

Sandia National Laboratories
Primary Hazard Screening (PHS)
PHS Number: SNL08A00071-008
Integration Lab Parts Clean Room 1511

I. Signatures (Electronic signature dates shown)
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Risk Management Determination

Hazard Classification: **Low****Operations with hazards that have the potential for significant local impacts.**Required Documentation: **A PHS with Integral HA is required**Facility/Project Designator: **Non-nuclear Facility**Date Created: **08/14/2014**DOE Order References: **425.1D**Results as of: **10/10/2014**Submitted for Review by: **Nogan,John**Org: **01132** Date: **09/02/2014**

Author / Technical Review

Assignment Completed

I am knowledgeable of the activities and hazards covered by this PHS and, after doing due diligence, the description, notes, identified hazards, analyses, and other information contained in this PHS are complete and accurate.

Please also review any other information in the PHS (e.g. description, notes, hazard tables, hazard assessments) necessary to perform your review assignment.

I have performed the review assignments shown above and concur that the document is complete and accurate.

Author: **Nogan,John**Org: **01132**CONCUR ON SUBMIT:
09/02/2014

Assignment Completed

Review Question 5c(1) for classification of UNP use

Review Question 21 and hazard-specific question sets that relate to the user-specified hazards identified in Question 21

Please also review any other information in the PHS (e.g. description, notes, hazard tables, hazard assessments) necessary to perform your review assignment.

I have performed the review assignments shown above and concur that the document is complete and accurate.

Industrial Facility Safety Basis SME: **Curran,Kelsey**Org: **04126**CONCUR: **09/04/2014****Leigh Forde**

ES&H Coordinator Review

Assignment Completed

The description and notes describe and scope the activities performed under this PHS. All hazards have been identified. Questions are answered correctly and, as necessary, rationale or clarification is provided. All hazards in the HA have been analyzed, including the identification of controls for each hazard. I have performed the above reviews and concur that those items are complete and accurate.

Please also review any other information in the PHS (e.g. description, notes, hazard tables, hazard assessments) necessary to perform your review assignment.

I have performed the review assignments shown above and concur that the document is complete and accurate.

ES&H Coordinator: **Nelson,John Seth**

Org: **01100**

CONCUR: **09/04/2014**

Quality Review

Assignment Completed

This PHS meets minimum Corporate standards for 1) description/notes and 2) required information. There are no gross inconsistencies. I have performed the above reviews and concur that those items are complete and accurate.

Please also review any other information in the PHS (e.g. description, notes, hazard tables, hazard assessments) necessary to perform your review assignment.

I have performed the review assignments shown above and concur that the document is complete and accurate.

PHS Team: **Costanzo,Jessica Amoret**

Org: **04126**

CONCUR: **09/16/2014**

Approver

Assignment Completed

The description and notes describe and scope the activities performed under this PHS. All hazards have been identified. Questions are answered correctly and, as necessary, rationale or clarification is provided. All hazards in the HA have been analyzed, including the identification of controls for each hazard. I have reviewed this PHS and concur that its contents are accurate and complete. I will ensure that the requirements and commitments in this PHS are implemented prior to the start of work.

Please also review any other information in the PHS (e.g. description, notes, hazard tables, hazard assessments) necessary to perform your review assignment.

I have performed the review assignments shown above and concur that the document is complete and accurate.

Approving Manager: **Shinn, Neal D.**

Org: **01130**

APPROVE: **09/17/2014**

II. PHS Purpose, Limitations, and Use in Work Planning and Control

Purpose of the PHS

For the scope of work identified, the PHS identifies:

- High-level (primary) hazards (e.g. chemicals, toxic gasses, explosives)
- Some, but not all controls (e.g. PPE, respirators, ventilation, lockout/tagout, and NEPA), please see the [limitations section](#), below for additional information.
- Hazard Classification, which determines the requirements for additional Safety Basis documents [e.g., Hazard Analysis (HA), Safety Assessment (SA), Safety Assessment Document (SAD), Documented Safety Analysis (DSA) etc.]

For the hazards and controls identified, the PHS enables the identification and communication of:

- Requirements documents (such as Corporate Policy System sections) that must be reviewed to determine specific requirements applicable to the work.
- Corporate Policy System-required training.
- Action and Warning messages that highlight key requirements.

The Hazard Analysis section of the PHS is used to perform a high-level hazards analysis and controls selection for hazards with a Hazard Classification of "Low" and, optionally, for Standard Industrial Hazards (SIH).

Limitations of the PHS for Use in Activity-level Work Planning and Control

Unless additional information is specifically added, a PHS **does not** contain all of the detail necessary to identify and control hazards at the activity/task level. The reasons for this include:

- PHSs are typically written at the project or work-area level and therefore, do not contain sufficient detail about individual tasks or the hazards/controls associated with them.
- While the PHS provides requirements for the hazards and controls identified, it **does not** provide a comprehensive list of all requirements in the Corporate Policy System and related documents. Furthermore, many of the requirements are identified by reference to sections of the Corporate Policy System, which must be evaluated for requirements applicable to the specific work being performed.
- It is impractical to ask enough questions to generate the level of detail necessary for activity/task-level hazard identification and control; human analysis must be employed. Consequently, details must be developed by a work planner, including:
 - Specific details about the hazard (e.g. what chemical, which laser, when, under what conditions, and where)"
 - Other controls needed, since the only controls automatically identified are the ones with Corporate Policy System requirements that result from their use. Important controls, such as access control, interlocks, shielding, monitoring, and personnel qualifications are not identified.
 - Specificity about controls (e.g. type of PPE, ventilation specifications)
 - Details on how and when you implement each control
 - Information on who needs to take what training

Recommended Use of the PHS to Support Activity-Level Work Planning & Control

The information developed in the PHS and any resultant Safety Basis documents should be utilized when performing the subsequent task of activity-level hazard identification, analysis, and control selection, where (1) the major work steps are identified; (2) the hazards associated with each major step are identified and analyzed; and (3) the controls for each hazard are identified and verified to be adequate to protect the involved workers. For the vast majority of work performed at Sandia, the Job Safety Analysis form (SF 2001-JSA) or equivalent is the recommended tool to use for this purpose. The JSA provides a systematic process for a team of involved workers and SMEs to ensure the activity-level work scope is rigorously analyzed to identify all potential hazards and specify appropriate controls for each hazard. Information from the PHS and Safety Basis documents is used as an input in developing the JSA, and the results of the JSA are used to develop TWDs, procedures, or other work instructions as appropriate.

