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Docket No. 50-461

10CFR50.73

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station - Unit 1
Licensee Event Report No. 96-004-00

Dear Sir:

Enclosed is Licensee Event Report No. 96-004-00: Inadequate Job Preparation for a Preventive Maintenance Task on a Switchyard Breaker Causes Main Steam Line Isolation Valve Closure and Reactor Scram. This report is being submitted in accordance with the requirements of 10CFR50.73.

Sincerely yours,

Wilfred Connell
Vice President

MRS/csm

Enclosure

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety
INPO Records Center

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)
Inadequate Job Preparation for a Preventive Maintenance Task on a Switchyard Breaker Causes Main Steam Line Isolation Valve Closure and Reactor Scram

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									None	05000
04	09	96	96	004	00	05	08	96	FACILITY NAME: None	DOCKET NUMBER: 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)		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)	X	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 (12)

NAME	TELEPHONE NUMBER (Include Area Code)
R. B. Bedford, Operations Task Coordinator	(217) 935-8881, Extension 3650

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	BB	IL	S135	N						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	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) (16)

On April 9, 1996, utility electrical maintenance personnel, with the support of a representative of the equipment vendor, were performing a preventive maintenance task on gas circuit breaker GCB 4522 in the Clinton Power Station (CPS) switchyard. The plant was operating at about 100 percent reactor power when the reserve auxiliary transformer (RAT) lost power due to the work being performed in the switchyard. The loss of power to the RAT caused a momentary loss of power to the turbine building main steam tunnel high temperature instruments. This caused the main steam line isolation valves to close which resulted in an automatic reactor scram. The cause of this event was attributed to inadequate job preparation brought on by a false sense of security on the part of the individuals involved with preventive maintenance task PEMSYM004. Plant procedures will be revised to more clearly define when a system impact matrix and work plan is required. Also, a briefing of applicable personnel will be conducted to reinforce what situations require a system impact matrix.

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DESCRIPTION OF EVENT

On April 9, 1996, the plant was in Mode 1 operating at about 100 percent reactor [RCT] power. Utility electrical maintenance personnel, with the support of a representative of the equipment vendor, were performing preventive maintenance task PEMSYM004 on switchyard gas circuit breaker (GCB) [52] 4522. The equipment vendor was contracted to support this work since this was the first time this preventive maintenance task was performed on GCB 4522.

GCB 4522 is in one of the two electrical supply paths that connect the plant's north bus to the south bus. The north bus supplies power to the reserve auxiliary transformer (RAT) [XRFM]. The RAT is the normal offsite power supply to the plant's safety-related power buses [BU]. The RAT also provides offsite power to the balance of plant electrical buses when the unit is not on-line. A one line diagram of the CPS switchyard [FK] is provided as Figure 1 of this report.

The purpose of preventive maintenance task PEMSYM004 is to perform an expanded visual check of GCB 4522. The job steps in the preventive maintenance task did not provide detailed instructions on what work was to be performed as part of the expanded visual inspection, only that the expanded visual inspection should be as directed by the vendor. The maintenance requires that the breaker have the insulating gas pressure removed and the hydraulic oil, which moves the breaker poles, drained from the system. In order to perform the required maintenance, the breaker was electrically isolated by opening the disconnect switches on either side of the breaker. Opening these disconnect switches isolated one of the two normal feeds to the plant's north bus which feeds the RAT. It was necessary to leave control power to the breaker energized in order to perform the preventive maintenance task on the breaker. The isolation of the breaker was performed using a switching order issued by the Illinois Power (IP) load dispatcher. The switching order was executed by a plant operator to isolate the breaker from the rest of the switchyard. Once the switching order was executed a "clearance" was issued by the IP load dispatcher to electrical maintenance personnel to allow them to perform the preventive maintenance task.

At about 1331 hours, utility electrical maintenance personnel moved the "C" phase pole of GCB 4522 so that the breaker contacts could be visually inspected. The protective relaying for GCB 4522 is designed so that if there is low insulating gas pressure or low hydraulic pressure in GCB 4522 and all three poles in the breaker are not in the same position (pole disagreement), a protective relaying scheme is actuated. When the "C" phase pole was closed, the conditions necessary to actuate the protective relaying scheme were met since the insulating gas, and hydraulic pressure were removed earlier from GCB 4522 and all three poles were not in the same position (pole disagreement). The protective relaying scheme for GCB 4522 sent a signal for GCB's 4502, 4518, and a breaker at the Rising substation, which is outside the CPS switchyard, to trip. The tripping of GCB 4502, in conjunction with GCB 4522 being out of service, caused the RAT to lose power. The electrical maintenance personnel in the switchyard heard GCB 4502 trip. They left the "C" phase pole closed and went to the relay house to help determine what caused GCB 4502 to trip. They did not believe at that time that the work that they were performing on GCB 4522 could have caused breaker 4502 to trip and interrupt power to the RAT. The loss of power to the RAT

