70-1257/w 12/13/96

SIEMENS

December 9, 1996
JBE:96:125

U.S. Nuclear Regulatory Commission
Attn: Michael F. Weber, Chief
Licensing Branch
Division of Fuel Cycle Safety and Safeguards, NMSS
Washington, DC 20555

Dear Mr. Weber:

Ref.: Letter, J.B. Edgar to E.G. Adensam, dated April 28, 1993

In the referenced letter Siemens Power Corporation (SPC) committed to forward to the NRC a copy of the Washington State Department of Ecology (WDOE) Notice of Construction approval for SPC's Dry Conversion facility. Instead of the WDOE, it is now the Division of Radiation Protection of the Washington State Department of Health (WDOH) which issues approvals of Notices of Construction. Enclosed is a copy of WDOH's approval letter.

In reviewing the application portion of SPC's recently renewed NRC Materials License we have discovered an omission in Chapter 15 and three minor needed corrections in Chapter 11.

Through an inadvertent omission the Chapter 15 process description and safety analysis sections for the Dry Conversion Building, submitted October 21, 1994 were left out of the October 28, 1996 application. The Dry Conversion Building information from October 21, 1994, the safety analysis section of which has been slightly revised to reflect only dry conversion, is resubmitted for completeness. (Originally the safety analysis discussed both ADU and dry conversion. Revised Chapter 15 sections submitted on October 2, 1995 dealt with ADU conversion, necessitating limiting the present submittal to dry conversion information.) Two copies each of pages 15-75 through 15-78, are submitted to convey this information. This information will be updated in the near future when the Dry Conversion Criticality Safety Analyses (CSA's) are completed.

In addition, in Chapter 11 (paragraph 11.3.17) the education and experience statement for the Manager, Safety submitted February 9, 1996 was erroneously replaced by his previous statement when the position was the Supervisor, Safety. This is being corrected. Two other changes to education and experience statements are also being made. In paragraph 11.3.18 the title and current position are revised to Lead Criticality Safety Specialist. In paragraph 11.3.19 the experience statement has been revised to describe present duties. Two copies of each of pages 11-28, 11-29, and 11-30 are enclosed to describe the above changes to Chapter 11.

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Siemens Power Corporation

Nuclear Division
Engineering & Manufacturing
2101 Horn Rapids Road
P.O. Box 130
Richland, WA 99352-0130
Tel: (509) 375-8100
Fax: (509) 375-8402

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If you require additional information, please call me at 509-375-8663.

Very truly yours,

James B. Edgar
Staff Engineer, Licensing

/pg

Enclosures

XXXXXXXXXX
XXXXX

AIR 95-306

STATE OF WASHINGTON

DEPARTMENT OF HEALTH

Airdustrial Center, Bldg. 5 • Mail Stop XXXX *• Olympia, Washington 98504*

March 14, 1995

Mr. B. A. Femreite, Richland Plant Manager
Siemens Power Corporation
Nuclear Division
Engineering and Manufacturing Facility
P. O. Box 130
Richland, Washington 99352-0130

Dear Mr. Femreite:

My staff has completed reviewing the Notice of Construction for the Dry Conversion Building in accordance with WAC 246-247. After the meeting with Mr. Jim Edgar and Randy Acselrod of my staff, this Notice of Construction is approved.

Please note that WAC 246-247 must be strictly adhered to. This approval is for all conditions of the Notice of Construction application contents.

If you have any questions, please do not hesitate to call me at (360) 586-0254 or Randy Acselrod of my staff at (360) 586-8950.