In some cases, the PHS system may be used for activity level hazard identification, analysis, and controls identification, however, the PHS usually must be supplemented with additional information to provide the level of detail necessary to serve this purpose. In these cases, a PHS should be designated as an "Activity-Level PHS" on the PHS General Information page; however, these PHSs will be reviewed during the review and approval process to confirm that they contain the detail necessary to identify the hazards and controls at any stage of the work being performed. If determined to not be adequate, options include (1) revising the PHS to include adequate information; or (2) removing the "Activity-Level PHS" designation, and using a JSA/JSA-equivalent process to perform activity-level hazard identification, analysis, and control selection.

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III. General Information

Document Status

Question Set Version: **M**

Status: **Approved**

Expiration Date: **09/17/2015**

Responsible Organization: **01132**

Operation Type: **Facility or Lab**

Radiological Protection Level

Radiological Protection Level for this facility or project: **None**

Description

The integration lab parts clean room houses tools that act in support of the integration lab activities and is a class 10,000 cleanroom. Systems located in that room include a HEPA filtered bead blasting system attached to the house exhaust. The system is for cleaning of shielding of the e-beam evaporator systems, sputter system, atomic layer deposition (ALD) system, and chemical vapor deposition (CVD) systems. The ALD reactor components are typically coated with which are typically coated with oxides of aluminum, hafnium, and zirconium, in addition to titanium nitride and platinum. CVD components are typically coated with Au, Al, Cu, Ti, Cr, SiN, Si and SiO₂. The room also contains a base and a solvent fume hood, which will be used for degreasing and etching of parts for use in the cleanroom. There are wafer dicing saws used for dicing of wafers from the integration lab, e.g. Si wafers, GaAs, SiC, and sapphire as well as lapping and chemical mechanical polishing equipment. A scribe and break tool supports cleaving of substrates when dicing is not an option. Support equipment for the lapping and dicing operations includes a low temperature wax bonder and tape mounted.

Notes

General Document Notes

Locations

Site	Area	Building	Room	Description
Primary Location				
SSTP	No Tech Area	518	1511	

Responsible Organization History

Organization Number	Effective (Starting) Date	This Org. Submitted Document for Review
01132	02/19/2008	Y

Planned Changes

Added UNP hazard analysis, also answered yes to question 5(c)1 as a certain percentage of the labs user base are not members of the work force, have access to this area perform work with UNP.

IV. Identified Hazards

Hazard Name	Hazard Description	Source
Chemicals	Potential personnel exposure to chemicals & fire protection regulatory requirements	QUESTION 5
Unbound Engineering Nanoscale particles	Unbound Engineered Nanoscale Particles(UNP); Potential inhalation and dermal exposure to UNP.	QUESTION 5c
Unbound Engineered Nanoscale (UNP) Particles	Potential inhalation and dermal exposure	QUESTION 5c(1)
Corrosive chemical	Corrosive chemical; Potential exposure to skin and eyes.	QUESTION 5e
Noncompliant storage, dispensing, or use of flammable or combustible liquids	Fire/Explosion Hazard	QUESTION 5g
Mechanical hazards	Potential injury from mechanical forces	QUESTION 7
Portable power tools	Potential injury from portable power tools	QUESTION 7b
Pressure source	Injury or damage	QUESTION 10
Potential environmental concerns	Potential for regulatory action	QUESTION 15
Wastewater discharge	Potential to exceed permitted quantities	QUESTION 15a
Air discharge	Potential to emit regulated contaminants	QUESTION 15b
Hazardous waste	Potential for regulatory action	QUESTION 15d
Low - Offsite Work Condition -MOW	Hazards from work conducted offsite by Members of the Workforce	QUESTION 21a(1)a
Exposure to hazardous energy	Potential injury to personnel from exposure to hazardous energy	QUESTION C3

V. Required Actions

Reviewer Imposed Requirements

1. Require completion of updated stand alone hazard analysis to confirm facility hazard classification prior to next PHS review cycle. Suggest IH review of UNP activities; UNP not listed in IH report # SNLNM05561 and SNLNM05162 (2nd year recommended). Imposed by reviewer in role: ISMS_IFSBReviewer. Concerning: QUESTION 21a(1).

2. Require completion of updated stand alone hazard analysis to confirm facility hazard classification prior to next PHS review cycle. Suggest IH review of UNP activities; UNP not listed in IH report # SNLNM05561 and SNLNM05162 (2nd year recommended). Imposed by reviewer in role: ISMS_IFSBReviewer. Concerning: QUESTION 5c(1).

Readiness Messages

Readiness Review Requirements: Prior to start or restart of Low Hazard operations, the manager shall ensure that a Low hazard review (LR) is completed in accordance with Tool RR-02-T, "Startup/Restart Review for Standard Industrial Hazard and Low Hazard Operations Checklist," of MN471017, *Safety Basis Manual*. Restart, in this context, is the resumption of operations after any change that modified:

- Hazards
- Controls, engineered or administrative (e.g., Safety Management Programs, TWDs)
- Physical configuration of the facility or laboratory
- Training for workers

It is a managers responsibility to grade the readiness review in accordance with the magnitude and significance of the changes that have occurred.

