UNITIED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D. C. 20555

October 31, 1980

IE Circular No. 80-23 : POTENTIAL DEFECTS IN BELOIT POWER SYSTEMS EMERGENCY GENERATORS

BACKGROUND

This circular addresses a potential deficiency involving the field leads of generators manufactured by Beloit Power Systems. It is known that the subject generators have been coupled with Fairbanks Morse diesel engines for use in nuclear power facilities; however, it is not known whether they have been coupled with other diesel engines for such use. Accordingly, the intent of this circular is to notify all nuclear power facilities of the potential defect and to assure that appropriate remedial actions are taken, if needed.

The Nuclear Regulatory Commission was first informed of the potential defect by a phone call from Mr. R. H. Beadle of the Fairbanks Morse Engine Division of Colt Industries to Mr. D. W. Hayes of Region III on September 19, 1980. On September 20, 1980, a conference call was held between the NRC Duty Officer, personnel from Prairie Island Nuclear Power Station, Mr. Beadle of Fairbanks Morse and Mr. C. Evenson of Beloit Power Systems, the principal spokesman. The purpose of this call was to describe an inspection method which Prairie Island personnel could use to examine the field lead assemblies of their generators for the potential defect. (We have since been informed by the Resident Inspector that the field lead assemblies of the Prairie Island generators did not have the suspected defects.)

In order to disseminate this information on a timely basis, the NRC Duty Officer at Bethesda called those operating facilities which he knew were using the suspect generators on September 20 and 21, 1980. The information conveyed included a description of the potential defect and a description of the aforementioned inspection method. The operating facilities called were:

FACILITY	NO. OF UNITS
Calvert Cliffs 1 and 2	3
Crystal River 3	2
Hatch 1 and 2	5
Duane Arnold	2
North Anna 1 and 2	4
Millstone 1 and 2	3
Robinson 2	2
Prairie Island	2
Vermont Yankee	2
Peach Bottom 2 and 3	4
Arkansas Nuclear One, Unit 2	2

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These phone calls were subsequently followed up with a Part 21 Report dated September 22, 1980 from Mr. J. M. Moriarty, Manager, Utility Sales, Fairbanks Morse Engine Division. Information conveyed in the Part 21 Report included the following excerpts:

> "A Beloit Power Systems generator in commercial service at Sitka, Alaska lost its field because a lead between the collector rings and the field coils shorted to the rotor and burned in two pieces at the point of the short. Subsequent examination of another generator of identical design at the same installation showed frayed insulation at a clamp (same location as the burn through) which secures the lead to the rotor. This unit was operating satisfactorily but if the insulation damage were to progress the possibility of grounding the lead to the rotor exists."
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> "To determine if the problem might exist at other locations our chief electrical engineer was sent to Provo, Utah which has four generators of identical design. He has reported by phone that two of the four at Provo have frayed insulation at the clamp but that there was no indication of loss of field."
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> "Concurrent with our inspection at Provo, Beloit Power Systems was asked to evaluate the cause of frayed insulation and also if any other generators might have the same problem. Their verbal report to us is that the cause of fraying is poor workmanship in installation of the clamps and that there are other generators of identical design in this area. Specifically the eight generators shipped to Limerick (Philadelphia Electric) are of the identical design in the area where poor workmanship is known to have caused a problem."
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> "Our plan is to inspect the Limerick generators and repair any poor workmanship which may be found. Beloit Power Systems also reports verbally that the design in this area for 5 and 6 frame alternators has been similar for a number of years and it is therefore possible that the problem may extend to operating units."

RECOMMENDED ACTIONS FOR HOLDERS OF CONSTRUCTION PERMITS OR OPERATING LICENSES:

1. Determine whether or not your facility uses emergency generators manufactured by Beloit Power Systems, having frame sizes 5 or 6, as part of the onsite emergency power system; if not, you need not pursue this matter further.

2. If your facility uses generators manufactured by Beloit Power Systems you should inspect the connections between the collector rings and the field coils in the field lead assemblies of the generators for frayed insulation at the clamps and make needed repairs per the enclosed instruction sheet, "Inspection Procedures for Generator Field Leads". The inspections should be completed as soon as practical and conducted within the constraints of the Technical Specifications.

3. If the inspection reveals the need for repair or dressing of the leads, said repair should be initiated at operating facilities as soon as practicable after the need has been determined but no later than ten (10) days thereafter, provided the unit is capable of performing its function

without the repair. Otherwise, the repair should be initiated immediately after the need has been identified. Needed repair work should be coordinated with Beloit Power Systems as stated in the inspection procedure.

