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Procedure
for
New Equipment and Process Change Management

REVISION

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1. INTRODUCTION

This procedure is for use at the College of Nanoscale Science and Engineering (CNSE) facilities to assist in installing new tools and managing significant changes in process chemistry or physical changes made to tools and/or equipment previously installed and commissioned under this and the EHS 00017- Equipment Commissioning Procedure. The contents of this Checklist are in no way intended to address all safety and regulatory issues related to all equipment installation projects. It is intended to stimulate aggressive code, safety, health and environmental review for each installation project and address the majority of such issues as seen fit by the CNSE Facility Operations Group (FOG) and Environment, Health and Safety (EH&S) personnel.

2. PURPOSE

- 2.1 To ensure that all new equipment/tools and significant changes in process chemistry or equipment configuration are in compliance with applicable codes, regulations, and sound engineering practices.
- 2.2 To proactively address safety, health and environmental concerns related to the design, installation, startup, operation and maintenance of new and modified equipment or introduction of new or significantly modified process chemistries within the scope of this procedure.
- 2.3 This New Equipment and Process Management Change Checklist provides a record of each new equipment installation and/or significant equipment modification or process chemistry change and the associated review process for the CNSE EH&S and FOG offices.

3. SCOPE

- 3.1 This procedure addresses the minimum requirements for the installation of new tools and for the addition of significant new or modified chemistries or a physical modification of existing equipment within the facility and is intended to identify the majority of EH&S and regulatory compliance issues for such activities. The New Equipment and Process Change Checklist must be completed for the installation of new equipment and for changes or modification that shall be made to all tools and equipment previously installed that meet at least one of the following criteria:
 - Uses Hazardous Production Materials (HPMs) as defined by the New York State Fire Code (NYSFC) and New York State Building

Code (NYSBC) (solid, liquid, or gas) with hazard ratings of 3 or higher.

- Uses or contains radiation (e.g. Ionizing, Laser, RF, X-ray)
- Has air pollution abatement equipment installed on it.
- Generates wastewater requiring treatment.
- Creates hazardous waste.

3.2 If this new installation and/or modification only involves the addition or removal of any toxic gas monitoring system (TGMS) monitoring points, then applicant must follow requirements outlined in TGMS Operations & Maintenance (O&M) procedure EHS-00031.

3.3 This procedure does not apply to facility only modifications. Those proposing to make facility modifications need to comply with the Facility Modification Procedure (EHS-00038).

4. DEFINITIONS

The definitions included in the EHS 00017 - Equipment Commissioning Approval Procedure apply to this procedure, as well as the following:

- 4.1 **Bulk Chemical Delivery System** - A system that consists of chemical storage vessels located outside of the fabrication area from which chemicals are delivered, via distribution piping, to equipment located in the fabrication area.
- 4.2 **Tool Owner** - As it relates to this procedure, the Tool Owner is the person who owns/purchased the tool and is listed as the "Applicant" on the Equipment Installation Approval Checklist. In the event that a more appropriate party exists, it shall be the responsibility of the "Applicant" to designate the person who will fulfill the responsibilities of the Tool Owner during the installation process.
- 4.3 **Equipment-specific** - An item is considered to be equipment-specific if it is installed specifically to accommodate, either wholly or in part, the presence of the equipment being installed or is installed internally to the equipment itself.
- 4.4 **Hazardous Energy** - Hazardous energy includes, but is not limited to, electrical, mechanical, hydraulic, pneumatic, chemical, thermal, ionizing radiation, non-ionizing radiation, and other types of energy. Lockout/tagout procedures must consider all hazards associated with all types of energy that may be related to the activity to be performed.

