendices
    A. Energy Control Procedure Template
    B. Control of Hazardous Energies Abandoned Lock Removal Form
    C. Annual Periodic Inspection Checklist for Control of Hazardous Energies
    D. NPO (Normal Production Operation) Process
    E. Normal Production Operation Evaluation Form
    F. COHE Alternative Method Process
    G. COHE Alternative Method Evaluation Process Form
X. Purpose:
   A. This standard was developed to educate personnel on Intel requirements to minimize exposure to hazardous energies and ensure compliance with regulatory requirements applicable to the control of hazardous energies. The purpose of this standard is to set minimum requirements for establishing appropriate lockout/tagout (LOTO) procedures for equipment which is capable of storing hazardous energy, including but not limited to: electrical, chemical, mechanical, hydraulic, pneumatic, thermal, laser and latent energies.
   B. Each site and/or group shall develop and implement a program which meets the minimum requirements of this document and any Federal, State or Local laws.

XI. Scope
   A. This standard applies to all Intel employees during servicing and/or maintenance of equipment or machines and at other times when LOTO of energy is required to ensure the safety of those working on or near hazardous energies if a release of this energy could cause injury to the employee. LOTO is required when the work requires an employee to place any part of their body into an area where a danger zone exists.
   B. Contractors must comply with the terms of their contract and all Federal, State and Local requirements. Contractors are required to meet the intent of this standard but shall train and certify their own employees. Intel and the contractor are required to inform each other of their respective programs.

XII. Program Requirements
   A. General Requirements
      1. Assessments shall be coordinated by the system/tool owner and performed on each tool/equipment set to identify potential hazardous energies and to document the Energy Control Procedures (ECP). The energy control procedures shall be written in preventive maintenance, modification or other relevant procedures (See Appendix A – Example Energy Control Procedure Template).
      2. Equipment specific Energy Control Procedures shall be written for each equipment type which covers:
         a) Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energies.
         b) Specific procedural steps for the placement, removal, and transfer of and the responsibility for placing them
         c) Specific requirements for testing a machine or equipment to determine and verify the effectiveness of LOTO and other energy control measures.
         d) Energy Control Procedures need not document the required procedure for a particular machine or equipment, when all of the following elements exist:
            (1) The machine or equipment has no potential for stored or residual energy, or re-accumulation of stored energy, after shut down which could endanger employees.
            (2) The machine or equipment has a single energy source, which can be readily identified and isolated.
            (3) The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment;
            (4) The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
            (5) The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
            (6) A single lockout device will achieve a locked-out condition.
            (7) The servicing or maintenance does not create hazards for other employees.
            (8) Intel, in utilizing this ECP exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.
e) Each Energy Control Procedure must be reviewed per a review cycle in accordance with local regulatory requirements.

3. If a change is made to equipment or systems that require an ECP, the system/tool owner must:
   a) Identify the change and update the ECP
      (1) Ensure that changes involving non-repetitive, non-routine, or changes in previously approved activities involving LOTO have been reviewed by the appropriate parties.
         Note: A non-repetitive, non-routine task is not defined by existing documentation.
      (2) Review the changes in the LOTO procedure or physical configuration, to identify any new hazards or hazardous conditions and ensure compliance to applicable local codes. Document physical or procedural changes.
      (3) Be responsible for ensuring 3rd party certification when needed prior to use of that system/factory tools/tool support equipment. Follow existing review process (WP/CIP) and archive all applicable documentation related to changes in the LOTO procedure.
   b) Define who will be impacted/affected by the change.
   c) Communicate changes through any effective means to all Authorized Employees, examples include the following: Team/Staff Meetings, 1:1’s with individuals.

4. Locks and tags utilized for LOTO shall not be used for any purpose other than controlling hazardous energies. Tags used for other applications shall not duplicate LOTO tags in color or verbiage.

5. Transfer of LOTO between the outgoing and oncoming personnel shall require:
   a) Personnel to meet at the point of lockout
   b) On coming shift employee shall apply LOTO devices prior to outgoing employee removing their device

6. No individual shall interfere with another person’s LOTO or try to start any equipment/tools under someone else’s LOTO.

7. To remove another person’s LOTO device, removal protocol requires that either a supervisor (or designated representative) along with an Authorized Employee complete the “Abandon Lock Removal Form” (See Appendix B - Control of Hazardous Energies Abandon Lock Removal Form).
   a) Need for lock and tag removal is identified to person’s supervisor.
   b) Attempt to contact the owner is documented on the Abandoned Lock Removal Form.
   c) An evaluation of the entire system must be made to ensure that an injury can not occur before the lock is removed. (Names are documented on the form.)
   d) Bolt cutters or other removal device are acquired.
   e) Supervisor or designee removes the lock. (Names are documented on the form.)
   f) An EHS rep must be notified within 24 hours of removal. (Names are documented on the form.)
   g) If contact cannot be made with the employee of the abandoned lock, the employee AND their supervisor must be made aware of the removal and state of the system before beginning his next work day.

