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U. S. Nuclear Regulatory Commission
Washington, DC 20555

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
LICENSEE EVENT REPORT (LER 2000-011-00)
DIESEL GENERATOR FUEL OIL STORAGE

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Attached is Licensee Event Report (LER) No. 2000-011-00, for the Virgil C. Summer Nuclear Station (VCSNS). The report describes conditions that resulted in VCSNS being outside of design basis. Initial notification was not required as the plant is in a refueling outage.

Should you have any questions, please call Mr. Mel Browne at (803) 345-4141.

Very truly yours,

Stephen A. Byrne

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NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

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TITLE

Diesel Generator Fuel Oil Storage

EVENT DATE			LER NUMBER			REPORT DATE			OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
10	19	2000	2000	– 011	– 00	11	18	00	FACILITY NAME	DOCKET NUMBER

OPERATING MODE	6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL	0		20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC FORM 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
M. N. Browne Manager, Nuclear Licensing & Operating Experience	(803) 345-4141

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
A	DG			Y					

SUPPLEMENTAL REPORT EXPECTED				EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On 10/19/00 plant engineering personnel determined that design calculations for the Emergency Diesel Generator (EDG) Fuel Oil Storage requirements do not consider the "optional" loads that would be loaded per the plant Emergency Operating Procedures (EOPs) following a loss of coolant accident (LOCA) coincident with a loss of offsite power (i.e., starting of instrument air compressors, etc.). This impacts fuel storage calculations. This event would place the plant outside of its design basis.

VC Summer Station is committed to compliance with Regulatory Guide (RG) 1.137, Revision 1, 10/79 which includes calculating the minimum required volume of EDG fuel oil in accordance with ANSI N195-1976 using the time dependent load method. Original design calculations performed to determine the minimum required volume of EDG fuel oil made non-conservative assumptions that under-stated the optional loads placed on the EDGs. Technical Specification (TS) 3.8.1 is based on these calculations, and requires that the EDG Fuel Oil Systems contain a minimum volume of 47,100 gallons of fuel oil which includes a 10 per cent (%) margin in Modes 1 through 4 and 33,200 gallons in Modes 5 and 6. The TS specified minimum volume for the EDG day tank is 300 gallons in Modes 1 through 6.

Calculations have been performed which identify and evaluate the optional loads that may be placed on the EDGs. The minimum fuel oil volume including a 10% margin that is needed to support operation in Modes 1 through 4 is 50,680 gallons. For Modes 5 and 6, the minimum fuel oil volume to support operation for seven days plus at least 10% is 42,500 gallons. The revised minimum required contained volume for the day tank is 360 gallons in Modes 1 through 6.

There were no adverse consequences resulting from this discrepancy. Additional fuel oil is available locally within 24 hours of determining needs and the system design allows for fuel oil transfer from the redundant EDG fuel oil storage tank via a normally closed cross-tie line between the tanks

Engineering has initiated appropriate TS and FSAR revisions based on the revised calculations.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

PLANT IDENTIFICATION

Westinghouse - Pressurized Water Reactor

EQUIPMENT IDENTIFICATION

Diesel Generator Fuel Oil System

EIIS Code DE

IDENTIFICATION OF EVENT

On 10/19/00 , with the plant shut down in mode 6, engineering personnel determined that design calculations for the Emergency Diesel Generator (EDG) Fuel Oil Storage requirements do not consider the "optional" loads that would be loaded per the plant Emergency Operating Procedures (EOPs) following a loss of coolant accident (LOCA) coincident with a loss of offsite power (i.e., starting of instrument air compressors, etc.). This impacts fuel storage calculations. This event would place the plant in a condition outside its design basis. This condition is reportable under 10CFR50.73(a)(2)(ii)(B).

