

**WESTINGHOUSE ELECTRIC CORPORATION  
ENERGY SYSTEMS**

**APPLICATION FOR RENEWAL  
OF A  
SPECIAL NUCLEAR MATERIALS LICENSE  
FOR THE  
COMMERCIAL NUCLEAR FUEL DIVISION  
AT THE  
COLUMBIA, SOUTH CAROLINA  
FUEL FABRICATION FACILITY**

**LICENSE NUMBER  
SNM-1107**

**April 30, 1990 (Revision No. 0.0)  
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**U. S. NUCLEAR REGULATORY COMMISSION  
DOCKET 70-1151**

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# REVISION RECORD

<u>REVISION NUMBER</u>	<u>DATE OF REVISION</u>	<u>PAGES REVISED</u>	<u>REVISION REASON</u>
1.0	30APR95	All	Update to current operations.

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## CHAPTER 1.0

### GENERAL INFORMATION

#### 1.1 FACILITY AND PROCESS DESCRIPTION

The Columbia Fuel Fabrication Facility (CFFF) of the Commercial Nuclear Fuel Division (CNFD) will be primarily engaged in the manufacture of fuel assemblies for commercial nuclear reactors. The manufacturing operations to be authorized by this license will consist of receiving low-enriched, less than or equal to 5.0 w/o U-235, uranium hexafluoride; converting the hexafluoride to produce uranium dioxide powder; and processing the uranium dioxide through pellet pressing and sintering, fuel rod loading and sealing, and fuel assembly fabrication. These operations will be governed by the technically sound radiation and environmental protection, nuclear criticality safety, industrial safety and health, SNM safeguards, and quality assurance controls described in detail in this License Application.

Two general systems are used to convert uranium hexafluoride to uranium dioxide powder -- Integrated Dry Route (IDR) and Ammonium Diuranate (ADU). IDR conversion equipment has been designed to receive and process uranium in enrichments up to 5.0 w/o U-235, through fuel rod loading. ADU conversion equipment has also been designed to receive and process uranium in enrichments up to 5.0 w/o U-235, through fuel assembly fabrication and shipping. These operations are supported by absorber coating, laboratory, scrap recovery, and waste disposal systems. Additional details concerning the facility and process systems are presented in the Site Safeguards documents described in Paragraph 1.1.1(e) of this Section, and in the SITE EMERGENCY PLAN described in Chapter 9.0 of this License Application.

##### 1.1.1 SITE UTILITIES AND SERVICES

###### (a) Electrical Supply

The CFFF will be served by a single, 115,000 volt, electrical supply line. Four diesel-powered standby generators will be installed and maintained to meet the emergency electrical power requirements of the site in the event of a temporary outage of the normal supply source. Emergency power will be automatically provided to crucial process equipment; emergency lighting systems; cooling system pumps; all fire alarm, hazard alarm, and other designated safety alarm systems; Conversion Control Room alarms; health physics sampling systems; and, emergency ventilation systems, including scrubbers.

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(b) Water Supply

A ten-inch main from the Columbia Municipal Water Authority supplies water to the site.

(c) Gaseous and Liquid Effluent Management

Gaseous exhausts, with potential for contamination, from process areas will be routed through HEPA filtration, to remove entrained uranium particulates, prior to discharge to the environment. Exhausts containing uranium in soluble form will be passed through aqueous scrubbers, preceding the HEPA filters. Following filtration, the gases will be continuously sampled, to enable analyses for assuring compliance with the limits specified in this License Application.

Liquid process wastes will be treated, prior to discharge to the Congaree River. Waste treatment, for the removal of uranium, ammonia, and fluorides, will consist of filtration, flocculation, lime addition, distillation, and precipitation (in a series of holding lagoons). Site sanitary sewage will be treated in an extended aeration package plant prior to discharge, either directly or through a polishing lagoon. The discharged effluent will be chlorinated, and mixed with treated liquid process waste, at the facility lift station. The combined waste will then be passed through a final aerater, followed by pH adjustment as required, and subsequently pumped to the river via a 4-inch pipeline. Compliance with licensed limits will be verified by passing the waste streams through on-line monitoring systems, or by manual sampling and analysis on a batch-basis. The treatment systems will have sufficient holdup capacity to assure the limits are continuously met.

Storm water from the site enters a system of drainage ditches and ultimately flows to the Congaree River.

(d) SOLID WASTE STORAGE AND DISPOSAL

Solid wastes will be sorted into appropriate combustible and noncombustible fractions, and placed in specially designated collection containers located throughout the work area. (The wastes consist of paper, wood, plastics, metals, floor sweepings, and similar materials which are contaminated by, or contain, uranium.) Following a determination that the wastes are in fact properly sorted, the contents will be transferred to a waste processing station.

Materials that are suited for thorough survey may be decontaminated for free-release, or re-use, in accordance with provisions of this License Application.

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Combustible wastes will be packaged in compatible containers, assayed for grams U-235, and stored to await incineration. Noncombustible wastes, and selected combustible wastes, will be packaged in compatible containers, compacted when appropriate, measured to verify the uranium content, and placed in storage to await shipment for further treatment, recovery, or disposal.

Administrative controls will be in effect to assure that only authorized materials are packaged for disposal. (These include verification of package contents, container security to minimize the probability of unauthorized additions to the containers, documentation of package contents, and routine overchecks to verify that the above referenced controls are effective.) Wastes designated for disposal will be packaged in DOT approved 55-gallon metal drums or in metal boxes. Materials packaged in metal boxes will be pre-measured in standard containers prior to transfer to the boxes. Filled containers will be stored in designated areas within the manufacturing or waste storage buildings; or, they may be stored outdoors, if protected from the elements.

Wastes consigned to disposal will be shipped to a licensed burial facility. Shipments will be made in compliance with all applicable NRC, DOT and State regulations; and, in conformance to burial site criteria.

(e) **SITE SAFEGUARDS**

Nuclear Materials Control and Accounting at the CFFF is described in the NRC-approved FUNDAMENTAL NUCLEAR MATERIAL CONTROL PLAN FOR THE COLUMBIA FUEL FABRICATION FACILITY, dated April 1, 1987, and subsequently revised in accordance with the regulations. Physical Security at the CFFF is described in the NRC-approved PHYSICAL SECURITY PLAN FOR THE COLUMBIA FUEL FABRICATION FACILITY, dated September 1, 1984, and subsequently revised in accordance with the regulations. These Plans detail the measures employed at the facility to detect any potential loss of, and mitigate the opportunity for theft of, Special Nuclear Material of Low Strategic Significance, in accordance with applicable requirements of 10CFR73 and 74.

**1.1.2 SCOPE OF LICENSED ACTIVITIES**

Compliance with all applicable Parts of Title 10, Code of Federal Regulations will be required, unless specifically amended or exempted by NRC staff.

(a) **Authorized Activities:**

(a.1) Authorized activities at the Columbia Fuel Fabrication Facility will include: (1)

Receipt, handling, and storage of Special Nuclear Material as uranium hexafluoride, uranium nitrates, uranium oxides; and/or contained in pellets, fuel rods, fuel assemblies, samples, scrap, and wastes; (2) Receipt, handling, and storage of other licensed radioactive material; (3) Chemical conversion processing by the Ammonium Diuranate Process and the Integrated Dry Route -- including vaporization and hydrolysis, precipitation and centrifugation, drying, calcining, comminution, and blending; (4) Fuel fabrication -- including powder preparation, die-lubricant mixing, pelleting, sintering, grinding, pellet coating with nuclear absorbers, fuel rod loading and inspection, and final fuel assembly; (5) Quality assurance and control inspection activities; (6) Analytical Services Laboratory operations -- including wet-chemistry and spectrographic techniques; (7) Metallurgical Laboratory operations -- including sample preparation, polishing, testing, and examination; (8) Chemical Process Development operations -- including laboratory-scale process research, prototype development, and equipment check-out; (9) Mechanical Process Development operations -- including laboratory-scale research and development; (10) Health Physics Laboratory operations -- including sample preparation and analysis, instrument repair and calibration, respirator fit-testing, and bioassay sample and sealed-source storage; (11) In-house, and contracted, scrap recovery operations -- including scrap batch processing, solvent extraction, coated-pellet recovery, scrap blending, and hydrofluoric acid recovery; (12) UF<sub>6</sub> cylinder washing, hydrostatic testing and re-certification; (13) Equipment and facility maintenance activities; (14) Equipment and facility decontamination activities -- including clothing; (15) Waste storage and disposal preparation operations -- including HEPA filter testing, conversion liquid waste treatment, advanced waste-water treatment, lagoon storage, incineration, radioactive waste packaging for disposal, and calcium fluoride disposition; (16) Ancillary mechanical operations -- including non-radioactive component fabrication and assembly; and (17) Shipping container and overpack refurbishment.

(a.2) The licensed activity may also perform work for other Westinghouse Divisions, or outside customers, which is within the authorized capabilities of the facility.

(b) Material Possession Limits and Constraints

The following will be the maximum quantities of Special Nuclear Material that may be possessed by the licensed activity at any one time; and, constraints for procurement, use, and transfer of such material.

(b.1) Material possession limits -- (1) 5-grams of U-233 in any chemical or physical form, limited to laboratory use as individual 1-gram maximum quantities in ventilated hoods; (2) 350-grams of U-235, as uranium of any enrichment, in any

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chemical or physical form; (3) 75,000-kilograms of U-235, as uranium enriched to no greater than 5.0 weight-percent, in any chemical or physical form except metal; and, (4) 1.5-grams of Pu-238/239 as sealed sources.

- (b.2) Material constraints -- The procurement of Special Nuclear Materials will be in accordance with licensed activity needs. Production, utilization, and/or significant loss of special nuclear materials will not be authorized. Transfers of Special Nuclear Materials will be only as arranged with facilities authorized to receive and possess such materials.

## 1.2 INSTITUTIONAL INFORMATION

This application requests a ten year renewal of License SNM-1107, Docket 70-1151, which authorizes the receipt, possession, storage, use, and transfer of Special Nuclear Material at the Westinghouse Electric Corporation's Columbia Fuel Fabrication Facility (CFFF). There is no control or ownership exercised over Westinghouse Electric Corporation by any alien, foreign corporation, or foreign government. In accordance with the requirements of 10 CFR 70.22(a)(1), the following additional information is submitted:

### 1.2.1 APPLICANT AND STATE OF INCORPORATION

Westinghouse Electric Corporation  
Pennsylvania

### 1.2.2 LOCATION OF THE PRINCIPAL OFFICE

Pittsburgh, Pennsylvania

### 1.2.3 NAMES (CITIZENSHIP) AND ADDRESSES OF PRINCIPAL OFFICERS

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James A. Fici (USA)  
CFFF Plant Manager  
Westinghouse Columbia Plant  
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Columbia, South Carolina 29250

#### 1.2.4 CORPORATE CONTACT FOR LICENSING MATTERS

Griff Holmes  
Manager, Energy Systems Regulatory Affairs  
Westinghouse Energy Center  
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#### 1.2.5 SITE CONTACT FOR LICENSING MATTERS

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Westinghouse Columbia Plant  
Drawer R  
Columbia, South Carolina 29250

#### 1.2.6 ADDITIONAL INFORMATION

Additional corporate financial and business information is provided in the Westinghouse Annual Report, available from:

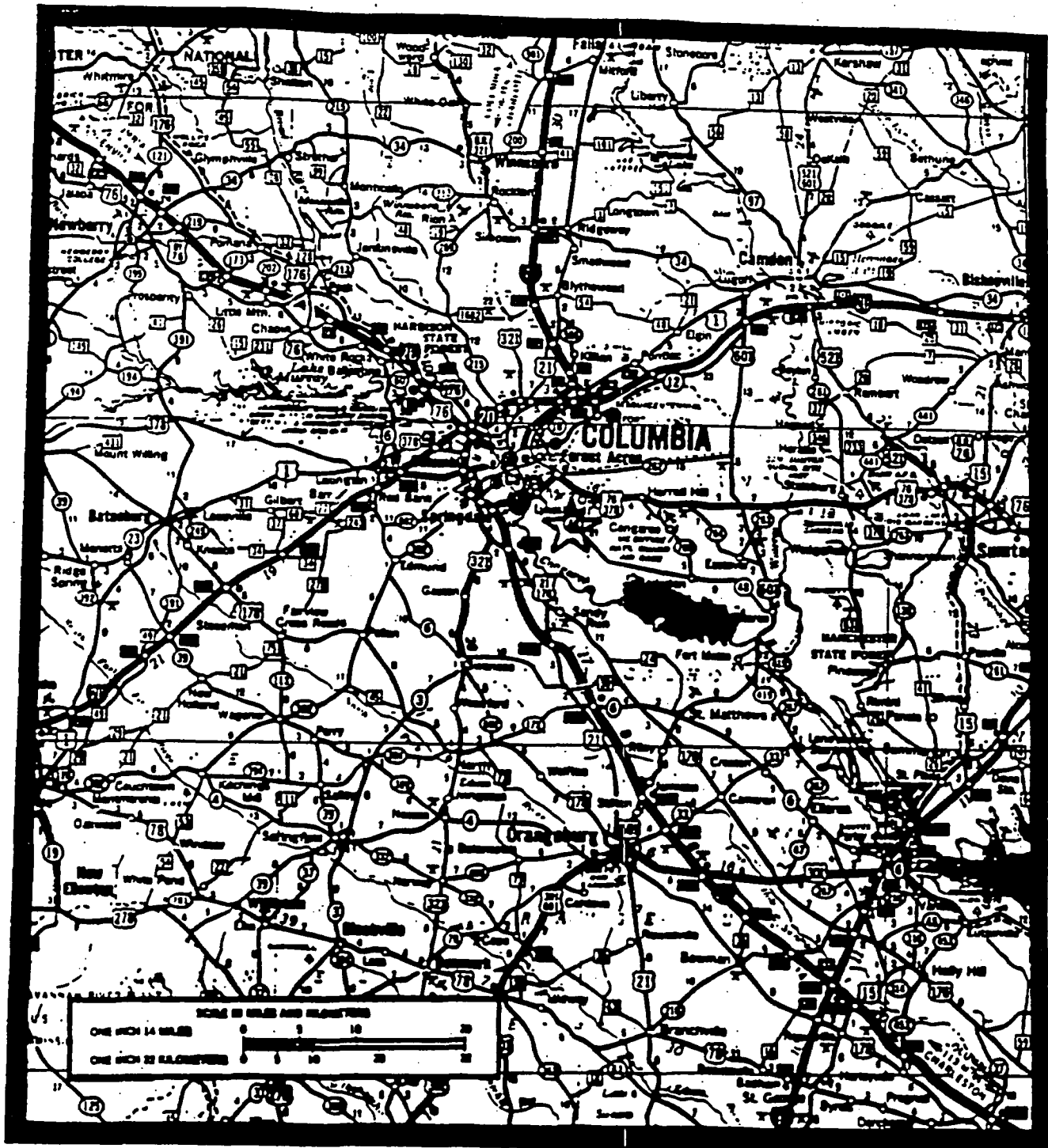
Westinghouse Electric Corporation  
P. O. Box 8815  
Pittsburgh, Pennsylvania 15221

#### 1.3 SITE DESCRIPTION

The Columbia Fuel Fabrication Facility (CFFF) is located near Columbia, South Carolina and is situated on an approximately 1,158 acre site in Richland County, some 8 miles southeast of the city limits of Columbia (see Figures 1.1 and 1.2) along South Carolina

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FIGURE 1.1  
CFFF SURROUNDING AREA

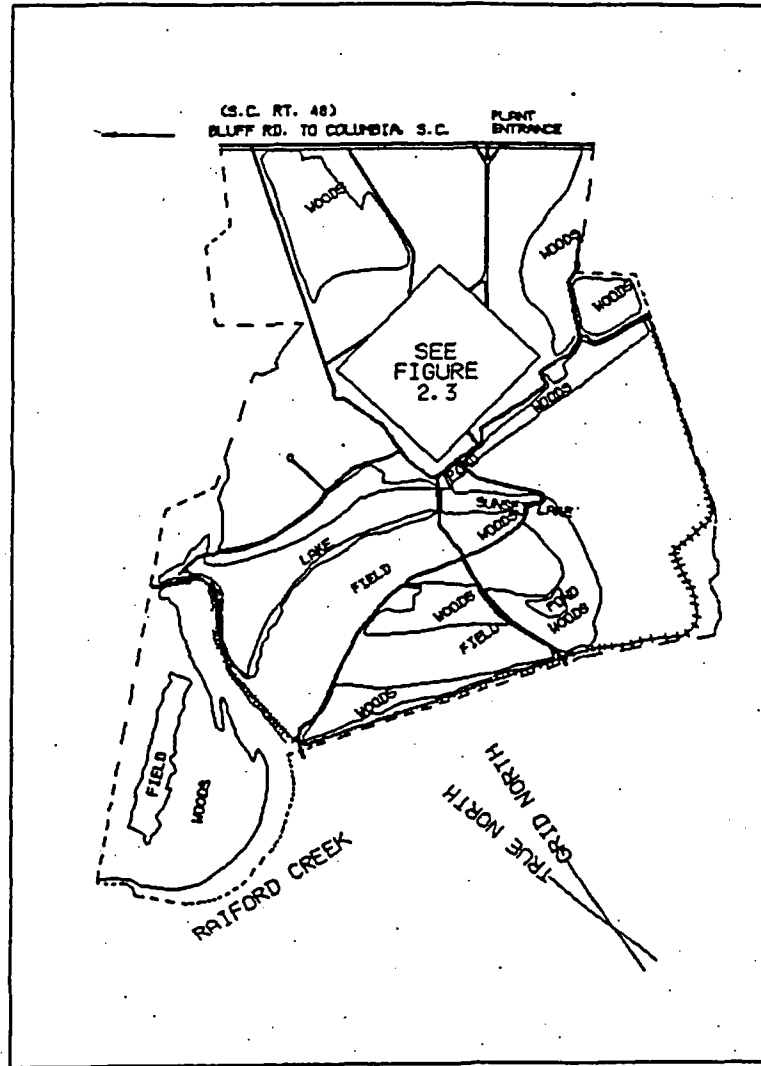


★ Columbia Fuel Fabrication Facility (CFFF)

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FIGURE 1.2

CFFF PROPERTY BOUNDARY



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Highway 48. The region around the site is sparsely settled, and the land is characterized by timbered tracts and swampy areas, penetrated by unimproved roads. Farms, single-family dwellings, and light commercial activities are located chiefly along nearby highways.