8. Periodic inspections of Authorized Employee shall be conducted annually to ensure compliance with LOTO operation requirements. The inspections shall include elements described in Appendix C – Periodic Inspection Checklist for Control of Hazardous Energies.
   a) A review, between the inspector and each authorized employee, of that employee’s responsibilities under the energy control procedure being inspected. The inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.
   b) The inspection shall document:
      (1) The identity of the machine or equipment on which the energy control procedure was being utilized
      (2) The date of the inspection
      (3) The names and job title of employee who were included in the inspection
      (4) The person who performed the inspection
c) The inspector needs to:
   (1) Observe a representative number of such employees while implementing the procedure.
   (2) Endorse as per site procedure in giving IU credit to those who satisfied requirements of Periodic Inspection and archive checklist used
   (3) Recommend to supervisor of authorized employees who did not pass requirements for them to retake classroom CoHE Training (00001537).

9. Each employee shall use locks for which only they possess each of its keys.

10. Each person whose work exposes them to a potential danger zone for any length of time shall apply their own lock and tag to the energy isolating device before entering that zone.

11. If using a lock box, the following steps shall be adhered to:
   a) Tool owner, project manager, or person supervising the lockout is assigned as Lead and shall:
      (1) Apply personal lock(s) and tag(s) to each hazardous energy control point.
      (2) Place the key(s) to the locks in a lock box
      (3) Affix their own lock and tag to the lock box
   b) The authorized employee(s) working on the locked out systems shall
      (1) Affix their personal lock and tag to the lock box when beginning work
      (2) Along with the Lead, verify that the system(s) they are working on are de-energized and verify the lock is on the correct isolation device
      (3) Remove their lock and tag when they have completed their work
      (4) Stop work and inform the person supervising the task of start and stop times and any issues found
   c) Change of shift: Lock keys are not passed on from outgoing to incoming personnel. To complete a change of shift without passing of keys inside a lock box, the following steps shall be conducted:
      (1) Outgoing Authorized Persons remove their locks and tags from the lock box.
      (2) Outgoing Lead removes his/her lock and tag from the lock box and obtains energy control point keys placed inside the lock box.
      (3) Outgoing Lead and Incoming Lead conduct a passdown at the tool.
      (4) Incoming Lead places his/her locks and tags on the energy control points and confirms energy isolation for each energy type being controlled.
      (5) Outgoing Lead removes his/her locks and tag from the energy control points. The tool is always in a locked state.
      (6) Incoming Lead updates incoming Authorized Persons on tool status and places the energy control point keys inside the lock box, then places his/her personal lock and tag on the lock box.
      (7) Incoming Authorized Persons place their locks and tags on the lock box and proceed with steps to verify isolation.
   d) Alternative methods to manage Group Lockout/Tagout that assure equivalent worker safety and meet all federal, state and local requirements may be allowed in site programs. Application of such methods shall require approval from the Corporate Program Owner and be documented in the site program materials.

12. The lock out of energy must be a true isolation, without possible override.
Notes: Unacceptable means for controlling or isolating hazardous energies include the use of interlocks, push buttons (EMOs), selector switches, software controls, and control circuit devices. Site EHS has discretion to approve alternate LOTO options such as use of a panel door cover if exclusive control remains with the employee doing the work.

13. Normal Production Operations (NPO): An exception when LOTO is not required for activities that must be accomplished WHILE THE MACHINE OR EQUIPMENT IS UTILIZED TO PERFORM ITS INTENDED PRODUCTION FUNCTION. LOTO is not required in this instance if it can be demonstrated that alternative means enable employees to service the machine without being exposed to an unexpected activation of the equipment or release of stored energy. An NPO exception must be documented, reviewed by Site
EHS, and ratified by the NPO/Alternative Methods Review Board before a normal production operations procedure not requiring LOTO can be implemented. The NPO exception cannot be utilized for electrical hazardous energies.

a) Normal Production LOTO Exception Process:
   (1) The normal production operations procedure shall be reviewed by engineering and a designated Site EHS representative.
   (2) Ensure that VF engineering stakeholders are consulted and agreeable on proposals before going to the NPO/Alternative Methods Review Board.
   (3) If applicable, the normal production operations procedure shall be documented within the NPO exception template/form.
   (4) The normal production operations procedure shall be provided by Site EHS or Engineering to the NPO/Alternative Methods Review Board.
   (5) The NPO/Alternative Methods Review Board will either accept or reject the normal production operations procedure as an approved NPO exception.
   (6) If approved, the normal production operations procedure will be implemented and LOTO for that specific activity WILL NOT be required.
   (7) If rejected, the normal production operations procedure will not be implemented and LOTO WILL be required before work can be completed.

b) Refer to Appendix D, NPO Process & Appendix E, NPO Evaluation Form for additional information.

