

CRITICALITY SAFETY

1.0 Objective

The objective of this surveillance is to ensure that effective programs have been developed and implemented to protect the public and DOE's workers from unplanned criticality. The programs should minimize the potential for inadvertent criticality, provide appropriate training for personnel on criticality hazards and procedures for preventing inadvertent criticality, and provide appropriate systems to detect such criticalities and warn workers. The surveillance activities provide a basis for evaluating the effectiveness of policies, programs, and procedures and for reviewing compliance with specific DOE requirements.

2.0 References

- 2.1 DOE 5480.24, *Nuclear Criticality Safety*
- 2.2 ANSI/ANS-8.1-1983, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors*
- 2.3 ANS-8.7/ANSI N-16.5-1975, *Guide for Nuclear Criticality Safety in the Storage of Fissile Material*
- 2.4 ANSI/ANS-8.3-1986, *Criticality Accident Alarm System*
- 2.5 ANSI/ANS-8.19-1984, *Administrative Practices for Nuclear Criticality Safety*

3.0 Surveillance Activities

The Facility Representative or Environmental, Safety, and Health Support Specialist will conduct walkthroughs of the facility, observe testing of the criticality alarm system, interview operators, and observe work practices. The surveillance activities provide an opportunity to evaluate the effectiveness of the criticality safety program in ensuring that personnel understand criticality hazards, implementation, the laboratory is complying with administrative controls, and the criticality alarm system is operable. Specific surveillance activities include:

- Activity 1 - Laboratory walkthrough evaluating criticality safety program
- Activity 2 - Observe operations that potentially involve criticality.
- Activity 3 - Observe testing of criticality alarm system.

**Surveillance Guideline
 CRITICALITY SAFETY**

Surveillance No.: _____

Facility: _____

Date Completed: _____

YES NO N/A

Activity 1 - Laboratory Walkthrough

- | | | | | |
|----|--|-------|-------|-------|
| 1. | Are criticality safety operating limits posted in areas where operations that involve criticality hazards may be performed? | _____ | _____ | _____ |
| 2. | Are posted criticality safety operating limits the most current version of the limits? | _____ | _____ | _____ |
| 3. | Are operator aids relating to criticality safety approved and included in a master index of operator aids? | _____ | _____ | _____ |
| 4. | Are fissile materials in the geometry (e.g., configuration, spacing, number of containers present, etc.) specified in criticality safety operating limits? | _____ | _____ | _____ |
| 5. | Are system valve lineups consistent with established administrative requirements to minimize the potential for inadvertent criticality? | _____ | _____ | _____ |
| 6. | Are total quantities of fissile material in glove boxes or storage areas less than the quantity prescribed by the criticality safety operating limit? | _____ | _____ | _____ |
| 7. | Are criticality alarm beacons clearly visible in areas where employees could be affected by a criticality accident? | _____ | _____ | _____ |
| 8. | Are drains to preclude accumulation of a potentially critical geometry unobstructed? | _____ | _____ | _____ |

**Surveillance Guideline
 CRITICALITY SAFETY**

YES NO N/A

Activity 2 - Observe Operations

CAUTION

**Avoid interrupting operators in their work. Wait for
 opportune times to transact business with facility
 operators.**

- | | | | | |
|-----|--|-------|-------|-------|
| 9. | Are operations governed by written procedures that provide step-by-step instructions on work activities to be performed? | _____ | _____ | _____ |
| 10. | Have procedures, and all revisions to such procedures, been reviewed and approved by a criticality safety expert? | _____ | _____ | _____ |
| 11. | Are parameters which are controlled to ensure sub-criticality and their associated limits identified explicitly in procedures and operator aids? | _____ | _____ | _____ |
| 12. | Are personnel rigorously following procedures? | _____ | _____ | _____ |
| 13. | Can personnel accurately describe the criticality hazards associated with work in progress? | _____ | _____ | _____ |
| 14. | Can personnel describe correctly the criticality accident alarm? | _____ | _____ | _____ |
| 15. | Can personnel describe the appropriate response to a criticality accident alarm? | _____ | _____ | _____ |
| 16. | Can personnel describe the appropriate response if a criticality safety limit is exceeded? | _____ | _____ | _____ |

CRITICALITY SAFETY

YES NO N/A

17. Do training records substantiate that personnel performing operations have received necessary training in criticality safety? _____

Activity 3 - Observe Testing of Criticality Alarm System

18. Is test being performed within the required interval? _____

19. Does testing verify that criticality accident alarms are visible or audible in all areas of the facility that could be affected by a criticality accident? _____

20. Does testing encompass all elements of the alarm system? _____

21. Does testing include measuring the response of detectors to radiation and calibration of detectors? _____

22. Does testing ensure that audible signal generators are tested at least once each month? _____

23. At the conclusion of the test, is the system returned to operable status? _____

24. Are results of testing appropriately documented? _____

25. Do personnel in the facility respond to the alarm test by immediately evacuating the facility? _____

26. Is personnel accountability verified as part of the system testing? _____

OTHER:

**Surveillance Guideline
CRITICALITY SAFETY**

YES NO N/A

OTHER (Continued)

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

NOTES/COMMENTS:

PERSONNEL CONTACTED:

**Surveillance Guideline
CRITICALITY SAFETY**

**IF MORE SPACE IS NEEDED FOR FINDINGS, OBSERVATIONS, AND FOLLOWUP
ITEMS - USE ADDITIONAL SHEETS**

FINDINGS:

Finding No.: _____

Description: _____

Finding No.: _____

Description: _____

Finding No.: _____

Description: _____

Surveillance Guideline
CRITICALITY SAFETY

OBSERVATIONS:

Observation No.: _____

Description: _____

Observation No.: _____

Description: _____

Observation No.: _____

Description: _____

Surveillance Guideline
CRITICALITY SAFETY

FOLLOWUP ITEMS:

Followup Item No.: _____

Description: _____

Followup Item No.: _____

Description: _____

Followup Item No.: _____

Description: _____

LABORATORY MANAGEMENT DEBRIEFED AND RESULTS: _____

Signature: _____ Date: _____

Facility Representative or
Environmental, Safety, and Health Support Specialist