The site is bordered by abutting properties, as presented in the PHYSICAL SECURITY PLAN described in Paragraph 1.1.1(e) of this License Application. Approximately 1098 acres of the site remain undeveloped. Of the total 1,158 acres, only 60 acres (about 5 percent) have been developed to accommodate the fuel fabrication facilities, holding ponds, and landscaped areas. A site plan is shown in Figure 1.3.

Details of the CFFF location, including proximity to nearby towns, industries, public facilities, the Congaree River, transportation links; and, site topography; are presented in Section 1 of the SITE EMERGENCY PLAN. Details of the site characterization are presented in Section 2.0 of the SITE EVALUATION REPORT.

#### 1.4 TERMS AND DEFINITIONS

Throughout this License, the following terms will be defined and used as indicated:

**ALTERNATIVE ACTIONS** -- Tests, procedures or other practices that may be substituted for prescribed activities as deemed appropriate by the Regulatory Component. In such case, a detailed analysis will be performed and documented by the cognizant Regulatory Functions. This analysis will include a comparison of the proposed action with that specified in the license; and, a demonstration that action levels and limits of the license will be met, and that health and safety of employees and the public, and quality of the environment, will be protected.

**CHEMICAL AREA** -- An area where uncontained radioactive material is processed, the probability of contamination on floors and accessible surfaces is high, and protective clothing is required; such as, the UF<sub>6</sub> Bay, the Conversion Area, the Pelleting Area, the Rod Loading Area, etc.

**CLEAN AREA** -- An area where radioactive material, if present, is completely contained and there is negligible contamination on the floors or accessible surfaces. Such locations include, but are not limited to, the Machining Area, Grid Assembly Area, Final Assembly Area, Office Areas, and the Cafeteria.

**COMPONENT** -- When used in an administrative context, an independent organizational unit distinguishable by its assigned responsibilities; such as, the Engineering Component, the Manufacturing Component, the Quality Component, and the Regulatory Component.

Figure 1.3 - Site Plan  
& Site Plan Key

(2 pgs withheld in entirety)

Ex. 2

**CONTAMINATION CONTROLLED AREA** -- An alternate name for the Chemical Area.

**CONTROLLED ACCESS AREA** -- A physically defined area, represented on three sides by a seven-foot high barrier of Number-11 American Wire Gauge fabric-fence topped by three strands of barbed wire, and on the fourth side by the Administration and Main Manufacturing Building. This area is the "Controlled Access Area" described in the Physical Security Plan.

**ENRICHMENT LIMIT** -- When used as an authorized enrichment limit, 5.0 w/o U-235 means that, based on an enrichment measurement uncertainty no greater than 0.50 percent relative, the hypothesis that the true enrichment level is 5.0 w/o U-235 or less can not be rejected at the 0.05 level of significance.

**EQUIVALENT EXPERIENCE** -- When used in a personnel qualification context to equate experience with education, eight years of applicable experience is equivalent to a baccalaureate degree.

**FIXED LOCATION GENERAL AIR SAMPLE** -- Air samples used to assess general area radioactivity concentrations; and, to assess the adequacy of radioactive material containment and confinement within the processing areas of the facility; and, to establish airborne radioactivity areas.

**FIXED LOCATION BREATHING ZONE REPRESENTATIVE AIR SAMPLE** -- Air samples used for purposes of assessing and assigning operator intake.

**FREQUENCIES** -- When measurement, surveillance, and/or other frequencies are specified in License documents, the following will apply: **DAILY** means once each 24-hour period; **WEEKLY** means once each seven consecutive days; **MONTHLY** means twelve per year, with each covering a span of 40-days or less; **QUARTERLY** means four per year, with each covering a span of 115-days or less; **SEMIANNUAL** means two per year, with each covering a span of 225-days or less; **ANNUAL** means once per year, not to exceed a span of 15-months; **BIENNIAL** means once every two years, with each covering a span of 30-months or less. **TRIENNIAL** means once every three years, with each covering a span of 45 months or less.

**FUNCTION** -- When used in an administrative context, an individual (or individuals), designated by the Component Manager, acting in coordination with the other personnel of a component, having the capability, responsibility, and authority to make and implement decisions required to carry out assigned duties; such as the Environmental Protection Function, Radiation Safety Function, Nuclear Criticality Safety Function, Chemical Safety Function, Fire Safety Function, and Safeguards Function of the Regulatory Component.

**LICENSED ACTIVITY** -- That combination of personnel, plant, and equipment established by Westinghouse Electric Corporation to carry out the processing of radioactive material authorized by this License Application.

**MAY** -- Denotes implied permission by NRC Licensing Staff to take a stated action or course.

**PORTABLE AIR SAMPLE** -- An air sample that is not integrated into the plant's central air sample vacuum system.

**REGULATORY-SIGNIFICANT PROCEDURES** -- Those procedures that contain, in whole or in part, actions that are important to environmental protection, health, safety, and/or safeguards.

**RESTRICTED AREA** -- Areas such as the Manufacturing Building, or equivalent areas, to which access is restricted by physical or administrative methods and which is monitored on a scheduled basis by the site Security Function.

**SAFETY-RELATED** -- Relevant to systems crucial or important to safety; and, those systems that improve the margin of safety (e.g., in the context of maintenance).

**SAFETY-SIGNIFICANT** -- Relevant to systems crucial or important to safety (e.g., in the context of quality assurance).

**UNRESTRICTED AREA** -- An area, access to which is neither limited nor controlled.

**WILL** -- Denotes a mandatory requirement to take a stated action or course.



## CHAPTER 2.0

### MANAGEMENT ORGANIZATION

#### 2.1 ORGANIZATIONAL RESPONSIBILITIES AND AUTHORITIES

The Westinghouse Electric Corporation (WEC) is divided into business units. One such unit is the Energy Systems Business Unit (ESBU), which encompasses all of the commercial activities of WEC directly related to the development, manufacturing, and marketing of products contributing to the use of nuclear reactors for electrical power generation.

##### 2.1.1 ORGANIZATIONAL OPERATING UNITS

Within ESBU, the primary responsibility for the design, development, and manufacture of commercial nuclear reactor fuel rests with the Commercial Nuclear Fuel Division (CNFD). The General Manager of CNFD reports directly to the Vice President and General Manager of ESBU. Within CNFD, the primary responsibility for all commercial nuclear reactor fuel manufacturing activities rests with the Columbia Fuel Fabrication Facility (CFFF); the CFFF Plant Manager reports to the General Manager of CNFD. Figure 2-1 illustrates the general structure of the Corporate organization.

The ultimate responsibility for all CFFF activities associated with the manufacture of commercial nuclear reactor fuel -- including environmental protection, health, safety, quality, and safeguards -- rests with the Plant Manager. The site organization consists of several staff Components reporting directly to the Plant Manager. One of these Components, Regulatory, has the responsibility for overall coordination and implementation of the Columbia Plant environmental protection, health, safety, and safeguards programs. Figure 2-2 illustrates the general structure of the CFFF organization.

##### 2.1.2 POSITIONS AND ACTIVITIES WITHIN ORGANIZATIONAL OPERATING UNITS

Each Westinghouse management position is covered by a written description, presenting in detail its scope, purpose, duties, responsibilities, difficulties, and requirements. The description identifies the incumbent's authority for decisions which may be made unilaterally, and those requiring higher management approval. It delineates relationships with other functions, and specifies responsibilities for managing personnel, and for the control and maintenance of managed facilities and equipment. Position descriptions are reviewed and approved by two higher levels of line management. A Management

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FIGURE 2-1  
CORPORATE ORGANIZATION

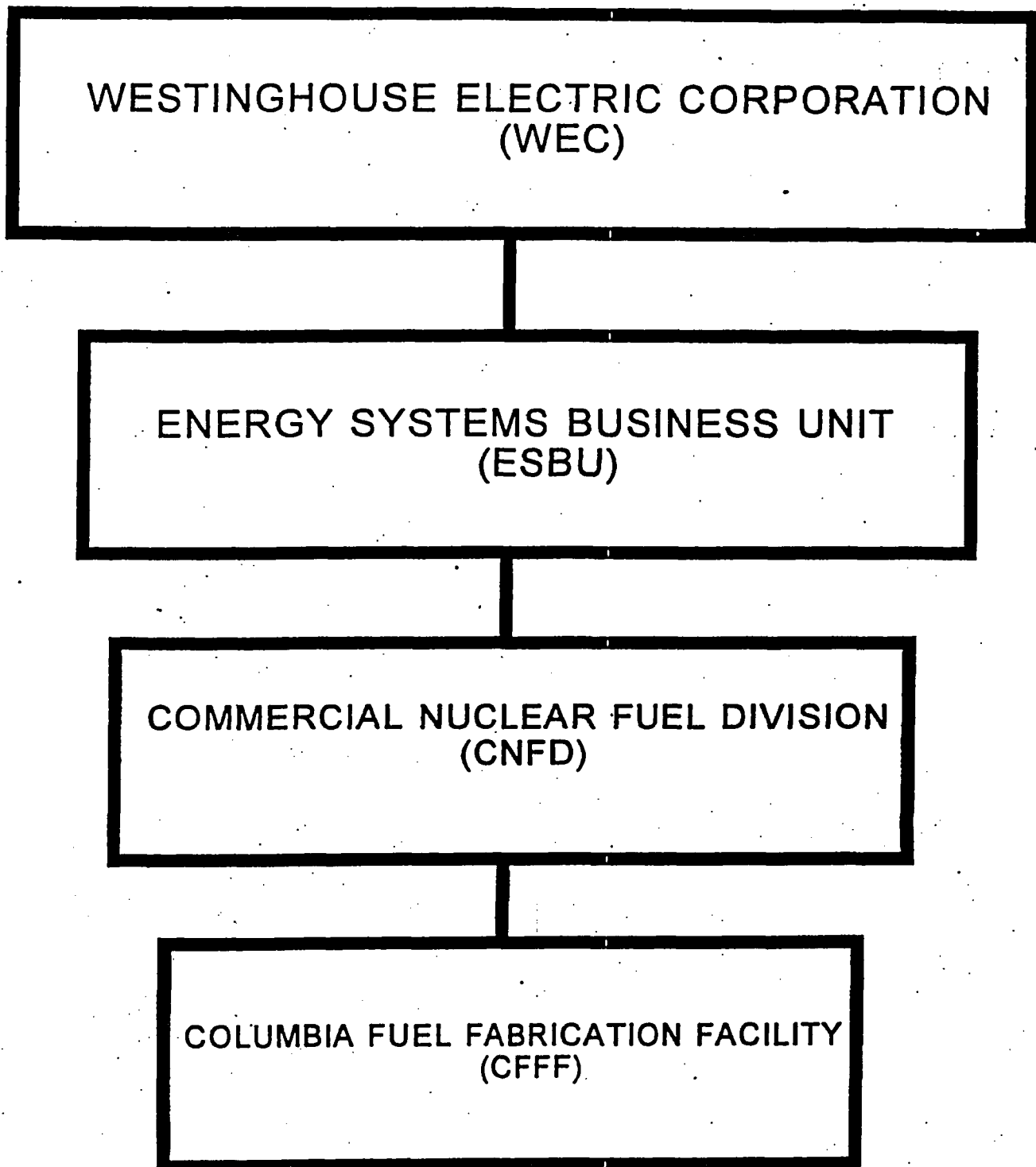
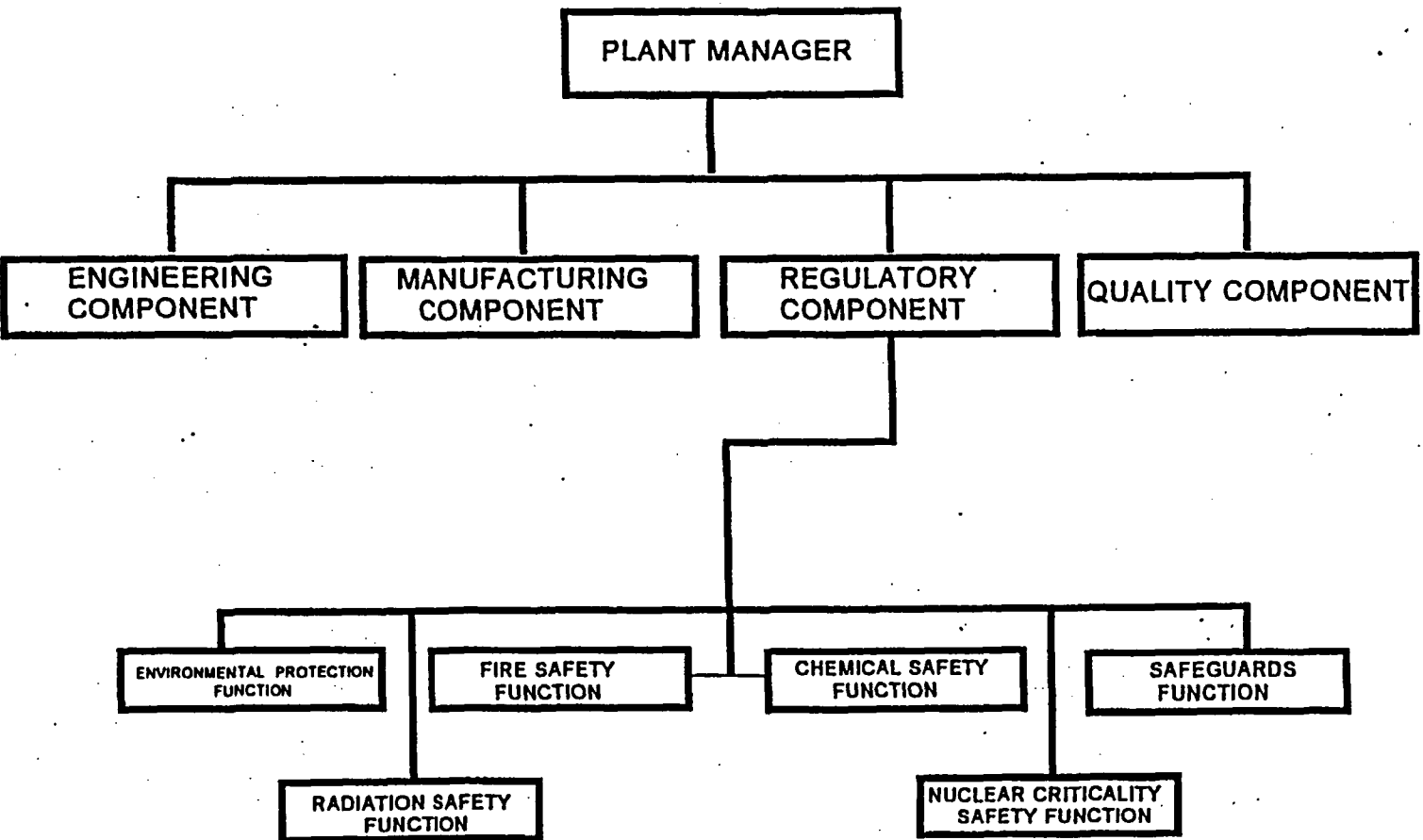


FIGURE 2-2  
CFF ORGANIZATION



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Position Committee, which consists of key members of the CNFD staff, reviews and evaluates such positions. These reviews determine that all key functions are covered, inter-relationships are clear, and conflicts are eliminated. Persons are selected to fill these management positions by evaluating their capability to perform the various activities specified in the position description. Two higher levels of management, at a minimum, must approve each selection or change of a management incumbent. Continuing quality performance of managers is assured through a formal program of annual review.

Operations at the Columbia Fuel Fabrication Facility are in accordance with the general operating philosophy and procedures that are employed in all Westinghouse plants and facilities. Briefly, this philosophy provides that total responsibility for all phases of operations, including environmental protection, health, safety, quality, and safeguards follows the usual lines of organizational authority. Advisory and service groups are provided to assist line management in the analysis of operations within their control, and to provide measurements, determinations and information which aid in the analysis of specific operations and situations; however, such service and staff assistance in no way relieves an individual line manager from accountability for high quality operation of the function and facility, or for ascertaining and assuring, through appropriate management channels, that adequate service is provided. Basic policies and procedures are established by line management with the review and approval of cognizant staff groups; and, within the framework of these policies and procedures, the responsibility for making decisions at the operating level rests with the first level manager. A first level manager has the basic responsibility for operating controlled activities in a safe and prudent manner.