14. CoHE Alternative Method: An exception when LOTO is not required or is impracticable on a machine or piece of equipment DURING MAINTAINANCE ACTIVITIES. This deviation from LOTO procedures must be reviewed and approved. As an example, LOTO may not be required in the instance if it can be demonstrated that alternative means enable employees to service the machine without being exposed to an unexpected activation of the equipment or release of stored energy. Like a NPO exception, a CoHE Alternative Method must be documented (Appendix F, CoHE Alternative Method Process and Appendix G, CoHE Alternative Method Evaluation Form), reviewed by Site EHS, and ratified by the NPO/Alternative Method Review Board before the alternative procedure not requiring LOTO can be implemented.

a) CoHE Alternative Method Process:
   (1) The specific alternative procedure shall be created by engineering and a designated Site EHS representative and must include
      (a) Determination if task is routine and repetitive
      (b) Explanation of why power is required
      (c) Establish why lockout is impracticable
      (d) Are employees exposed to hazards?
      (e) Are guards being removed?
      (f) Are interlocks bypassed?
      (g) Perform a Risk Assessment which includes:
         (i) Identification of the tasks related hazards
         (ii) Qualitative estimation of exposure and severity to determine the level of risk
         (iii) Assessment and evaluation of the risk
         (iv) Identification of control actions selected as the best protective alternative
         (v) Verification of effectiveness of the selected alternative
         (vi) Documentation of the Risk Assessment Process
   (2) Ensure that VF engineering stakeholders are consulted and agreeable on proposals before going to the NPO/Alternative Methods Review Board.
   (3) The alternative procedure shall be documented within the CoHE Alternative Method template/form.
   (4) The Alternative Method shall be provided to the NPO/Alternative Method Review Board.
(5) The NPO/Alternative Method Review Board will either accept or reject the alternative procedure as an approved CoHE exception.

(6) If approved, the Alternative Methods will be implemented and LOTO for that specific activity WILL NOT be required.

(7) If rejected, the Alternative Method will not be implemented and LOTO WILL be required before work can be completed.


15. When an employee is working in an area with potential exposure to electrical energy, they are required to use LOTO. If there is a compelling reason to work on the system energized, refer to the Electrical Energized Work (EEW) standard for additional requirements.

16. Dual valve isolation is required for pressurized (>15psi) Hazardous Production Materials (HPMs). This requires that one valve be locked/tagged out and a second valve to be closed between the source of hazard and the authorized employee. The second valve may be closed by any means, including by manually closing the valve, closing air operated valves that are normally closed by isolating the air source, engaging interlock(s) that close a valve(s), or removing power to solenoids.

Note: Inert gases per definition are not HPM. However, LOTO is required if pressurized more than 15psi and additional controls may be necessary based on the workplace conditions as per Intel Inert Gas guideline.

17. Lockout/Tagout (LOTO) is not required for equipment that has only one electrical energy source and is capable of being unplugged, provided that the plug is under the direct control and immediate supervision of the employee performing the work for the duration of the task. The plug is under the exclusive control of the employee if it is physically in the possession of the employee, or in arms reach and in line of sight of the employee.

Note: Does NOT apply when more than 1 employee is working on the tool/system.

18. Use both locks and tags unless the system will not physically accept a lock. If a particular piece of equipment does not have a device allowing it to be physically locked out, then only a tag can be used.

a) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device. It should be installed and be obvious/visible to anyone attempting to operate the device.

b) Additional means to ensure equivalent safety as lockout are required as necessary. (An example would be to remove a valve handle or unland wires.)

c) Notify your safety representative within 24 hours of any equipment that will not accept a lock so that it can be modified if possible.

19. Custodial Lock Out And Tag Out

a) A lockout procedure intended to provide protection to systems, equipment, and/or machinery – NOT EMPLOYEES. If an employee is required to place any part of his/her body into an area where a danger zone exists, he/she must utilize CoHE procedure for that system, equipment or machinery.

b) Custodial Lock and Tags must be different from the Safety/CoHE Locks and Tags used

20. Custodial LOTO is used in the following circumstances:

a) System, equipment, or machine is secured to prevent its operation when a component is missing.

b) System, equipment, or machine is secured to prevent its operation when demolition is scheduled.

c) Installation is complete or in progress, but the system, equipment, or machine has not been qualified and, therefore, not released for use (ex. up to SL1).

d) To secure valves/controls that are set in a prescribed position to maintain system integrity.
B. LOCKOUT/TAGOUT (LOTO) PROCEDURES

1. LOTO Preparation
   a) Obtain the LOTO devices and tags
      **Note:** It is the responsibility of the authorized person applying LOTO to perform a risk assessment on the isolation points and select an appropriate LOTO device that does not introduce or create a hazard. For example metal LOTO cables are not suitable for electrical LOTO purposes or LOTO of other hazards like pneumatics, circuit breakers that are in proximity to electrical circuitry.
   b) Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment
   c) Read and understand the equipment specific energy control procedures.
   d) Locate each energy control point on the equipment. Use as reference documents (ex. Piping and Instrumentation Diagram) to identify the appropriate lock out points and normal position of system controls.
   e) Power down equipment.
   f) Isolate the equipment from all hazardous energies sources.