Sincerely,

Allen W. Conklin, Head
Air Emissions and Defense Waste Section
Division of Radiation Protection

AWC/RA/jr

cc: Deborah McBaugh

- Operations Manager, Nuclear Fuel Manufacturing, responsible for daily direction and overall coordination of the activities of the manufacturing process of C-E nuclear products. Assigned as Emergency Director for the Nuclear Fuel Manufacturing facilities and Product Development laboratories. (1989)

- Plant Manager, ABB-Combustion Engineering Nuclear Fuel Manufacturing, responsible for all aspects of the safe operation of the NRC licensed manufacturing facilities producing finished nuclear fuel assemblies and related components to the commercial nuclear power industry. (1990-1992)

- Project Director, ABB Combustion Engineering Windsor Site Remediation, responsible for the safe and cost effective characterization and environmental remediation of the ABB Windsor site areas contaminated under AEC contact. Provided liaison with DOE, NRC, EPA, and Connecticut DEP. (1992)

1992-Present

Employed by Siemens Power Corporation as Manager, Safety, Security, and Licensing, reporting directly to the Vice President, Engineering and Manufacturing and is responsible for developing, administering, and auditing the licensing, industrial safety and health, health physics, criticality safety, environmental surveillance, ALARA, security and safeguards programs for SPC's facility at Richland, Washington.

11.3.17 Manager, Safety - T. C. Probasco

Education

BS	Microbiology	1970	Oregon State University
BS	Military Science	1970	Oregon State University
Certified Safety Professional		1982	Board of Certified Safety Professionals

Experience

1970-1972

Highway Engineering Technician for the Oregon State Highway Department.

1972-1975

Employed by a food processing company.

- Supervised chemical and bacteriological laboratories in the Quality Assurance Department. (1972-1973)
- Safety Engineer. (1973-1975)

1975-Present

Employed by Siemens Power Corporation.

- Plant Safety Engineer. (1975-1984)
- Plant Criticality Safety Engineer. (1975-1984)
- Supervisor, Radiological and Industrial Safety, responsible for supervising Health Physics Technicians, Radiological Safety Specialist, and Industrial Hygiene Specialist. (1985-1989)
- Supervisor, Safety, responsible for supervising Criticality Safety Specialists, Health and Safety Specialist, Radiological Safety Supervisor, Health and Safety Technicians, and the Health Records Clerk. (1990-Present)
- Manager, Safety, responsible for emergency preparedness and for supervising Criticality Safety Specialists, Health and Safety Specialist, Radiological Safety Supervisor, Health and Safety Technicians, and The Health Records Clerk. (1996-Present)

11.3.18 Lead Criticality Safety Specialist - C. D. Manning

Education

BS Nuclear Option of General Engineering 1982 Idaho State University

Experience

1976-1984

Employed by Union Pacific Railroad.

1984-1985

Employed by Newport News Reactor Services as a Radiological Control Engineer.

- Training HPT technicians and operators
- Shielding and dosimetry requirements
- Auditing radiological control program compliance

1985-1987

Employed by Rockwell Hanford Company as a Criticality Safety Engineer.

- Criticality safety analyses
- Auditing criticality safety program compliance

1987-1990

Employed by Westinghouse Hanford Company as a Nuclear Safety Engineer.

- Cognizant Safety Engineer for the Plutonium Metal Production Line.
- Event Investigation Team Leader
- Plant criticality safety approval authority

1990-Present

Employed by Siemens Power Corporation as Lead Criticality Safety Specialist. Engineer responsible for all aspects of the criticality safety program.

11.3.19 Criticality Safety Specialist - J. M. Deist

Education

BS Nuclear Engineering	1990	Kansas State University
Nuclear Criticality Safety Short Course	1994	University of New Mexico
SCALE Training Course	1995	Oak Ridge National Laboratory

Experience

1990-1992

Employed by Kansas State University as a Graduate Research Assistant in the Nuclear Engineering Department.

- Radiation Detection Laboratory Assistant
- Neutron Activation Analysis Laboratory Assistant

1992-Present

Employed by Siemens Power Corporation.