Warning Messages

1. There are a variety of requirements applicable to chemicals. Refer to the portions of Corporate Policy: ESH100, Environment, Safety and Health relevant to the activities being performed for requirements. (QUESTION 5)

2. Members of the Workforce and Visitors meeting any of the following criteria are required to participate in SNL's UNP Worker Registry:

- 1) Have the potential for inhalation or dermal exposure to UNP;
- 2) Routinely spend time in an area in which UNP have the potential to become dispersed in the air or on surfaces; or
- 3) Perform work on equipment that might contain or bear UNP and that could release UNP during servicing or maintenance (QUESTION 5c)

3. All operators of the system must be qualified according to the requirements of the Pressure Safety Manual. The Pressure Operator Qualification Form (SF 2001-PQF) is available as an optional tool for documenting the applicable training and qualification requirements for pressure applications. See MN471000, Pressure Safety Manual, Chapter 2, "The Pressure Safety Program," for requirements and guidance on qualification of pressure operators. (QUESTION 10a)

4. There are requirements for waste minimization and documentation of waste minimization efforts/results. Contact the Pollution Prevention (P2) Team and/or refer to website <http://info.sandia.gov/esh/p2/TechnicalAssistance.html> if assistance with waste minimization documentation is needed. (QUESTION 15d)

5. If Members of the Workforce wish to voluntarily use respiratory protection, contact the division ES&H Team Industrial Hygienist to perform an exposure assessment (QUESTION C2a(1)b)
6. All contractors performing servicing and maintenance on SNL-owned equipment shall perform LOTO when required in accordance with 29 CFR 1910.147 (OSHA Standards for General Industry) and comply with the following two additional requirements: (1) The contractor shall be briefed on SNL-specific LOTO devices and procedures applicable to the equipment under maintenance. (2) The contractor shall inform the SNL equipment owner and other authorized or affected workers of the contractor's energy control procedure/process, including any differences between that process and SNL-specific requirements. (QUESTION C3a(1)a)
7. Ensure that activity meets the requirements for the cord and plug exemption Corporate Procedure: ESH100.2.IS.2, "Control Hazardous Energy (Lockout/Tagout)," also see information at loto.sandia.gov. (QUESTION C3a(1)b)
8. Ensure periodic inspections are appropriately documented and retained by appropriate LOTO administrator or ES&H Coordinator. (QUESTION C3a(1)c)

Action Messages

1. Ensure suitable facilities for emergency quick drenching or flushing of the eyes and body are provided within the work area for immediate emergency use, where eyes or body of any person may be exposed to injurious corrosive materials. See Corporate Procedure: ESH100.2.IH.13, "Work with Injurious Corrosive Materials and Manage Safety Shower and Eyewash Use," as needed for requirements. (QUESTION 5e)
2. Store, dispense and bond flammable or combustible liquids in accordance with the requirements in the SNL, "Record of Code Decision." (QUESTION 5g)
3. Obtain a National Environmental Policy Act (NEPA) checklist determination for all activities. Contact your ES&H Coordinator, NEPA Subject Matter Expert (SME), or Qualified NEPA Reviewer (QNR) if assistance is desired with this determination and/or process. (QUESTION 15)
4. Submit documentation for discharge permits and request written approval for all process discharges. Contact the Waste Water Subject Matter Expert or the appropriate wastewater contact under the ES&H/EM Contact List if assistance is needed. (QUESTION 15a)
5. Contact your Environmental Compliance Coordinator (ECC) or the Hazardous Waste Management Facility (HWMF) at (505) 844-3470 (SNL/NM only) to determine how to appropriately manage hazardous waste. (QUESTION 15d)

Required Training

PHS Identified Training

[Note: This training is a regulatory requirement for one or more people involved in operations associated with identified hazards. Each class may not be required by all people working in the area. Please note that some training classes are only provided occasionally. Please be sure to allow adequate lead-time for personnel to schedule and complete training.]

Course Code	Course Title	Exclusions	Training Interval (years)	One-time Training
CHM100	CHEMICAL SAFETY TRAINING		3	No
	Required by: QUESTION 5			
CHM103	SITE-SPECIFIC CHEMICAL SAFETY TRAINING		3	No
	Required by: QUESTION 5			
ENV112	HAZARDOUS WASTE & ENVIRONMENTAL MANAGEMENT TRAINING		1	No
	Required by: QUESTION 15d			
ESH100	ES&H AWARENESS		1	No
	Required by: general corporate business process			
ESH200	SAFETY MANAGEMENT		--	Yes
	Required by: general corporate business process			
MCH200	HAND AND POWER TOOL SAFETY		--	Yes
	Required by: QUESTION 7b			
NANO101	NANOTECHNOLOGY SAFETY AWARENESS TRAINING		3	No
	Required by: QUESTION 5c			
PPE106	PERSONAL PROTECTIVE EQUIPMENT TRAINING		3	No
	Required by: QUESTION C2a(1)a			
PRS150	PRESSURE SAFETY ORIENTATION		--	Yes
	Required by: QUESTION 10a			
PRS150R	PRESSURE SAFETY ORIENTATION REFRESHER		3	No
	Required by: QUESTION 10a			

Regulatory Requirements

Regulatory and Standards Drivers for this Facility or Lab. [Note: CPS Manual sections listed below contain requirements and guidance that pertain to the hazards you have identified in this PHS. It is your responsibility to ensure these requirements have been fulfilled.]

1. (QUESTION C4) Corporate Procedure: ESH100.1.EP.2, "Implement NEPA, Cultural Resources, and Historic Properties Requirements"
2. (QUESTION 15) Corporate Procedure: ESH100.1.EP.2, "Implement NEPA, Cultural Resources, and Historic Properties Requirements"
3. (QUESTION 15b) Corporate Procedure: ESH100.2.ENV.12, "Obtain and Comply with Air Permits"
4. (QUESTION 15d) Corporate Procedure: ESH100.2.ENV.15, "Manage Hazardous Waste at SNL/CA"
5. (QUESTION 15d) Corporate Procedure: ESH100.2.ENV.20, "Manage Other Waste at SNL/CA"
6. (QUESTION 15d) Corporate Procedure: ESH100.2.ENV.22, "Manage Hazardous Waste at SNL/NM"
7. (QUESTION 5) Corporate Procedure: ESH100.2.ENV.27, "Maintain an Accurate Chemical and Biological Material Inventory"
8. (QUESTION 15a) Corporate Procedure: ESH100.2.ENV.6, "Control Discharges to the Sanitary Sewer System"
9. (QUESTION 5g) Corporate Procedure: ESH100.2.FP.1, "Manage Fire Protection Requirements"
10. (QUESTION 5e) Corporate Procedure: ESH100.2.IH.13, "Work with Injurious Corrosive Materials and Manage Safety Shower and Eyewash Use"
11. (QUESTION C1) Corporate Procedure: ESH100.2.IH.15, "Control Hazards Using Local Exhaust Ventilation and High Efficiency Particulate Air Filters"
12. (QUESTION 5c) Corporate Procedure: ESH100.2.IH.16, "Evaluate and Control Unbound Engineered Nanoscale Particles"
13. (QUESTION 5) Corporate Procedure: ESH100.2.IH.4, "Evaluate and Control Chemical Hazards"
14. (QUESTION 7b) Corporate Procedure: ESH100.2.IS.10, "Manage Industrial Machine and Portable Power Tool Safety"
15. (QUESTION C3a(1)a) Corporate Procedure: ESH100.2.IS.2, "Control Hazardous Energy (Lockout/Tagout)"
16. (QUESTION C2) Corporate Procedure: ESH100.2.IS.8, "Assess Workplace Hazards and Provide and Maintain Personal Protective Equipment"
17. (QUESTION 10a) MN471000, Pressure Safety Manual, Chapter 2, "The Pressure Safety Program"
18. (QUESTION 10f) MN471000, Pressure Safety Manual, Chapter 6, "Testing and Evaluating Pressure Systems"
19. (QUESTION 10f) MN471000, Pressure Safety Manual, Chapter 7, "Verifying the Safe Operation of Pressure Systems"
20. (QUESTION 10f) MN471000, Pressure Safety Manual, Chapter 8, "Servicing Pressure Vessels and Components"