2. LOTO Application
   a) Apply the LOTO device so that it locks the energy isolating device in the off position. Affix the tag directly to each lock.
   b) Dissipate, drain, or safely release any stored or residual energy in the system.
      **Note:** In some cases it may be advisable to verify energy isolation prior to dissipating stored or residual energy. This should be included in the energy control procedure.
   c) Verify that all sources of hazardous energies have been isolated. This should be done by first by trying to start the equipment and then where appropriate by measuring the energy with a meter or gauge. Prior to using the meter/gauge, ensure it is functioning properly. Be sure to return all switches to the off position after testing.
      (1) For verification of electrical isolation, a qualified person shall use test equipment to test the circuit elements and electrical parts of the equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are de-energized.
         **Note:** Hazards such as RF and UV are not considered circuit elements or electrical parts of equipment and therefore would not require a voltage check. Attempting to restart the system would be an appropriate method for verifying these hazards have been isolated. In all cases if there is potential of contacting an exposed electrical circuit, proper electrical verification with a volt meter must be used.
      (2) The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back feed even though specific parts of the circuit have been de-energized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately after the test.
      (3) Perform a Three-Point Check to ensure your Volt-Meter is working properly:
         (a) Set Voltage Scale to appropriate voltage and test on a known-voltage source.
         (b) Check Danger Zone Voltage with Meter – confirm to be Zero.
         (c) Check meter with a known voltage again to confirm proper operation of the meter.
3. LOTO Preparation for Re-energization
   a) Inspect the work area to ensure that all nonessential items, tools, etc., have been removed from the danger zone.
   b) Check that all the guarding and safety controls have been properly replaced.
   c) Notify “Affected Employees” and ensure that all personnel are in a safe location before re-energization.

4. LOTO Lock and Tag Removal
   a) Check the tags before removal, and then remove the LOTO locks and tags.
   b) Re-energize the equipment/system according to start up procedures.

5. LOTO Lock and Tag Temporary Removal
   a) Clear equipment of tools and materials.
   b) Remove “Affected Employees” from equipment area.
   c) Remove LOTO devices.
   d) Energize and proceed with testing or positioning.
   e) De-energize all systems and reapply energy control measures in accordance with procedures.

   Note: In situations in which LOTO devices must be temporarily removed from the energy isolating device and the equipment energized to test or position the equipment, follow the steps above.

6. LOTO Equipment Used
   a) Do not proceed with the task unless the correct LOTO equipment is available.
   b) Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color, shape, and additionally, in the case of tagout devices only, print and format shall be standardized. Size may not be practical as you need different size locks to fit different situations.
   c) Locks:
      (1) Durable and uniquely identified locks, with a single key, shall be available for all authorized employees. The key will remain at all times with the individual who places the lock. Locks (as described above) can be available for use by a number of people and stored in a central location. Personnel can take locks to use for LOTO as long as they control the key for the duration of that LOTO. Locks and keys can be returned to central location afterwards.
      (2) These locks are not to be used for any other purpose (e.g., locking tool, custodial locks, boxes, lockers, chaining equipment, etc.).
   d) LOTO Tags:
      (1) Durable tags, which will not deteriorate under work conditions, shall be used whenever a lock is placed.
      (2) The tags must contain at a minimum, the following information:
          (a) Employee’s name and phone/pager number.
          (b) Legend such as the following: Do Not start, Do Not Open, Do Not Close, Do Not energize, Do Not Operate
      (3) If an energy source cannot accept a lock (tagout only), the tag must contain a warning against hazardous conditions if the machine or equipment is energized.
      (4) Wires, tie wraps, or cords shall be used for securing the tags to the energy control point and must be able to withstand 50-lb of force.
XIII. Training

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| Control of Hazardous Energy (Authorized Person)  | 00001537    | **A.** Authorized Employees  
1. Must initially attend and complete Intel’s Control of Hazardous Energies training course (IU code 00001537). Annually thereafter, each authorized employees shall be retrained on CoHE or pass Periodic Inspection (00005673).  
2. Will receive equipment specific training and certification, as applicable.  
3. Authorized employees must be retrained by completing the Control of Hazardous Energy course if:  
a) The employee uses blatant disregard of CoHE procedures during periodic inspection.  
4. Authorized employees shall be coached/ receive hands on training if:  
a) There is a change in job assignment, a change in machines, equipment or processes that present a new hazard, or there is a change in the energy control procedure.  
b) The periodic inspection reveals, or whenever there is reason to believe, there are inadequacies in the employee’s knowledge or use of the energy control procedure.  
5. If employee is observed and found to be proficient during the Annual Periodic Inspection, they are not required to attend the Control of Hazardous Energy course. If employee is not observed during the periodic inspection, they shall attend the Control of Hazardous Energy course to ensure proficiency. |
| Control of Hazardous Energy (Periodic Inspection) - OJT | 00005673    |                                                             |
| Control of Hazardous Energies (Affected Employee) | New Employee Orientation | **B.** Affected Employees  
1. Affected employees working in areas where LOTO may be used must be trained in the purpose and use of the Control of Hazardous Energies.  
2. Affected employees must be retrained if a significant local regulation or Intel CoHE standard change has been made (i.e. new requirement, change in locks or tags, new or modified equipment).  
3. Affected employee retraining can be delivered through awareness campaigns. |
XIV. Roles and Responsibilities:

A. Employees
   1. Authorized Employees
      a) Shall perform LOTO activities which are in conformance with Intel’s requirements.
      b) Retain control of the equipment, system or machinery while a LOTO is in progress and work
         only under their own lock and tag.
      c) Retain control of the equipment, system or machinery while a LOTO is in progress and work
         only under their own lock and tag.
      d) Complete all training required to be authorized to work with specific equipment, tool(s) or
         machinery.
   2. Affected Employees
      a) Be aware and knowledgeable of the intent and requirements of the Control of Hazardous
         Energies Program.
      b) Complete required training.
      c) Be knowledgeable of energies associated with the equipment.