- 4.5 **Hazardous Production Materials (HPM)** - 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 National Fire Protection Association (NFPA 704 - 1997)] and is used directly in research, laboratory or production processes that have as their end products, materials that are not hazardous.
- 4.6 **Local Dispense Chemical Delivery System** - A local dispense chemical is one that is stored in and/or dispensed from a vessel that is internal to the equipment or is delivered to the equipment from storage vessel(s) located in a dispensing cabinet that is remote from the equipment but located within the fabrication area.
- 4.7 **Non-HPM** - A solid, liquid or gas that has a degree-of-hazard rating in health, flammability, or reactivity of Class 0, 1 or 2 [as ranked by the National Fire Protection Association (NFPA 704 - 1997)]. Non-HPM chemicals are those that pose minimal, if any, hazards to personnel who may be exposed to them. They are the only chemicals that may be introduced to the equipment after Part 1 of the Equipment Commissioning Checklist (EHS-00017-F1) has been signed off.
- 4.8 **Point-of-use** - The point-of-use is considered to be that point on the external surface of the equipment that is nearest to the point of connection of gas, liquid, or vacuum supply lines to the equipment. Point-of-use labels are intended to identify all gas, liquid and vacuum lines and electrical cords at the point of connection to the equipment.
- 4.9 **Significant changes in process chemistry** - A change in the type of or hazard level of chemicals or gases utilized in an existing tool or equipment that results or may result in a need to increase the level of ambient air monitoring or a change in the method of air pollution control. (An example would be the use of an HPM chemical/gas in a tool which previously only utilized inert gases and had no air pollution control device installed or a tool that used a material at a concentration of 5% now needed to use a concentration of 25%).
- 4.10 **Significant increases in previously approved HPM use** – An increase in use of HPM gases or chemicals in excess of 20% above previously approved and permitted levels would be considered significant. This would require review of the corresponding air pollution control equipment capacity, as well as the exhaust air flow capacity.
- 4.11 **Significant changes in process equipment** – A change in equipment configuration (including addition of process modules beyond what was initially approved), increased input or output potential (resulting in increase power consumption or exhaust flow), addition of an air pollution control device due to a change in process chemistry (resulting in increased

energy consumption, exhaust air flow, water utilization and industrial drain connections), or other physical changes in operation.

5. ASSOCIATED DOCUMENTS

- 5.1 EHS-00016-F1 – CNSE New Equipment and Process Change Checklist
- 5.2 EHS-00016-F2 – Radiation Device Inventory
- 5.3 EHS-00016-F3 – Radiation Survey Sheet
- 5.4 EHS-00016-F4 – Non-Ionizing Radiation Source Equipment Inventory
- 5.5 EHS-00016-F5 – Laser Inventory

6. RESPONSIBILITIES

- 6.1 The tenant or equipment owner requesting permission to install new equipment and/or modify or add new chemical or gases to an existing tool in the CNSE facilities will complete the New Equipment and Process Change Checklist.
- 6.2 Responsible parties for each checklist item are identified with an “X” in the column on the checklist. This identifies the group or individual that is responsible for taking action on and ensuring completion of each checklist item. The designated CNSE personnel will review the checklist and required documentation. Approval to begin the installation and/or modification or change process will be granted (in most cases), or the request will be referred to the CNSE Facilities Department if there is a question about the change being requested.
- 6.3 The groups to be represented on the Equipment Installation Approval Sign-off Team are as follows:
 - Tool Owner (TO)
 - Tool Engineer (TE)
 - CNSE Safety, Health & Environmental (EH&S)
 - Registered CNSE Engineer (RE)
 - CNSE Director
- 6.4 The New Equipment and Process Checklist Sign-off Team members will meet at the site as necessary to complete their assigned checklist responsibilities. Each checklist item will be verified and initialed by the appropriate group as indicated with an “X” in the column. For checklist items that list more than one party responsible for the item, all parties must initial the Yes, No, or N/A blocks for the group they represent. If

additional persons or persons other than those listed are responsible for an item, the responsibilities can be reassigned by crossing out the original party..

7. PROCEDURE

The New Equipment and Process Change procedure guides the involved tool owner and assigned personnel through a review of the new tool installation and/or proposed installation design change prior to the change as well as allowing for periodic reviews prior to and during the installation/change. These reviews provide an opportunity for involved personnel to verify that required elements are in place prior to the start of the new equipment or process change and prior to re-starting the equipment.

The New Equipment and Process Change Checklist aids in identifying deficiencies in the design pre-installation phase.

The New Equipment and Process Change Checklist also provides an opportunity to ensure that general design, regulatory codes and EH&S requirements have been met in the design phase prior to the start of the equipment installation or change. Approval for proposed equipment or process change through the use of the New Equipment and Process Change Checklist, must be received from CNSE prior to any changes taking place.

7.1 The first section of the New Equipment and Process Change Checklist is the Equipment Installation Data. This data is intended to provide a *quick* reference to the following information regarding the equipment being installed:

- A brief description of the new equipment or proposed modification/change.
- Status of the equipment (new, relocated from another tenant location, or relocated within the NanoTech facility).
- Location where the equipment is to be installed.
- Identification of contact persons involved with the installation including the Tool Owner, the Tool Engineer; who are responsible for the installation, CNSE personnel.
- Identification of those responsible for completion of various checklist items.
- Identification of required documentation.
- Identification of the basic safety concerns that qualify the equipment to follow this procedure.