First level managers are responsible for providing operating instructions for the guidance and direction of subordinate personnel. Written procedures or manuals are prepared, which become the bases for performing specific operations. The first level manager cannot make unilateral changes in such written instructions, or in posted limits, without review and approval of cognizant staff groups. First level managers are also responsible for assuring that personnel under their jurisdiction receive adequate training.

The Regulatory Component presents an orientation to new employees. Fundamental radiation safety rules and policies, use of protective clothing and personnel monitoring devices, prevention of internal exposure, limiting exposure to external radiation, nuclear criticality safety, and plant emergency procedures are among the topics discussed. To acquaint the new employee with basic regulations, selected parts of Title 10, Code of Federal Regulations, are covered. Primary emphasis is placed upon 10 CFR Parts 19 and 20. The cognizant first level manager assigns an experienced employee the responsibility of indoctrinating and training a new employee in the proper procedures and precautions for performing each specific job. The first level manager then evaluates the progress of the new employee and gradually increases job assignments until complete requirements of the job description are fulfilled. Failure to achieve minimum

performance requirements is cause for a change in assignment, or for release from employment. Periodic reinforcement instruction is conducted, on the job, by the employee's first level manager and/or by personnel from the Regulatory Component. As the need arises, changes in regulations, changes in operating conditions and/or procedures, and changes in administrative policies are covered.

To ascertain that all employees are familiar with the site emergency evacuation procedures, drills and/or exercises are conducted at least annually to simulate emergencies. After each drill or exercise is evaluated, appropriate first level managers are informed of any shortcomings disclosed, and they subsequently instruct their personnel regarding any remedial actions required.

At the CFFF, all personnel involved in operation of the facility will have the right to question, and/or request review of, the safety of any operating step or procedure. Further, a cognizant Regulatory Component staff member on duty will have the responsibility and authority to prohibit, through the cognizant first level manager, any operation which is believed to involve undue immediate hazard. Such terminated operations will remain in safe-shutdown until the situation is reviewed with cognizant management, and there is a consensus resolution of the methods and procedures to be used.

### 2.1.3 POSITION ACCOUNTABILITY AND REQUIREMENTS

Administrative and managerial controls will be in effect at all times to assure that decisions related to the operation of the licensed activity are made at the designated level of accountability, by individuals meeting the necessary technical requirements.

#### (a) Plant Manager

The Plant Manager will have overall accountability for all nuclear fuel manufacturing activities at the Columbia Fuel Fabrication Facility. This individual will direct all activities of licensed operations and staff functions, either personally or through designated management personnel. This individual will also coordinate any necessary support activities, obtained from higher Westinghouse management; and, will perform all assigned management functions in accordance with Westinghouse policies and higher management directives.

The minimum requirements for the position of Plant Manager will be a baccalaureate degree, or equivalent; and, five years of management experience in a nuclear facility. The Plant Manager will have broad general knowledge concerning the regulatory aspects of policies and procedures in effect at the Columbia Fuel Fabrication Facility.

(b) Component Managers

Four Component Managers will have specific accountability for engineering, manufacturing, regulatory, and quality operations and activities involving licensed materials. The Manufacturing Component will conduct the operations and maintenance activities required for production of nuclear fuel. The Engineering Component will provide design services related to processes and facilities used by the Manufacturing Component. The Quality Component will provide assurance, inspection, and analytical services in support of the Manufacturing Component. (The Regulatory Component is described in Paragraph (c) of this subsection.) Component Managers will plan, direct, and control such activities personally, or through other management personnel; and, will perform all assigned management duties in accordance with Westinghouse policy and higher management directives. A Component Manager may be responsible for more than a single work area; and, will be directly accountable for the safe operation and control of activities in the work area(s) and for the protection of the environment, as influenced by the activities conducted. With appropriate support from cognizant service groups, they will be responsible for environmental protection, health, safety, quality, and safeguards, in all areas over which they have authority.

First Level Managers will supervise operating personnel. They will fulfill their responsibilities by assuring that all operations under their control are carried out in accordance with the radiation protection limits, nuclear criticality safety controls, processing procedures, schedules, and other instructions supplied by higher management.

All Component Managers will be knowledgeable in the operating procedures applicable to their work areas. Each Manager will have demonstrated proficiency in application of the licensed activity's environmental and radiological protection programs, as they relate to controls and limitations on work activities, in assigned radiation and radioactive materials areas. Each Manager of work areas where uranium is handled will have demonstrated proficiency in the application of the areas' nuclear criticality safety controls. All Managers will be knowledgeable in the occupational safety and health procedures applicable to their areas of responsibility.

The minimum requirements for a Position of Component Manager, above the First Level, will be a baccalaureate degree, or equivalent, with a science or engineering emphasis; and, two years of experience in a nuclear facility. A First Level Manager will have demonstrated management capabilities by a continuing record of quality work accomplishments.

(c) **Regulatory Component Managers and Engineering Functions**

The Regulatory Component will be that organizational component of the licensed activity with the responsibility for environmental pollution control, radiation protection, nuclear criticality safety, occupational safety and health, and emergency planning; and, for evaluating the effectiveness of these programs. The Regulatory Component will be specifically responsible for assuring that applicable license conditions, radiation and environmental protection requirements, nuclear criticality safety requirements, and occupational safety and health requirements have been evaluated and communicated to other Component management for incorporation into facilities, equipment, and procedures prior to their use for processing licensed material.

The Regulatory Component will, to the extent practicable, be administratively independent of manufacturing process supervision. The Regulatory Component will be responsible for the establishment, conduct, and continuing evaluation of licensed programs to ensure the protection of the employees at the licensed facility, of the public, and of the environment. In particular, for any processing change which could result in a credible consequence not previously evaluated, or in excess of one previously evaluated, the Regulatory Component will perform a safety analysis to assure that no off-site consequences, in excess of those specified in the regulations, would occur. Any process change for which the analysis indicates that a process upset could produce effects in excess of those previously evaluated will be submitted for review and approval by the NRC staff, prior to implementation.

The radiation protection program administered by the Regulatory Component will include as a minimum: the evaluation of releases of radioactive effluents and materials from the site; the establishment of procedures to control contamination, exposure of individuals to radiation, and integrity and reliability of radiation detection instruments; the maintenance of required records and reports to document the program's activities; and a program to maintain the above parameters As Low As Reasonably Achievable (ALARA).

Nuclear criticality safety services provided by the Regulatory Component will include as a minimum: the performance of process or equipment nuclear criticality safety analyses and evaluations before a new or modified fissile material operation is begun to include the determination of parametric controls and spacing requirements based upon validated analytical or computational techniques, including computation of effective neutron multiplication factors for fuel configurations; provision of audits, inspection and surveillance services to protect against accidental criticality; the maintenance of required documentation

for the program performance of process and equipment review, validated nuclear criticality safety analyses and evaluations, operating equipment and procedure review, verification, and approval; and the performance of audits of the nuclear criticality safety program.

The occupational safety and health program administered by the Regulatory Component will include as a minimum: the evaluation of potential physical, chemical, and fire hazards; the development and implementation of safety programs and procedures designed to minimize accidents and injuries to employees; the procurement and maintenance of industrial safety protection and monitoring equipment; and the maintenance of required records and reports to document the program's activities.

Specific responsibilities of the Regulatory Component will include, but not necessarily be limited to, the following:

- License and permit administration;
- Routine surveillance of operations;
- Audits of licensed activities for compliance with applicable State and Federal regulations, licenses, and permits; and, documentation of these audits and actions, to facilitate corrective activities;
- Maintenance of the site regulatory plans;
- Maintenance of the site regulatory manuals;
- Maintenance of the site regulatory procedures;
- Conduct and review of nuclear criticality safety analyses;
- Review and approval of all site procedures specifically related to environmental and radiation protection, nuclear criticality safety, occupational safety and health, and emergency planning;
- Review and approval of design drawings of equipment, and layouts, associated with the processing, handling, and storage of nuclear material;
- Inspection of installed equipment for conformance with radiation protection, nuclear criticality safety, and occupational safety and health requirements; and, documentation of said conformance;
- Review of nuclear criticality safety, radiation protection, and occupational safety and health aspects of changes to equipment and operations associated with the processing, handling, or storage of nuclear material;
- Training in, and monitoring the training effectiveness of, environmental protection, radiation safety, nuclear criticality safety, occupational safety and health, and emergency planning; and,
- Monitoring, and reporting the effectiveness, of the program to assure radioactivity in effluents and radiation exposures are kept As Low As Reasonably Achievable (ALARA).

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The minimum requirements for a position of Regulatory Component Manager will be a baccalaureate degree, with biological science, physical science, or engineering emphasis; and, two years of experience in assignments involving regulatory activities. A Regulatory Manager will have appropriate demonstrated proficiency in health physics, nuclear criticality safety, and/or industrial safety and hygiene; and, in quality administration of functional programs being managed.

The minimum requirements for a position of Regulatory Function Engineer will be a baccalaureate degree, or equivalent, with science or engineering emphasis; and, two years of nuclear industry experience in the assigned function. A Regulatory Function Engineer will have demonstrated proficiency in quality administration of the assigned position programs.

## 2.2 SAFETY COMMITTEES

The Regulatory Compliance Committee (RCC) will be responsible for overall coordination of all licensing, compliance, and regulatory health and safety matters; and, for developing policies and procedures relating to the use and storage of nuclear materials. Special responsibilities of the RCC will include:

- Review and assessment of radioactive material releases to unrestricted areas, internal and external radiation exposures, and unusual occurrences;
- Review and assessment of health and safety programs;
- Review and assessment of the ALARA program;
- Self-assessments of regulatory performance;
- Review of noncompliance items, and assurance of implementation of corrective actions; and,
- Serving as the 10CFR21 Safety Review Committee.

The Regulatory Compliance Committee will also function as a management advisory group to assure that operations are conducted in a manner that provides maximum possible protection from injury to employees; and, to assure that employee health hazard concerns are adequately addressed.

The Regulatory Compliance Committee will be chaired by the Plant Manager, or by an individual formally designated by the Plant Manager. RCC membership will consist of the Manager of the Regulatory Component, and at least three other Component Managers who are qualified to evaluate plant operations from a regulatory and safety standpoint. The committee will convene at least quarterly on a routine basis; and, following any process upset or procedural deficiency identified by the Regulatory Component for committee involvement, or when otherwise warranted by instant circumstances. The

committee's findings, conclusions and recommendations will be formally documented to the Plant Manager, following each meeting, and tracked in the meeting minutes. Appropriate action will be taken, as required, to maintain and demonstrate compliance with regulatory and ALARA requirements.

The Regulatory Compliance Committee may formally delegate any part of its responsibilities, or assign specified projects, to qualified individuals or sub-committees. Reports of progress, and findings and recommendations, by such individuals or sub-committees will be formally submitted to the RCC for review at scheduled meetings.

## CHAPTER 3.0

### CONDUCT OF OPERATIONS

The basis for total quality conduct of operations at the Columbia Fuel Fabrication Facility (CFFF) will be the Safety Margin Improvement Program (SMIP). This program will be a structured oversight process that maintains management awareness, and enables monitoring, of management-specified regulatory and process improvement activities; and, will be a management decision process for determining where and when resources will be allocated. This program will address, until their logical completion, elements of Environmental Protection Improvement, Criticality Safety Margin Improvement, Occupational Safety Improvement, and General Plant Improvement. A responsible individual will be assigned accountability for each SMIP element initiative. The Safety Margin Improvement Program will not be a commitment tracking system; SMIP commitments will be followed to management-approved completion by the responsible individual specifically assigned accountability for each particular initiative. This program will be a documented demonstration of CFFF Managements' strong commitment to evaluate, on a continuing basis, opportunities to improve the Plant margin of safety -- with the understanding that: addition, change, and/or deletion of program elements and/or initiatives; continuation of ongoing program elements and/or initiatives; and/or, additions, deletions and/or changes of program implementation schedules - relevant to the Safety Margin Improvement Program - will always be at the discretion of the Plant Manager, as advised by the Engineering, Manufacturing, and Regulatory Components.

#### 3.1 CONFIGURATION MANAGEMENT

To assure that design changes will not adversely impact on environmental protection, health, safety, quality, and/or safeguards programs at the Columbia Fuel Fabrication Facility (CFFF), a formal review process will be established to analyze new systems and components, or modifications to existing systems and components, in order to reliably predict performance under normal operating conditions and potential process upsets. Structured hazard analyses, as conducted in accordance with Chapter 4.0 of this License Application, will specifically include analysis of verified drawings under configuration management.

##### 3.1.1 CONFIGURATION MANAGEMENT PROGRAM AND PROCEDURE

The CFFF Configuration Management Program will embrace an approved procedure for implementation of proposed additions or changes to facility systems. The procedure will define the review and approval process to assure the impacted systems will continue to meet or exceed regulatory specification requirements of baseline safety assessments. The

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procedure will specify documentation required to maintain a current record of existing system conditions.

### 3.1.2 CONFIGURATION MANAGEMENT IMPLEMENTATION

The Configuration Management Program will be a major sub-element of the Safety Margin Improvement Program described in the introduction to this Chapter. Configuration management will not be a substitute for procedures described in Subsection 3.4.1 of this Chapter, but will facilitate continuing compliance with their requirements through responsible facility addition and/or change project reviews.

### 3.1.3 CONFIGURATION MANAGEMENT PROCESS

The following sequence of activities will be utilized for all facility addition and/or change projects. Complexity of each project, and the issues involved, will determine the magnitude of effort afforded to each activity.

- (a) A project will be formally opened for review by an assigned responsible individual completing a configuration change control form, and enclosing specified project information for the review process.

- (b) Manufacturing, Engineering, And Quality Component Reviews

Designated Manufacturing, Engineering, and/or Quality Component Functions will review the project proposal for economics, practicality, and technical merit. Formal approvals will be documented as part of the review package.

- (c) Regulatory Component Reviews For Approval

Extent and depth of regulatory review of the project will be formally determined by an assigned Regulatory Component Manager. Designated Regulatory Component Functions will review the project proposal for impact on environmental protection, health, safety, and/or safeguards programs; and, for compliance with applicable regulatory requirements and conformance to regulatory commitments. Formal approvals will be documented as part of the review package.

- (d) Ancillary Programs and Procedures

Ancillary programs and procedures will be activated commensurate with identification of environmental protection, health, safety, and/or safeguards issues. Such programs will range from simple design reviews by cognizant multi-

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discipline Functions, through structured What-If/Checklist or Hazards and Operability Analyses. Formal approvals will be documented as part of the review package.

The Regulatory Component may issue conditional, documented approvals for preliminary and/or detailed project designs as the process advances.

- (e) Specific documents to be updated will be formally identified as the process advances.
- (f) Drawings that are generated, or modified, will be maintained in a "For Construction" state until applicable installation is completed. Following installation, the "As Built" conditions will be recorded as "Released" drawings that represent actual system configuration.
- (g) A project will be formally closed by the assigned responsible individual signing the configuration change control form, attesting that all required documentation has been updated, all required training has been completed, and the project has been terminated.

## 3.2 MAINTENANCE

The purpose of the maintenance program for safety-related systems and components at the Columbia Fuel Fabrication Facility (CFFF) will be to assure that this equipment is kept in a condition of readiness such that it is likely to perform its desired function when called upon to do so. The maintenance program will embrace three functional activities: Programmed Maintenance, to include specified frequency calibrations; Periodic Functional Testing; and, Repair or Replacement, for systems and components that fail to perform to required standards.

### 3.2.1 PROGRAMMED MAINTENANCE OF SAFETY-RELATED SYSTEMS AND COMPONENTS

The Manufacturing Component will utilize a suite of maintenance planning and control computer programs to initiate work orders for programmed maintenance, and to record details of the execution of the work orders. The computer programs will include procedures for programmed maintenance of safety-related systems and components -- prepared, reviewed, and approved in accordance with Subsection 3.4.1 of this Chapter.

The following safety-related systems and components will receive programmed maintenance:

- Air Compressors;
- Emergency Electrical Generators;
- Fire Detection and Fire Control;
- Natural Gas Valves;
- Nuclear Criticality Detection;
- Pellet Carts;
- Pressure Relief Valves;
- Steam Boilers.

Additional safety-related systems and components will be placed under programmed maintenance, as disclosed by the results of Integrated Safety Assessments described in Chapter 4.0 of this License Application.

Programmed maintenance of safety-related systems and components will include specified calibration and re-calibration of relevant instruments. Such calibration and re-calibration will be initiated and controlled by the maintenance planning and control computer programs. Discrimination between safety-related and non-safety-related calibrations will be by use of an entry on the electronic instrument calibration card utility within the maintenance planning and control computer programs.