B. Supervisors/Managers
   1. Ensure that only authorized employees, who are qualified and trained, apply and remove locks and
      tags. Ensure that employees who are found to have insufficient skills or understanding of LOTO
      requirements do not perform LOTO and are retrained.
   2. Designate a program owner for the Control of Hazardous Energies Program.
   3. Implement, manage, and audit personnel for conformance with the Control of Hazardous Energies
      Program.
   4. Ensure that all safety equipment is stocked, stored and maintained in a state of readiness and is
      available for employee use.
   5. Ensure that any deficiencies or deviations found in the working procedures/specs are corrected.

C. Site Environmental Health and Safety
   1. Ensures that a site and/or group implementation program is documented, implemented and complies
      with the minimum requirements of this document.
   2. Works with management to ensure compliance with this document and all other local requirements.
   3. Remains current with site specific and local requirements.
   4. Ensures a system is in place to properly train employees.
   5. Audit site’s and/or group’s program(s) periodically to ensure the content of this document and
      employee practices are current with local regulations and maintains audit documentation.
   6. Audit site contractor’s training programs and practices for compliance.

D. Global Environmental Health and Safety
   1. Shall maintain the Corporate Control of Hazardous Energies standard.
   2. Will serve as a resource for the interpretation of this document and its requirements.
   3. Provides communication to site EHS of any changes to the document.

E. Intel Contractor Sponsor
   1. Communicates the expectations of this standard to contractors as appropriate.

F. System or Tool Owner
   1. Is responsible for ensuring the Energy Control Procedures for the system or tool they own are
      updated in conjunction with any changes to the system or tool that affect the procedures.
   2. Is responsible for conducting periodic review of energy control procedures to ensure the procedures
      are compliant with this standard and in accordance with local regulatory requirements.
XV. Definitions

Affected Employee: A person who operates or maintains equipment that may be locked/tagged out. Also, a person who works in an area where equipment is being serviced.

Alternative Method: An exception when LOTO is not required or is impracticable on a machine or piece of equipment DURING MAINTAINANCE ACTIVITIES. This deviation from LOTO procedures must be reviewed and approved. As an example, LOTO may not be required in the instance if it can be demonstrated that alternative means enable employees to service the machine without being exposed to an unexpected activation of the equipment or release of stored energy. Like a NPO exception, a CoHE Alternative Method must be documented, reviewed by Site EHS, and ratified by the NPO/Alternative Method Review Board before the alternative procedure not requiring LOTO can be implemented.

Authorized Employee: A person who locks/tags out machines or equipment in order to perform servicing or maintenance. Authorized Persons must initially attend and complete Intel’s Control of Hazardous Energies training course and will receive equipment specific training and certification, as applicable.

Authorized Inspector: An authorized employee who has been trained and has demonstrated proficiency to perform servicing and maintenance on the machine or equipment to be inspected. They must also be given the authority and responsibility to perform the inspections by Intel management.

Capable of Being Locked Out: An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

Custodial Lockout: A lockout procedure intended to provide protection to systems, equipment, and/or machinery – NOT EMPLOYEES. If an employee is required to place any part of his/her body into an area where a danger zone exists, he/she must utilize CoHE procedures for that system, equipment, and/or machinery.

Danger Zone: The area or workspace where, if the hazardous energy was inadvertently released, the energy could potentially cause injury.

Examples of danger zones include:
- Electrical work- areas where a person could receive an electric shock if the electrical energy inadvertently became re-energized.
- Hazardous chemical line work- areas where a person could be exposed to the hazardous liquids, vapors, gases, or mists if the line is inadvertently opened and chemical leaks out.
- Mechanical work- areas with the potential for crushing, pinching, cutting, snagging, or puncturing.

De-energization: Parts are de-energized when the working potential is completely depleted, discharged, or has returned to a non-hazardous state.

Energy: Includes but is not limited to:
- Mechanical motion - moving links, bars, chains, belts, sliders, wheels, shafts, gates, rams, blades, pistons, etc.
- Potential or stored energy - pressure (above ambient pressure), vacuum (below ambient pressure), gravity, springs, batteries, or capacitors.
- Electrical energy - potentially hazardous voltage (> 50 volts), hazardous static electrical potentials, or may be stored in a capacitor.
- Radio frequency energy
- Electromagnetic energy from lasers.
- Ultraviolet light sources, x-ray sources, or high level magnetic fields.
- Thermal energy - very hot or very cold temperatures (e.g., < 32°F/0 C or > 140°F/60 C).
- Chemical energy - reactive, corrosive, flammable, radioactive, poisons, oxidizer materials or other Hazardous Production Materials.