PWR Neutronics Engineer (1992-1996)

- Lead Neutronics Engineer for H.B. Robinson plant
- Neutronics input for safety analysis
- Startup and operations data
- Incore monitoring data
- Safety Analysis Report and Startup and Operations Report

Criticality Safety Specialist (1996-Present)

- Criticality safety analysis
- Criticality safety audits

15.1.14 Dry Conversion

15.1.14.1 Vaporization - UF_6 cylinders are moved by forklift and overhead monorail hoist to the vaporization facilities in the Dry Conversion Building. In the vaporization room a cold valve check is performed to evaluate the condition of the cylinder valve. The cylinder must have the appropriate vacuum to prevent rupture during heating. If the cylinder is found not to be under negative pressure, a negative pressure is drawn on it and the valve is checked for leakage. A replacement valve is installed if a leak is indicated. UF_6 cylinders are then placed in electrically heated autoclaves and connected to a welded, heated, and insulated stainless steel header system used to transport UF_6 gas to the dry conversion reactor. A backup safety shutoff valve is installed next to the cylinder valve for added protection against uncontrolled release of gas from the cylinder.

The vaporization autoclaves, each limited to a single cylinder are designed to act as pressure vessels capable of containing all UF_6 released in a worst case leak from a UF_6 cylinder. Any UF_6 leakage within the autoclaves will be contained and recovered.

UF_6 cylinder temperature and pressure are monitored and recorded during heatup and vaporization. In addition to control thermocouples, separate thermocouples and a pressure sensor are used on the autoclave to independently shutdown power in case of an over temperature or over pressure condition. Burnout of a thermocouple causes the control instrumentation to drive upscale and safely shutdown cylinder heating.

As with the ADU system the weight of each UF_6 cylinder is confirmed upon receipt to preclude rupture of an overfilled cylinder during the solid-to-liquid phase change and subsequent volume expansion which occurs during cylinder heating.

Personnel connecting and disconnecting UF_6 cylinders are required to use protective clothing including coveralls, rubber shoe covers, and plastic gloves. Separate self-contained breathing equipment, avid suits and fresh air supply are available in case of emergency.

15.1.14.2 UF_6 to U-Oxide Conversion - In the dry conversion process vaporized UF_6 is reacted with a steam-nitrogen-hydrogen atmosphere in a fluidized bed reactor to form dry UO_2 powder. In addition to those used for reactor temperature control, thermocouples are provided for over-temperature protection and for under-temperature interlocks of steam, hydrogen and

UF_6. These low temperature interlocks are included for moderation control to ensure no liquid water can form in the reactor. High pressure in the reactor will also shut off the UF_6 flow. During normal operation to attain complete reaction and assurance that no UF_6 gas may pass through the off-gas filter system, an excess of steam is supplied. The UF_6 flow is terminated should the steam to UF_6 ratio become low.

15.1.14.3 **U-Oxide Calcination** - The calcination system, consisting of a rotary calciner, is used to reduce the fluoride content of uranium dioxide from the conversion reactors to acceptable levels. The calciner operates at temperature from 600 °C to 800 °C in an atmosphere of steam and hydrogen. Interlocks are used to prevent high and low calciner temperature and high pressure. The low temperature control is to ensure no liquid water can be present.

The calciner product is transferred by gravity to the UO_2 stabilizer where the O/U ratio is adjusted.

15.1.14.4 **Process Off-Gas** - The HF-bearing offgas from this conversion and U-Oxide calcination processes, consisting of nitrogen, hydrogen, HF, steam and some entrained UO2 powder, is passed through two banks of sintered metal filters which quantitatively remove all oxides of uranium. The filtered UF-bearing offgas is then condensed to form liquid nydrofluoric acid at a nominal concentration of 45 wt%. Non-condensed offgas is treated with a caustic scrubber to remove residual HF. Before discharge to the building stack the offgas is treated with a flare to destroy H_2 and is passed through a HEPA filter.

15.1.14.5 **HF Collection** - The hydrogen Fluoride (HF) collection process includes two stage condensers for the reactor and calciner offgas, a condensate receiver tank, and an HF storage and loadout station. An inline uranium analyzer is used to monitor the uranium content of the HF condensate. In the unlikely event there is high uranium content in the offgas condensate, the process is shutdown automatically. Leak detection and ambient air HF monitors at the HF collection pad are used to detect HF leaks and protect personnel. These systems will alarm both locally and in the control room. Appropriate protective clothing is worn for all hands on activities in which contact with HF is possible. Hands on activities include sampling, unloading storage tanks to trucks and maintenance activities. During handling of HF tanks employees will wear protective clothing respirators. The coproduct HF will be marketed commercially as an industrial chemical.

