



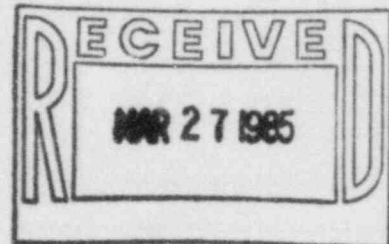
Public Service  
Company of Colorado  
P.O. Box 840  
Denver, CO 80201-0840

OSCAR R. LEE  
VICE PRESIDENT

March 25, 1985  
Fort St. Vrain  
Unit No. 1  
P-85103

Regional Administrator  
Region IV  
U. S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, Texas 76011

Attn: Mr. E. H. Johnson



DOCKET NO: 50-267

SUBJECT: Certification of Compliance  
to 10CFR50.49 (Generic  
Letter 84-24, G-85022)

REFERENCE: PSC Letter dated  
February 4, 1985 Lee to  
Johnson (P-85033)

Dear Mr. Johnson:

This letter is Public Service Company of Colorado's (PSC) response to the NRC's December 27, 1984 order concerning certification of compliance to 10CFR50.49 (Generic Letter 84-24).

Summary of Previous Submittals

PSC has previously submitted many letters concerning environmental qualification of safety related equipment, either as follow up to meetings, in response to IE Bulletin 79-01B, or in response to 10CFR50.49.

The following summarizes those previous submittals:

PSC Letter dated June 15, 1977 Millen to Denise (P-77137)

1. Summarized PSC's Seismic and Environmental Qualification Program.
2. Summarized review on seismic qualifications of Class I equipment and environmental qualifications of safe shutdown equipment.
3. Established corrective action for unqualified Class I equipment.

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PSC Letter dated June 12, 1979 Fuller to Seyfrit (P-79124)

1. Determined the matter of environmental qualification closed with Amendment 18 to the Facility Operating License DPR-34.
2. Listed relevant correspondence between PSC and the NRC during the review of the Fort St. Vrain Environmental Qualification Program by NRC-NRR and NRC-I&E Region IV with PSC in 1977 and 1978 (Attachment "A" to P-79124).

PSC Letter dated March 18, 1980 Swart to Seyfrit (P-80051)

1. Included computer lists similar to IE-79-01B Enclosure 2. (Attachment "A" to P-80051).
2. Discussed plant equipment numbering. (Attachment "B" to P-80051).
3. Discussed areas not applicable to a High Temperature Gas-Cooled Reactor (HTGR), including radiological details of DBA#1. (Attachment "C" to P-80051).
4. Discussed steam line accidents including report entitled "Environmental Temperatures in the Vicinity of the Rupture Point of Steam Lines for Fort St. Vrain Equipment Qualification." (Attachment "D" to P-80051).

PSC Letter dated April 11, 1980 Swart to Seyfrit (P-80078)

1. Summarized items from March 18, 1980 submittal that were previously accepted by NRC letter dated October 28, 1977 Denise to Fuller; G-77076 (Attachments "C" and "D" to P-80051).
2. Updated computer lists (Attachment "A" to P-80078) and submitted preliminary Component Evaluation Work Sheets.

PSC Letter dated April 18, 1980 Swart to Seyfrit (P-80090)

1. Updated computer lists (Attachment "A" to P-80090) and Component Evaluation Work Sheets.
2. Finalized Emergency Procedures review.
3. Clarification of Component Evaluation Work Sheets.

PSC Letter dated October 3, 1980 Fuller to Seyfrit (P-80350)

1. Commitment to completion of environmental qualification records review.

2. Commitment to completion of environmental testing of generic items.
3. Revised computer lists (Attachment "A" to P-80350) and Component Evaluation Work Sheets (Attachment "E" to P-80350).
4. Discussion of areas not applicable to a HTGR, including aging.

PSC Letter dated May 17, 1983 Lee to Collins (P-83178)

1. Summarized previous submittals.
2. Described methods by which safety related equipment is identified.
3. Reviewed areas not applicable to a HTGR.
4. Provided a schedule for completion of environmental qualification records audit.
5. Provided a schedule for environmental qualification of safe shutdown equipment and Regulatory Guide 1.97 Category I and II equipment.
6. Provided a Justification for Continued Operation (JCO) for operation with three items not fully qualified.