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caused the power supply for the safety-related buses in the plant to switch over to be supplied by the Emergency Reserve Auxiliary Transformer (ERAT) [XRFM] instead of the RAT. The ERAT does not provide offsite power to the balance of plant electrical buses. There was a momentary loss of power (about 2.5 seconds) on the station's safety-related buses 1A1 and 1B1 during the transfer of power from the RAT to the ERAT. This time delay is part of the plant design and the loss of power caused the turbine building main steam line high temperature instruments to lose power and send a failure signal to the nuclear steam protection system (NSPS) [JE] logic. This caused an automatic isolation signal to Group 1 containment isolation valves [ISV] which closed the main steam isolation valves (MSIV). Closure of the MSIV's caused an automatic reactor scram.

The loss of power to the RAT caused all systems that are not supplied by the plant's safety-related power supplies to lose power. Systems that did not have power supplied to them included: normal service water [KG], component cooling water [CC], circulating water [KE], drywell cooling [VB], instrument air [LD] and service air [LF].

The reactor scram caused the reactor water level to decrease to below the low reactor water level (level 3), initiating close signals to containment isolation valves [ISV] in Group 2 (residual heat removal (RHR) system [BO] to upper containment pools), Group 3 (RHR shutdown cooling) and Group 20 (miscellaneous valves). Safety/relief valves [RV] 1B21-F051C and 1B21-F051D automatically opened to control reactor pressure. Operators continued to operate these and other safety/relief valves throughout the event in order to maintain reactor pressure. This was necessary because the reactor was isolated from the condenser [COND] therefore, it was not available as a heat sink for decay heat from the reactor.

Immediately after the reactor scram the reactor operator (RO), a licensed operator, observed that some of the control rods did not indicate that they were fully inserted. The RO then initiated a manual scram. After the manual scram some control rods still did not indicate that they were fully inserted. The RO then initiated Alternate Rod Insertion. Subsequently, the display went blank because the circuit breaker that supplies the core map display tripped. The severe transients on the normal power supplies to the rod control and information system core display map caused the anomalous indications that were seen in the first few seconds of the event. The exact cause of these indications could not be determined. The cause of the circuit breaker trip was determined to be an overcurrent condition caused by the decay of voltage to the core map display. It was later determined that all control rods did go fully into the core at the time of the scram as required by design.

At 1332 hours reactor water level increased to the high reactor water level (Level 8), initiating a trip of the main turbine [TRB]. GCB's 4506 and 4510 opened which isolated the generator [GEN] from the electrical grid.

At about 1335 hours all control rods were verified to be fully inserted into the core.

At 1337 hours operators manually started the reactor core isolation cooling system (RCIC) [BN].

At 1343 hours operators shut down RCIC. RCIC was started and stopped throughout the event in order to maintain reactor water level between level 3 and level 8.

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1350 hours operators attempted to close GCB 4502 in order to restore the RAT. The attempt was unsuccessful.

At 1358 hours operators tried to start the Division 1 H_2O_2 system [IK], but the air compressor [CMP] failed to start. The reason the compressor failed to start was that a bad lamp socket had caused a fuse to blow. The bad lamp socket was replaced prior to restart. At 1400 hours the Division 2 H_2O_2 system was started. Also, operators started the combustible gas control system [BB] mixing compressors [CMP] to control drywell pressure which was increasing due to the loss of drywell cooling [VB] caused by the loss of its' electrical supply source.

At 1413 operators secured both combustible gas control mixing compressors because drywell pressure had been adequately reduced.

At 1416 hours operators noted that the position indication for valves [20] 1SX014A and 1SX014B were indicating an intermediate position. Valves 1SX014A and 1SX014B are the valves that isolate safety-related service water system [BI] from the non-safety related system. The valves were locally verified by operators as being closed. The valves properly indicated closed when the non-safety related service water system was restored.

At 1438 hours operators attempted to close GCB 4502. The attempt was unsuccessful.

At 1453 hours GCB 4502 was successfully closed by the operators. Closing GCB 4502 restored power to the RAT. Prior to the attempts to close the breaker, electrical maintenance and operations were in contact with the IP load dispatcher to try to determine why breaker 4502 tripped and could not be reset. The load dispatcher directed them to look at a number of different indications in the relay house for the cause of the breaker trip. Electrical maintenance personnel noticed that the GCB 4522 lockout relay was in the tripped condition. The load dispatcher and the system engineer then determined that the "C" pole on GCB 4522 needed to be opened to reset the lockout relay. Electrical maintenance personnel then opened the "C" phase pole which allowed the lockout relay to be reset and GCB 4502 to be closed.

At 1456 hours the plant's non-safety 6900 volt electrical buses [EA] were energized.