### 3.2.2 PERIODIC FUNCTIONAL TESTING OF SAFETY-RELATED SYSTEMS AND COMPONENTS

The following safety-related systems and components will receive programmed maintenance at the frequencies indicated:

- Plant-wide Fire Alarm System and Criticality Alarm System -- Each working shift, one day per working week;
- Plant-wide Hazard Warning System -- Semiannual;
- Specified Safety-related Interlocks on Process Equipment -- Annual;
- Hydrogen and Natural Gas Line Leak Tests -- Annual.

Additional safety-related systems and components will be placed under periodic functional testing, based on the results of integrated safety assessments described in Chapter 4.0 of this License Application.

### 3.2.3 REPAIR OF SAFETY-RELATED SYSTEMS AND COMPONENTS

The maintenance planning and control computer-generated work orders and records will provide documentation of systems and components that have been repaired or replaced.

When a component of a safety-related system is repaired or replaced, the component will

be field-tested to assure that it is likely to perform its desired function when called upon to do so.

If the performance of a repaired or replaced safety-related component could be different from that of the original component, the safety-related system will be field-tested to assure that it is likely to perform its desired function when called upon to do so.

### 3.3 QUALITY ASSURANCE

The purpose of the formal quality assurance (QA) program for safety-significant processing equipment at the Columbia Fuel Fabrication Facility (CFFF) will be to assure that such equipment is designed, installed, operated, and maintained so that it will perform its desired function when called upon to do so. This quality assurance program will be in addition to the quality assurance programs for nuclear components and fuel shipping containers; however, the three programs may share common elements (e.g., organization structures, tool and gage control, change management, etc.).

#### 3.3.1 QA PROGRAM STRUCTURE

To the maximum extent practicable, the QA program for safety-significant processing equipment will utilize elements of the facility's Process Safety Management (PSM) program (29 CFR 1910.119), structured to include licensed radioactive materials. The Engineering Component will maintain a detailed matrix that graphically demonstrates how the PSM program elements will address the following QA program criteria:

- (a) QA Organization;
- (b) QA Program;
- (c) Equipment/System Design Control;
- (d) Procurement Documentation Control;
- (e) Instructions, Procedures, and Drawings;
- (f) Document Control;
- (g) Control of Purchased Materials, Equipment, and Services;
- (h) Identification and Control of Materials, Parts, and Components;
- (i) Control of Special Processes;

- (j) Internal Inspections;
- (k) Test Control;
- (l) Control of Measuring and Test Equipment;
- (m) Handling, Storage, and Shipping Controls;
- (n) Inspection, Test, and Operating Status;
- (o) Control of Nonconforming Materials, Parts, or Components;
- (p) Corrective action;
- (q) QA Records; and,
- (r) Audits.

The PSM program will then be supplemented, as required, to assure detailed inclusion of all QA criteria.

### 3.3.2 GRADED APPROACH

The "graded approach" will be addressed by performing a systematic and integrated assessment of the hazards at the facility; then, identifying the safety systems and components that are intended to prevent, or mitigate the consequences of, these hazards; then, to apply the programs of assurance which provide the appropriate level of quality. (Completion of these assessments, as an ancillary supporting process, will be phased-in according to the implementation schedule for the facility's Integrated Safety Assessment.) Where judgement is required, salient decisions will be documented; when quality requirements are determined not to be necessary, the bases will be documented.

#### (a) Quality Level A; Crucial Safety Systems

These systems are crucial to safety and, therefore, will receive rigorous attention to installation, operation, and quality assurance. They will be defined by controlling the following hazard consequences:

- Greater than or equal to 5 rem dose equivalent to an individual offsite; and/or,
- Greater than or equal to 10 milligrams soluble Uranium intake by an

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- individual offsite; and/or,  
• Greater than or equal to 25 milligrams HF/m<sup>3</sup> exposure to an individual offsite.

Crucial safety systems will require full application of the QA program requirements, where each of the 18 criteria that could apply are specifically addressed. They will be initially qualified when placed into service, and will be requalified as required, using controlled methods and procedures.

(b) Quality Level B; Important Safety Systems

These systems are important to safety and, therefore, will include key aspects that require high quality judgement or attention to detail. The key aspects will be identified and documented in the hazard assessment. They will be defined by controlling the following hazard consequences:

- Greater than regulatory limits to an individual offsite;
- Death or serious injury to an individual onsite.

Important safety systems will require selected application of the QA program requirements, where elements of the 18 criteria that the Quality Component determines will apply are specifically addressed.

(c) Quality Level C; Safety Margin Improvement Systems

These systems have safety implications, but are neither crucial nor important to safety. They do not require specified attention to quality assurance, and no extraordinary level of safety detail is applied. Safety margin improvement systems will be maintained and operated as part of routine and prudent industry practice.

### 3.3.3 ADDITIONAL QA PROGRAM COMMITMENTS AND EXCLUSIONS

The program will be designed and incorporated, as an ancillary supporting process of the facility's Integrated Safety Assessment, such that it becomes an integral part of routine CFFF operations.

The program will be performance-based. Quality assurance decisions will be based, to the extent practicable, on system performance histories.

The program descriptions will be documented in facility procedures that specify responsibility, authority, and accountability for all program elements. PSM program

elements and other facility programs and procedures important to quality assurance, will be specifically cross-referenced; and, the cross-reference will be maintained by the Quality Component for future audit.

The program elements will be conducted in accordance with approved, written procedures. Training to these procedures will be conducted to ensure the program operates effectively.

The program will require documented records to demonstrate compliance with program requirements.

The program will include a level of checks and balances through functional separation and audit. The program will be developed to incorporate quality-at-the-source concepts. Routine quality assurance for safety systems may be performed by the functions responsible for operating the systems.

The program will embrace issues identification, remedial actions, and management control elements to ensure that deficiencies, deviations, and defective equipment and components are disclosed, and corrected, in a timely manner.

The program will be forward-fitting upon implementation. It will be a bounding assumption that existing systems were appropriately designed, installed, and operated in accordance with applicable requirements and acceptable practices. Existing systems will not be back-fitted except for component replacement, system modification, and/or actions arising from internal investigations and/or external disclosures such as NRC Information Notices. Such back-fitting will always be at the discretion of the Plant Manager, as advised by the Engineering and Regulatory Components.

### 3.4 PROCEDURES, TRAINING AND QUALIFICATION

At the Columbia Fuel Fabrication Facility (CFFF), procedures, training and qualification will be integrated into a combined process to assure that environmental protection, health, safety, quality, and safeguards programs are being conducted in accordance with Westinghouse policies, and in accordance with commitments to Regulatory Agencies. Elements of this integrated process will be developed by knowledgeable Component staff, will be reviewed and approved by cognizant individuals in affected Components, and will be authorized for implementation by Component Management at a level that is responsible and accountable for the operations covered.

#### 3.4.1 PROCEDURES

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Operations to assure safe, compliant activities involving nuclear material will be conducted in accordance with approved procedures. Approved procedures will be maintained and controlled by an Electronic Procedure System. Approved procedures will provide the basis for training of all personnel involved in operations with nuclear material at the facility.

Structured hazards analyses, as conducted in accordance with Chapter 4.0 of this License Application, will include human factors analysis of applicable procedures, as described in Section 3.5 of this License Application.

(a) Regulatory-Significant Procedure Structure

CFPP procedures will be classified into three general categories:

(a.1) Category-1 Procedures

Category-1 procedures will be for use by the Regulatory Component. The salient utility of such procedures will be to provide health, safety, and safeguards training and instructions for Regulatory Functions. They will be prepared, and approved for issuing, by Regulatory Functions assigned by a cognizant Regulatory Component Manager; and, will be reviewed, and approved for issuing, by the cognizant Regulatory Component Manager.

The Category-1 scope will group sets of procedures into such subcategories as:

- Administration;
- Health Physics;
- Nuclear Criticality Safety
- Environmental Protection
- Safeguards
- Shipment and Transportation;
- Instruments;
- Surveys;
- Dosimetry;
- Bioassay; and,
- Laboratory Practices

Changes to Category-1 Procedures will be prepared, and approved for issuing, by Regulatory Functions assigned by a cognizant Regulatory Component Manager; and will be reviewed, and approved for issuing, by the cognizant Regulatory Component Manager.

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(a.2) Category-2 Procedures

Category-2 procedures will be for use by individuals outside the Regulatory Component, and deal exclusively with regulatory practices. The salient utilities of such procedures will be to provide health, safety, and safeguards training and instructions for Engineering, Manufacturing, and Quality Functions; and, for use by these Functions in preparing Category-3 Procedures. They will present regulatory guidance methodology acceptable to the Regulatory Component. They will be prepared, and approved for issuing, by Regulatory Functions assigned by a cognizant Regulatory Component Manager; and, will be reviewed, and approved for issuing, by the cognizant Regulatory Component Manager.

The Category-2 scope will be similar to, and may in many cases overlap, that for Category-1 -- as applicable to use outside the Regulatory Component.

Changes to Category-2 Procedures will be prepared, and approved for issuing, by Regulatory Functions assigned by a cognizant Regulatory Component Manager; and, will be reviewed, and approved for issuing, by the cognizant Regulatory Component Manager.

(a.3) Category-3 Procedures

Category-3 procedures will be for use by responsible individuals outside the Regulatory Component. The salient utility of such procedures will be to provide training and instructions -- including health, safety, and safeguards -- for the Operations, Maintenance, Inspection, and Analytical Services Functions. They will be prepared, and approved for issuing, by Component Functions assigned by a cognizant Component Manager, based on consideration of applicable Category-2 Procedures and/or consultation with cognizant Regulatory Component Engineers; and, will be reviewed, and approved for issuing, by the cognizant Component Manager.

The scope of Category-3 Procedures will be as determined by the cognizant Component Manager.

Changes to Category-3 Procedures will be prepared, and approved for issuing, by Component Functions assigned by a cognizant Component Manager, and will be reviewed, and approved for issuing, by the cognizant Component Manager.

(b) Issuance, Approval, and Communication of Contents of Procedures

Acceptable practices for environmental protection, health, safety and safeguards

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activities will be provided to operations Components in documented procedures that are approved, by the Regulatory Component, for electronic issue. Contents of these procedures will be communicated to operations personnel, by Component Management, through incorporation into specified operating and/or quality assurance procedures.

Regulatory-significant practices in operations and quality assurance procedures, and changes to such procedures, will be issued by cognizant Components in accordance with documented policies for procedure preparation, review, and approval. Specifically, Regulatory Component approvals will be required for all regulatory aspects of procedures, and their changes, involving the storage, handling, processing, inspection, and/or transport of nuclear materials. Component Management will be responsible for assuring and documenting that contents of these procedures are communicated to appropriate personnel through training programs, access to the Electronic Systems, and/or posting of instructions.

(c) Procedure Review Frequencies

Maximum frequencies of reviews-for-updating for regulatory-significant procedures will be:

- Annual, for Category-1 and Category-2 Procedures; and,
- Biennial for Category-3 Procedures.

(d) Procedure Compliance

A formal system will be maintained to enable employees to report inadequate procedures, and/or inability to follow procedures, to their First Level Managers for follow-up action.

First Level Managers will enable, and require, compliance with all regulatory-significant procedures. This will be accomplished by providing ready employee access to procedures, requiring documented employee procedure review and acknowledgement, then evaluating employee performance with respect to procedure compliance on a continuing basis. Employees will receive additional instruction, if determined necessary by the First Level Manager evaluations; and, if procedures are deliberately or repeatedly violated, disciplinary action will be taken in accordance with established Westinghouse policies.

### 3.4.2 TRAINING AND QUALIFICATION

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Training will be provided for every individual in the Columbia Fuel Fabrication Facility (CFFF), commensurate with their duties. Formal training programs will be developed and implemented to enhance and augment procedure review and acknowledgement described in Paragraph 3.4.1(d) of this Chapter, and training responsibilities described in Chapter 2.0 of this License Application. Such training programs will be performance-based; and as such, will incorporate the structured elements of job and task analysis, learning objectives, instructional methodology, implementation, and evaluation and feedback. In addition, training of Nuclear Criticality Safety Function Engineers will include qualification by cognizant Regulatory Component Management that goes beyond the position requirements described in Chapter 2.0 of this License Application. The programs will be structured such that specified training and qualification requirements will be met prior to safety-significant positions being fully assumed, or covered tasks being independently performed. Training records will be maintained in accordance with Section 3.8 of this Chapter.

(a) General, Topical, and Refresher Training

All new employees will receive training relative to safety aspects concerning radiation and radioactive materials; risks involved in receiving low level radiation exposure; basic criteria and practices for radiation protection, nuclear criticality safety (based upon selected guidance from ANSI/ANS-8.20-1991, facility operating experience, and area specific requirements), chemical and fire safety, maintaining radiation exposures and radioactivity in effluents As Low As Reasonably Achievable (ALARA), and material safeguards. Facility visitors will either be provided with equivalent training (commensurate with their visit's scope); and/or, will be escorted by trained employees.

Employees or visitors for whom respiratory protection devices might be required, within the scope of their work, will receive pre-work training in the proper use of such devices.

Employees designated to take part in emergency response to facility accidents or incidents will receive training commensurate with their assigned activities during such response.

Employees who work with nuclear materials will receive regulatory refresher training on a biennial basis. This training will consist of:

- Providing each employee with a current revision of the Regulatory Affairs Training Manual;
- Presenting each employee supplementary videotaped instruction on general regulatory issues; and,

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- Requiring each employee to successfully pass an examination.

The Training Manual will include such subjects as:

- ALARA;
- General health physics practices;
- Health physics rules and recommendations;
- Area-specific health physics practices;
- General nuclear criticality safety practices;
- Area-specific nuclear criticality safety practices;
- Industrial safety and hygiene, and fire safety, practices;
- Chemical Area work practices;
- Radiation risks;
- Emergency planning; and,
- Safeguards.

Employees who are absent from the facility during scheduled regulatory refresher training will receive such training within one month of their return to work.

(b) Training and Qualification of Nuclear Criticality Safety Function Engineers

Nuclear Criticality Safety Function Engineers will develop skills and abilities directed by the cognizant Regulatory Component Manager, who will evaluate fundamental development methodologies for applicability and utilization on a case-by-cases basis. Examples of development methods include:

- A nuclear criticality safety short course;
- Westinghouse auditing certification;
- American Nuclear Society Standards development and review;
- Facility criticality safety handbook development and review;
- A structured hazards analysis course;
- A structured human factors course; and,
- Criticality safety calculations certification.

Demonstrated performance of Nuclear Criticality Safety Function Engineers skills and abilities will be formally reviewed and documented by the cognizant Regulatory Component Manager and the senior Regulatory Component Manager. Performance evaluated by the Managers, for review on a case-by-case basis, will include:

- Reports of internal audits and inspections conducted;
- Feedback from worker training presented;

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- Criticality safety analyses and evaluations performed.

Qualification of each Nuclear Criticality Safety Function Engineer will be formally documented by the cognizant Regulatory Component Manager and the senior Regulatory Component Manager -- prior to the Function position being fully assumed, or crucial tasks being independently performed.

(c) Training and Qualification of Health Physics Technicians

Training and qualification prerequisites for a Health Physics Technician will include, as a minimum, a high school diploma or equivalent.

Health Physics Technicians will develop skills and abilities, as directed by the cognizant Regulatory Component Manager. Methods evaluated by the cognizant Manager for qualification, on a case-by-case basis, will include:

- Documented acknowledgement of applicable procedures;
- Emergency preparedness training; and/or
- Applicable skills competency training.

### 3.5 HUMAN FACTORS

Human factors concepts will be employed at the Columbia Fuel Fabrication Facility (CFFF), in recognition of how the total job environment -- areas, equipment, training, and procedures -- shapes the expectations, thoughts, and decisions of employees who work with licensed materials. A human factors awareness will be developed at various levels of the organization, and structured human factors analyses will be performed. Because the operating philosophy of the organization is strongly embodied in procedures, as described in Subsection 3.4.1 of this Chapter, procedures will receive particular human factors attention.

#### 3.5.1 DEVELOPMENT OF HUMAN FACTORS AWARENESS

To enable integration of human factors concepts into facility operations, an initial, formal course -- prepared and presented by recognized human factors experts -- will be provided for the Plant Manager; all Engineering, Manufacturing, Regulatory, and Quality Component Managers; and, designated Functions from these Components. The course will address the following elements, including exercises to enhance learned skills:

- (a) Process Safety Management;
- (b) Human Factors Concepts;



- (c) Performance Shaping Factors For Hardware;
- (d) Performance Shaping Factors For Procedures;
- (e) Analysis Preparation;
- (f) Error-Likely Situations;
- (g) Procedure Analysis Techniques;
- (h) Worker Self-Checking Techniques; and,
- (i) Supervisor Coaching Principles.

### 3.5.2 STRUCTURED HUMAN FACTORS ANALYSIS

A part of the CFFF Integrated Safety Assessments, described in Chapter 4.0 of this License Application, will include a structured human factors analysis of assessed system procedures. These analyses will be led by an individual who has completed a formal human factors course. The analyses will embrace the following:

- (a) Using Procedure-Specific Guide Words For Structured Analysis Of Procedures.
- (b) Minimizing Opportunities For Human Errors Of Omission and Commission Related To Procedures.

Results of the structured analyses, including findings and recommendations for improvements, will be documented in formal reports to cognizant Component Management.