15.1.14.6 **Process Offgas Scrubber** - After passing through the condensors the offgas is scrubbed with a 5.5% NaOH solution to remove the small amount of residual HF. The scrubber discharge is sampled and discharged to a waste lagoon.

15.1.14.7 **Solid Waste Handling** - Dry conversion waste will be limited to contact contaminated materials from handling the uranium oxide product and production equipment. It will either be incinerated or buried.

15.1.14.8 **Criticality Safety**

Criticality Safety of UF_6 cylinders is ensured by using moderation control and plant wide enrichment limitations (equal to or less than 5 wt% ^{235}U).

Prior to its introduction into the conversion area, each UF_6 cylinder is checked for enrichment using a gamma counter to verify the shippers values and to verify equal to or less than 5 wt% ^{235}U. If cylinder enrichment is greater than 4.7 wt%, a sample from the master cylinder is analyzed, prior to introduction into the conversion area, to verify equal to or less than 5 wt% ^{235}U.

Criticality safety in dry conversion equipment is attained through moderation control. All powder is verified dry in the reactor and calciner. Interlocks exist in both the reactor and calciner to ensure that the existence of liquid water is not possible. The entire process area of the Dry Conversion building is moderator controlled.

15.1.14.9 **Radiation Protection**

Conversion of UF_6 to UO_2 is performed in restricted areas and the processes are contained in the reactor and associated dry conversion equipment. Personnel entering the area are required to wear radiation monitoring devices and protective clothing/equipment appropriate for the work to be performed. Personnel are required to survey themselves prior to exiting the controlled area. Equipment leaving the controlled area must be released by Radiological Safety personnel. All personnel also receive initial and yearly refresher training on radiation protection principles and requirements.

Airborne uranium contamination is controlled by extensive use of hoods which are maintained at negative pressure and ventilated to the process offgas (POG) system.

Routine surveys are performed and housekeeping practices are enforced to minimize surface and airborne contamination in the conversion areas. Air is continuously sampled and periodically analyzed to detect any airborne contamination.

Urine sample analyses and lung counts are periodically performed for personnel who work in the controlled access area. The frequencies of such testing are described in Chapter 3.

15.1.14.10 Fire Protection

The Dry Conversion building is rated as noncombustible. Fire loading is kept to a minimum through monthly inspections. Fire extinguishers, alarm pull boxes, and heat detectors are strategically placed throughout the conversion areas. Where moderation control is in place, water exclusion signs are posted to alert local fire fighters of areas where water is not to be introduced. In these areas high expansion foam, dry chemical or CO_2 would be used to combat a fire.

There are two high temperature unit operations in the conversion area. The conversion reactor which operates between 400 and 650 °C and the rotary calciner which operates from 600 to 800 °C. Both systems utilize overtemperature interlocks to avoid overheating.

Hydrogen is used in the Dry Conversion system in both the reactors and the calciner. The reactors are sealed to outside air and operated under nitrogen purge at near atmospheric pressure. Due to the lack of driving force the probability of leakage of air into the system is remote. The calciners are sealed presenting the leakage of air into the system.

15.1.14.11 Environmental Safety

Hazardous materials are contained to prevent their introduction into the environment. All unit operations are served by POG vent lines or by hoods. Hoods are maintained at a negative pressure and vented to the POG system. Floors are sealed and have no drains.

The POG system treats and removes fumes and particulates from the exhaust air using sintered metal filters, scrubbers and two stages of HEPA filtration. See sections 15.1.14.4 through 15.1.14.6 for description of offgas treatment.

All room and building air is processed through the heating, ventilation, and air conditioning system and then HEPA filtered to remove particulates.

Solvent contaminated rags from the controlled area are disposed of in special containers distributed throughout the conversion area. The rags are treated as mixed hazardous waste and stored in a secured area for future disposal.

15.1.14.12 Reactions of Hydrocarbons with UF_6

Reactions of hydrocarbons with UF_6 is discussed in Section 15.1.5.