Energy Control Point: The single point at which hazardous energy flow can be effectively and positively blocked so that it can no longer cause injury or loss of resources. There may be more than one Energy Control Point on a tool.

Energy Control Procedure: Specific procedure for:
- Steps for shutting down and isolating hazardous energies.
- Procedures for applying, removing, and transferring lockout/tagout devices.
- Requirements for testing a machine/piece of equipment to determine and verify the effectiveness of lockout/tagout procedures.
**Energy Isolating Device:** A mechanical device that physically prevents the transmission or release of energy. Examples of energy isolating devices are a manually operated circuit breaker, a disconnect switch, a valve, a mechanical blocking device, or any similar device used to block or isolate hazardous energy.

**Energized:** Connected to an energy source or containing residual or stored energy.

**Hazardous Production Material (HPM):** An HPM is defined as a solid, liquid or gas that has a degree-of-hazard rating in health, flammability or reactivity of Class 3 or 4 as ranked by the Uniform Fire Code Standard 79-3 (NFPA 704 and NFPA 49); and which is used directly in research, laboratory or production processes which have as their end product materials which are not hazardous.

**Impracticable:** A LOTO that cannot be performed due to equipment, engineering or work environment difficulties that would increase the potential hazard to employees who perform the LOTO or equipment or process design that does not allow for isolation of hazardous energy. This does not include convenience or production impact.

**Lockout:** The placement of a physical restraint energy isolating device, which ensures that the equipment cannot be operated or release a hazardous energy.

**Lockout Device:** A device which utilizes a positive means such as a lock to hold an energy isolating device in the safe position and prevent the energization of a machine or equipment. Included are blank flanges and bolt slip blinds. The Federal OSHA regulation specifies that the lockout device must be substantial so that it cannot be easily removed or defeated without excessive force or unusual techniques (e.g. bolt cutters, hacksaw).

**Lock Box:** An approved box or container into which a key or set of keys could be placed. Lock boxes shall be substantial enough to prevent entry without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools. Lock boxes must be capable of being locked out with a hasp or other means of attachment to which, or through which, a lock and/or lockout scissors can be affixed.

**Normal Production Operation (NPO):** An exception when LOTO is not required for activities that must be accomplished while the machine or equipment is utilized to perform its intended production function. LOTO is not required in this instance if it can be demonstrated that alternative means enable employees to service the machine without being exposed to unexpected activation of the equipment or release of stored energy. An NPO must be documented, reviewed by Site EHS, and ratified by the NPO Review Board before the alternative procedure not requiring LOTO can be implemented. The NPO exception cannot be utilized for electrical hazardous energies.

**Servicing and Maintenance:** Any scheduled or unscheduled activity that when complete will enable the machine to perform its intended function; such as constructing, installing, setting up, adjusting, inspecting, demobilizing, modifying, and maintaining and/or servicing machines or equipment.

**System/Tool Owner:** Employee designated by the organization owning the system, factory tool or equipment, and any support equipment unique to that system/ tool or equipment for the safety of that system/tool and equipment unique to that system/ tool or equipment. May be called "system owner" or "tool owner".

**Tagout:** The placement of a warning/identification tag on an energy-isolating device to indicate that the equipment must not be operated.

**Tagout Device:** Must include Employees Name, warning against hazardous conditions if the machine or equipment is energized and a legend such as the following: Do Not start, Do Not Open, Do Not Close, Do Not energize, Do Not Operate Wires, tie wraps, or cords shall be used for securing the tags to the energy control point and must be able to withstand 50 lb. of force.
XVI. References

A. Applicable Forms and Documents
   1. 29 CFR 1910.147, Control of Hazardous Energies (Lockout/Tagout)
   2. 29 CFR 1910.301, Subpart S, Electrical
   3. ANSI Z244.1 Control of Hazardous Energy-Lockout/Tagout And Alternative Methods
   4. NPFA 70E, National Electric Code, Article 120

XVII. Change Control

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev #</th>
<th>Section</th>
<th>Author</th>
<th>Change Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/2009</td>
<td>7.4</td>
<td>All</td>
<td>Obet Huele</td>
<td>Added section 4.11.3; Appendix I, Lock Box Change of Shift; and changed owner to Mindy Koch.</td>
</tr>
<tr>
<td>11/2009</td>
<td>8.0</td>
<td>All</td>
<td>Mindy Koch</td>
<td>Removal of geo-specific regulatory references (note: requirement may still be included as a best practice without regulatory citation). Requirement to conduct annual ECP review changed (proposed) to be US only. Incorporated Appendix I, Lock Box Change of Shift into the body of the document. Clarified requirements for dual valve isolation of pressurized HPMs in accordance with the Intel Specialty Gas Guideline. Removed Appendix, H Partial Listing of Site Lock Colors. Expires October 2012.</td>
</tr>
<tr>
<td>12/2009</td>
<td>8.0</td>
<td>All</td>
<td>Mindy Koch</td>
<td>Changed outline numbering scheme to match standard outline format. Changed owner to Heath Foott.</td>
</tr>
<tr>
<td>4/2011</td>
<td>8.1</td>
<td>All</td>
<td>Heath Foott</td>
<td>Changed III.B.2. to clarify metering and testing requirements for by-products (i.e. RF and UV) of electricity.</td>
</tr>
</tbody>
</table>
APPENDICES