### 3.6 AUDITS AND SELF-ASSESSMENTS

The bases of the Columbia Fuel Fabrication Facility (CFFF) Audits and Self-Assessment program will be the performance-based reporting process described in Section 3.7 of this Chapter, the performance-based internal inspection and audit program, and facility management self-assessment of regulatory program performance.

#### 3.6.1 PERFORMANCE-BASED INTERNAL INSPECTIONS AND AUDITS

##### (a) INFORMAL INSPECTIONS

Regulatory Component personnel on duty, including Regulatory Component

management, will conduct continuing informal inspections of regulatory program performance in the course of their routine duties. Observed process upsets and procedural inadequacies will be promptly reported to the cognizant First Level Component Manager for remedial action. Repeated upsets and inadequacies will be reported to the cognizant Regulatory Component Manager, who in turn will report them to increasingly higher levels of Component Management until effective remedial action has been taken. Such repeated upsets and inadequacies will be documented in monthly formal audits to assure applicable tracking and resolutions.

(b) FORMAL AUDITS

Cognizant Regulatory Function Engineers will conduct monthly formal audits of regulatory program performance. The auditors will have the technical capability, and will be formally directed by Regulatory Component management, to find process upsets and procedural inadequacies well beyond those surfaced by simple paperwork reviews. The audits will include reviews of items entered into the performance-based reporting process, and repeated upsets and inadequacies reported to Regulatory Component management, for the areas being audited; and, detailed area walkdowns. Disclosed upsets and inadequacies will be formally documented in a report to cognizant First Level Component Managers; and, will be tracked by the audit team leader until appropriately addressed.

3.6.2 FACILITY MANAGEMENT SELF-ASSESSMENT

The purpose of the self-assessment program will be to provide a means to assure that deficiencies in regulatory performance are identified and corrected to Westinghouse management standards.

The Plant Manager will document CFFF policy on the purpose and objectives of self-assessment to Component Managers, including aggressive demand for quality assessment performance.

The management self-assessment organization will be the Regulatory Compliance Committee (RCC) described in Chapter 2.0 of this License Application. RCC members will be provided with the Nuclear Regulatory Commission Staff's views concerning self-assessment -- particularly, that the function of such assessment will be to aggressively disclose and forcefully report identified process upsets and procedural inadequacies before they self-reveal and/or Regulatory Agencies find them.

On a semi-annual basis the following assessment parameters will be summarized and trended by the Regulatory Component:

- A summary of items documented in the performance-based reporting process;
- A summary of upsets and inadequacies documented in performance-based internal audit reports;
- Facility Collective Dose Equivalent;
- Facility average Total Effective Dose Equivalent;
- Top 10 facility workers' Total Effective Dose Equivalents;
- Overexposures;
- Regulatory Agency notifications;
- Ratio of Recordable Incident Rate to SIC code average;
- Lost time accidents per production hour;
- Results of Special Nuclear Material Physical Inventory (annual);
- Emergency response team activations;
- Radioactive emissions in gaseous effluents;
- Radioactive emissions in liquid effluents;
- Radioactive material transportation incidents; and,
- Regulatory Agency violations.

The summaries and trends will be formally reviewed by the RCC, particularly for need to be addressed by initiatives of the Safety Margin Improvement Program described in Chapter 3.0 of this License Application.

### 3.7 INCIDENT INVESTIGATIONS

At the Columbia Fuel Fabrication Facility (CFFF), the organizational structure described in Chapter 2.0 of this License Application, and procedures in accordance with Subsection 3.4 of this Chapter, will provide for: systematic investigation of abnormal events; making decisions on corrective measures to prevent recurrence of such events; and, follow-up on the implementation of the preventive measures. Further, the CFFF will have in-place a structured methodology for determining and categorizing the root cause(s) of the failure(s) that led to investigated events.

#### 3.7.1 INTERNAL REPORTING OF INCIDENTS

A formal system will be maintained to enable employees to report process upsets and procedure inadequacies to their First Level Managers for follow-up action; and, employees will be instructed in its use. Documentation of this performance-based reporting process will provide for the following information:

- Event identification number, date, and time.
- Names of the report originator and the First Level Manager, shift number, and event description;
- Immediate action taken by the First Level Manager;

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- Explanation of ultimate event closure; and,
- Acknowledgement of closure (and date acknowledged) by the cognizant Engineering Function Engineer, the cognizant Regulatory Function Engineer, the originator's First Level Manager, and the originator.

Potential safety-significant reports will be forwarded to the Regulatory Component for evaluation and determination of necessity for action by the incident review committee, as described in Subsection 3.7.2 of this Chapter. All documentation of the performance-based reporting process for an area will be reviewed as a part of the formal audits of the area, as described in Paragraph 3.6.1(b) of this Chapter.

### 3.7.2 STRUCTURED INCIDENT EVALUATION

An incident review committee -- comprised of the Engineering Component Senior Manager, the Manufacturing Component Senior Manager, and the Regulatory Component Senior Manager -- will determine if reported process upsets and/or procedure inadequacies are to undergo structured incident evaluation. Structured incident evaluations will be maintained by a datapack process. Documentation of this process will provide for the following information:

- Results of a Root Cause Analysis, led by an individual with formal training in conducting such an analysis, including recommendations;
- Status of corrective action(s) implementation;
- Regulatory assessment;
- Notification documentation;
- Training documentation;
- Plant-wide applicability assessment; and,
- Miscellaneous information pertaining to the incident and/or the evaluation.

### 3.7.3 NOTIFICATION OF REGULATORY AGENCIES

Cognizant Regulatory Agencies will be promptly notified of major safety incidents in accordance with all requirements from 10 CFR Parts 20 and 70. In particular, as points of additional clarification, the NRC Operations Center will be notified of the following types of incidents, within the time limits prescribed:

#### (a) 1-Hour Notifications

- (a.1) Any incident for which an Alert or Site Area Emergency has been declared, as prescribed by the Site Emergency Plan described in Chapter 9.0 of this License Application.

- (a.2) Any incident involving Quality Level A systems, for which accident controls cannot be initiated, whether or not regulatory limits are exceeded.
- (a.3) [RESERVED]
- (a.4) [RESERVED]
- (b) 4-Hour Notifications
  - (b.1) Any incident involving Quality Level B systems, for which accident controls cannot be initiated, whether or not regulatory limits are exceeded.
- (c) 24-hour Notifications
  - (c.1) Any incident for which the work area is unavailable for normal use for an entire day, following a loss of radioactivity contamination control.
  - (c.2) Any incident for which Quality Level A or B system safety equipment is not performing its intended function.
  - (c.3) Any incident for which an employee, having removable radioactivity contamination, receives medical treatment outside of facility contamination control areas.
  - (c.4) Any incident for which a fire or explosion damages nuclear fuel and its processing equipment or container.
  - (c.5) [RESERVED]
  - (c.6) [RESERVED]
  - (c.7) [RESERVED]
- (d) A procedure will be prepared, maintained, and followed -- in accordance with Subsection 3.4.1 of this Chapter -- that details the information to be included in a notification.

Each notification of a nuclear criticality safety incident will include the following information:

- Whether the notification is the result of an event, or of a deficient nuclear criticality safety analysis (including the time period for which the deficiency existed);
- The significance of the incident;
- Potential criticality pathways involved, including brief scenario(s) of how accidental criticality could occur;
- Controlled parameters -- mass, moderation, geometry, concentration, etc. -- involved;
- Estimated amount, enrichment, and form of licensed material involved -- including applicable process limits and the percent of worst-case critical mass of the material, in the configuration, involved;
- A description of the involved failures or deficiencies -- including applicable nuclear criticality safety controls or control systems; and,
- Corrective actions to restore safety systems, and when each was implemented.

### 3.8 RECORDKEEPING AND REPORTING

The Columbia Fuel Fabrication Facility will identify, maintain, preserve, control, and destroy records -- as defined in the records management section of the controller's manual -- in accordance with the guidelines, procedures, and practices set forth by the Westinghouse Electric Corporation. Such records, specifically required by applicable regulations, will be maintained in accordance with those regulations. Reporting of records data will be as prescribed by applicable regulations.

#### 3.8.1 RECORDS

Written procedures, prepared and maintained in accordance with Subsection 3.4.1 of this Chapter, will specify the management program for licensed activity records; including:

- (a) Environmental Surveys;
- (b) Radiation And Contamination Surveys;
- (c) Personnel Exposures;
- (d) Instrument Calibration Results;
- (e) Nuclear Criticality Safety Evaluations, Analyses and Methodology Validations;

- (f) Audit And Inspection Reports;
- (g) ALARA Reports;
- (h) Regulatory Compliance Committee Meeting Minutes;
- (i) Employee Training And Re-training Documentation;
- (j) Records Of Plant Alterations Or Additions;
- (k) Documentation Of Abnormal Or Atypical Occurrences And Events Associated With Radioactivity Releases;
- (l) Decontamination And Decommissioning Files; and,
- (m) Other Such Records Required By the Regulations.

These procedures will include Records Flow Schedules, which list:

- Record category,
- Name of record;
- Form numbers;
- Retention period in active files;
- Retention period in the central records bureau; and,
- Retention period in the records center.

Records of tests, measurements, and surveys required to document compliance with conditions of operating licenses and permits will be retained for at least three years, unless otherwise specified in the regulations.

Records of nuclear criticality safety analyses will be retained for the lifetime of the facility.

### 3.8.2 RECORDS RETRIEVAL

All retained records will be stored, and maintained readily accessible, in order to meet time restraints relative to their use. Retained records will be as complete and detailed as necessary to enable traceability to original source data.

The records retention system will include the capability to retrieve records within 24-hours for records generated within the past 12-months; and, inside 7-calendar-days for older generation periods.

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### 3.8.3 RECORDS RE-CREATION

Prudent measures of protection and redundancy will be afforded such that acts of record alteration or inadvertent destruction will not foreclose capability for reconstructing a complete and correct set of required records.

In cases where protective measures fail, and a particular record is lost or inadvertently destroyed, a reconstruction may be generated using source data applicable to the time the subject record was originally created. When a document is just partially missing, all salvaged portions will be attached to the reconstruction. If source data is not available for re-creating a missing record, the record may be reconstructed using inference to data relative to other documents for similar information and time periods.

### 3.8.4 REPORTS

A detailed listing of reports required by NRC regulations will be maintained and followed. This listing will document:

- Reference to applicable regulations;
- Descriptions of the reports required; and,
- Frequencies at which the reports must be submitted.



## CHAPTER 4.0

### **INTEGRATED SAFETY ASSESSMENT**

The Columbia Fuel Fabrication Facility (CFFF) will develop, and maintain as a real-time process, an Integrated Safety Assessment for the Site. The ISA will identify and evaluate the various radiological and related chemical hazards that could arise from, or impact control over, licensed materials. The ISA will identify process equipment and control features that are relied upon for protection of the environment, and the health and safety of facility employees and the neighboring public.

The Integrated Safety Assessment will include the following format and content:

- Section 1.0; **PROCESS DESCRIPTION**, that presents a precise narrative definition of normal operation as it relates to each defined system. A schematic representation of the system and a narrative outline of the system transfer interconnections, with text references that detail normal operating boundaries (e.g., composition, concentrations, flows, and sampling). References to all relevant drawings and procedures; and; photographs, diagrams, tables, and charts depicting crucial system and subsystem equipment.
- Section 2.0; **PROCESS THEORY**, that presents a narrative description of the normal process operating parameters, including the ranges of conditions expected, for each defined system. Descriptions of upset conditions which have the potential for exceeding safety limits. References documenting the sources of the theory.
- Section 3.0; **PROCESS DESIGN AND EQUIPMENT**, that presents the dimensions, construction materials, and design configuration of lines and vessels of each defined system. A precise narrative definition of subsystem equipment controls and features, as related to the defined system, and a tabulation of relevant reference drawings.
- Section 4.0; **DRAWINGS AND OPERATING PROCEDURES**, that presents a complete reference listing of all documents used in performing the formal Process Hazard Analysis, and describes their relationship to the evaluation process, for each defined system. Photographs of the system/subsystem equipment that had relevance to (and were used during) the analysis process. (All other documents collected for review and/or information purposes will be retained as part of the Data Pack for the system's Safety Evaluation.)
- Section 5.0; **SAFETY ANALYSES**, that presents the results of comprehensive safety

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reviews of each defined system.

The system will first be independently evaluated by Environmental Protection, Radiation Safety, Nuclear Criticality Safety, Fire Safety, and Chemical Safety Functions. Then, to complete the process, all cognizant Safety Functions will deliberate as a group to optimize controls, and provide a consensus document to cognizant Component Management for review and approval.

- Section 6.0; PROCESS HAZARDS ANALYSIS, that presents each defined system's Hazards and Operability Analysis (HAZOP) Table or What If/Checklist Results, Fault Trees, and Event Trees. (This will constitute an integrated analysis that looks at Environmental Protection, Radiation Safety, Nuclear Criticality Safety, Fire Safety, and Chemical Safety.) Essential elements of the HAZOP Table or What If/Checklists Results will include a listing of each upset and deviation disclosed in the analysis, the significant causes of each such upset or deviation, the consequences of each such upset or deviation, and the controls in place to prevent each cause and/or mitigate each consequence. Those controls that have been imposed as License Conditions will be specifically identified. The complete Analyses Report, providing the detailed results of the analysis in a narrative format, will be retained as part of the Data Pack for each system's Safety Evaluation.
- Section 7.0; LICENSE COMPLIANCE VERIFICATION, that presents a listing of License commitments specific to the defined system; and, a statement that the commitments were reviewed during the Process Hazard Analysis of the system, and were attested to be (or not to be) in-place and operational.
- Section 8.0; APPENDICES, that presents a summary of ancillary information (such as calculations, parametric sensitivity studies, references, etc.) for each defined system.

Documentation of continuing progress toward completion of the Integrated Safety Assessment will be maintained for Regulatory Agency review. The ISA will be substantially complete within five (5) years of the approval date for this License Application. The ISA, and all ancillary supporting processes, will be fully implemented within seven (7) years of the approval date for this License Application.

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## CHAPTER 5.0

### RADIATION SAFETY

#### **5.1 ALARA (As Low As Reasonably Achievable) POLICY**

The Regulatory Compliance Committee will maintain oversight of CFFF management's commitment of making every reasonable effort to maintain radiation and radioactivity exposures, to employees and the general public, as low as is reasonably achievable (ALARA).

- 5.1.1 Ultimate ALARA responsibility and authority will be vested in first level managers, with assistance from upper management and cognizant service groups. Specific ALARA recommendations and requirements will be generated by the Regulatory Component, in the form of environmental protection and radiological safety policies and procedures. ALARA policies, expectations, and goals will be identified, and provided to first level managers, by the Regulatory Compliance Committee. Selected ALARA criteria will be incorporated into operating procedures, as applicable.

ALARA considerations will be incorporated into the design of new, or modified, facilities and equipment and will be verified and approved by the Regulatory Component. Individuals responsible for facility and equipment designs will be directed to interface with the Regulatory Component, at the earliest stage of development, to assure that ALARA philosophies are appropriately incorporated into each project.

ALARA principles and requirements will be provided to employees as part of routine training sessions.

- 5.1.2 Short-term ALARA progress will be based on a formal quarterly evaluation and documentation of ALARA program indicators, by a task group of cognizant Regulatory Component representatives. Such indicators will include, but may not necessarily be limited to: surface contamination, airborne radioactivity excursions, airborne radioactivity averages, DAC-hours, bioassay, Total Effective Dose Equivalent, and effluents; particular attention will be paid to new operations. Results of these evaluations will be documented and, unfavorable trends and/or failure to meet specified goals will be reported as a regular agenda item at quarterly Regulatory Compliance Committee meetings.

- 5.1.3 Long-term ALARA progress will be based on a formal annual report, by the Regulatory Compliance Committee, to the Plant Manager. This ALARA Report will review

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exposure and effluent data to determine: (1) if there are any upward trends developing in concentrations or quantities of radioactive materials in effluents to the environment, or in personnel exposures for identifiable categories of workers or types of operations; (2) if such concentrations or quantities in effluents, or exposures, might be lowered in accordance with the ALARA concept; and (3) if equipment for effluent and exposure control is being properly used, maintained, and inspected. The ALARA Report will include review of related audits and inspections performed during the reporting period; and will summarize data from the following areas: effluent releases, environmental monitoring, inplant airborne radioactivity, personnel exposures, bioassay results, and unusual occurrences.

5.1.4 Implementation of the ALARA program, including commitments in Subsections 5.1.2 and 5.1.3, will satisfy the requirement (10CFR20.1101(c)) for an annual review of the radiation protection program content and implementation.

## 5.2 RADIATION WORK PERMITS (RWP)

### 5.2.1 CRITERIA

- (a) Specific requirements of the Radiation Work Permit (RWP) program will be documented in an approved procedure.
- (b) A Radiation Work Permit will be required for all work for which radiation protection requirements are not covered by operating procedures and one, or more, of the following conditions is met:
  - (b.1) Release of detectable contamination outside of a Contamination Controlled Area might result in contamination of personnel or equipment by the work under consideration.
  - (b.2) The local concentration of radioactive contaminants is predicted to average 50-percent, or more, of Derived Air Concentration (DAC), as a result of the work under consideration.
  - (b.3) The deep dose equivalent is predicted to exceed 100 millirem in a week, as a result of the work under consideration.
  - (b.4) The Total Effective Dose Equivalent is predicted to exceed 10-percent of the 10CFR20 limit, as a result of the work under consideration.
- (c) RWP's will be requested by the responsible department, and such requests will be submitted to the Regulatory Component for evaluation, preparation and

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approval. The Regulatory Component will specify applicable protection requirements for the work to be performed. Approvals from the Regulatory Affairs Component and the cognizant first level manager will be obtained prior to starting the activity.