Technical Specification (TS) Limiting Condition for Operation (LCO) 3.8.1.1 requires that the EDG Fuel Oil Systems contain a minimum volume of 47,100 gallons of fuel (which includes a 10 per cent (%) margin) in Modes 1 through 4 and 33,200 gallons in Modes 5 and 6. The EDG day tank required minimum is 300 gallons in Modes 1 through 6. Revised calculations have been performed to correctly identify and evaluate the optional loads that may be placed on the diesel generators. These calculations show that the minimum fuel oil volume to support operation in Modes 1 through 4 for seven days plus at least a 2% margin is 48,500 gallons, which is above the current LCO requirement, and below the 52, 000 gallon nominal storage capacity of the Diesel Fuel Oil Storage Tanks. The minimum fuel oil volume including a 10% margin that is needed to support operation in Modes 1 through 4 is 50,680 gallons which is less than the nominal capacity of the Diesel Fuel Oil Storage Tanks. The minimum fuel oil volume to support operation for seven days plus at least 10% in Modes 5 and 6 is calculated to be 42,500 gallons. The revised minimum required contained volume for the day tank is 360 gallons in Modes 1 through 6.

EVENT DATE

October 19, 2000

REPORT DATE

November 18, 2000

The event is documented in the VCSNS Corrective Action Program under Condition Evaluation Report CER 00-1493, CER 00-1507, and CER 00-1712.

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CONDITIONS PRIOR TO EVENT

Mode 6 – Refueling (0% - RCS Depressurized)

DESCRIPTION OF EVENT

VCSNS engineering personnel determined that design calculations for the Emergency Diesel Generator (EDG) Fuel Oil Storage requirements do not consider the "optional" loads that would be loaded per the plant Emergency Operating Procedures (EOPs) following a loss of coolant accident (LOCA) coincident with a loss of offsite power (i.e., starting of instrument air compressors, etc.). The DG Fuel Oil Storage tanks are sized in accordance with RG-1.137, "FUEL OIL SYSTEMS FOR STANDBY DIESEL GENERATORS", (Revision 1; 10/79), position C.1.c. VCSNS complies with Regulatory Position C.1.c by calculating the fuel oil storage capacity requirements in accordance with the ANSI N195-1976 time dependent load method. ANSI N195-1976 states that, "If the design includes provision for an operator to supply power to equipment other than the minimum required for the plant condition, such additional load(s) shall be included in the calculation of required fuel storage capacity".

Design calculations DC08360-011, "EDG Load Profile " and DC06630-001, "EDG Fuel Oil Consumption" do not consider some of the "optional" loads as defined in DC08360-006, "DIESEL GENERATOR 1A & 1B LOAD STUDY". The main optional loads that are excluded are the IA Compressor (XAC-3A), Supplemental Air Compressor (XAC-12). Current EOPs direct that these loads be started; therefore, they should be included in the fuel oil consumption calculations per ANSI N195-1976. Also, calculation DC08360-011 assumes that RB Spray pumps are secured at 2 hours after the event and that the CC pump is placed in slow speed at 24 hours after the event. There are no provisions that require the RB Spray pumps be secured exactly at after 2 hours, and it is unclear if instructions exist for placing the CC pump in slow speed at 24 hours. All of these assumptions have a direct impact on calculating the 7day amount of required fuel oil. The 47,100 gallons required by TS 3/4.8.1 may be insufficient to ensure the 7day supply (+10%) is maintained. Condition Evaluation Report (CER) 00-1493 was initiated to evaluate this concern.

On 10/20/00, While revising the EDG Fuel Oil Consumption Calculation, engineering personnel discovered that the TS 3/4.8.1.2 Mode 5 and 6 fuel requirement of 33,200 gallons was not adequate to ensure the required fuel is available for these modes. The revised calculation indicates that 42,500 gallons is required to be maintained in each tank during Modes 5 and 6 to ensure a seven day supply and at least a 10% margin. Each Diesel Fuel Oil Storage Tank is capable of containing the new amount with ample margin. CER 00-1507 was initiated to address this concern.

On 11/08/00, as part of the continuing review, engineering personnel determined that the day tank minimum of 300 gallons in Modes 1 through 6 was not adequate. The revised calculation indicates that a minimum contained volume of 360 gallons is required in Modes 1 through 6. CER 00-1712 was initiated to address this concern.