21. (QUESTION 10d) MN471000, Pressure Safety Manual, Chapter 9, "Documenting the Operational Safety of Pressure Systems"
22. (QUESTION 10e) MN471000, Pressure Safety Manual, Chapter 9, "Documenting the Operational Safety of Pressure Systems"
23. (general corporate business process) Corporate Procedure: ESH100.2.ELC.1, "Manage Electrical Hazards"
24. (general corporate business process) Corporate Procedure: ESH100.2.GEN.3, "Develop and Use Technical Work Documents"
25. (general corporate business process) Corporate Procedure: ESH100.2.IS.7, "Implement Traffic Safety"
26. (general corporate business process) MN471018, Work Planning and Control Manual

VI. Related Documents

Permits

Document Title	Number	Type	End Date
CINT's Authority-to-Construct Permit No. 1725 Actual Date of Initial Start-up	No. 1725	Air	
City of Albuquerque - Wastewater Discharge Permit for CINT	2238A	Water	

NEPA Documents

Document Title	Number	Project End Date
CINT room 1511 - Integration Lab Parts Clean room	SNA08-0179	
CINT Bldg. 518/1527 Installation and Operation of Atomic Layer Deposition (ALD) Reactor	SNA10-0098	03/15/2015

Other Documents

Document Title	Number	Type	Published Date
Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in Center 1100 Laboratories	SOP1100.001 Issue D	SOP	11/01/2010

VII. Primary Hazard Screening Worksheets

Interview Worksheet

	Questions	Answers
1	Radiation-Generating Devices (RGDs): Is there a radiation-generating-device (RGD)? (Answer this question "no" if all RGDs are registered as in-storage status.)	No
2	Radioactive Materials: Is radioactive material present?	No
3	Explosives and Ammunition: Are any explosives or ammunition (i.e., Hazard Class 1 materials) including explosive waste managed, handled, processed, used, or stored?	No
4	Lasers: Do the activities covered by this PHS involve regulated laser activities? Please review the definition of regulated laser activities before answering this question.	No
5	Chemicals: Do the activities involve chemicals? (Review the Help Text before answering this question.)	Yes
5a	Has the Industrial Hygiene Program performed an exposure assessment of the current activities conducted on Sandia-controlled premises involving chemicals that are covered by this PHS?	Yes
Notes: ER2007-2689		
5a(1)	Did the results of the exposure assessment determine that workers are exposed to chemicals above an occupational exposure limit (regardless of respiratory protection)?	No
5b	Do any of the activities include? <ul style="list-style-type: none"> - Hazardous waste cleanup operations (e.g., environmental restoration [ER] sites) - Treatment, storage, and disposal (TSD) facilities - Emergency response 	No
5c	Will activities have, use, synthesize, or liberate unbound engineered nanoscale particles (UNP)?	Yes
5c(1)	Could anyone who is not a Member of the Workforce be exposed by the activities that have, use, synthesize, or liberate unbound engineered nanoscale particles (UNP)?	Yes
5d	Do the activities involve storage or utilization of simple asphyxiants in any quantity?	No
5e	Are the hazardous chemicals, hazardous substances, or hazardous waste involved in these activities considered injurious corrosive materials?	Yes
5e(1)	Do these activities involve the use of hydrofluoric acid?	No
5f	Do these activities involve the use of new chemicals (a substance which has not been listed on the TSCA Inventory List)?	No
5g	Do the activities involve the storage, dispensing, or use of flammable or combustible liquids?	Yes

Questions	Answers
<p>5h Do the activities involve any of the following?</p> <ul style="list-style-type: none"> - Flammable chemicals in quantities greater than 5 liters of liquid, 1 kg of solid, or 500 cubic feet of gas (at STP) in any single container or manifolded series of containers - Equipment connected to a house system for flammable gases - Reactive chemicals in quantities greater than 1 liter of liquid, 100 g of solid, or 500 cubic feet of gas in any single container or manifolded series of containers - Oxidizers, other than nitric acid, in quantities greater than 5 liters of liquid, 1 kg of solid, or 500 cubic feet of gas in any single container or process 	No
<p>5i Do the activities involve pyrophoric chemicals or metal powders in total quantities greater than 100g?</p>	No
<p>5j Do the activities include a process that involves highly hazardous chemicals at or above twenty-five percent of the Process Safety Management standard threshold quantities, or are there flammable liquids or gases involved in a process with a quantity of greater than 2,500 pounds?</p>	No
<p>5k Do activities use or store toxic gases/liquids/vapors in quantities greater than the de minimus quantities listed in the Help Text?</p>	No
<p>5l Do the activities use or store hazardous chemicals in quantities equal to or greater than the Emergency Management screening threshold quantities? (Refer to Help Text to determine if quantities have been exceeded.)</p>	No
<p>6 Electrical: Do Members of the Workforce:</p> <ul style="list-style-type: none"> - Operate or maintain electrically powered equipment at 50 Volts or greater for alternating current (AC) or direct current (DC), other than general office equipment or, - Have the potential to come into contact with live electrical sources at 50 Volts or greater, other than plugging/unplugging common 120 V wall sockets? 	No
<p>7 Mechanical: Does the facility or activity involve the use of any of the following tools, equipment or activities?</p> <ul style="list-style-type: none"> - machine shop equipment - portable power tools - powder-actuated tools - centrifuge operations - forklifts - motorized hand trucks - cranes/hoists, miscellaneous lifting devices, - industrial robots or industrial robotic systems - operate light or heavy earth-moving equipment - excavations/trenches - floor or wall penetrations - stored or kinetic mechanical energy that could cause an injury during normal working conditions 	Yes
<p>7a Do Members of the Workforce operate machine shop equipment?</p>	No
<p>7b Do Members of the Workforce operate portable power tools?</p>	Yes
<p>7c Do Members of the Workforce operate powder-actuated tools (also known as explosive-actuated fastening tools)?</p>	No