- (d) Only personnel who have completed appropriate safety training as detailed in Subsection 3.4.2 of this License Application -- will be assigned to perform work under an RWP.
- (e) A copy of the Radiation Work Permit will be made available to personnel working under the RWP, and the work will be conducted as specified in the approved permit.

### 5.3 VENTILATION SYSTEMS

- 5.3.1 Ventilation systems will be designed and operated to assure adequate control of process-generated radioactive dust and particulate matter. Air flows will be typically maintained from non-chemical process areas to Chemical Areas. Whenever adverse air flows are detected, corrective actions will be taken as soon as practicable.
- 5.3.2 Ventilation systems servicing laboratory-type hoods, production hoods, and/or other primary enclosures where uncontained nuclear material is handled, will provide a minimum face velocity of 100-linear-feet per minute at all openings during work operations. Face velocity measurements will be made, and documented, on at least a quarterly basis when such equipment is in operation; and, systems found not to meet the minimum flow velocity will be measured on at least a weekly basis until a documented evaluation demonstrates the minimum flow velocity can be maintained.
- 5.3.3 When containment of uranium dust by conventional ventilation hoods is not possible, or is impractical, gloveboxes may be used. Ventilation systems for gloveboxes, and similar enclosed devices, will be designed and operated with a nominal negative internal pressure of at least 0.1-inches of water with respect to room air. Gloveboxes will be equipped with instrumentation for measuring differential pressure, and such instrumentation will be checked for proper operation on at least a monthly basis when the enclosed equipment is in operation.

When positive-pressure atmosphere control is required for product quality or other approved purpose; and, where there is un-encapsulated radioactive material in positive-pressure gloveboxes, the following criteria shall apply:

- (a) Gloveboxes will be designed for high integrity confinement.

- (b) Gloveboxes will be operated with a maximum positive internal pressure of 0.1 inches of water with respect to room air.
- (c) Internal atmospheres will be continuously re-circulated through HEPA filters, at a flow rate designed to attain at least 20-atmosphere-changes per hour.
- (d) Alarms will be provided, to indicate when pressure exceeds the pre-set positive pressure limit.
- (e) An interlock, or other pressure relief device, will be provided to exhaust the glovebox with a sufficient factor of safety to ensure its continuing integrity.

5.3.4 Ventilation hoods and gloveboxes will be constructed primarily of metal, using glass and/or fire resistant plastic for viewing areas. Plastics will conform to a Class-I fire rating.

5.3.5 Ducts will be designed to minimize accumulations of nuclear material, and will be inspected on a routine basis commensurate with the potential for material accumulations.

5.3.6 Exhausts from gloveboxes, hoods, local exhaust enclosures, and similar devices, when employed for radiation protection purposes, will be passed through HEPA filtration. The HEPA filters will be replaced, either on a routine schedule, or when airborne activity concentrations, hood velocities, differential pressure drops, or particulate penetration measurements indicate that replacement is necessary. The maximum differential pressure permitted across a HEPA filter will be 8-inches of water for negative pressure systems and 4-inches of water for positive pressure systems.

5.3.7 Exhausts from in-plant, recirculating process-air cleaning systems, including gloveboxes, hoods, local exhaust enclosures, and similar devices, will either have their HEPA filters penetration tested, or will be sampled for airborne radioactivity concentrations, on at least a quarterly basis; and, maintenance will be performed on systems found to exceed 25% DAC.

5.3.8 Ventilation control facilities, equipment, and systems, as necessary to minimize exposures to radioactive materials will be developed and utilized.

5.3.9 Gloveboxes, ventilation hoods, or other containment devices will be installed and used whenever they are determined to be necessary as a result of radiation protection measurements or evaluations.

\* 5.3.10 The effectiveness of the final HEPA filters, in process ventilation equipment and containment systems, will be determined by in-situ testing, using particulate penetration

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\* methods, or other testing means, selected by the Radiation Safety Function. Such testing will be performed following each filter change.

5.3.11 Adequacy of ventilation and containment controls within the licensed activity will be determined by continuous air sampling. The action levels in Subparagraph 5.4.1(i) will be used as guidance to determine adequacy of ventilation and containment.

## 5.4 AIR SAMPLING

### 5.4.1 WORK AREA AIR SAMPLING

- (a) All areas where exposed radioactive materials are handled will be sampled for airborne radioactive particulate matter using a combination of fixed location general area air samplers, fixed location breathing zone representative air samplers, or portable air samplers. The type of sampling employed, and location of samplers, will be determined by the Radiation Safety Function.
- (b) Fixed location air samplers used for the purposes of assessing and assigning operator intake will be located in or around the breathing zone of operator work stations where uranium handling operations are performed, or where short term operations occur frequently. Breathing zone representativeness of these samplers will be established when the samplers are initially installed. Samplers will be re-examined for representativeness annually, or whenever substantive equipment or process changes are made (in accordance with Section 3 of Regulatory Guide 8.25, "Air Sampling in the Workplace.") Representativeness studies will be performed in accordance with methods and acceptance criteria described in Table 2 of Regulatory Guide 8.25.
- (c) Fixed location air samplers will be located where potential airborne contamination hazards exist; such that, deterioration in ventilation controls, containment controls, or operating procedures resulting in significant increases in airborne radioactivity concentrations will be detected so corrective actions can be instituted.
- (d) All new operations or substantive modifications to existing equipment will be evaluated by the Regulatory Component, or sampled using portable samplers to assess the need for fixed location sampling stations.
- (e) Lapel samplers may be used on a limited basis to supplement other air sampler measurements where work stations are not defined, or for special studies.
- (f) Continuous, alarming air monitors may be used on a qualitative basis to provide

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early warning for operators in the event of a significant airborne release.

- (g) Work-area air samples will be changed out at least once each working shift and allowed time for natural activity decay before processing during production operations, unless a documented evaluation by the Radiation Safety Function demonstrates that another schedule is justified. Samples will be analyzed using calibrated counting equipment; and, airborne activity concentrations calculations will account for filter collection efficiency, self-attenuation, and counter efficiency. Analyses will include radiological counting of the samples to determine radiological concentrations in the work areas.
- (h) Air samples suspected of reflecting releases and significantly elevated concentrations will be counted as soon as practicable following sample change out, to determine radioactivity concentration.
- (i) All work-area sampling programs will provide for investigation, special sampling, and/or increased sampling frequency if the activity concentration outside of containment structures (not directly resulting from a specific known cause) exceeds the following action levels (where the DAC for Class Y uranium is used):
  - A single sample collected for 8 hours or longer exceeds 250% DAC.
  - The monthly average for a sample location exceeds 100% DAC.

Operations or equipment will be shut-down, and immediate corrective action will be taken, at locations where a single air sample exceeds 1000% DAC.

5.4.2 Fixed in-plant air and gaseous effluent sampling systems will be subject to surveillance by the Radiation Safety Function. Such surveillance will assure that flow meters are working and properly adjusted, that the vacuum system is intact, and that filter media has been properly installed.

5.4.3 Air flow measurement devices on the fixed in-plant air sampling system, the gaseous effluent sampling system, and environmental air samplers, will be verified annually for proper operation, and will be replaced as required.

## 5.5 CONTAMINATION CONTROL

### 5.5.1 CONTAMINATION SURVEYS

Contamination surveys will be performed on a continuing basis, to evaluate the potential spread of radioactive contamination.

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- (a) Contamination surveys will be performed with sufficient frequency to assure that maximum acceptable limits are not exceeded. Maximum acceptable limits, and minimum survey frequencies for floors and other readily accessible surfaces will be as specified in Figure 5-1. Specific portions of a Contamination Controlled Area may be assigned higher limits and/or frequencies, provided a documented evaluation by the Radiation Safety Function has demonstrated that collective protective measures for the subject area will assure compliance with licensed and regulatory requirements. Examples include areas where contamination does not represent the potential for becoming airborne or being tracked and decontamination is impractical (e.g., under process equipment, hoods, etc.).

FIGURE 5-1  
CONTAMINATION SURVEY LIMITS AND FREQUENCIES

AREA TYPE	ALPHA ACTIVITY ON SMEAR *	MINIMUM FREQUENCY
Change Rooms, and Eating/Vending Areas	50	Weekly
Clean Area	200	Monthly
Contamination Controlled Area	5000	Biweekly
*Units of Disintegrations-Per-Minute Per 100-Square-Centimeters		

- (b) All new operations will be subjected to increased contamination surveillance until experience has shown that the routine schedule will be adequate to protect health and safety.
- (c) If the average contamination level in the Contamination Controlled Area exceeds the specified action level, decontamination will be required within three working-shifts; and, immediate decontamination, or area isolation, will be required if the average contamination level in the Contamination Controlled Area is greater than five times the specified action level. An area not greater than

10-square-meters will be used to determine such average contamination levels. If a given smear exceeds an action level, additional smears may be taken, as necessary, to demonstrate that immediate decontamination is not required. Verification surveys will be performed to verify decontamination. In the Clean Areas, decontamination is required immediately following the discovery of any contamination above the appropriate limit.

- (d) An alpha smear measurement technique will be used which is capable of detecting 25-disintegrations-per-minute per sample, at a 90-percent confidence level, when surveying clean areas, change rooms, and eating and vending areas.

#### 5.5.2 ACCESS

Access to areas in which radioactive materials are used or stored will be controlled. Convenient change rooms and step-off pads will be provided at access points, to prevent the spread of contamination from Contamination Controlled Areas.

- (a) Personnel will be authorized to enter Contamination Controlled Areas, by virtue of management approval in accordance with the CFFF Physical Security Plan, only after completing required radiation protection training.
- (b) Access points to Contamination Controlled Areas will be established through change rooms and step-off pads. Each such access point will define a contaminated side and an uncontaminated side, with a step-off area provided between the two sides.
- (c) Each access point to the Contamination Controlled Area will be posted in accordance with 10CFR20.1902, except for 10CFR20.1902(e). In lieu thereof, a sign bearing the legend "Every container or vessel in this area might contain radioactive material" may be posted at entrances to each such area in which radioactive materials are used, or stored.
- (d) Access to Contamination Controlled Areas, including the Chemical Manufacturing Area and other areas involved in the processing and storage of unencapsulated radioactive materials, will require the use of protective clothing.
- (e) Protective clothing will be provided for personnel entering the Contamination Controlled Area. This will include labcoats, coveralls, shoecovers, safety shoes, and/or other specified garments -- consistent with an individual's work assignment. Street clothing, of persons to be dressed completely in protective clothing, will be stored on the uncontaminated side of the change line. Used protective clothing will be stored on the contaminated side of the change line until

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collected for laundering. Contamination limits for protective clothing will be consistent with the limits in Figure 5-1.

- (f) Personnel survey instruments will be provided in change rooms and at step-off pads, for use by personnel leaving Contamination Controlled Areas. Instruments will be checked for proper operation daily, during production operations, by the Radiation Safety Function.
- (g) Instructions will be posted at exit points from Contamination Controlled Areas, which describe survey techniques, procedures for decontamination, and what to do in event of survey instrument malfunction.

## 5.6 EXTERNAL EXPOSURE

### 5.6.1 PERSONNEL MONITORING DEVICES

Film badges or thermoluminescent dosimeters, provided by a commercial supplier which is NVLAP certified, and capable of detecting and measuring beta-gamma and x-radiation, will be provided to individuals specified by the Radiation Safety Function. These badges or dosimeters will be evaluated at least quarterly, or more frequently as specified by the Radiation Safety Function. In addition, neutron detection capability will be available, for use as specified by the Radiation Safety Function, and will be evaluated at least quarterly.

## 5.7 INTERNAL EXPOSURE

The Regulatory Component will perform a biennial evaluation of vendors used to analyze bioassay samples. Such evaluations will also be performed if substantive program anomalies are disclosed. The evaluations will consider the need for "spike" and "replicate sample" submittals.

The invivo counter will be calibrated at least annually; and, will be functionally tested each day the counter is in operation.

A bioassay program will be maintained to evaluate the effectiveness of material control and personnel protection programs, to evaluate intakes exceeding action levels specified in Subsection 5.7.3 and to assess dose used to determine compliance with applicable occupational dose equivalent limits (diagnostic bioassay only). Samples will be analyzed by a qualified laboratory using fluorometric methods for routine urine samples and radiometrically for diagnostic urine and/or fecal samples. The primary method of assessing and calculating intake and Committed Effective Dose Equivalent (CEDE) will be by the measurement of breathing zone representative air sampling results.

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### 5.7.1 INVITRO BIOASSAY

- (a) Routine urinalysis samples will be collected for the purpose of tracking and evaluating potential long term accumulation and retention of radioactive material in individuals. Samples will be submitted annually by individuals required to be monitored for internal radiation exposures. The Radiation Safety Function will perform evaluations of statistically meaningful results and prescribe subsequent actions to be taken based on these evaluations.
- (b) Work activity restrictions will be imposed, and diagnostic bioassay samples will be requested, when air sampling indicates exposures exceeding the action levels in Subsection 5.7.3 may have occurred. Such bioassay measurements, invivo measurements, air sampling measurements or any combination of these measurements will be used to assess intake and dose used to demonstrate compliance with the occupational dose equivalent limits in 10CFR20.
- (c) Acceptable biokinetic models and intake assessment methods specified in Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program," will be used in the interpretation of bioassay measurements.
- (d) Baseline urinalysis measurements will be performed for individuals required to be monitored for internal exposure prior to initial work activities that involve exposure to radioactive material. Termination measurements will be performed, when practical, if an individual is no longer subject to the bioassay program due to changes in the individual's employment status (such as termination of employment or changes in the individual's assigned duties).

### 5.7.2 INVIVO BIOASSAY

- (a) Routine uranium lung burden evaluations will be performed for the purpose of tracking and evaluating potential long term accumulation and retention of radioactive material in individuals. Invivo counts will be performed annually for individuals required to be monitored for internal radiation exposures. The Radiation Safety Function will perform evaluations of statistically meaningful results and prescribe subsequent actions to be taken based on these evaluations.
- (b) Diagnostic uranium lung burden analysis will be performed when an individual exceeds the intake or dose action levels specified in Subsection 5.7.3. or the action level for nontransportable uranium exposures specified in Subsection 5.7.3. Such invivo measurements, invitro bioassay measurements, air sampling measurements or any combination of these measurements will be used to assess

intake and dose used to demonstrate compliance with the occupational dose equivalent limits in 10CFR20.

- (c) Baseline invivo measurements will be performed for individuals required to be monitored for internal exposure prior to initial work activities that involve exposure to radioactive material. Termination measurements will be performed, when practical, if an individual is no longer subject to the bioassay program due to changes in the individual's employment status (such as termination of employment or changes in the individual's assigned duties).

### 5.7.3 RADIATION EXPOSURES

- (a) Individuals likely to receive greater than 10% of the applicable Annual Limit on Intake (ALI) will be monitored for intakes of radioactive material. Suitable and timely measurements of radioactive material in the air of the work area, measurements of radionuclides in the body, measurements of radionuclides excreted from the body, or any combination of airborne concentration, invivo and invitro bioassay measurements will be used to monitor intakes to individuals.
- (b) Committed Dose Equivalent (CDE), Committed Effective Dose Equivalent (CEDE), and Total Effective Dose Equivalent (TEDE) occupational doses will be calculated in accordance with 10CFR20 and acceptable methods described in Regulatory Guide 8.34, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses."
- (c) Intakes to Class D uranium will be limited to less than 10 milligrams uranium per week per individual.
- (d) Work restrictions and diagnostic evaluations will be performed when an individual receives a single intake of greater than 40 DAC-Hours exposure to Class W and/or Class Y uranium or 20 DAC-Hours Class D uranium (which corresponds to approximately 5 milligrams Class D uranium @ 3.5 weight % U-235 enrichment).
- (e) Work activity restrictions will be imposed when an individual exceeds 80% of applicable limits; i.e., 0.8 ALI, 1600 DAC-Hours, 4.0 REM CEDE for inhalation exposures to Class W and Y uranium, 4.0 REM TEDE, 4.0 REM DDE, 40 REM CDE, etc.).

### 5.8 RESPIRATORY PROTECTION

A policy statement will be written on respirator usage and will include the following:

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- 5.8.1 Engineering controls and administrative procedures will be provided to minimize the need for respiratory protection.
- 5.8.2 Respiratory protection equipment will be used in accordance with written procedures, and individuals using respiratory protection will be trained in accordance with the criteria in 10CFR20, Subpart H.
- 5.8.3 Only respirators certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) will be used.
- 5.8.4 Protection factors from Appendix A, 10CFR20 will be used when assigning actual intakes.
- 5.8.5 Personnel authorized to use respiratory protection equipment will be fit-tested biennially.
- 5.8.6 Personnel authorized to use respiratory protection equipment will be trained in the applicable requirements biennially.
- 5.8.7 Personnel will be required to test respirators for operability immediately prior to each use.
- 5.8.8 Written policies and procedures will cover the following:
- (a) respirator selection, fitting, issuance, maintenance and testing;
  - (b) supervision and training of personnel;
  - (c) monitoring, including air sampling and bioassay;
  - (d) recordkeeping;
  - (e) determination by a physician that the individual user is physically able to use the equipment (including a certification prior to initial fitting and at least every twelve months thereafter);
  - (f) use of process or other engineering controls, instead of respirators;
  - (g) routine, nonroutine and emergency use of respirators; and
  - (h) periods of respirator use and relief from respirator use.