PSC Letter dated August 15, 1983 Brey to Collins (P-83280)

1. Updated status of environmental qualification records audit.
2. Provided JCO for six components not fully qualified.

In a PSC-NRC meeting in February 1984, PSC presented for NRC consideration its position, exception and overall rationale for environmental qualification of electrical equipment at Fort St. Vrain.

PSC Letter dated February 28, 1985 Warembourg to Johnson (P-85065)

1. Submitted PSC's report on Regulatory Guide 1.97 instrumentation.

#### Fort St. Vrain Environmental Qualification (EQ) Program

The Fort St. Vrain environmental qualification program was established to ensure safe reactor shutdown following Design Basis Events. The specified Design Basis Events were a complete offset rupture of a cold reheat line in the Reactor Building, and a complete offset rupture of a hot reheat line in the Turbine Building.

In the various submittals, PSC made every attempt to set forth the basis of our EQ program and to set forth differences between Fort St. Vrain requirements and those being promulgated by 10CFR50.49 as well as provide pertinent information for NRC evaluation in response to various bulletins and generic letters.

These areas were discussed in our March 18, 1980 submittal P-80051, our October 3, 1980 submittal P-80350, and our May 17, 1983 submittal P-83178. For convenience, similar discussions are repeated below:

1. Pressure: The FSV HTGR does not have a containment building; therefore, there is no ambient pressure buildup.
2. Relative Humidity: During an HELB event the high energy steam being released is in the high quality (dry) range. During the qualification testing of equipment for use at FSV, steam is used to provide the test environment, thereby exposing the test sample to a humidity level similar to actual event conditions.
3. Chemical Spray: Chemical sprays are not utilized at FSV.
4. Radiation: Because the process fluid is not contaminated, there are no radiological concerns directly associated with a High Energy Line Break (HELB) at FSV. Our October 3, 1980 submittal, P-80350, concludes that the reactor building will be accessible for short term operations following DBA#1. It further concludes that the accumulated doses incurred during DBA#1 would have no operational effect on equipment in the Reactor Building.
5. Submergence: Water is not used as the primary coolant for shutdown nor is it used for emergency core spray; in addition, the volume of the keyway is large enough to accommodate large quantities of water. Therefore submergence is not a concern.
6. Aging: PSC has concluded, in our October 3, 1980 submittal, P-80350, that we have an adequate basis for taking exception to the aging requirements. This conclusion is based on the following arguments:

Fort St. Vrain does not utilize a conventional containment building. Thus, harsh environmental conditions do not exist for long periods of time.

Fort St. Vrain does not utilize dedicated emergency cooling systems. The normal reactor cooling systems are also the emergency cooling systems. The advantage here lies in the fact that the safe shutdown cooling systems are operated in the course of normal operations. This eliminates the question of the reliability of infrequently used safety systems. Maintenance is performed as required to ensure continued reliable operation.

Since the FSV HELB is short term in nature, and radiological concerns minimal, access to any location in the plant is possible shortly following an accident.

Redundant Forced Circulation Pooling equipment is physically located in different areas to preclude failures from a single accident. Additional assurance is provided by valves with



manual overrides and/or "designed failure modes" to ensure ththeir proper operation following an accident.

The availability of access coupled with the time available to restore Forced Circulation Cooling provides desirable flexibility in terms of manual overrides and maintenance.

The PCRV Liner Cooling system has redundancy and physical separation to preclude failure from a single accident.

In the unlikely event that the normal power supply to the PCRV Liner Cooling system fails, backup power is available via the Alternate Cooling Methods (ACM) system. The controls and cabling for this system are physically separated from normal emergency equipment.

Because of the above reasons, Fort St. Vrain has adequate means of protecting the health and safety of the public, should "aged" equipment fail during a HELB.

#### EQUIPMENT QUALIFICATIONS

PSC has recently completed an audit of our environmental qualifications records. This audit revealed a total of nine items that were not fully qualified or replaced. All units were subsequently tested and qualified. As part of this audit, or records were placed in a more auditable form.

There are presently several methods utilized to identify safety related equipment and their respective qualification requirements.

1. A general listing of Class I and Safe Shutdown systems and equipment is provided in the FSAR, Section 1.4.
2. Special symbols on Process and Instrumentation (P&I) diagrams, Instrument Block (IB) diagrams, and Instrument and Control (IC) diagrams identify safety related instruments, process lines, and class boundaries.
3. Electrical schematic diagrams highlight the exact circuitry that must function in order to provide a safe shutdown.
4. The Safety Related Component List (SR-6-2) identifies specific equipment and instruments that are safety related. SR-6-2 also defines the environmental qualification requirements for safety related instruments and equipment.
5. Design Directives are used to provide guidance in detemining the environmental qualification requirements of new equipment.