	Questions	Answers
7d	Does this facility or project activity use centrifuges?	No
7e	Are forklifts used in any operations?	No
7f	Are motorized hand trucks used in any operations?	No
7g	Are overhead cranes/hoists, mobile cranes, miscellaneous lifting devices, (shop or gantry crane), or rigging used in any operations?	No
7h	Are industrial robots or industrial robotic systems used in this project or activity?	No
7i	Do Members of the Workforce operate light or heavy earth moving equipment?	No
7j	Do Members of the Workforce perform or come into close proximity to any of these activities: - Excavations/Trenches - Floor and/or Wall Penetrations	No
7k	Do activities involve stored or kinetic mechanical energy that could cause an injury under normal working conditions?	No
8	Nonionizing Radiation: At any time, do activities produce nonionizing radiation (NIR) (excluding lasers and the low-power emitters specifically exempted in the help text)?	No
9	Thermal: Do thermal hazards or thermal stressors exist in the work area? Please review the definition of thermal stressors before answering this question.	No
10	Pressure: Are Members of the Workforce involved in the design, installation, operation, or maintenance of a pressure system (including pressure, vacuum, cryogenic fluid applications)?	Yes
10a	Do Members of the Workforce function as pressure system operators?	Yes
10b	Do Members of the Workforce function as pressure installers?	No
10c	Do Members of the Workforce handle cryogenic fluids, or design install or operate cryogenic fluid-handling systems?	No
10d	Do all systems meet the documentation requirements of the Pressure Safety Manual, Chapter 9? Note: Data packages on Pressure Safety Analysis Reports must reflect the current system configuration and personnel.	Yes
10e	Do supplier-established pressure ratings exist for all systems and system components?	Yes
10f	Are pressure system (or component) reevaluations being performed according to the requirements of the Pressure Safety Manual? (A common example would be the replacement or retesting of pressure relief valves.)	Yes
11	Noise: At any time, do sources of noise hazards exist during activities covered by this PHS?	No

	Questions	Answers
12	<p>Miscellaneous Hazards: Does the facility or activity involve any of the following hazards or activities?</p> <ul style="list-style-type: none"> - Ergonomic or musculoskeletal stressors - Construction-like activities - Work with and around asbestos - Elevated work - Underwater diving - Animals and hazardous plants - Aircraft - Airborne objects (other than aircraft) - Firearms - Use of human subjects - Use of sealed drum(s) 	No
13	<p>Outside of Manufacturer's Recommendations: Does this work involve the use of equipment, tools, or materials outside of their design specifications or outside of the manufacturer's recommendations? (See Help Text for examples). Please enter each item into the hazard table.</p>	No
14	<p>Noncommercial Equipment: Does this work involve the use of noncommercial equipment or apparatus (excluding robots, robotics systems, and equipment where the only hazard is a pressure system that has a pressure safety data package)? Please enter each noncommercial piece of equipment into the hazard table.</p>	No
15	<p>Environmental Concerns: Are there any potential environmental concerns with this activity that align with the Sandia National Laboratories (SNL) Environmental Management System (EMS) aspects, such as chemical use, fuel or oil storage, waste generation (except sanitary trash), construction activities, outdoor test activities, disturbance to habitat or protected species, or discharges to the air, ground surface, ground water, or the sewer systems?</p>	Yes

Environmental Concerns Hazards		
Source	Type	Est. Quantity
Base Waste (Liquids)	Hazardous Waste Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Base Bench Comments: Comments: Base waste generated in 1511 will be introduced in small (<200 ml) or moderate(up to 3 Liters) quantities to the facility's AWN (Acid Waste Neutralization)System for treatment. The AWN system is designed to process both acid and base waste streams.	4 gal/yr
Base Waste (Solid)	Hazardous Waste Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Base Bench Comments: Solid waste with basic residues from processing operations. This waste may consist of cleanroom wipes, cleaning pads and other base contaminated materials. Waste material is collected in a single properly marked waste can and subsequently processed through Sandia's hazardous waste handling system.	10 kg/yr
Solvent Waste (Liquids)	Hazardous Waste Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Solvent Bench Comments: All solvent waste generated in 1511 will be collected in a single (4.5) gallon carboy that is integrated into the solvent bench. Once the carboy becomes full, the waste product will be transferred to a disposable (5) gallon container for processing through Sandia's hazardous waste handling system.	10 gal/yr

Environmental Concerns Hazards		
Source	Type	Est. Quantity
Solvent Waste (Solids)	Hazardous Waste	10 kg/yr
Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Solvent Bench Comments: Solid waste with solvent residue from processing operations. This waste will mostly consist of cleanroom wipes, however pipette syringes, small containers and other solvent contaminated materials may also be introduced to this waste stream. Waste material will be collected in a single properly marked waste cans waste and processed through Sandia's hazardous waste handling system.		

