

NRC INSPECTION MANUAL

FCOB

MANUAL CHAPTER 2603

INSPECTION OF THE NUCLEAR CHEMICAL PROCESS SAFETY PROGRAM AT FUEL CYCLE FACILITIES

2603-01 PURPOSE

This chapter establishes the inspection program for the Nuclear Chemical Process Safety Program (NCPSP) at NRC-licensed or certified nuclear fuel cycle facilities. Included in this program are facilities for spent fuel storage, spent fuel reprocessing, plutonium processing and fuel fabrication, uranium processing and fuel fabrication, UF_6 conversion, uranium enrichment, and certain research and development activities associated with these facilities.

In the past, NRC has focused narrowly on radiological safety while leaving the regulation of chemical hazards to other regulatory agencies such as the Occupational Safety and Health Administration (OSHA) and the U.S. Environmental Protection Agency (EPA). Recent incidents, such as the January 1986 release of UF_6 at a uranium processing facility, which resulted in one fatality, have focused NRC's attention on the scope of its regulatory authority over chemically hazardous substances since those chemical hazards can affect the safety of operations with Special Nuclear Material (SNM). Four categories of chemical hazards were identified in NRC's Branch Technical Position (BTP) on chemical safety,¹ which served to define NRC's regulatory responsibilities. These categories are:

1. Radiation hazards posed by radioactive materials: These are well recognized and adequately addressed by fuel cycle facilities;
2. Chemical hazards posed by radioactive materials: These include: a.) toxic, fire, or explosion hazards derived from licensed nuclear materials (e.g., toxicity of UF_6), or b.) chemical or physical hazards from nuclear material processing operations (e.g., acid dissolution of uranium or conversion of UF_6 to UO_2 , during which HF is formed), which can have serious toxic effects on both onsite and offsite populations;

¹U.S. Nuclear Regulatory Commission, "Guidance on Management Controls/ Quality Assurance, Requirements for Operation, Chemical Safety, and Fire Protection for Fuel Cycle Facilities," Federal Register Notice, Vol. 54, No. 53, March 21, 1989.

3. Plant conditions that may directly or indirectly affect radiation hazards: These include:
 - a. Chemical or physical hazards derived from hazardous materials, whether intimately involved with nuclear material operations or not, that can

impact the ability of the plant operators to perform their duties. An example would be an operator being temporarily incapacitated by fumes from an ammonia release and thus unable to attend to his responsibilities; this might result in loss of containment of SNM.

- b. Hazards derived from gaseous or liquid flammable materials such as hydrogen (or cracked ammonia) which, if released and ignited, can breach SNM confinement systems and lead to significant radiation exposure. At some facilities, propane (used for heating and as a backup for natural gas) is stored in close proximity to the process area. A propane leak could ignite and have the same effects as listed above.
4. Chemical hazards posed by nonradioactive materials: These include chemical hazards which do not affect nuclear operations in any way (e.g., NaOH or HCl release in the waste-water treatment area) and that have no effect on containment of licensed nuclear material or nuclear operations at the facility.

The review of fuel facilities' NCPSP will provide NRC a method to assess the facilities' chemical hazards programs that fall into the second and third categories outlined above. These NRC inspections will determine if licensees are recognizing and managing these hazards. Although NRC is not the primary responsible agency for the fourth category, it will work with the responsible agencies (e.g., OSHA²) to help ensure that fuel cycle facilities conform to applicable Federal regulations.

2603-02 OBJECTIVES

02.01 To establish general policy for the routine inspection program for the NCPSP at fuel cycle facilities.

02.02 To define specific requirements for inspection of the NCPSP at fuel cycle facilities.

02.03 To aid in the achievement of a uniform, standardized process of inspection.

02.04 To define the scope of the inspection process, with respect to the NCPSP, at fuel cycle facilities.

2603-03 PROGRAM ASSUMPTIONS

The program described here deals primarily with the inspection of the NCPSPs established at operating fuel cycle facilities, as well as those in standby status.

²U.S. Nuclear Regulatory Commission / the Occupational Safety and Health Administration, A Memorandum of Understanding between NRC and OSHA, "Worker Protection at NRC-licensed Facilities," 53 FR 43950, October 31, 1988.

2603-04 PROGRAM DESCRIPTION

04.01 Nuclear Chemical Process Safety Program

This chapter identifies requirements for the inspection of a fuel cycle facilities' NCPSP. The programmatic elements and corresponding inspection procedures are shown in Table 1.

Table 1. Nuclear Chemical Process Safety Program (NCPSP) Elements for NRC Review³

IP	Title	Elements
88056	Process Safety Information	Hazard Recognition Elements
88057	Hazard Identification and Assessment	
88058	Standard Operating Procedures	Prevention and Mitigation Elements
88059	Site-wide Safety Practices	
88060	Detection and Monitoring	
88061	Training	
88062	Maintenance and Inspection	
88063	Management of Change	
88064	Emergency Procedures	
88065	Incident Investigation	Examination Elements
88066	Audit and Inspection	

The type of information to be reviewed during a NCPSP inspection is listed below:

1. Process Safety Information

- a. Material Safety Data Sheets (MSDSs) for hazardous chemicals - hazards of process
- b. current Process Flow Diagrams (PFDs)

³There is no special significance attached to the title chosen for each inspection procedure (e.g., it is not necessary that the licensee have a program titled "Hazard Identification and Assessment," if the equivalent material has been addressed elsewhere).

