AmerGen
An Exelon Company

Clinton Power Station
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Clinton, IL 61727

10 CFR 50.73

U-603739

July 14, 2005

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Licensee Event Report 2005-001-00

Enclosed is Licensee Event Report (LER) No. 2005-001-00: Inadequate Procurement Specification for Charcoal Results in Inoperable Control Room Ventilation Subsystem. This report is being submitted in accordance with the requirements of 10CFR50.73.

Should you have any questions concerning this report, please contact Mr. William Iliff, Regulatory Assurance Manager, at (217)-937-2800.

Respectfully,

R. S. Bement
Site Vice President
Clinton Power Station

RSF/blf

Enclosures: Licensee Event Report 2005-001-00
Summary of Commitments

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Clinton Power Station
Office of Nuclear Facility Safety – IEMA Division of Nuclear Safety

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

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4. TITLE
Inadequate Procurement Specification for Charcoal Results in Inoperable Control Room Ventilation Subsystem

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									None	05000
05	04	2005	2005	- 001 -	00	07	14	2005	None	05000

9. OPERATING MODE
1

10. POWER LEVEL
095

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- X 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
R. W. Chickering, Design Engineering	(217) 937-2818

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On 5/16/05 with the plant at power, and 12 days after charcoal adsorber samples were taken from Division 1 Control Room Ventilation (VC) subsystem recirculation bed filter for penetration testing per Technical Specification (TS) 3.7.3.3, the methyl iodide penetration level of the charcoal sample was determined to be unacceptable. As a result of the unsatisfactory test results, TS 3.7.3 was not met.

Additionally, during 5 of the 12 days, the Division 2 VC subsystem was inoperable due to a planned emergency diesel generator (EDG) maintenance outage; however, the EDG was restored to operable status prior to receipt of the charcoal sample results. Thus both subsystems were inoperable during 5 days; however, an analysis concluded that the degraded charcoal would have been capable of performing its safety function.

The cause of this event is the industry standards providing the basis for charcoal purchasing requirements were inadequate for the unique application at Clinton Power Station (CPS) and had no limit on as-manufactured moisture levels. Corrective actions for this event included replacing the charcoal in the Division 1 VC Subsystem with acceptable charcoal, evaluating other charcoal beds in the VC system as acceptable, and establishing a purchasing requirement for charcoal to limit moisture to 8 percent or less by weight.

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

PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

Unit: 1 Event Date: 5/4/2005 Event Time: 0106 Central Daylight Time

Mode: 1 (POWER OPERATION) Reactor Power: 95 percent

DESCRIPTION OF EVENT

During normal plant operation, either the Division 1 or Division 2 Subsystem of the Main Control Room Ventilation System (VC) [VI] is in operation with the bypass dampers [DMP] open such that airflow is directed around and not through the VC recirculation charcoal filters [FLT]. Each subsystem is operated in the high radiation mode with airflow through the recirculation filters during surveillance testing and to support plant maintenance.

On May 4, 2005, the plant was in Mode 1 with reactor power at about 95 percent. At about 0106 hours, charcoal adsorber [ADS] samples were taken from Division 1 VC recirculation charcoal bed filter 0VC07SA to perform charcoal penetration testing in accordance with the Ventilation Filter Testing Program as required by Control Room Ventilation System Technical Specification (TS) Surveillance Requirement 3.7.3.3. The samples were later sent to a vendor for analysis with results due within 31 days per the TS Bases.

On May 9, 2005, at about 0400 hours, a planned maintenance outage commenced for the Division 2 Emergency Diesel Generator System (EDG) [EK]. The Division 2 EDG outage continued until May 14, 2005, at about 0530 hours. The Division 2 VC Subsystem was considered inoperable during this time without its emergency diesel generator power available.

On May 16, 2005, the charcoal sample analysis results were received from the test vendor, showing the charcoal penetration value was 7.084 percent. After applying a correction factor of 1.153 in accordance with procedures, the penetration value was 8.168 percent. The administrative limit for charcoal penetration per the surveillance procedure is 4.5 percent with an operability limit of 6 percent, thus the sample results indicated unacceptable charcoal in the Division 1 VC Subsystem. Main Control Room operators were notified of the charcoal sample analysis results at about 1800 hours and they entered Action A.1 requirements of TS 3.7.3 that require restoration of the Division 1 VC Subsystem to an operable status in 7 days. At about 2115 hours operators commenced shifting VC operation from the Division 1 to the Division 2 subsystem to support replacement of the charcoal in Division 1 VC; the VC shift was completed by 2115 hours. Additional charcoal samples were taken and analyzed by an independent vendor, validating the unsatisfactory charcoal analysis results.

The degraded charcoal in the Division 1 VC Subsystem was replaced. On May 18, 2005 at about 1700 hours the replacement charcoal was verified to be acceptable in accordance with procedures, and the Division 1 VC subsystem was declared operable.