4. If the inspection reveals the need for repair or dressing of leads at facilities holding Construction Permits, said repair should be initiated at the licensee's earliest convenience and coordinated with Beloit Power Systems.

Enclosure:
"Inspection Procedure for
Generator Field Leads"

LOUIS ALLIS
Litton Bolen Power Systems

ENGINEERING INSTRUCTION
ALTERNATORS · CONTROLS · ROTARY COMPRESSORS

SHEET	1 OF 1
REV. NO.	
FILE NUMBER	BPSEI-390
DATE	9/24/80
PREPARED BY	R.L.BUILER
APPROVED BY	[signature]

REFERENCE NUMBER: GENERAL - NUCLEAR STANDBY GENERATORS

SUBJECT: INSPECTION PROCEDURE FOR GENERATOR FIELD LEADS

I. SCOPE

This instruction includes the procedure for the inspection of generator field leads to determine if the possible field problem reported by Colt Industries exists and addressed in NRC Register #7782.

A. Inspection

1. Remove the screen from the generator bearing arm (this is the screen located directly above the generator bearing).

2. Visually locate the rotor field leads at the collector ring assembly.

3. Rotate the generator, by barring the engine over by hand, until the rotor leads are on top or at the 12 o'clock position on the shaft.

4. Starting at the collector ring assembly visually inspect the rotor leads up to the rotor poles. (It may be necessary to use a flashlight and mirror). Areas of concern are the insulation around the rotor leads at the clamping device and the inner pole connections behind the cooling fan. Inspect the insulation around the clamping device for any signs of fraying (becoming ragged or worn along the edges). It will not be necessary to remove the clamps to determine this. Also inspect the inner pole connections behind the fan for signs of insulation deterioration as the result of contact.

5. Megger the main rotor windings to ground through the collector ring assembly. It will be necessary to raise the brushes to accomplish this. The actual winding insulation resistance is to be obtained by applying direct potential to the entire windings for one minute. In addition, record the ambient temperature.

6. Should a condition be found, as outlined in No. 4 above, it will be necessary to remove the clamping device and inspect further.

7. Provide complete inspection report. After which, BPS will advise best repair procedure if necessary.

REVIEWED AND APPROVED: [signature] 9-25-80
Q.A. MANAGER DATE

Rev No	Serial No.	Date	Loc	Was	Chkd By	Rev No	Serial No	Date	Loc	Was	Chkd By
1	-	9/25/80	-	Chgd. Sect. 4 & 5	[initials]						

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RECENTLY ISSUED
IE CIRCULARS

Circular No.	Subject	Date of Issue	Issued to
80-23	Potential Defects in Beloit Beloit Power Systems Emergency Generators	10/31/80	All holders of a power reactor OL or CP
80-22	Confirmation of employee qualifications	10/2/80	All holders of a power reactor OL or CP, architect-engineering companies and nuclear steam system suppliers
80-21	Regulation of refueling crews	9/10/80	All holders of a power reactor OL or CP
80-20	Changes in Safe-Slab Tank Dimensions	8/21/80	All Part 50 and Part 70 fuel facility licensees
80-19	Noncompliance with license requirements for medical licensees	8/26/80	All medical licensees
80-18	10 CFR 50.59 safety evaluations for changes to radioactive waste treatment systems	8/22/80	All power reactor facilities with an OL or CP
80-17	Fuel pin damage due to water jet from baffle plate corner	7/23/80	All holders of PWR OLs and PWR CPs
80-16	Operational deficiencies In Rosemount Model 510DU Trip Units And Model 1152 Pressure Transmitters	6/27/80	All power reactor facilities with an OL or a CP
80-15	Loss of Reactor Coolant Pump Cooling and Natural Circulation Cooldown	6/20/80	All power reactor facilities with an OL or CP
80-14	Radioactive Contamination of Plant Demineralized Water System and Resultant Internal Contamination of Personnel	6/24/80	All holders of power and research reactor licenses (operating and construction permits), and fuel cycle licensees
80-13	Grid Strap Damage in Westinghouse Fuel Assemblies	5/18/80	All holders of reactor OLs and CPs
80-12	Valve-Shaft-To-Actuator Key May Fall Out of Place When Mounted Below Horizontal Axis	5/14/80	All holders of reactor OLs and CPs