Appendix A
Energy Control Procedure (ECP)

Control_of_Hazardous_Energies_ECP.docx
Appendix B

Control of Hazardous Energies Abandon Lock Removal Form

This form is to be used any time a Lockout/Tagout (LOTO) device is to be removed by someone other than the person who placed the LOTO device. The person removing the LOTO device must be directed to do so by management. Failure to follow and document the appropriate steps to remove a LOTO device can result in disciplinary action up to and including termination.

<table>
<thead>
<tr>
<th>DATE:</th>
<th>TIME:</th>
</tr>
</thead>
</table>

1. Name of LOTO device owner whose lock/tag is to be removed:

2. LOTO device owner’s extension/pager:

3. LOTO device owner’s First-Line Supervisor or On-Shift Supervisor:

4. Document attempt to contact LOTO device owner.

<table>
<thead>
<tr>
<th>DATE/TIME</th>
<th>METHOD OF ATTEMPTED CONTACT</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Reason for removing lock (e.g. LOTO device owner called in sick, LOTO device owner forgot to remove lock before leaving site, etc.)

6. Evaluate the entire affected system to ensure employee’s safety before LOTO device is removed. LOTO device(s) removed by:

   Removed by (Print): ________________________________

   Supervisor’s (or designee) Signature: ________________________________

   Date/Time: ________________________________

   Observed by (Print): ________________________________

   Authorized Employee’s Signature: ________________________________

   Date/Time: ________________________________

7. Intel EHS Representative informed (i.e. email or phone call/message) that a LOTO device has been removed within 24 hours of removal.

   EHS Representative Notified: ________________________________

   Date: ________________________________

   Time: ________________________________

*Method of notifying LOTO device original owner and their supervisor that the LOTO device was removed prior to beginning their next shift.*
## Appendix C

### Annual Periodic Inspection Checklist for Control of Hazardous Energies

<table>
<thead>
<tr>
<th>Authorized Employee Observed:</th>
<th>WWID:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment:</td>
<td>Date:</td>
</tr>
<tr>
<td>Procedure:</td>
<td>Location:</td>
</tr>
<tr>
<td>Periodic Inspector:</td>
<td>WWID:</td>
</tr>
</tbody>
</table>

**Hazardous Energies Involved:**
- **a)** Electrical: Voltage_________
- **b)** Chemical
- **c)** Pressure (pneumatic/hydraulic)
- **d)** Vacuum
- **e)** Thermal: High Temp: _______ Cryogenics:______
- **f)** Ionizing Radiation
- **g)** Non-Ionizing Radiation: Ultraviolet _____ Infrared _____ RF/Microwave_____ Laser ____ Magnetic Fields_____  
- **h)** Stored
- **i)** Mechanical

### PROCEDURAL STEPS

<table>
<thead>
<tr>
<th>PROCEDURAL STEPS</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO LOCK OUT THE EQUIPMENT:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Notified Affected Employees of LOTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Identified all power disconnect points. Specific Points: ______________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Stopped or powered down equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Isolated equipment from all hazardous energies sources. Number of isolation points: ______________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Applied LOTO device(s) energy isolating device is locked in Off position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Attached LOTO Tag to Lock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Dissipated, drained, or safely released stored or residual energy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Blocked mechanical parts or removed mechanical links</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Attempted to re-start machinery or re-energize equipment through normal means. Returned switch to OFF position.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Verified no hazardous energies present or isolated. Identify test equipment/meters used: ______________________</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TO RE-ENERGIZE THE EQUIPMENT</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inspected work zone to ensure it is clear of equipment, workers, tools, and test equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Unlocked and removed any blocking devices and replaced mechanical linkages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Repositioned safety valve(s) left open to prevent re-build up of pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Checked all guarding and safety controls properly replaced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Warned workers to stay clear of area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Removed all locks and tags from energy control points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Verified area clear of personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Restarted/re-energized equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Notified Affected Employees LOTO completed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The results of this inspection were discussed between the Authorized Employee being observed and the Inspector.*

**Signature of Authorized Employee Observed:**

**Signature of Periodic Inspector:**
Appendix D

NPO (Normal Production Operation) Process

**Normal Production Operation Lockout/Tag out Exceptions**: The CoHE standard was developed to protect workers from potential hazards associated with performing servicing and maintenance activities. (Servicing and maintenance activities are defined to include constructing, installing, setting up, adjusting, inspecting, maintaining, repairing, and servicing.) OSHA has a special exception for activities that must be accomplished while the machine or equipment is in a production mode, which is referred to as a Normal Production Operation (NPO) Lockout/Tag out exception. Intel's position is that use of this exception requires an alternate means of protection to control the hazardous energies. CoHE must be complied with for any servicing or maintenance activities in a danger zone where unexpected release of hazardous energies could cause injury unless a NPO Lockout/Tag out exception has been approved by the NPO review board. It is important to note that the NPO LO/TO exception cannot be utilized for Electrical Hazardous Energies.