CAUSE OF EVENT

The cause of this event is considered to be due to personnel error during original plant design and EOP development. When the fuel oil storage calculations were previously performed, the "optional" loads that would be loaded per the plant EOPs following a LOCA coincident with a loss of offsite power were not considered. Through this oversight, the design basis calculations for fuel oil storage capacities were incorrect and the FSAR and TS did not reflect the appropriate design minimum volumes.

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ANALYSIS OF EVENT

Design calculations DC08360-006, revision 8 (Diesel Generator 1A and 1B Load Study), DC08360-011, revision 1(EDG Load Profile), DC06630-001, revision 3 (EDG Fuel Oil Consumption) and DC06630-003, revision 4(DG Fuel Oil Consumption) were performed to determine the required storage capacity of the Diesel Generator Fuel Oil Storage Tanks (XTK0053A, B). It was intended that these calculations were developed in accordance with the above guidance. The conclusion of these calculations was that 47,100 gallons of fuel oil was sufficient to meet the requirements of ANSI N195-1976. Accordingly, Technical Specification Limiting Condition for Operation 3.8.1.1.b.2 was written requiring that each Diesel Generator Fuel Oil Storage System contain a minimum volume of 47,100 gallons of fuel oil during Modes 1 through 4. The Diesel Generator Fuel Oil Storage Tanks (XTK0053A, B) are nominal 52,000 gallon tanks. The EDG day tank minimum established for TS was 300 gallons.

CER 0-C-00-1493 documents that design calculations DC08360-011 (revision 1), DC06630-001 (revision 3) and DC06630-003 (revision 4) were performed with some non-conservative assumptions that under stated the required minimum Diesel Generator Loading during the postulated seven-day Loss of Off-Site Power scenario. Specific examples include that fact that the EOPs direct the plant operators to load certain optional loads (such as the instrument air compressors) onto the Diesel Generators, but these loads are not accounted for in the fuel oil consumption calculations. These calculations also assumed operator actions to remove certain loads from the Diesel Generators at specific times, without any specific operator guidance to perform these actions. Specifically it was assumed that the RB Spray Pumps would be secured two hours into the event, and that CCW Pump would be placed into slow speed 24 hours into the event.

Design calculation DC06630-001 (revision 5) has been performed to supercede DC08360-011 and DC06630-003 and to define and evaluate the correct load profiles. The results of this calculation show that the minimum volume of Diesel Generator Fuel Oil required in Modes 1 through 4 to ensure that a seven day supply plus at least 2% margin is 48,500 gallons, or 50,680 gallons including the 10% margin required by ANSI N195-1976. The minimum required capacity of 48,500 gallons is above the 47,100 gallons required by Technical Specification LCO 3.8.1.1, but is within the capacity of the Diesel Generator Fuel Oil Storage Tanks. The 50,680 gallon capacity which includes the required 10% margin is below the nominal 52,000 gallon storage capacity of the storage tanks. The tanks are filled to a maximum level of 51,000 gallons to ensure that they will not overflow (precaution II.3 of System Operating Procedure SOP-307 "Diesel Generator Fuel Oil System") which leaves a narrow tank operating range of 2500 gallons. This tank operating range will provide an additional operating margin of up to 5.2% of tank capacity.

Revised calculations have been performed to correctly identify and evaluate the optional loads that may be placed on the diesel generators. These calculations show that the correct minimum fuel oil volume to support operation for seven days plus at least 2% margin in Modes 1 through 4 is 48,500 gallons. The minimum fuel oil volume including a 10% margin that is needed to support operation in Modes 1 through 4 is 50,680 gallons. For Modes 5 and 6, the minimum is 42,500 gallons to support operation for seven days plus at least 10% margin. The revised minimum required contained volume for the day tank is 360 gallons in Modes 1 through 6.

The minimum volume of fuel oil required to be available by Technical Specification Limiting Condition for Operation 3.8.1.1 will be administratively controlled to be 48,500 gallons until a change to the Technical Specifications can be approved.

ANALYSIS OF EVENT (Cont'd)

ANSI N195-1976 "Fuel Oil Systems for Standby Diesel-Generators", section 5.2 requires that the on-site oil storage shall be sufficient to operate the minimum number of diesel-generators following the limiting design basis accident for either seven days or the time required to replenish the oil from sources outside the plant site following any limiting design-basis event, whichever is longer. Section 5.4 requires that the minimum calculated fuel oil storage capacity be increased by a margin of at least 10% when the less conservative time-dependent loading method is used.