- c. current Process Piping and Instrumentation Drawings (P&IDs)
- d. process description - process technology
- e. safe operating limits, etc.
- f. process equipment information

2. Hazard Identification and Assessment

Documentation of the following:

- a. results of Hazard Identification (i.e., a list of hazardous materials and their locations)
- b. methodology and rationale for selecting a particular Hazard Assessment (HA) methodology
- c. team members of HA study
- d. team recommendations
- e. actions to promptly address/resolve findings
- f. schedules for timely completion of actions - tracking system
- g. communication of findings with affected personnel.

3. Standard Operating Procedures

Written operating procedures for the safe conduct of chemical activities including:

- a. safe operating limits
- b. trouble-shooting guide - deviations from normal operation and their consequences
- c. information on process hazards
- d. annual certification, to ensure currency

4. Detection and Monitoring

Documentation of the following:

- a. determining detection and monitoring needs
- b. rationale for choice of detectors and monitors (number and locations)
- c. methods for ensuring their safe operation

5. Site-wide Safety Procedures

Documentation of safe work practices such as:

- a. hot work permits
- b. confined space permits
- c. lockout/tagout procedures
- d. control of access
- e. contractor management program
- f. line breaking and opening process equipment
- g. lifting heavy loads over active process equipment

6. Training

Written documentation for:

- a. training records for initial/refresher training
- b. methods for determining content of training program
- c. training material
- d. selection of trainers
- e. methods for determining frequency of refresher training
- f. employee certification in lieu of initial training
- g. employee feedback and effectiveness of training program

7. Maintenance and Inspection

- a. written procedures and schedules for maintenance and inspection activities
- b. copies of relevant portions of applicable manufacturers' instructions, codes, and standards

8. Management of Change

Written procedures to manage change to:

- a. process chemicals
- b. technology
- c. equipment
- d. procedures
- e. change to facility

9. Emergency Response Procedures

- a. summary of Emergency Plan for chemical hazards
- b. scenarios for chemical emergencies

10. Incident Investigation

- a. documented procedures for investigation of incidents/near-misses
- b. written investigation report for incidents/near misses containing findings, recommendations, corrective actions, timely resolution of actions

11. Audits and Inspection

- a. audit of every element, on a 3-year cycle
- b. audit report containing findings, recommendations, corrective actions, and timely resolution of actions

04.02 General

This manual chapter identifies the NCPSP inspection requirements for fuel cycle facilities. It identifies the scope of the inspection program based on NRC's regulatory responsibilities, the level of effort, and inspection frequency required for each individual element in the NCPSP.

a. Inspection Cycle

Unless modified by management in accordance with Section 04.03, below, a complete NCPSP inspection cycle will be conducted once every 2 years for each fuel cycle facility. An inspection cycle consists of eleven inspection procedures.

b. Inspection Procedures

Each inspection procedure listed in Table 1 identifies inspection objectives, inspection requirements, and inspection guidance. To complete and close out an inspection procedure, it is only necessary for the Inspection Section Chief to concur that the inspection objectives have been met for a particular licensee. Since these inspection procedures are performance-based, completion of all the inspection requirements is not necessary if the inspection objectives have been met. The inspectors should note that individual inspection requirements may not be applicable to all licensees.

c. Vertical Slice Inspection Method

The NCPSP inspection procedures were specifically developed to be applied in a "vertical slice" inspection. That is, a licensee's management controls will first be reviewed for technical adequacy and compliance with the appropriate license conditions. Then the inspector will verify proper implementation of those requirements in the field by conducting an in-depth performance review focused on a single system or process. The inspector is not expected to complete all of the inspection requirement line items for those cases where there is no apparent problem. Rather, the inspector is expected to concentrate his or her efforts on those areas where apparent safety problems exist.

04.03 Program Adjustments

The program provides inspection staff management the "flexibility" to adjust the frequencies of inspection effort within various program areas (and, thereby, level of program effort), based on an evaluation of the inspection findings and enforcement experience with particular licensees. The following general rules apply for implementing program adjustments for a particular licensee:

- a. The normal level of inspection effort should be continued on the basis of evaluation findings that give reasonable assurance of adequate and effective management control of the licensed activity.
- b. Reduction in the normal level of inspection effort may be warranted on the basis of evaluation findings that show the licensee has been outstanding in conducting a safe operation and in complying with regulatory requirements.
- c. An increase above the normal level of inspection effort may be warranted on the basis of evaluation findings that show minimum licensee satisfactory performance with respect to operational safety and compliance with regulatory requirements. Licensees should not be kept on an increased inspection schedule for more than one inspection cycle without some increased level of management involvement being used to correct the deficiencies in licensee performance.

END