



Improving NCS in Maintenance and Construction Activities at Y-12 National Security Complex

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This review does not constitute clearance for public release.

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Overview of Maintenance Program

13 Maintenance Crews Reside in Y-12 Nuclear Facilities

- Outside Machinists, Electricians, Pipefitters, Carpenters, Insulators, Welders, Painters, Iron Riggers, Security, Specialized Craft

5 Categories of Maintenance Work

- Maintenance: Corrective, Preventive, Inspection, and Calibration
- Construction

25 Maintenance Planners

- Responsible for creating work packages
 - Complete walk downs
 - Complete Hazard Identification Worksheets and Job Hazard Analysis
 - Obtain guidance and controls from Subject Matter Experts
 - Obtain permits
- Required to take NCS for Facilities and Infrastructure Services, Construction, and ProForce training

NCS Reviews of Maintenance and Construction Work

- NCS participates in Maintenance and Construction walk downs
- Maintenance planners complete a Hazard Identification Worksheet
 - Hazard 700 is for NCS
 - Control: Site NCS training. Requires written Nuclear Criticality Safety guidance incorporated into work packages.
- NCS would provide guidance through email or the Automated Job Hazard Analysis (AJHA) system
- Maintenance planner incorporates guidance into work instructions

NCS Review of Maintenance and Construction Work

General Concerns

- Storage area container and spacing requirements
- Scaffolding and ladders near fissile storage or processes

Solution Area Concerns

- Maintaining the integrity of the Large Geometry Exclusion Areas (LGEAs)
- Draining lines and tanks
- Maintain the integrity of stainless steel floors and walls

Metal Area Concerns

- Work completed in hoods, gloveboxes, and workstations
- Relocating material
- Limit volume of liquids

Other Concerns

- Sprinkler replacements
- Out-of-service equipment removal
- Lifts of large equipment over nuclear facilities

Maintenance Incident (February 2016)

- Replacement of a rupture disc on a hydrogen fluid bed
- During the replacement, the breathing air system failure occurred
- Work was stopped and left in an open state
- NCS was contacted and the Job Hazard Analysis (JHA) was reviewed for NCS administrative controls
- Determined that no NCS review of the work package had been completed

Identifying Gaps between Maintenance and NCS

Review of Maintenance Packages

- NCS compiled 8519 completed work orders and maintenance items from nuclear facilities
- NCS reviewed 850 of those work orders and maintenance items
- Maintenance work was divided into corrective, preventive, and inspection and calibration

Corrective Work Review Summary

Facility	Work Orders Reviewed	Work Orders w/ NCS Review	Work Orders w/o NCS Review [A]	Number of [A] Work Orders Requiring NCS Review [B]	Percentage of Work Orders w/o NCS Review $[(B/A)*100]$
A	107	40	67	8	11.9
B	50	0	50	1	2
C	12	0	12	0	0
D	51	0	51	1	2
E	89	0	89	1	1.1
F	10	0	10	0	0
G	31	0	31	0	0

Identifying Gaps between Maintenance and NCS

Preventive Work Review Summary

Facility	Work Orders Reviewed	Work Orders w/ NCS Review	Work Orders w/o NCS Review [A]	Number of [A] Work Orders Requiring NCS Review [B]	Percentage of Work Orders w/o NCS Review $[(B/A)*100]$
A	56	10	46	5	10.9
B	30	3	27	0	0
C	6	1	5	0	0
D	28	0	28	2	7.1
E	33	0	33	1	3
F	4	0	4	0	0
G	31	0	31	0	0

Inspection and Calibration Work Review Summary

Facility	Work Orders Reviewed	Work Orders w/ NCS Review	Work Orders w/o NCS Review [A]	Number of [A] Work Orders Requiring NCS Review [B]	Percentage of Work Orders w/o NCS Review $[(B/A)*100]$
A	135	48	87	9	10.3
B	47	0	47	0	0
C	5	0	5	0	0
D	35	0	35	0	0
E	116	0	116	0	0
F	5	0	5	0	0
G	24	0	24	0	0

Addressing the Gaps

Developed web-based NCS Training for Maintenance and Construction Planners with 11 lessons:

1. Programmatic Requirements: Identify the NCS requirements for new operations
2. Fissile Material Equipment, Containers, and Transporters: Identify fissile material equipment, containers, and transporters that have NCS concerns.
3. NCS Documents: Identify the differences between Criticality Safety Evaluations, Criticality Safety Approvals, Criticality Safety Requirements, and Technical Deviations
4. Criticality Accidents: Define a criticality accident. Describe the consequences of a criticality accident. Describe the Y-12 process criticality accident.
5. NCS postings and Labels: Be able to identify NCS postings.
6. Large Geometry Exclusion Areas (LGEAs): Identify LGEAs and the requirements that are associated with these areas.