## 5.9 INSTRUMENTATION

### 5.9.1 RADIATION PROTECTION INSTRUMENTS

Instruments used for radiation protection measurements will have capabilities as follows; however, more than one instrument may be utilized to cover the specified range:

- (a) Portable Survey Instruments -- Alpha, 100 to 1.0E06 disintegrations per minute; Beta-Gamma, 0.1-millirem per hour to 300-REM per hour; neutron, 0.5 to 5 mREM per hour.
- (b) Laboratory Assay Instruments -- Alpha, 10-percent of the regulatory limit for Derived Air Concentrations (DAC), for sampling periods of 8-hours or more.

Radiation protection instruments will be calibrated on a routine schedule established by the Radiation Safety Function. The schedule will require calibration following initial instrument acquisition; and, thereafter, at minimum, following major repairs, semiannually, or the manufacturer's recommendation, whichever is lesser. Alpha counting instruments used in the Radiation Safety Function Laboratory will be checked each working day, when in use, to determine background activity; and, a calibrated source will be counted to assure proper instrument functioning. A voltage plateau, defining the proper counting voltage for each such laboratory alpha counting instrument, will be determined quarterly. Instrument calibration records will be maintained for a period of at least three years.

Operability of portable survey instruments will be determined prior to each use.

## 5.10 SUMMING INTERNAL AND EXTERNAL EXPOSURES

### 5.10.1 RADIATION DOSES

- (a) Internal and external occupational radiation doses will be combined in accordance with criteria in 10CFR20 and applicable guidance contained in Regulatory Guide 8.34, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses," and Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data."

### 5.10.2 DOSE TO EMBRYO/FETUS

- (a) Radiation dose to the embryo/fetus will be calculated in accordance with applicable guidance in Regulatory Guide 8.36, "Radiation Dose to the Embryo/Fetus."

## CHAPTER 10.0

### ENVIRONMENTAL PROTECTION

#### 10.1 EFFLUENT AIR TREATMENT

For operations that might result in exhausting radioactive materials to unrestricted areas, the adequacy of air effluent control will be determined by representative stack sampling to demonstrate compliance with the regulations. Sampling will be performed continuously during production operations. Samples will be collected and analyzed daily during production operations. If radioactivity in plant gaseous effluents exceeds 1,500 microcuries per calendar quarter, a report will be prepared and submitted to the NRC Staff within 30-days of the end of the quarter in which the incident occurred. This report will identify the cause for exceeding the limit, and corrective actions to reduce the release rates. The report will be submitted to NRC Headquarters Staff, with a copy to NRC Region II. Subsequently, if any parameters important to a dose assessment in the original report are found to have changed, a follow-up report will be submitted, within 30-days, which describes the changes in parameters and includes an estimate of the resultant change in dose commitment. In the event that a calculated Total Effective Dose Equivalent to any member of the public, in a calendar year, threatens to exceed 100 mREM per year, immediate steps will be taken to reduce emissions to levels that will assure compliance.

#### 10.2 LIQUID WASTE TREATMENT FACILITIES

A liquid waste treatment facility, with sufficient capacity and capability to enable holdup, treatment, sampling, analysis, and discharge of liquid wastes in accordance with the regulations, will be provided and maintained in proper operating condition.

Compliance with NRC 10 CFR 20 effluent radioactivity limits for discharge of liquid waste to the unrestricted area is assured by a continuous on-line gamma ray spectroscopy system within the main plant's ADU chemical controlled access area. Quarantine tanks, diversion tanks, and filtration operations are provided to assure the liquid is below  $3.0 \text{ E-05 uCi/ml}$ . When the liquid has been successfully scanned for discharge, it will be pumped from the final ADU pump out tank to the advanced wastewater treatment facility for uranium removal external to the main plant. Discharges from this operation will assure uranium concentration in the effluent is less than 0.05 ppm. Other miscellaneous streams are sampled on a batch basis and filtered to assure uranium is removed to levels below  $3.0 \text{ E-06 uCi/ml}$ . Quiescent settling in the lagoons (East, West, North, and South) will assure uranium is removed to levels

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which assure compliance with 10 CFR 20.1301 and 1302, by either meeting the TEDE dose limit or the unrestricted release limit.

A continuous, proportional sample of liquid effluent released to the Congaree River will be collected. A 30-day composite of this sample will be analyzed for gross alpha activity, gross beta activity, and isotopic uranium content.

Any violation of the facility NPDES Permit will be reported to NRC Region II within 15-days of confirmation of the violation. If the NPDES permit conditions are revised, or if the permit is revoked, the NRC Headquarters Licensing Staff will be promptly notified.

### 10.3 SOLID WASTE DISPOSAL FACILITIES

Solid waste disposal facilities, with sufficient capability to enable preparation, packaging, and transfers to licensed disposal sites in accordance with the regulations, will be provided and maintained in proper operating condition.

### 10.4 PROGRAM DOCUMENTATION

The licensed activity prepared an Environmental Evaluation Report dated March 1975, that has been subsequently updated in revisions dated April 1983 and April 1990. Future Environmental Impact Appraisal updates will be prepared and submitted to the NRC Licensing Staff on a schedule contingent upon the operating term of the license. For a 10-year license, the review will be documented in the ALARA Report (described in Chapter 5.0 of this License Application) and updating will be concurrent with each renewal application. The substance and methodology of each such update will be as agreed upon by cognizant NRC Licensing Staff and representatives of the licensed activity.

#### 10.4.1 MINIMUM PROGRAM IMPLEMENTATION

The Columbia Fuel Fabrication Facility environmental monitoring program will include the elements illustrated in Figure 10-1. For wells found not to contain water at time of sampling, an evaluation will be performed by the Regulatory Component to determine if alternate well data may be used or a new well must be dug. Minimum program analytical sensitivities will be as illustrated in Figure 10-2. Locations of air, vegetation, and soil monitoring stations, locations of surface water monitoring stations, and locations of monitoring wells, will be as illustrated in Figures 10-3, 10-4, and 10-5, respectively. Action levels will be established by procedure for environmental samples. These program elements, analytical sensitivities, and/or locations may be changed without prior NRC Licensing Staff approval, provided: (1) a documented

**FIGURE 10-1**  
**CFFF ENVIRONMENTAL MONITORING PARAMETERS**

TYPE OF SAMPLE	LOCATIONS	ANALYSES	SAMPLING FREQUENCY
Air Particulates	Four	Alpha	Continuous (Collection Weekly)
Surface Water	Three	Alpha; Beta	Quarterly
Well Water <sup>1</sup>	Ten	Alpha; Beta; Ammonia	Quarterly
River Water	Three	Alpha	Quarterly
Sediment	One	Alpha; Beta; Uranium	Annually
Soil	Four	Alpha; Beta; Uranium	Annually
Vegetation <sup>2</sup>	Four	Alpha; Beta; Fluoride	Annually
Fish	One	Alpha; Beta; Uranium	Annually

<sup>1</sup>If gross alpha concentration exceeds 15 pCi/l, isotopic analyses for uranium will be conducted. If gross beta exceeds 50 pCi/l, isotopic analyses for beta will be performed. If a monitoring well exceeds a mean concentration of 30 pCi/l of total uranium, the result will be provided to cognizant NRC staff.

<sup>2</sup>If a vegetation gross alpha activity result exceeds 15 pCi/gram an additional sample will be collected.

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evaluation by the Environmental Protection Function demonstrates that the changes will not decrease the overall effectiveness of the environmental monitoring program; and, (2) the changes and documented evaluation are submitted to the NRC Licensing Staff as part of the subsequent Environmental Impact Appraisal update.

#### 10.4.2 REPORTING PROGRAM RESULTS

Radioactivity in releases of radioactive materials in gaseous and liquid effluents from the facility will be reported to the NRC Staff, in accordance with the regulations and applicable Regulatory Guide documents, on a semiannual basis.

#### 10.5 EVALUATIONS

The Regulatory Component will perform a biennial evaluation of vendors used to analyze environmental samples. Such evaluations will also be performed if substantive program anomalies are disclosed. The evaluations will consider the need for "spike" and "replicate sample" submittals.

#### 10.6 OFF-SITE DOSE

Compliance with NRC 10 CFR 20, Subpart D and EPA 40 CFR 190 regulations for off-site dose requirements to the maximally exposed individual will be demonstrated by assuring that the off-site annual dose does not exceed 25 mREM. The calculational methodology will include models which have been evaluated by the Regulatory Component and are deemed acceptable by the appropriate regulatory agencies.

**FIGURE 10-2**  
**ENVIRONMENTAL MONITORING PROGRAM SENSITIVITIES**

TYPE OF SAMPLE	ANALYSES	TYPICAL QUANTITY	NOMINAL MINIMUM DETECTION LEVEL
Air Particulates	Alpha	571 Cubic Meters	2.0E-15 Microcuries Per Milliliter
Surface Water	Alpha	1 Liter	2.2E-9 Microcuries Per Milliliter
	Beta	1 Liter	2.5E-8 Microcuries Per Milliliter
Well Water	Alpha	1 Liter	2.2E-9 Microcuries Per Milliliter
	Beta	1 Liter	2.5E-8 Microcuries Per Milliliter
River Water	Alpha	1 Liter	2.2E-9 Microcuries Per Milliliter
	Beta	1 Liter	2.5E-8 Microcuries Per Milliliter
Sediment	Alpha	100 Grams	1.0 Picocurie Per Gram
	Beta	100 Grams	3.0 Picocuries Per Gram
	Uranium	100 Grams	0.5 Picocuries Per Gram
Soil	Alpha	100 Grams	1.0 Picocurie Per Gram
	Beta	100 Grams	3.0 Picocuries Per Gram
	Uranium	100 Grams	0.5 Picocuries Per Gram
Vegetation	Alpha	100 Grams	3.0 Picocuries Per Gram
	Beta	100 Grams	0.5 Picocuries Per Gram
Fish	Alpha	30 Grams	1.0 Picocurie Per Gram
	Beta	30 Grams	3.0 Picocuries Per Gram
	Uranium	1 Kilogram	0.5 Picocuries Per Gram

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**FIGURE 10-2  
ENVIRONMENTAL MONITORING PROGRAM SENSITIVITIES**

TYPE OF SAMPLE	ANALYSES	TYPICAL QUANTITY	NOMINAL MINIMUM DETECTION LEVEL
Surface Water			
Well Water			
River Water			
Sediment			
Soil			
Vegetation			
Fish			

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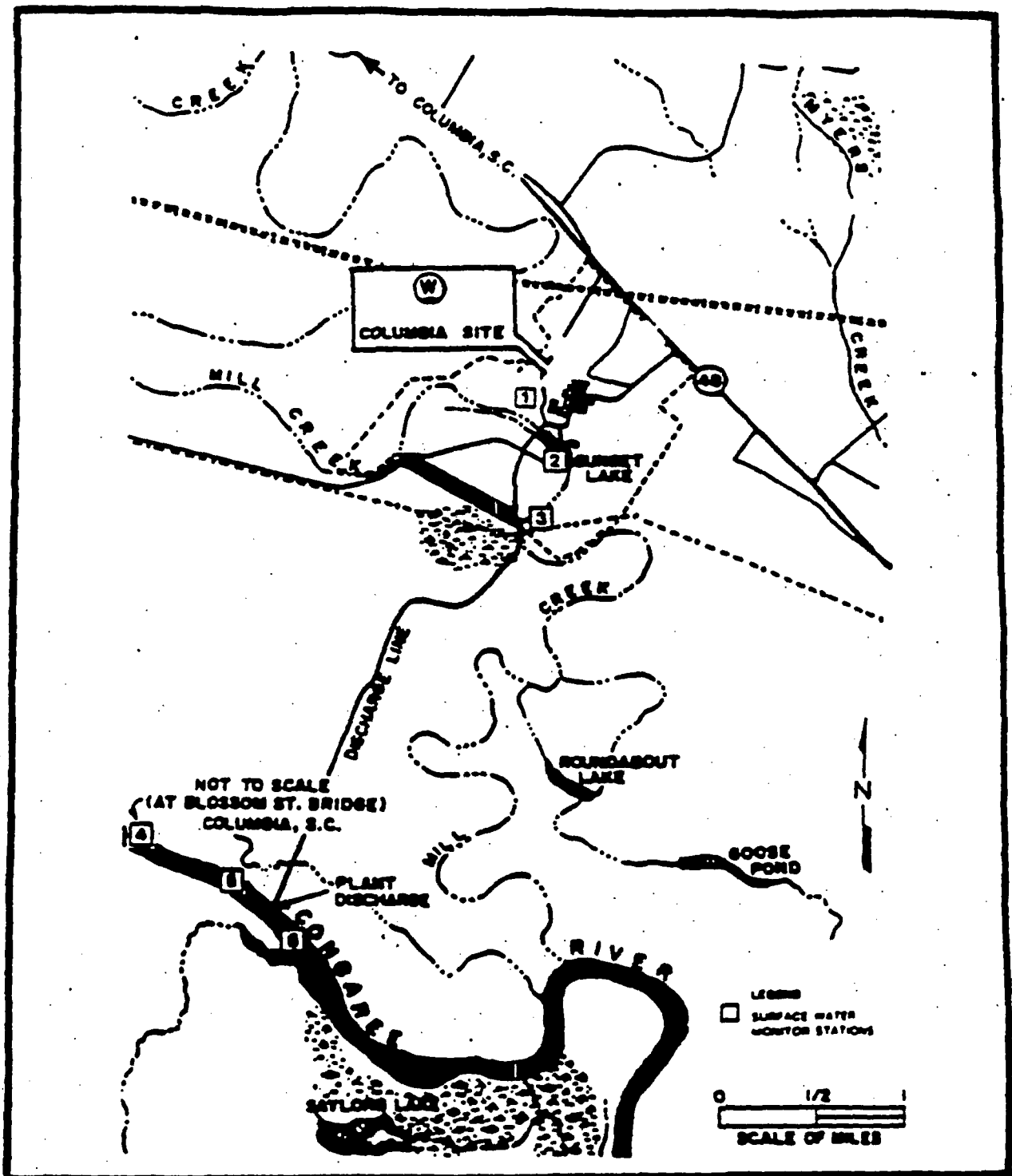
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FIGURE 10-4  
SURFACE WATER MONITORING LOCATIONS



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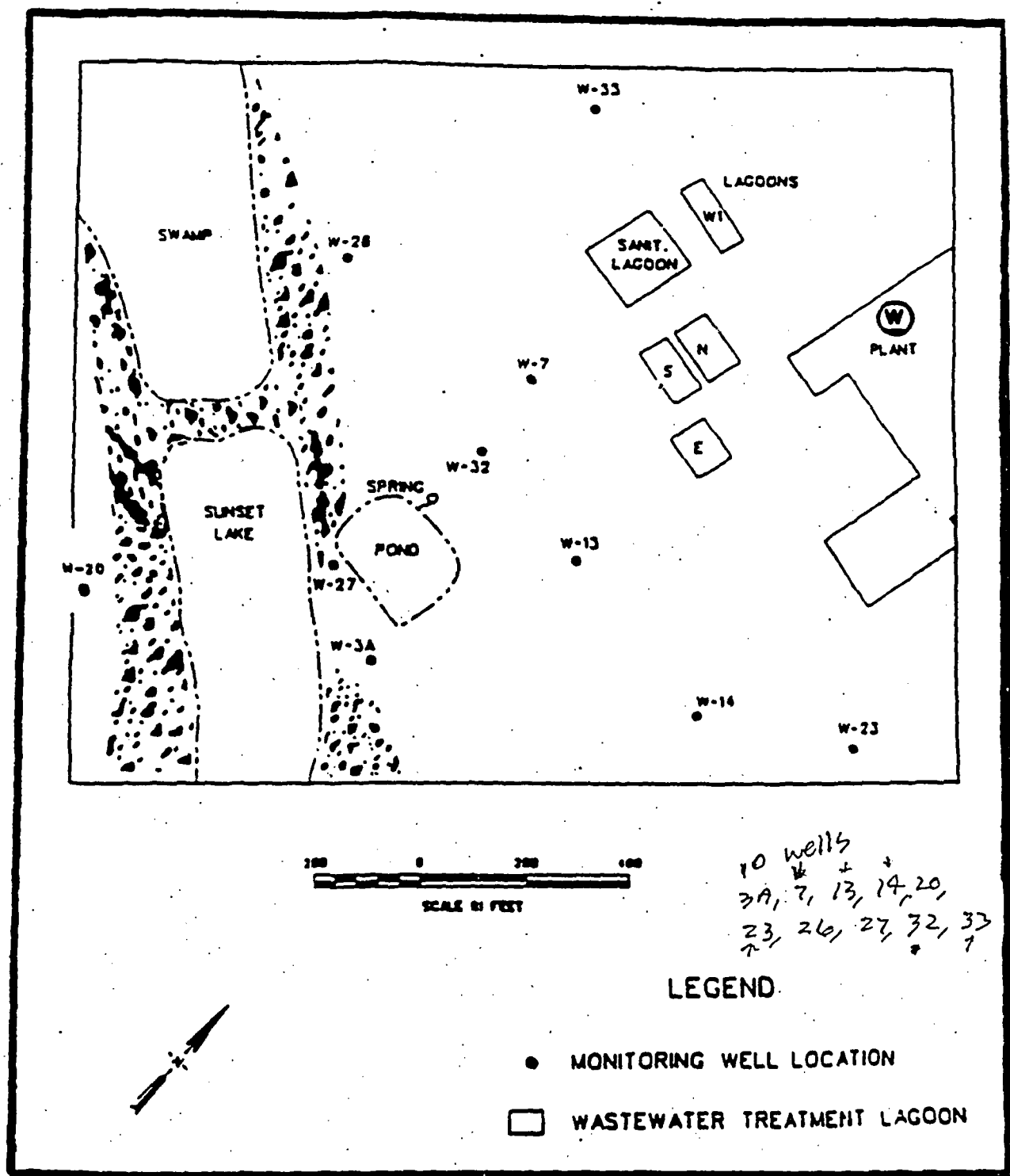
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FIGURE 10-5  
GROUND WATER MONITORING LOCATIONS



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## CHAPTER 11.0

### DECOMMISSIONING

To assure adequate financial resources will be available to decommission the Columbia Fuel Fabrication Facility (CFFF) at the end of its useful life, a conceptual decommissioning plan ("COST ESTIMATE TO TERMINATE LICENSE SNM-1107"), and a decommissioning funding plan and financial assurance mechanism will be prepared and maintained current.