At 1459 hours the plant's non-safety 4160 volt electrical buses [EA] were energized.

At 1506 hours all transformers and unit substations on the 4160 volt non-safety buses were energized.

At 1539 hours a component cooling water system pump was started.

At 1542 hours a normal service water system pump was started.

At 1617 hours a service air compressor was started.

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TEXT CONTINUATION

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At 1619 hours the RCIC pump automatically swapped it's suction source from the RCIC tank to the suppression pool due to a high suppression pool level caused by the lifting of safety/relief valves. Operators tried to defeat the interlock that prevented them from returning the RCIC pump suction to the RCIC storage tank. A procedural deficiency prevented them from successfully performing this action. This caused suppression pool water instead of RCIC storage tank water, which is the preferred source, to be pumped to the reactor vessel. The shift supervisor authorized a deviation from the procedure to allow the completion of the task to transfer the RCIC pump suction source from the suppression pool to the RCIC storage tank. Condition report 1-96-04-021 was written to document and provide corrective action for this problem. At 1716 hours RCIC pump suction was successfully returned to the RCIC tank from the suppression pool.

At 1630 the plant was stable in Mode 3 (HOT SHUTDOWN) with reactor water level being maintained with RCIC between level 3 and level 8 and reactor pressure was being maintained between 600 psig and 800 psig with the use of the safety/relief valves.

During this event, a number of items not previously described did not work as anticipated, but did not contribute in any way to the significance of this event. Below is a list of those components.

The reactor recirculation system [AD] pump discharge isolation valves [V] 1B33-F067A and 1B33-F067B had indication that they were in the intermediate position when they should have been closed. Both valves later successfully cycled closed.

A relief valve on the Division 2 automatic depressurization system [RV] backup air supply header was leaking air past its' seat. This was caused by air leaking past the regulating valve [PCV] on the discharge of the air supply bottles. This regulator reseated and the leakage stopped.

The pump breaker on the "C" circulating water system pump motor did not show the expected trip indication. The control switch [HS] was replaced and now works satisfactorily.

Reactor water cleanup system [CE] valve [20] 1G33-F100 indicated that it was in an intermediate position when it was closed. The valve was cycled and proper position indication was observed.

The safety-related bus 1C1 reserve feeder breaker had both tripped and running indications. The breaker operated as expected during the event. MWR D71138 was written to repair the breaker. Troubleshooting of the breaker did not find any problems with the breaker or the indication.

No other automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. No other equipment or components were inoperable at the start of this event to the extent that their inoperable condition contributed to this event.

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CAUSE OF THE EVENT

The design of the breaker failure logic for GCB 4522, which caused the interruption of power to the RAT, is significantly different than the other GCB's in the Clinton Power Station (CPS) switchyard. One difference is that the breaker failure logic for the other GCB's in the switchyard require current to be flowing through the breaker to cause it to actuate. GCB 4522 does not require current flow through the GCB for the trip to occur when the breaker has low insulating gas pressure, or low hydraulic pressure and one of the three poles is not in the same position (pole disagreement).

At CPS, an impact matrix, which is a written description of the consequences of changing a component's configuration on other plant equipment, is not required when the equipment being worked on is within the boundary of a tagout. The individuals involved with preventive maintenance task PEMSYM004 believed that the "clearance" they were issued met the requirements of working within the boundaries of a tagout. However, because control power was still available to the protective relay scheme of breaker GCB 4522, i.e., not part of the "clearance," an impact matrix should have been prepared.

The cause of this event was attributed to inadequate job preparation brought on by a false sense of security on the part of the individuals involved with preventive maintenance task PEMSYM004. This false sense of security was based on the belief that the "clearance" would prevent them from adversely affecting the plant, previous successful completion of similar preventive maintenance tasks on other GCB's in the switchyard, and reliance on the vendor's expertise.

CORRECTIVE ACTION

After this event the breaker failure relay logic for GCB 4522 was isolated to prevent any impact from this logic on the plant during the preventive maintenance task. A system impact matrix was added to preventive maintenance task PEMSYM004 to ensure that all of the potential impacts for performing this task have been identified.

To address the elements of the cause related to the false sense of security the following actions will be taken. Appropriate work control procedures will be revised to define what "within the boundaries of a tagout" means when determining whether or not an impact matrix is required. A briefing of appropriate maintenance planners, maintenance technicians, engineers and operators will be conducted to describe when a system impact matrix is required, including a definition of what constitutes working within the boundaries of a tagout. A training lesson plan containing information specific to GCB 4522 will be developed. Also, CPS No. 1007.02, "Contractor Management," will be revised to require a work plan or detailed job instructions when tasks are performed at the direction of a vendor.

