APPENDIX A

GUIDANCE FOR CONDUCTING FUEL CYCLE INSPECTIONS

PART I
FUEL CYCLE FACILITY TERMINOLOGY

A. PURPOSE

This part describes the types of facilities and systems covered by the fuel facility inspection program and various terms used in the program.

B. TYPES OF FACILITIES

The following types of facilities are included in the fuel cycle facility inspection program.

1. Category I Fuel Fabrication Facility. A facility licensed under 10 CFR Part 70 to use or possess strategic special nuclear material (Category I formula quantities of high enriched uranium or plutonium) in processing, recovery, fuel fabrication, or research and development activities and operations.

2. Category II Fuel Fabrication Facility. A facility licensed under 10 CFR Part 70 to use or possess special nuclear material of moderate strategic significance (Category II formula quantities of high enriched uranium or plutonium) in processing, recovery, fuel fabrication, or research and development activities and operations.

3. Category III Fuel Fabrication Facility. A facility licensed under 10 CFR Part 70 to use or possess special nuclear material of low strategic significance (Category III quantities of low enriched uranium or plutonium) in processing, recovery, fuel fabrication, or research and development activities and operations.

4. Category III Fuel Assembly Facility. A facility licensed under Part 70 to use or possess special nuclear material of low strategic significance (Category III quantities of low enriched uranium or plutonium) in loading finished fuel pellets into fuel assemblies.

5. Uranium Conversion Facility. A facility licensed under 10 CFR Part 40 to produce uranium hexafluoride (UF_6) from concentrated uranium oxides (yellowcake) or to produce uranium tetrafluoride (UF_4) from UF_6.

6. Uranium Enrichment Facility. A facility licensed or certified under 10 CFR Part 70 or 76, respectively, to increase the ratio of the isotope U-235 to the isotope U-238 in uranium. Enriched uranium may also be downblended at these facilities by mixing it with natural or lower enriched quantities of uranium. (Downblending can also be accomplished at some fuel fabrication facilities.)

C. SAFETY SYSTEMS

Variability among the different types of facilities as well as in the processes that are employed in similar facilities does not lend itself to generic inspection planning. The specific risk significant systems in a facility that should be addressed by each inspection procedure (IP) depend on the type of facility and the processes used. Guidance on selection of risk-significant systems is provided in each inspection procedure. For some facilities, the term “safety systems” may be defined more narrowly in facility documents than would serve the purposes of the safety inspection program. For example, the term may refer to items relied on for safety (IROFS) or alternatively only to systems designed to prevent major offsite releases. The inspectors should rely on the Integrated Safety Analysis (ISA), Safety Analysis Report (SAR), or license application to identify risk-significant systems. Discussions with the Branch Chief and Project Inspector are also useful in determining inspection priorities.

The purpose of the following descriptions is to describe some of the safety systems that typically are found at fuel cycle facilities without necessarily limiting the applicability of the designation “safety system” to other process elements within the plant.

1. Plant Protection System. A function of plant protection systems is to initiate the operation of controls important to safety. The plant protection system encompasses all electrical and mechanical devices and circuitry, from sensors to actuation device input terminals, involved in generating signals associated with the detection of off-normal conditions and events that could threaten safety. It may also automatically trigger responses to maintain the continued safe condition of the plant. Functioning of the plant protection system may serve to actuate one or more of those systems described in the following paragraphs.

2. Mechanical Process Systems. These systems include receiving, storing, handling, transferring, and forming fissile material in fuel fabrication plants and other plants for plutonium and uranium processing. There may be important subsystems or components encompassed by these systems that will be subject to inspection. Examples include provisions for cleanups, maintaining assemblies in subcritical conditions, crane operations, fuel pellet pressing, uranium dioxide transfer and blending, pellet grinding, and handling or lifting liquid-filled UF_6 casks or fuel elements.

3. Chemical Process Systems. These systems may involve changes in the physical or chemical composition of nuclear materials contained in them (e.g., UF_6 vaporization, filtering, centrifugation, solvent extraction). The intended and unintended changes in physical or chemical composition of the nuclear material or moderating material in these systems are of particular safety significance, especially with respect to nuclear criticality.

   These processes often require sophisticated instrumentation for monitoring and processing control, especially when they contain fissile material. The actual form of the fissile material at any point in such a process may be subject to rapid and undetected change if required process parameters cannot be maintained. Such undesirable changes in chemical composition could greatly increase the risk of a radiological event.