7.2 Critical Requirements

- 7.2.1 Installations/modifications shall abide by all current editions of the New York State Building and Fire Codes.
- 7.2.2 Tools and tool components installed within CNSE Facilities shall be compliant with SEMI standards; S-2/S-8/S-14. CNSE also requires the safety provisions of S-2/S-8; for VMBs, GIB Assemblies, Gas Cabinets, Chemical Distribution Units, use of Safety Interlocks, and Emergency Shutdown Capability be fully implemented.
- 7.2.3 [A complete copy of the S-2/S-8 written report of the tool's compliance and or non-compliance with the SEMI standards; S-2/S-8 must be submitted to EH&S. Any non-compliance issues must be addressed and closed in writing by the third party providing the report.](#)
- 7.2.4 All powered electrical equipment shall bear a UL Label and or be certified as compliant to UL or comparable international standards.
- 7.3 General Safety Concerns
- This section of the checklist allows for quick identification of some of the major hazards associated with the equipment. Checking "Yes" for any of the items in this section requires that this New Equipment Installation and Process Change Checklist and the Equipment Commissioning Checklist must be completed.
- 7.4 Environmental, Health and Safety Installation Design Requirements
- This section of the checklist covers a broad range of safety and environmental concerns that may be associated with a tool. It identifies whether the new and installed tools have undergone and conformed to a SEMI S2/S8 review as submitted during original installation phase, whether the tool has radiation devices present, what the exhaust/ (emission control) treatments are and what type of fire protection measures are needed and if they are in place. It also identifies whether the new or installed tool have devices and electrical components that are compatible for the safe use of gases and/or chemicals and whether those gases and/or chemicals have been approved for use at the facility and if their wastes/byproducts can be adequately treated by pollution abatement systems currently installed.
- 7.5 Facility Design Requirements
- 7.5.1 This section identifies the proposed changes in tool utility consumption and tool quality specifications that are needed by the new installation or proposed change in tool configuration or operation for a successful installation at the facility. The facility design requirements included in this checklist include:

- Electrical power,
- Process chilled water (PCW),
- Deionized water,
- Process Vacuum (PVAC),
- Compressed Dry Air (CDA),
- Exhaust,
- High pressure Nitrogen (HPN2),
- Low pressure nitrogen (LPN2),
- Radiated Heat Load,
- Temperature,
- Humidity,
- Noise,
- Airborne Molecular Contamination (AMC),
- Electro Magnetic Interference(EMI) / Electro Magnetic Field (EMF),
- Vibration,
- Cleanliness,
- Inert – bulk and cylinder gases,
- Wastewater drains.

7.5.2 Only those requirements that are expected to change as a result of the new installation or proposed modification need to be addressed in the checklist.

7.5.3 The need for completing the Facilities Design Requirements section can be omitted if the tool installation cut sheets are submitted instead.

7.6 Punch List Items

Any deficiencies that are discovered during reviews that do not directly impact the safety of the equipment or the installation of the new tool or proposed change are to be listed in the Punch list at the end of the Equipment Commissioning Checklist. Deficiencies discovered during reviews that do impact the safety of equipment or installation should be identified as major deficiencies in this New Equipment and Process Change checklist and need to be addressed before EH&S sign-off. This should also be done before any other items on the equipment commissioning checklist or deficient items checklist.

The party responsible for the completion of each item will be listed in the Punch list as well. Punch list items should be completed in a timely manner and must be completed before the checklist is signed off.

7.7 Deficient Checklist Items

All items for which "No" is indicated on the checklists must be listed in the "Deficient Items" table at the end of the checklist as appropriate. Upon completion of the deficient item, the party responsible for its completion

will indicate the date of completion and sign the "Deficient Checklist Items" table to indicate the completion of each deficient item.

7.8 Signature Blocks

Successful completion of all checklist items allows approval of the New Equipment and Process Change Checklist, whichever applies. Only upon completion of all checklist items, including those designated as Deficient or Punch list items, may the installation be approved. All parties must wait to sign the appropriate signature block until all checklist items, for which they are responsible, are verified. The CNSE Registered Engineer and EH&S Manager must wait until all Tool Owner signatures have been affixed to the checklist. The CNSE Director has final authority and will sign after all signatures have been affixed.

8. RECORDS

The New Equipment and Process Change Checklist serves as documentation of the individual equipment installation projects and will be archived for future reference by the CNSE EH&S and Document Control Departments.