#### 11.1 CONCEPTUAL DECOMMISSIONING PLAN

In support of the COST ESTIMATE TO TERMINATE LICENSE SNM-1107, a document file will be maintained. This file will consist of the following record categories:

- (a) Correspondence Chronological File;
- (b) Historic Conceptual Plan(s) and Cost Estimate(s);
- (c) Historic Facility Radiological Information;
- (d) NRC Guidance Documents;
- (e) EPA Guidance Documents;
- (f) Decommissioning Plan Shell;
- (g) Current Conceptual Plan And Cost Estimate; and,
- (h) Financial Assurance.

The file will include a record log-out/return process that provides for information on: "date", "out to", and "file number or name out"; and, each record category will be clearly marked: "warning, these decommissioning records must not be removed or destroyed without the written approval of (the Regulatory Component)".

Copies of the most recent COST ESTIMATE TO TERMINATE LICENSE SNM-1107 will be maintained by the Regulatory Component and/or the Engineering Component. The Engineering Component will maintain the electronic copy that contains the Westinghouse position in the following file structure:

- (a) Executive Summary;
- (b) Project Summary;
- (c) Project Description;
- (d) Estimate Configuration;
- (e) Assumptions;
- (f) Westinghouse Staff;
- (g) Demolition Labor Rate;
- (h) Subcontract - Consumables;
- (i) Wash-Down Estimate;
- (j) Labor Factors;
- (k) Material Density And Pack Factors;
- (l) Inflation Factors;
- (m) Major Cost Drivers;
- (n) Overhead Piping Density;
- (o) Structure Data Sheets;
- (p) Equipment Data Sheets; and,
- (q) Major Drivers.

The COST ESTIMATE TO TERMINATE LICENSE SNM-1107 will be reviewed for need to update on a triennial basis.

#### 11.2 DECOMMISSIONING FUNDING PLAN AND FINANCIAL ASSURANCE MECHANISM

To substantiate the cost total for decommissioning, the Westinghouse position on the following cost estimating tables will be maintained.

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- (a) Planning And Preparation;
- (b) Decontamination And/Or Dismantling Of Radioactive Facility Components;
- (c) Packaging, Shipping, And Disposal Of Radioactive Wastes;
- (d) Restoration Of Contaminated Areas On Facility Ground;
- (e) Final Radiation Survey; and,
- (f) Site Stabilization, Long-Term Surveillance.

The Westinghouse Electric Corporation Financial Assurance Certification (RA 94-027 AJN) was provided to the Nuclear Regulatory Commission Staff in a letter dated September 23, 1994. Future updates of this certification will be provided in accordance with prevailing conditions and/or regulatory directives.

## CHAPTER 12.0

### AUTHORIZATIONS AND EXEMPTIONS

#### 12.1 AUTHORIZATIONS

##### 12.1.1 AUTHORIZATION TO MAKE CHANGES TO LICENSE COMMITMENTS

###### (a) CHANGES REQUIRING PRIOR APPROVAL

Westinghouse shall not make changes to the License Application that decrease the effectiveness of commitments, without prior NRC approval. For these changes, Westinghouse will submit to the NRC, for review and approval, an application to amend the License. Such changes will not be implemented until approval is granted.

###### (b) CHANGES NOT REQUIRING PRIOR APPROVAL

Upon documented completion of an Integrated Safety Assessment for a facility or process, as described in Chapter 4.0 of this License Application, Westinghouse may make changes in the facility or process as presented in the License Application, or conduct tests or activities not presented in the Application, without prior NRC approval, subject to the following conditions:

1. There is no degradation in the safety commitments in the License Application.
2. The change, test, or activity does not impair the Westinghouse ability to meet all applicable Federal regulations.
3. The change, test, or activity does not conflict with any condition specifically stated in the License.

Records of such changes shall be maintained, including technical justification and management approval, in dedicated datapacks to enable NRC inspection upon request at the facility. A report containing a description of each such change, and appropriate revised pages to the License Application, shall be submitted to the NRC within three months of implementing the change.

##### 12.1.2 AUTHORIZATION FOR LEAK-TESTING SEALED PLUTONIUM SOURCES

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The following procedure shall be authorized for leak-testing sealed plutonium sources at the licensed activity:

- Each sealed plutonium source in use shall be leak-tested at least semiannually. In absence of a certificate from the supplier indicating that such a test has been performed within the six months prior to transfer to the licensed activity, the subject sealed plutonium source shall not be put into use until leak-tested.
- Sealed plutonium sources that are stored, and are not being used, shall be exempt from the leak-test requirement. Such stored sources shall be leak-tested prior to any use in, or transfer from, the licensed activity unless such a test has been performed within the six months preceding the date of use or transfer.
- The leak-test shall be capable of detecting the presence of 0.005-microcuries, or more, of alpha contamination on a smear-test sample. The smear-test sample shall be taken directly from the sealed source, or from appropriate accessible surfaces of the device in which the source is mounted or stored.
- Records of leak-test results shall be kept in units of microcuries, or other units directly convertible to microcuries by multiplication using a recognized constant; and, the records shall be maintained for review by the NRC Staff.
- If a leak-test reveals the presence of 0.005-microcuries, or more, of removable alpha contamination, the subject sealed source shall be immediately withdrawn from use, repaired and/or decontaminated, or disposed of in accordance with the regulations.
- Within five working-days of a determination that any sealed plutonium source has leaked in excess of the 0.005-microcuries limit, the licensed activity shall file a report with NRC Staff Headquarters which describes the subject source, the leak-test results, the extent of any related contamination, the apparent cause of failure, and corrective actions taken. A copy of this report shall also be sent to the NRC Region II Staff.

### 12.1.3 AUTHORIZATION FOR POSSESSION AT REACTOR SITES

The licensed activity may possess unirradiated fuel assemblies, at nuclear reactor facilities anywhere within the United States, for the purpose of loading them into shipping packages, and delivery to an authorized carrier for transport in accordance with the regulations. Operations incident to such loading shall be subject to the control

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of a licensed activity representative, approved by the Manager of the Regulatory Affairs Component, who shall assure that the completed transport package complies with all requirements of the regulations.

For such operations, the licensed activity shall be exempted from conditions of Title 10, Code of Federal Regulations, Part 70.24; CRITICALITY ACCIDENT REQUIREMENTS, provided:

- As finished fuel assemblies are removed from their approved storage facilities, they shall be constrained in an arrangement that is no more reactive than that which they will assume in the shipping package.
- The total number of fuel assemblies in process at any one time shall not exceed the maximum authorized contents of the packaging being loaded.
- If two fuel assemblies are in movement at the same time, a 12-inch minimum edge-to-edge separation shall be maintained between them; and, only one fuel assembly at a time shall be loaded into the shipping package.
- Loaded packages shall be stored in the approved shipping array, pending delivery to a carrier.
- No more than the maximum number of packages authorized for a single shipment shall be loaded and possessed, in conduct of such operations by the licensed activity, at any one location.

#### 12.1.4 AUTHORIZATION FOR USE AT OFF-SITE LOCATIONS

Up to 15-grams of licensed activity U-235 in unirradiated uranium may be used for demonstration or testing purposes at off-site locations, in the United States, except for Agreement States. Such material shall be subject to the following controls:

- While not in authorized transport, the material shall be subject to control by a licensed activity representative approved by the Manager of the Regulatory Affairs Component.
- The licensed activity representative shall be cognizant of, and shall assure compliance with, the radiation protection requirements of the regulations, license conditions, and Westinghouse policies and procedures.
- The licensed activity representative shall assure that there will be no commingling of the licensed activity material with other special nuclear material, such that the

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total mass of U-235 would exceed 350-grams.

#### 12.1.5 AUTHORIZATION FOR TRANSFER OF HYDROFLUORIC ACID

Pursuant to Title 10, Code of Federal Regulations, Part 20.2002; METHOD FOR OBTAINING APPROVAL OF PROPOSED DISPOSAL PROCEDURES, aqueous hydrofluoric acid containing trace quantities of uranium may be transferred to non-licensed receivers provided the following conditions are met:

- Prior to first unrestricted sale or other transfer of the subject material to each receiver, a detailed plan for such sale or transfer shall be submitted to the NRC Staff for review and approval.
- Prior to transfer of the hydrofluoric acid from Westinghouse, each shipment must be representatively sampled and analyzed; and the following maximum permissible concentrations shall not be exceeded: A uranium enrichment of 5 w/o U-235; A uranium concentration of 3-parts-per-million by weight; and, an HF concentration, in the acid solution, of 55-percent by weight.
- Particular attention shall be paid to each sale or transfer to assure that the hydrofluoric acid is not to be used for any purpose resulting in human consumption.

#### 12.1.6 AUTHORIZATION FOR TRANSFERS AS NON-REGULATED MATERIAL

Pursuant to Title 10, Code of Federal Regulations, Part 20.2002; METHOD FOR OBTAINING APPROVAL OF PROPOSED DISPOSAL PROCEDURES, industrial waste treatment products from the licensed activity, such as calcium fluoride and other homogeneous mixtures in which the mean concentration of uranium constituents does not exceed 30-picocuries per gram, may be released without continuing NRC licensing controls, to receivers for off-site calcium fluoride drying and briquette manufacturing, or for brick manufacturing, or to disposition at a chemical disposal site or industrial landfill. Calcium fluoride so released to off-site manufacturers shall contain a minimum of 60-percent solids. Prudent efforts shall be made to reduce the radioactive contents of all such transferred materials to levels as low as reasonably achievable.

A sampling plan shall be implemented to characterize the industrial products in accordance with NUREG/CR-2082; MONITORING FOR COMPLIANCE WITH DECOMMISSIONING TERMINATION SURVEY CRITERIA, as follows:

- The estimation of the population mean for uranium concentration shall be representative of the industrial products being transferred.

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- The sample size used to calculate the mean uranium concentration value shall be determined such that the 95-percent confidence limit for the value is less than 25-percent of the value.
- The sampling plan shall provide a minimum confidence level of 95-percent that the true mean uranium concentration value, determined for the industrial products to be transferred, is less than the maximum permissible limit of 30-picocuries per gram of dry material.

Records pertaining to the release of such materials, including identities of receivers, shall be maintained for review by the NRC Staff.

#### 12.1.7 AUTHORIZATION TO RELEASE CONTAMINATED RECORDS

The licensed activity may abandon or dispose of small quantities of radioactive materials that are present as minor contamination on certain papers, notebooks, computer print-outs, films, and/or similar items retained for record purposes. No licensed controls shall be required for final disposition of such records, and they may randomly be mingled with, and/or disposed of as, other records, provided:

- Prior to transfer from contamination control areas at the licensed activity, a documented survey instrument measurement shall conclude that the following limits are not exceeded: Average uranium-alpha contamination of 220-disintegrations-per-minute per 100-square-centimeters; Maximum uranium-alpha contamination of 2200-disintegrations-per-minute per 100-square-centimeters. Average beta-gamma emitter contamination of 660-disintegrations-per-minute per 100-square-centimeters; Maximum beta-gamma emitter contamination of 6600-disintegrations-per-minute per 100-square-centimeters.
- Such records shall be kept in locations that are used primarily for record storage and/or disposal.

#### 12.1.8 AUTHORIZATION TO RELEASE FOR UNRESTRICTED USE

Licensed activity materials and equipment may be released from contamination areas on-site to clean areas on-site, or from on-site possession or use to unrestricted possession or use off-site; provided, such releases are subject to all applicable conditions of the NRC Staff's April 1993 document entitled; GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL.



## 12.2 EXEMPTIONS

### 12.2.1 EXEMPTIONS FROM PRIOR COMMITMENTS

All commitments made to NRC Staff prior to the approval date of this License Application shall be no longer binding upon Westinghouse, following approval of this License Application, unless re-imposed as License Conditions.

### 12.2.2 EXEMPTION FROM INDIVIDUAL CONTAINER POSTING

Notwithstanding the requirement of paragraph (a) of Title 10, Code of Federal Regulations, Part 20.1904; LABELING CONTAINERS, the licensed activity shall be exempted from the requirement that "each container of licensed material bears a durable, clearly visible label"; provided, in lieu thereof, a sign bearing the legend "EVERY CONTAINER OR VESSEL IN THIS AREA MAY CONTAIN RADIOACTIVE MATERIAL" is posted at each entrance to areas or buildings in which radioactive materials are used or stored, from areas in which such materials are not used or stored. Regarding storage of radioactive materials outside the Fuel Manufacturing Building, the number of posted buildings and size of posted areas shall be minimized to the extent practicable, consistent with manufacturing and storage requirements.

### 12.2.3 EXEMPTION FROM RESPIRATOR USE REPORTING

Notwithstanding the requirement of paragraph (d) of Title 10, Code of Federal Regulations, Part 20.1703; USE OF INDIVIDUAL RESPIRATORY PROTECTION EQUIPMENT, since use of respiratory protection has been ongoing at the Columbia Fuel Fabrication Facility, continuing use shall be authorized and the licensed activity shall be exempted from the requirement to "notify, in writing, the Regional Administrator of the appropriate Nuclear Regulatory Commission Regional Office listed in Appendix D at least 30-days before the date that respiratory protective equipment is first used" under provisions of the April 30, 1995 License Renewal Application approval.

### 12.2.4 EXEMPTION FROM SHALLOW-DOSE EQUIVALENT TISSUE DEPTH

Notwithstanding the requirement of Title 10, Code of Federal Regulations, Part 20.1003, DEFINITIONS, "Shallow-Dose Equivalent", the licensed activity shall be exempted from the requirement that the Shallow-Dose Equivalent is taken as the dose equivalent at a tissue depth of 0.007 centimeter ( $7 \text{ mg/cm}^2$ ), when this dose is measured at the finger. In lieu thereof, for finger doses, the Shallow-Dose Equivalent shall be taken as the dose equivalent at a tissue depth of 0.038 centimeter ( $38 \text{ mg/cm}^2$ ).

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This applies to both the assessment of finger doses and for determining compliance with the finger dose limit.

#### 12.2.5 EXEMPTIONS FROM CRITICALITY MONITORING SYSTEM REQUIREMENTS

Notwithstanding the requirements of Title 10, Code of Federal Regulations, Part 70.24, the licensed activity shall be exempted from the "monitoring system" requirements in the areas, and under the conditions specified below:

Office and conference room areas, chemistry laboratories, metallurgical laboratories, development laboratories, health physics counting rooms, and machine shop areas -- provided that:

- Each such area shall be remote from other operations with special nuclear material.
- Each such area shall be administratively limited to 1000 grams of  $U^{235}$ ; and, for chemistry laboratories, an additional 5 grams of  $U^{233}$ .

Low concentration storage areas in which containers have uranium in quantities representing no more than 350 grams of  $U^{235}$  per package and no more than 5 grams of  $U^{235}$  in any 10 liters of package; or, no more than 50 grams of  $U^{235}$  per package and no more than an average of 5 grams of  $U^{235}$  per 10 liters of package -- provided that:

- Each such area shall be under nuclear isolation with respect to other areas where special nuclear material is more concentrated.

Storage areas in which the only special nuclear material present is contained in approved shipping containers -- provided that:

- The maximum number of containers permitted in each such area shall be unlimited for low specific activity packages; or, 250 Fissile Class I packages; or, a quantity of Fissile Class II packages totaling no more than 50 transport units; or, one approved shipping quantity of Fissile Class III packages.
- Each such storage array shall be under nuclear isolation with respect to other special nuclear material.