Chemical process systems also include those for producing chemicals containing no nuclear material, but which are needed to feed processes that do involve nuclear materials elsewhere in the plant. Such processes can also pose risks to the safe control of nuclear material. Upset conditions associated with the system could lead to radiological consequences in neighboring systems that do contain nuclear material.

4. Process Offgas Systems. Process offgas systems are designed to confine hazardous chemical or radioactive materials that may be generated during process operations or radioactive waste storage. They are also designed to reduce the concentrations of these materials in gaseous process effluents. Usual components of process offgas systems are gas collection systems, scrubbers, condensate removal systems, sampling systems, chemical monitoring systems, and control and instrumentation systems.

   To ensure reliable service in the event of postulated accidents, offgas systems are generally equipped with redundant components to maintain the availability of critical functions. For example, redundant exhaust blowers may be installed. These may be designed to automatically switch to emergency power systems upon loss of normal electrical supply to ensure plant ventilation.

5. Confinement Barriers and Systems. Confinement barriers or systems are used to control the release of radioactive materials to the environment or into areas normally occupied by plant personnel. They can be used either singly, or in combination, to improve effectiveness or add redundancy.

   Primary confinement barriers include glove boxes, walls of process vessels, tankage, piping, and storage containers whose failure could result in releases of substantial quantities of radioactive materials.

   Final confinement barriers include exterior structure housing features, ventilation intake filters, or suitable intake dampers. The portion of a building's exhaust ventilation system consisting of final filtration equipment and equipment used to maintain a negative building pressure can also be considered to serve as a confinement barrier system.

   Absolute barriers are fabricated of impermeable material that can be expected to prevent penetration of all confined material without regard to the material's physical or chemical nature. Examples include pipe and vessel walls, and walls of buildings and structures.

   Selective barriers, such as mass-transfer devices or filters, are usually employed to remove selected chemical or particulate matter from a process or ventilation stream, while allowing the bulk amount of the stream to pass through. Examples of selective barriers are adsorbers, scrubbers, distillation units, and particulate filters.

6. Ventilation Systems. A principal risk to health and safety is the release and dispersal of radioactive materials. The prevention of such releases and dispersal is an important function of ventilation systems. They serve as principal confinement barriers in a multiple confinement barrier system that guards against the release of radioactive or other potentially dangerous materials during normal or abnormal conditions.

7. Emergency Utility Services. Included are:

   a. Electrical supply system with power supply and distribution networks to maintain the following: final confinement barrier and related systems associated with maintenance of its functional integrity; fire protection systems; and safety-related monitoring and alarm systems, including those concerned with security, criticality, combustible gases, effluents, and maintenance of pressure differential between the ambient atmosphere and the plant interior atmosphere.

   b. Water supply systems intended for fire protection, chemical dilution, or required equipment cooling, each with appropriate capacity and distribution capability.

   c. Compressed air supply systems intended to serve safety-related instruments and controls (with appropriate capacity and distribution capability), and spargers.

   d. Lighting systems to illuminate vital process operations and security areas and aid in personnel egress and reentry.

   e. Steam supply systems intended for process operations, maintenance of critical temperatures in processes, and operation of jet-eductors used for transfer of process and waste solutions, etc.

8. Fire Protection Systems. These include fire alarm and fire suppression systems. They are significant to nuclear safety in at least two ways. First, by limiting the consequences of fires through early detection and automatic suppression, they enable plant personnel to maintain safe control of nuclear material. Second, the use of water or other hydrogenous materials to suppress fire may inadvertently provide sufficient moderation to cause inadvertent criticality. In areas where sufficient quantities of special nuclear material exist, fire suppression systems and techniques must be limited to prevent this from occurring.

9. Other Safety Communications and Alarms Systems. These include emergency communications systems, monitoring and alarm systems for plant security, nuclear criticality, combustible gases, effluents, and pressure differential across confinement barriers. Some of the monitoring and alarm systems may be integral parts of the plant protection systems.

END

ATTACHMENT 1

Revision History For IMC 2600, Appendix A

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	04/26/07 CN-07-014	Revised to incorporate the new inspection procedures developed to address changes to Part 70 and to reflect enhancements made to the fuel facility inspection program.	None	N/A	ML070600575
N/A	08/15/07 CN 07-025	Remove “OFFICIAL USE ONLY - SENSITIVE INTERNAL INFORMATION” designation from entire manual chapter to make publicly available.	None	N/A	ML072070424