These design inputs, coupled with numerous reviews of proposed plant design changes, ensure environmental qualification in accordance with the FSV EQ program for all new equipment.

### Modes of Safe Shutdown Cooling

The primary methods of core cooling used at Fort St. Vrain is Forced Circulation Cooling. Forced Circulation Cooling consists of two redundant loops each with two helium circulators and one steam generator.

Each circulator has two independent sources of motive power: a steam turbine drive which is normally used, and a backup water turbine drive. Attachment A identifies six separate methods of supplying motive power to each circulator.

Each steam generator has two sections: an economizer, evaporator, superheater (EES) section, and a reheater section. There are five methods of supplying water to the EES, and two methods of supplying water to the reheater. These methods are shown on Attachment A.

One helium circulator and either the EES or reheater section of the steam generator in the same loop is capable of providing adequate heat removal following a scram from full load.

Our recent audit of our environmental qualification records has verified that all of the electrical equipment required for the proper operation of both loops of forced circulation cooling has been qualified in accordance with the FSV electrical equipment qualification program.

In addition to Forced Circulation Cooling, the core can be cooled using the PCRV liner cooling system. This method provides adequate core cooling in the event of a permanent loss of forced circulation cooling. Although this accident would result in extensive fuel damage, depressurization of the PCRV and continued PCRV liner cooling would protect the health and safety of the public.

### Qualification of 10CFR50.49 Equipment

10CFR50.49(b) identifies the electrical equipment that is required to be environmentally qualified these are:

- 1) Safety related equipment.
- 2) Non-safety related equipment whose failure could prevent the satisfactory accomplishment of safety functions.
- 3) Certain post-accident monitoring equipment.

The Fort St. Vrain Nuclear Generating Station is designed for performance of the required safety functions in case of earthquakes and tornadoes. Equipment which has a safety function under those conditions is designed and qualified to the requirements applicable to Class I items as specified in the FSAR. The remaining equipment is Class II.

Only Class I equipment is required to perform a safety function in the event of a High Energy Line Break; therefore, only the Class I electrical equipment items require consideration of environmental qualification under the scope of 10CFR50.49. The applicable environmental qualification requirements for the

Class I electrical equipment vary depending on item location and function. In accordance with 10CFR50.49 paragraph c(iii), Class I items not exposed to a severe environment do not require environmental qualification. Class I items required for safe shutdown (Safe Shutdown equipment) that are exposed to a High Energy Line Break (HELB) are required to be qualified for that environment.

All Class I items required for safe shutdown exposed to a HELB have been qualified in accordance with our EQ program.

Our recent audit of environmental qualifications records has determined that electrical failure of Class II equipment due to a HELB cannot prevent Class I electrical equipment from performing their safety functions. The audit also verified that any component that has an effect on a Class I function is itself defined as Class I. Special designations are assigned to components that must either maintain system pressure boundary or electrical circuit continuity. Such components are qualified accordingly.

PSC letter Warembourg to Johnson dated February 28, 1985 (P-85065) identifies the instrumentation required for Post Accident Monitoring (PAM).

Regulatory Guide 1.97 specifies that Category I and Category II instrumentation must be environmentally qualified. All of our Category I and Category II instrumentation identified in P-85065 is qualified in accordance with our EQ program.

#### Specific Generic Letter 84-24 Concerns

IE Bulletin 82-04: Research determined that Bunker Ramo penetrations were not used at FSV. This was attested to in PSC letter Lee to Collins dated December 29, 1982 (P-82563).

IE Information Notice 82-11: A review by our staff has determined no Westinghouse pressure instruments are used in safety related systems at FSV.

IE Information Notice 82-52: A staff review has determined that none of the equipment concerned is used at FSV.

IE Information Notice 83-45: Our staff has determined that we do not use 4 position GE CR-2940 switches.

IE Information Notice 83-72: We have determined that none of the equipment failures are of concern to FSV.

IE Information Notice 84-23: Research has verified that these solenoid valves are not used at FSV in any safety related application.

IE Information Notice 84-44: All cables used in HELB areas have been qualified by our EQ program.

IE Information Notice 84-47: Terminal blocks used at FSV have been qualified in



accordance with our environmental qualification program.