Currently, a requirement exists to perform an impact assessment when work is performed in the switchyard. Requirements to perform a written impact assessment were not followed because personnel were not aware of the requirements. Appropriate procedures will be revised to describe what elements should be included in the switchyard impact assessment, when one is necessary, and who initiates the impact assessment. Individuals involved in switchyard activities will be briefed on these requirements.

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ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73(a)(2)(iv) due to the automatic initiation of the reactor protection system [JC]. Assessment of the safety consequences and implications of this event identified that this event was not nuclear safety significant. The event was compared to the Loss of Auxiliary Power Transformer transient discussed in Chapter 15 of the Updated Safety Analysis Report (USAR) and was determined to be within the design basis of the plant.

ADDITIONAL INFORMATION

The failed lump socket was part number 4-01774A manufactured by Sentry Equipment Corporation.

Clinton Power Station has not reported previous similar events in recent history.

For further information on this event, contact R. B. Bedford, Operations Task Coordinator, (217) 935-8881, extension 3650.

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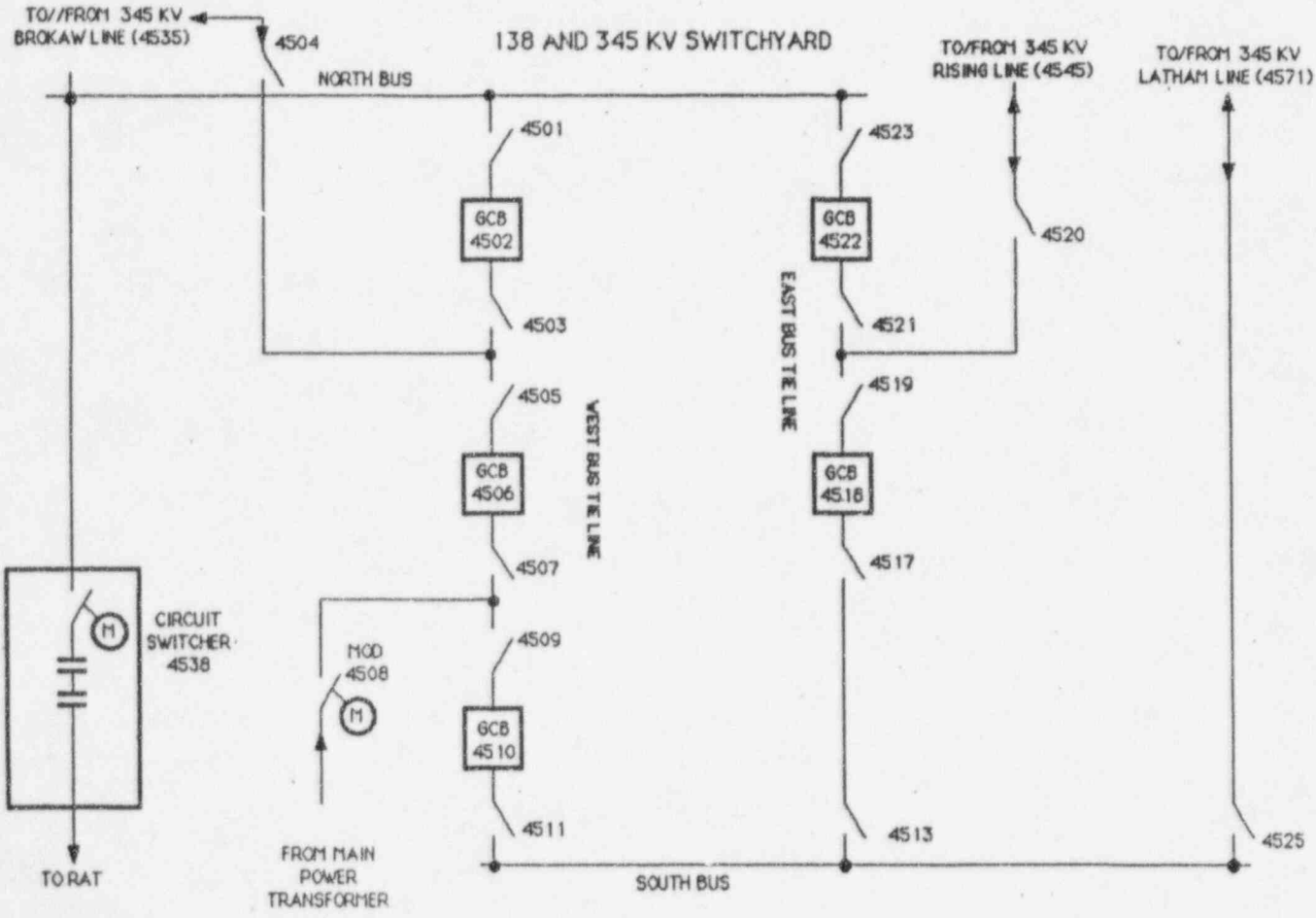

Figure 1
Clinton Power Station
Switchyard Schematic