The requirements for both the operating interval and the margin are conservative criteria for ensuring that sufficient fuel oil will be available to run the diesel generators for an extended run during a loss of-offsite power event. However, these criteria are arbitrary. Compliance with these requirements will not ensure that a sufficient volume of fuel is available to run the diesel generators to support any conceivable combination of events; nor will non-compliance with these criteria result in a definite inability to support diesel generator for the required duration of a particular loss of off-site power event.

As discussed in the above detailed description of condition, VC Summer station has sufficient fuel oil to support diesel generator operation for a period of seven days with a 5.2 percent margin on the volume of available fuel oil. Therefore, the only non-conforming issue is that of reduced margin in comparison with the requirements of ANSI N195-1976. To offset this lack of margin there are several methods for augmenting the existing fuel oil supply during a loss of off-site power event.

1. The Diesel Generator Fuel oil Storage Tanks (XTK0053A, B) are cross-connected by a non-safety pipe (currently being upgraded to Safety Class 2b), separated by Safety Related locked closed valves XVG00963A, B-DG. For single EDG operation, The running diesel can access the additional fuel oil contained in the fuel oil storage tank of the opposite train.

2. The #2 Fuel Oil Storage Tank (XTK0103) is a 500,000 gallon non-safety related storage tank located near the Diesel Generator Storage Tanks. The fuel in this tank is procured through the same process as that stored in the Diesel Generator Fuel Oil Storage Tanks. The only difference is that the Chemistry Department samples the fuel oil, and verifies critical characteristics prior to moving fuel into the DG Fuel Oil Storage Tanks. Excess fuel oil purchased for Diesel Generator use is stored in the #2 Fuel Oil Storage Tank. Occasionally, fuel oil is brought on site exclusively to fill the #2 Fuel Oil Storage Tank; the Chemistry Department does not sample this fuel. Although there is currently no permanently installed method to transfer fuel from this tank to the DG Fuel Oil Storage tanks, such contingencies have been developed and could be implemented during the first few days of loss of off-site power event if it was believed that normal fuel oil delivery would not be possible. Prior to transferring fuel oil from the #2 Fuel Oil Storage Tank to the Diesel-Diesel Generator Fuel Oil Storage Tanks, the fuel oil would have to be sampled and certified by the Chemistry Department. There has been at least one occasion in the past when the Chemistry Department has sampled the fuel oil in the #2 Fuel Oil Storage Tank, and it was found to be of certifiable quality.

3. In the event that the above two on-site fuel oil sources are unavailable, fuel oil is readily available in the area and can be delivered on short notice by truck if normal procurement processes are available. In the event of extraordinary circumstances that could preclude normal delivery of fuel oil, emergency fuel oil deliveries could be arranged through South Carolina Emergency Preparedness Division - Adjutant General's Office.

CORRECTIVE ACTIONS

VCSNS Design Engineering has revised the design basis calculations for diesel fuel oil storage.

The FSAR and plant Technical Specifications will be reviewed and revised, as necessary, to reflect the proper minimum storage capacities of the fuel oil storage tanks and the EDG day tanks.

VCSNS Technical Support Center Guidelines will be reviewed and revised, as necessary, to address the "optional" loads identified as needed during a LOCA followed by a loss of offsite power.

The NNS cross-tie line will be upgraded to Safety Class 2b per Engineering Change Request 50335 to increase the assurance that this line will be available if this contingency ever needs to be utilized.

System Operating Procedure (SOP-307) will be revised to include instructions for cross-connecting the EDG fuel oil storage tanks and for re-filling the EDG fuel oil storage tanks from the #2 Fuel Oil Storage Tank. This ensures that approved instructions are in place if these contingencies ever need to be utilized.

These actions are projected to be completed prior to Mode 4 entry as the current refueling is being completed (RF-12). This is expected to be early January, 2001.

PRIOR OCCURRENCES

None - within the previous three years