Questions

Answers

15a	Wastewater: Are there any wastewater discharges from this activity?	Yes
15b	Air: Are there any air discharges or emissions at this activity?	Yes
15b(1)	Ozone Depleting Substance (ODS): Are there any ODSs at this activity?	No
15b(2)	Will this activity include the installation and or use of combustion equipment ? (Combustion equipment includes boilers and internal combustion engines, such as generators.)	No
15b(3)	Will this activity involve open-burn activities?	No
15b(4)	Will this activity involve soil disturbance, building demolition, or construction that disturbs soil , including access roads and staging areas?	No
15b(5)	Radionuclide National Emissions Standards for Hazardous Air Pollutants (NESHAP): Are there any radionuclide air discharges or use of radionuclides in gaseous form or at elevated temperatures from this activity?	No
15c	Radioactive Waste: Will this activity generate any radioactive waste, or will Members of the Workforce be required to handle radioactive waste?	No
15d	Hazardous Waste: Will this activity generate any hazardous waste, or will Members of the Workforce be required to handle hazardous waste?	Yes
15d(1)	Hazardous Waste Accumulation Area: Will this activity have the potential to accumulate greater than 55 gallons of any hazardous waste at any one given time?	No
15d(2)	Acutely Hazardous Waste: Will this activity generate any acutely hazardous waste ?	No
15e	Mixed Waste: Will this activity generate any mixed waste , or will Members of the Workforce be required to manage mixed waste?	No
15f	Infectious / Biohazardous Waste: Will this activity generate any infectious or biohazardous waste, or will Members of the Workforce be required to handle infectious or biohazardous waste?	No
15g	Material or Waste of Unknown Origin: Will this activity require handling material or waste of unknown origin?	No
15h	Fuels or Oil Storage: Does this activity use a fuel or oil storage container capable of containing 55 gallons or more?	No
15i	Discharges to Ground Surface: Does this activity have discharges (liquid or solid) to the ground surface ? Note: Discharges are commonly associated with outdoor testing and maintenance activities.	No

	Questions	Answers
15j	Improvements/modifications to structure/building exteriors and landscaping: Will this project involve activities that require modifications to the exteriors of structures and buildings or modification to existing landscape, including removal of vegetation?	No
15k	Disturbance to habitat or protected species: Will this project involve activities that will disturb habitat or protected species, including wildlife management and outdoor projects or testing activities?	No
16	Movement of Hazardous Material: Will any activities covered by this PHS involve the movement of hazardous material (including explosives or radioactive material) outside of a building using motorized equipment?	No
17	Fire Protection Concerns: Will the activity include any of the following? - Members of the Workforce modifying in any way any fire suppression or life safety system (fire rated walls, fire doors, fire sprinklers, fire alarm devices, fire extinguishers, or means of egress). - Members of the Workforce performing hot work in association with this facility or project activity. (Please note that soldering is considered hot work).	No
18	Biological Agents: Do activities involve the use of or potential exposure to biological agents? (see Help Text before answering this question.)	No
19	Confined Spaces: Are confined spaces present in the work area?	No
20	Beryllium: Do operations include any activities that? (Review the Help Text before answering this question) - Use or handle beryllium, beryllium-containing alloys or beryllium oxides? - Create or work with beryllium ceramics ? - Handle waste potentially-contaminated with beryllium or waste containing beryllium? - Perform decontamination of beryllium contamination? - Entail work in a beryllium contaminated building or area? - Apply abrasive or destructive methods to metal objects, articles, weapon components or bar stock, potentially containing beryllium? - Use non sparking tools containing beryllium?	No
21	Offsite Locations: Does this PHS include work at locations other than KAFB, SNL/CA, NTS, or TTR regardless of whether or not the worksite is on Sandia-controlled Premises?	Yes

	Questions	Answers
21a	<p>Does work performed by Members of the Workforce at locations other than KAFB, SNL/CA, NTS, or TTR involve any of the following (as defined in the listed PHS questions)? In the question notes, please identify which of the hazards drive a "yes" answer to this question and include approximately a sentence for each identified hazard, describing how it is used or produced.</p> <ul style="list-style-type: none"> - Radiation-generating devices (see question 1) - Radioactive materials (see question 2) - Explosives (see question 3) - Lasers in navigable air space or affecting other operations (see question 4b) - HAZWOPER operations (see question 5b) - Unbound engineered nanoparticles (see question 5c) - Newly developed chemical substance (see question 5f) - Chemical physical hazards (see question 5h) - Pyrophorics or metal powders >100g (see question 5i) - >25% PSM quantities (see question 5j) - Toxic gases (see question 5k) - >Emergency Management screening quantities (see question 5l) - Personnel overexposure to nonionizing radiation (see question 8a(1)) - Public overexposure to nonionizing radiation (see question 8b(1)) - Non-routine aircraft (see question 12g(1)) - Airborne objects other than aircraft (e.g., projectiles, fragments) (see question 12h) - Firearms (see question 12i) - Equipment used outside of manufacturer's recommendations with the potential to cause injury to co-located workers or public (see question 13b) - Non-commercial equipment with the potential to cause injury to co-located workers or public (see question 14b) - Biological agents BSL-2 or higher 	Yes

Notes: This question is answered "yes" for UNP

	Questions	Answers
21a(1)	Has the SNL Safety Basis Department determined a hazard classification for these activities?	Yes
21a(1)a	What hazard classification was determined by the SNL Safety Basis Department?	Low
21b	Do these activities involve foreign travel?	No
22	Roving: Will any Member of the Workforce enter into non-office work areas with operations controlled by others while conducting activities covered by this PHS? Include all work activities meeting these criteria, including research. Do not include personnel from other organizations, whose work is not covered by this PHS, who enter your workspace (e.g., custodial personnel)?	Yes
22a	Do the entries include non-office work areas on Sandia-controlled premises?	No
22b	Do the entries include work areas on non-Sandia-controlled premises?	No
23	Emergency Response: Do activities include emergency response operations (e.g., confined space rescue, hazardous materials response, emergency medical services, natural disaster, Radiological Assistance Program, Accident Response Group, Joint Tactical Operations Team, Nuclear Emergency Search Team)?	No
24	Off-Hour Activities: Could Members of the Workforce conduct activities covered by this PHS outside the hours of 0700 to 1700 or on weekends/holidays? Note: These are the hours without full emergency response or medical coverage at SNL/NM.	Yes
24a	Will the need to perform work off-hours present increased risks or additional hazards that would necessitate implementation of additional controls? Note: Include increased risks and hazards from the work being performed, personnel working alone, decreased emergency response support, general work area hazards, potential loss of utilities, and natural phenomena.	No
24b	Could off-hour activities require emergency response support beyond the normal off-hours support listed in the help text? If "yes," describe the applicable activities in the note for this question.	No
25	Other Hazards: Do the activities have important hazards not specifically identified elsewhere in this PHS?	No