**Q**. What if I feel that the work/service to the tool can only be done while the tool is operating and cannot be performed if the tool is locked out in compliance with Intel's CoHE procedure?

**A**. Refer to the appropriate web page above to see if a NPO exception has already been approved for the tool and task in question. If one has been approved, work can proceed in accordance with the approved NPO. If no NPO has been approved, work must be done in compliance with CoHE requirements or a NPO exception must be obtained.

**Q**. How do I obtain a NPO exception?

**A**. Answer the following question and proceed accordingly:

Are there tasks being performed (PM, production operations, troubleshooting, inspecting, clearing jams, etc) where the employee is being protected from hazardous energies with alternate methods other than lockout tag out (i.e., software or mechanical interlocks or light curtains etc)?

If **YES** - The Tool owner should contact the site safety engineer and complete a NPO Evaluation Form (form on next page). Tool owner should bring to his VF Engineering Forum the NPO proposal and get agreement before presenting it to the NPO/AM Review Board. The Safety Engineer will submit the completed NPO Evaluation Form to the appropriate NPO Review Board and request a review meeting by contacting the NPO Review Board Chair.

If **NO** - Lockout tag out is used and the NPO process does not apply.
## Appendix E

### Normal Production Operation Evaluation Form

<table>
<thead>
<tr>
<th>Date:</th>
<th>Originator/Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Engineer</td>
<td>Task Title</td>
</tr>
</tbody>
</table>

### Equipment | Tool: | System |

1. **Provide explanation as to why this task needs to be performed while tool is energized.**

2. **Identify separately each type of hazardous energies, current method of control and type of injury that could result if controls failed and the machine became operational:**

   **Examples:** Engineering Controls: Equipment modification, redesign, hard interlocks
   
   Type of energy:
   - Engineering Controls:
   - Administrative Controls:
   - Potential Injury:

   Type of energy:
   - Engineering Controls:
   - Administrative Controls:
   - Potential Injury:

3. **List the specific steps to perform the task.**

   “Focus on steps where hazardous energy controls are removed/bypassed or employee places body part in danger zone.”

4. **What is the frequency of task (i.e., per hour, per shift, per week, etc.)?**

5. **Has the worker been trained for this specific task?**
   - Yes
   - No

6. **Do other sites with the same tool perform LO/TO during this task?**
   - Yes
   - No
   
   **If yes, why is this tool being evaluated differently?**

7. **Have there been any previous incidents or injuries within Intel relating to this tool and the task being evaluated?**
   - Yes
   - No
   
   **If yes, briefly explain. (i.e. behavioral/equipment related).**

8. **Does supplier maintenance manual require LO/TO for this particular task?**
   - Yes
   - No
Appendix F

COHE Alternative Method Process

**COHE Alternative Method**: An exception when LOTO is not required or impracticable on a machine or piece of equipment DURING MAINTENANCE ACTIVITIES. LOTO may not be required in the instance if it can be demonstrated that alternative means enable employees to service the machine without being exposed to an unexpected activation of the equipment or release of stored energy.

Impracticable means that LOTO can not be performed due to equipment, engineering or work environment difficulties that would increase the potential hazard to employees who perform the LOTO. This does not include convenience or production impact.

**Q. How do I obtain a CoHE Alternative Method?**

A. Answer the following question and proceed accordingly:

1. Discuss situation with site EHS to determine if the situation meets the criteria. If Yes, Complete the form located _______________ and submit through site EHS to the NPO/Alternative Method Board that is appropriate for your situation.

*Note: Tool owner should bring to his VF Engineering Forum the AM proposal and get agreement before presenting it to the NPO/AM Review Board.*
## Appendix G

### COHE Alternative Method Evaluation Form

<table>
<thead>
<tr>
<th>Date:</th>
<th>Originator/Site:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety Engineer:</th>
<th>Task Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment:</th>
<th>Tool:</th>
<th>System:</th>
<th>Platform:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Is this task routine and repetitive?**
   - Yes
   - No

2. **Why is the hazardous energy required to be “on” to perform this task?**

3. **Why is the LOTO impracticable?**

4. **Are employees exposed to hazards?**
   - Yes
   - No
   *If yes, please explain what type.*

5. **Are guards being removed?**
   - Yes
   - No

6. **Are interlocks bypassed?**
   - Yes
   - No

7. **Describe Task.**

### RISK MANAGEMENT

1. **Identify all task related hazards.**

2. **Provide qualitative estimation of exposure and severity to determine level of risk.**

3. **Provide assessment and evaluation of risk.**

4. **Identify potential control actions considered to reduce the risk of each hazard.**

5. **Identify control actions selected as the best protective alternative.**

6. **Provide verification of effectiveness of the selected alternative.**