Addressing the Gaps

Developed web-based NCS Training for Maintenance and Construction Planners with 11 lessons:

7. Waste: Describe the NCS guidance for handling non-fissile waste generated during maintenance and construction activities in LGEAs and fissile controls areas.
8. Facility Overviews: Identify the NCS concerns associated with each of the nuclear facilities.
9. Ventilation and Uranium Holdup Survey Program (UHSP): Describe the UHSP and its relationship with NCS.
10. Lifts, Ladders, and Scaffolding: Describe the possible impacts of ladders and scaffolding on fissile equipment and fissile storage arrays.
11. Hazard Identification Worksheet (HIW) and NCS Maintenance and Construction Requests: Identify situations when NCS was not notified of maintenance activities. Identify situations where the 700 question (“Impacts fissile material or fissile material activities”) on the HIW should be checked “yes.” Look at an example NCS Maintenance and Construction Request Form.

Addressing the Gaps

NCS Maintenance and Construction Work Request

- HIW control changed: Worker must have site NCS training. If question is answered yes, fill out NCS Maintenance and Construction Work Request and submit to NCS for review. Controls from signed request form shall be included in the work package and/or JHA.
- Request form has 3 sections
 - General information about the work
 - NCS questions
 - NCS guidance for Operations and Maintenance

NCS MAINTENANCE AND CONSTRUCTION WORK REQUEST

Work Order/Maint Plan #

TO BE COMPLETED BY REQUESTOR OF WORK

LOCATION OF WORK	BUILDING	ROOM/AREA	SYSTEM/COMPONENT
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REQUESTOR	USERID	BADGE	PHONE
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DESCRIPTION OF WORK (INCLUDE CHANGE REQUEST #'s, JHA's, ETC.)

CHECK ALL THAT ARE APPLICABLE AND EXPLAIN YES ANSWERS IN THE DESCRIPTION OF WORK.	YES	NO
Is the work in a Large Geometry Exclusion Area? If yes, then answer questions a through D.	<input type="checkbox"/>	<input type="checkbox"/>
a. Does the work require a LOTO or draining of fissile solution systems?	<input type="checkbox"/>	<input type="checkbox"/>
c. Will the work impact the stainless steel floor?	<input type="checkbox"/>	<input type="checkbox"/>
d. Does the work require insulation/Asbestos removal?	<input type="checkbox"/>	<input type="checkbox"/>
e. Does the work require welding?	<input type="checkbox"/>	<input type="checkbox"/>
Will the work require use of a liquid (e.g. oil, dye penetrant, paint, etc)?	<input type="checkbox"/>	<input type="checkbox"/>
Will the work impact a fissile work station or fissile storage array?	<input type="checkbox"/>	<input type="checkbox"/>
Will the work require ladders/scaffolding or critical lifts over fissile material?	<input type="checkbox"/>	<input type="checkbox"/>
Will the work be on equipment that may contain fissile material holdup (e.g. duct, OOS equipment)?	<input type="checkbox"/>	<input type="checkbox"/>

TO BE COMPLETED BY NCS

Maintenance Guidance:

Operating Organization Guidance:

	SIGNATURE	BADGE NUMBER	DATE
APPROVED BY	<input type="text"/>	<input type="text"/>	<input type="text"/>
NCS ENG:	<input type="text"/>	<input type="text"/>	<input type="text"/>

Applicability to Other DOE Sites

Aging Facilities

- Maintenance and construction work is performed often, but is not analyzed in CSEs
- Maintenance and construction workers are not trained as fissile material handlers and therefore do not handle fissile material, but they can easily impact fissile material

Training

- Work planners and craft need to understand the impacts of their work and when to ask for guidance
- Crews from outside nuclear facilities come into nuclear facilities to perform work

Communication

- NCS Maintenance and Construction Work Request was created to improve communication of guidance

Questions?