Controls Worksheet

	Questions	Answers
C1	Local Exhaust Ventilation: Do the activities covered by this PHS use local exhaust ventilation (LEV) on Sandia-controlled premises (e.g., laboratory hoods, glove boxes, downdraft tables, "elephant trunks," canopy hoods, paint booths, slot ventilation, portable welding ventilation, etc.)?	Yes
C2	Personal Protective Equipment (PPE): Are hazards (e.g., chemicals radiological, electrical, mechanical, thermal, flying particles and/or falling or rolling objects) encountered that are capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact?	Yes
C2a	Has a workplace hazard assessment been performed for these activities on Sandia-controlled premises?	Yes
C2a(1)	Did the workplace hazard assessment determine that PPE will be required?	Yes
C2a(1)a	Did the workplace hazard assessment determine that hard hats, safety glasses, face shields, safety shoes and/or gloves are required for mechanical hazards and have not been covered by other task/site specific training?	Yes
Notes: Hazard Assessment Survey Report ID SNLNM01542		
C2a(1)b	Has the workplace hazard assessment determined respiratory protection is required?	No
C3	Hazardous Energy Control: (including but not limited to: electrical, pressure, pneumatic, mechanical, cryogenic, chemical, fire, radiation, laser, gravity, high temperature). Do you have any equipment in your operations that requires any of the following service and maintenance activities?	Yes
	<ul style="list-style-type: none"> - Construction - Installation - Setup - Adjustment - Inspection - Modification - Maintenance - Service - Lubrication - Cleaning - Un-jamming - Making adjustments or tool changes 	
C3a	While performing any of the servicing and maintenance activities listed above, is there potential for injury from the unexpected energization or start up of the machines, equipment, or process, or from a release of stored energy?	Yes
C3a(1)	Will service or maintenance be done on a machine, equipment, or a process by Members of the Workforce within your organization?	Yes
C3a(1)a	Will all service or maintenance be done on a machine, equipment, or a process by Members of the Workforce within your organization ?	No
C3a(1)b	During the service or maintenance can all the equipment be controlled by cord and plug?	Yes

	Questions	Answers
C3a(1)c	Have periodic inspections of hazardous energy control (lockout/tagout) procedures and LOTO authorized workers been completed for all workers and procedures, as required?	Yes
C3b	Are there any activities where control of hazardous energy sources is only necessary for protection of configuration, equipment, or property (i.e., not for personnel protection)?	No
C4	NEPA Compliance: Has this project or activity been reviewed for National Environmental Policy Act (NEPA) compliance in the ISMS NEPA Module? Note: NEPA Checklists should be amended at least every five years.	Yes
C4a	Are all relevant NEPA documents listed in the Documents section of this PHS?	Yes
C5	Activity-Level PHS: Will this PHS be used as an Activity-level PHS, in lieu of a Job Safety Analysis (JSA), for low rigor work?	No

VIII. Hazard Analysis (HA) Section

Hazard Analysis

Source Name or Question: QUESTION 21a(1)a
--

Source Reason: Low-Level Offsite Hazardous Work Condition
--

Hazardous Condition: Potential for worker exposure

PHS Identified 'Low' Hazard.

Author's Comment: IH has determined that the area classification is low, therefore further analysis should not be required. Please refer to the IH assessment SNLNM01542 for further detail.

Source Name or Question: QUESTION 5c(1)
--

Source Reason: Unbound Engineered Nanoscale Particles (UNP)
--

Hazardous Condition: Potential inhalation and dermal exposure to Unbound Engineered Nanoscale Particles(UNP)

PHS Identified 'Low' Hazard.**Author's Comment:**

Cause: Natural Phenomemon

UNP is suspended in a solvent solution and then drop cast to a surface as a part of the process. The solvent dries and not all NP are bound to the surface by van der Waals forces. Material could become airborne of land on surfaces outside of the intended area.

Consequence: Negligible ES&H Impact

Exact impact of direct exposure to these materials is not clearly understood.

Mitigation: Active Engineering Control-Air Flow Control System

UNP must be handled within the work space of a ventillated hood. In the event that the material becomes airborne, it is anticipated that the hazard would be pulled away from the worker reducing the risk of exposure.

Mitigation: Procedural (Monitoring etc.)-Other

Industrial Hygene Exposure Assessment covers UNP handling and transfer as one of the activities surveyed.

Author Assessment of Adequacy: Applied Mitigation and Prevention are sufficient.

Adequacy Explanation: The long term risks of handling UNP are not clear, however these mitigations are incorporated under the guidance of Sandia subject matter experts and the Industrial Hygenist.

Cause: Human Error

While working in ventillation hood, vial containing nanomaterials spills on top of bench.

Consequence: Minor Environmental Impact

Nanomaterials are collected and disposed of in the appropriate hazardous waste recepticle.

Mitigation: Unspecified Control-Other

Sandia's Waste Disposal and Description Request process for disposal of hazardous waste.

Author Assessment of Adequacy: Applied Mitigation and Prevention are sufficient.

Adequacy Explanation: Sandia's WDDR process allows the hazardous waste to be disposed of in an environmentally friendly manner.

Consequence: Negligible ES&H Impact

Small portions of namomaterials may become unbound as carrier solvent evaporates.

Mitigation: Active Engineering Control-Air Flow Control System

Nano particles are swept away from the the workspace protecting worker.

Author Assessment of Adequacy: Applied Mitigation and Prevention are sufficient.

Adequacy Explanation: Workspaces where nanomaterials are handled, follow Sandia's LEV program to ensure that ventillation meets minimum safety standards as identified by Sandia EH&S and IH guidance.

Note: 12 hazard analysis(es) were not reported, because no (optional) hazard analysis was performed for them.