As a result of the unsatisfactory charcoal, the 7-day Required Action Completion Time to restore an inoperable VC subsystem and the Required Actions to be in Mode 3 (HOT SHUTDOWN) and

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

Mode 4 (COLD SHUTDOWN) per TS 3.7.3 were not met. Additionally, the Division 2 VC Subsystem was inoperable from May 9 to May 14 due to the Division 2 EDG maintenance outage. With both VC subsystems inoperable during the period of May 9 to May 14, the station was in TS 3.7.3 Required Action D.1, requiring entry into TS Limiting Condition for Operation (LCO) 3.0.3. Since the sample results were not known during the period of the EDG outage, Action D.1 and LCO 3.0.3 were not entered. When the sample results were known, Action D.1 and LCO 3.0.3 were no longer applicable as the Division 2 EDG and Division 2 VC subsystem were operable. An analysis of the condition having both subsystems of VC inoperable at the same time is included in the Analysis of Event section of this report. The analysis concludes that the degraded charcoal in Division 1 VC subsystem was capable of performing its safety function.

Issue report 335698 was initiated to perform a root cause evaluation of the charcoal filter bed penetration test failure after only 17 months of service and to identify corrective action.

No automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. No other inoperable equipment or components directly affected this event

CAUSE OF EVENT

The cause of this event is that charcoal purchasing requirements were inadequate for the unique application at Clinton Power Station (CPS) that involves high airflow velocity, thin charcoal beds, and no airflow heaters. The charcoal installed in the Division 1 VC filter was purchased to ANSI/ASME N509-1980, "Nuclear Power Plant Air Cleaning Units and Components," that has no limit on as-manufactured moisture levels. High moisture levels of 12 percent led to aging and minor caking resulting in reduced adsorption efficiency.

The root cause analysis identified potential failure modes and determined that no poisons or excessive moisture was introduced during storage or operation of the charcoal bed. The three other VC beds had lower moisture, passed the penetration test, and did not have any evidence of the charcoal caking as was observed in the 0VC07SA charcoal. Chemical tests performed on the degraded charcoal from the 0VC07SA bed revealed insignificant levels, 2 percent, volatiles and poisons. The charcoal installed in 0VC07SA had been stored per requirements, and tested while in storage and retested when loaded into the 0VC07SA bed in November 2003 with satisfactory results. The 0VC07SA bed had not been exposed to water, high humidity, or poisons during the seventeen months it was installed prior to the May 4, 2005 sample.

The CPS VC recirculation filters have reduced penetration test margin because they are 2-inch thick beds with high (80 feet per minute) airflow and no air intake heaters. Most VC charcoal beds in the industry operate at 40 feet per minute. High airflow rates in thin beds significantly reduce the residence time and increase the penetration levels, leading to bed performance that is more sensitive to charcoal degradation.

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

Moisture adversely impacts activated charcoal performance and causes caking. The presence of caking indicates that charcoal grain size increased during operation. Both of these mechanisms led to reduced charcoal bed efficiency.

SAFETY ANALYSIS

This event is reportable under the provisions of 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's technical specifications.

This event had no impact on radiological conditions and presented no risk to control room operators from degraded control room ventilation charcoal bed filter iodine adsorption efficiency under normal and transient conditions. Under accident conditions, the radiological consequences from this event would be negligible because the measured penetration level of 8.168 percent, although greater that the CPS operating limit of 6 percent for the penetration test, was less than the 15 percent limit that is consistent with the NRC approved safety factor in GL 99-02, Laboratory Testing of Nuclear-Grade Activated Charcoal. CPS uses the more demanding ASTM D3803-1989, Standard Test Method for Nuclear-Grade Activated Charcoal, test that is the basis for the safety factor of 2 discussed in GL 99-02. (Clinton has included the GL 99-02 provisions in a proposed change to the operating license for the CPS Ventilation Filter Testing Program.) If a design basis accident had occurred while the unsatisfactory charcoal was installed, control room operators would not have received radiation exposure greater than the analyzed level.

No safety system functional failures occurred during this event.

CORRECTIVE ACTION

New acceptable charcoal was installed in the Division 1 VC Subsystem recirculation charcoal bed filter 0VC07SA and was validated to be acceptable on May 18, 2005.

Other charcoal beds in the VC Subsystems were tested and found acceptable; however, the Division 2 recirculation and make-up charcoal filter beds were replaced.

A requirement to limit moisture to less than or equal to 8 percent by weight will be incorporated into purchasing specifications for charcoal. (IR 335698-15)

PREVIOUS OCCURRENCES
None

COMPONENT FAILURE DATA
None

SUMMARY OF COMMITMENTS

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITMENT TYPE	
	ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
A requirement to limit moisture to less than or equal to 8 percent by weight will be incorporated into purchasing specifications for charcoal. (IR 335698-15)		Yes