IE Information Notice 84-57: Although, as a result of our environmental test program, we feel that moisture intrusion into safety related equipment in high humidity, high temperature areas is not a problem, we are investigating the possibility of improving maintenance procedures to ensure protection against moisture intrusion.

IE Information Notice 84-68: Research has shown that we do not use solenoid valves with a similar design to those identified.

IE Information Notice 84-78: The concerns of underrated terminal blocks in Limitorque operators are similiar to those raised in Information Notice 83-72. We have determined this is not a problem at FSV.

#### Summary and Certifications

Our environmental qualification program was established to ensure safe shutdown following postulated Design Basis Events.

This program has taken into consideration and applied, as applicable, areas of concern addressed in 10CFR50.49. Among these are: pressure, relative humidity, chemical spray, radiation, submergence and aging. Although PSC has not filed any specific exemption requests, PSC's program and positions have been set forth to the NRC on several occasions, both in correspondence and in meetings in an attempt to reach a mutual understanding between PSC and NRC on our environmental program.

PSC utilized several methods to ensure that all new equipment installed is properly qualified as required by our EQ program.

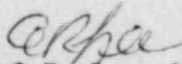
The primary means of core cooling at Fort St. Vrain is forced circulation cooling. Both redundant loops are fully qualified in accordance with our EQ program.

All of our equipment which PSC has determined is required to be qualified has been qualified by our EQ program.

All of the specific action items identified in Generic Letter 84-24 have been addressed.

Based on our positions stated herein, we feel that we are in full compliance with 10CFR50.49 as it applies to the FSV HITGR.

Very truly yours,



O.R. Lee, Vice President  
Electric Production

ORL:pa  
Attachment



## ATTACHMENT A

SUMMARY OF FORCED CIRCULATION COOLING REDUNDANCIES

Number of Cooling Loops	2	
Number of Cooling Sections per Loop	2 (EES* & Reheater)	
<u>Sources of Water to EES*</u>	<u>Equipment</u>	<u>Location</u>
1. Normal Feedwater	(3 FW Pumps)**	TB2
2. Feedwater via Emergency Feedwater Line	(3 FW Pumps)**	TB2
3. Condensate via Emergency Condensate Line	(4 Condensate Pumps)	TB2
4. Firewater via Emergency Feedwater Line	(2 Fire Pumps)***	OPL
5. Firewater via Emergency Condensate Line	(2 Fire Pumps)***	OPL
<u>Sources of Water to Reheater</u>	<u>Equipment</u>	<u>Location</u>
1. Condensate via Emergency Condensate Line	(4 Condensate Pumps)	TB2
2. Firewater via Emergency Condensate Line	(2 Fire Pumps)***	OPL
Number of Circulators Per Loop	2	
<u>Sources of Motive Power to Circulators</u>	<u>Equipment</u>	<u>Location</u>
1. Cold Reheat Steam	main turbine steam	TB2
2. Auxiliary Boiler Steam	(2 Auxiliary Boilers)	TB2
3. Feedwater via Emergency Feedwater Line	(3 FW Pumps)**	TB2
4. Condensate via Emergency Condensate Line	(4 Condensate Pumps)	TB2

- |   |                   |     |
|---|-------------------|-----|
| 5. Firewater via Emergency<br>Feedwater Line  | (2 Fire Pumps)*** | OPL |
| 6. Firewater via Emergency<br>Condensate Line | (2 Fire Pumps)*** | OPL |

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\*Economizer-Evaporator-Superheater

\*\*2 Steam Driven, 1 Electric Motor-Driven

\*\*\*1 Diesel Engine Driven, 1 Electric Motor-Driven

OPL = Outside of Plant

TB2 = Turbine Building HELB Environment

RX2 = Reactor Building HELB Environment

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter

Public Service Company of Colorado  
Fort St. Vrain Unit No. 1

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) Docket No. 50-267  
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AFFIDAVIT

O. R. Lee, being duly sworn, hereby deposes and says that he is Vice President of Public Service Company of Colorado; that he has read the letter regarding Certification of Compliance to 10CFR50.49 (Generic Letter 84-24) and knows the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

*O. R. Lee*  
O. R. Lee  
Vice President

STATE OF Colorado )  
COUNTY OF Denver )

Subscribed and sworn to before me, a Notary Public on this 25<sup>th</sup>  
day of March, 1985.

*Ina Roblanc*  
Notary Public  
4026 E. 113<sup>rd</sup> Place  
Shawton, CO 80233

My commission expires August 19, 1987.