IX. Supplemental Information

PHS Input

Notes from Interview Questions

Q 5a - ER2007-2689

Q 21a - This question is answered "yes" for UNP

Notes from Controls Questions

Q C2a(1)a - Hazard Assessment Survey Report ID SNLNM01542

User Entered Hazard Tables

Environmental Concerns Hazards		
Source	Type	Est. Quantity
Base Waste (Liquids)	Hazardous Waste	4 gal/yr
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Base Bench Comments: Comments: Base waste generated in 1511 will be introduced in small (<200 ml) or moderate(up to 3 Liters) quantities to the facility's AWN (Acid Waste Neutralization)System for treatment. The AWN system is designed to process both acid and base waste streams.	
Base Waste (Solid)	Hazardous Waste	10 kg/yr
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Base Bench Comments: Solid waste with basic residues from processing operations. This waste may consist of cleanroom wipes, cleaning pads and other base contaminated materials. Waste material is collected in a single properly marked waste can and subsequently processed through Sandia's hazardous waste handling system.	
Solvent Waste (Liquids)	Hazardous Waste	10 gal/yr
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Solvent Bench Comments: All solvent waste generated in 1511 will be collected in a single (4.5) gallon carboy that is integrated into the solvent bench. Once the carboy becomes full, the waste product will be transferred to a disposable (5) gallon container for processing through Sandia's hazardous waste handling system.	
Solvent Waste (Solids)	Hazardous Waste	10 kg/yr
	Location: Site: SSTP, Area: No Tech Area, Building: 518, Room: 1511 Location Details: Solvent Bench Comments: Solid waste with solvent residue from processing operations. This waste will mostly consist of cleanroom wipes, however pipet syringes, small containers and other solvent contaminated materials may also be introduced to this waste stream. Waste material will be collected in a single properly marked waste cans waste and processed through Sandia's hazardous waste handling system.	

Assigned Reviewers

Review Type	Role	Person	Required/Requested
Technical SME	Industrial Facility Safety Basis SME	Curran,Kelsey Leigh Forde	Required review by business rule.
	Required Assignment: Review Question 21 and hazard-specific question sets that relate to the user-specified hazards identified in Question 21		
	Required Assignment: Review Question 5c(1) for classification of UNP use		
	Comment: [KLFC 08-27-2014] IFSB classification review of PHS Q21a MOW performing work at locations other than KAFB, SNL/CA, NTS, or TTR listed as nanoparticles at CINT location. IFSB classification review of PHS Q5c(1) UNP; suggest IH review of UNP activities; UNP not listed in IH report # SNLNM05561 and SNLNM05162 (2nd year recommended). Require completion of updated stand alone hazard analysis to confirm facility hazard classification prior to next PHS review cycle.		
ES&H Coordinator	ES&H Coordinator	Nelson,John Seth	Required review by business rule.
	Comment:		
Safety Basis	PHS Team	Costanzo,Jessica Amoret	Required review by business rule.
	Comment: Reviewed and concur.		
Manager	Line Manager	Shinn,Neal D.	Required review by business rule.
	Comment:		

PHS Output

Major Safety Concerns

The hazard classification is: Low

The required documentation is: A PHS with Integral HA is required

Safety Concerns at this Low level include:

(QUESTION 5c(1)) Potential inhalation and dermal exposure

(QUESTION 21a(1)a) Hazards from work conducted offsite by Members of the Workforce

Other Safety Concerns

Other Safety Concerns (potential hazard sources) for this: Facility or Lab

(QUESTION 5) Potential personnel exposure to chemicals & fire protection regulatory requirements

(QUESTION 5c) Unbound Engineered Nanoscale Particles(UNP); Potential inhalation and dermal exposure to UNP.

(QUESTION 5e) Corrosive chemical; Potential exposure to skin and eyes.

(QUESTION 5g) Fire/Explosion Hazard

(QUESTION 7) Potential injury from mechanical forces

(QUESTION 7b) Potential injury from portable power tools

(QUESTION 10) Injury or damage

(QUESTION 15) Potential for regulatory action

(QUESTION 15a) Potential to exceed permitted quantities

(QUESTION 15b) Potential to emit regulated contaminants

(QUESTION 15d) Potential for regulatory action

(QUESTION C3) Potential injury to personnel from exposure to hazardous energy

PHS Identified Training, by Source

[Note: This training is a regulatory requirement for one or more people involved in operations associated with identified hazards. Each class may not be required by all people working in the area. Please note that some training classes are only provided occasionally. Please be sure to allow adequate lead-time for personnel to schedule and complete training.]

CHM100: CHEMICAL SAFETY TRAINING ()

CHM103: SITE-SPECIFIC CHEMICAL SAFETY TRAINING ()

ENV112: HAZARDOUS WASTE & ENVIRONMENTAL MANAGEMENT TRAINING ()

ESH100: ES&H AWARENESS ()

ESH200: SAFETY MANAGEMENT ()

MCH200: HAND AND POWER TOOL SAFETY ()

NANO101: NANOTECHNOLOGY SAFETY AWARENESS TRAINING ()

PPE106: PERSONAL PROTECTIVE EQUIPMENT TRAINING ()

PRS150: PRESSURE SAFETY ORIENTATION ()

PRS150R: PRESSURE SAFETY ORIENTATION REFRESHER ()

Results Based on Answers and User-Entered Hazards

The results in this PHS were based on the following answers to interview questions and user-entered hazards:

Q 0 answered: Y; Q 5 answered: Y; Q 5c answered: Y; Q 5c(1) answered: Y; Q 5e answered: Y;

Q 5g answered: Y; Q 7 answered: Y; Q 7b answered: Y; Q 10 answered: Y; Q 10a answered: Y;

Q 10d answered: Y; Q 10e answered: Y; Q 10f answered: Y; Q 15 answered: Y; Q 15a answered: Y;

Q 15b answered: Y; Q 15d answered: Y; Q 21a(1) answered: Y; Q 21a(1)a answered: Low; Q C1 answered: Y;

Q C2 answered: Y; Q C2a(1)a answered: Y; Q C2a(1)b answered: N; Q C3 answered: Y; Q C3a(1)a answered: N;

Q C3a(1)b answered: Y; Q C3a(1)c answered: Y; Q C4 answered: Y;