June 11, 2001

Mr. Ron J. DeGregorio
Vice President Oyster Creek
AmerGen Energy Company, LLC
P.O. Box 388
Forked River, New Jersey 08731

SUBJECT: OYSTER CREEK GENERATING STATION - NRC INSPECTION REPORT 05000219/2001-005

Dear Mr. DeGregorio:

On April 27, 2001, the NRC completed a team inspection at the Oyster Creek Generating Station. The enclosed report presents the results of that inspection. The preliminary results of this inspection were discussed on April 27, 2001, with Messrs. V. Aggarwal and E. Harkness and other members of your staff.

The inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The team reviewed selected procedures and records, observed activities, and interviewed personnel.

The team identified two issues that were evaluated under the risk significance determination process (SDP) and were determined to be of very low safety significance (Green). Both issues were determined to involve violations of NRC requirements. However, because of their very low safety significance, and because they were entered into your corrective action program, the NRC is treating these issues as Non-Cited Violations, consistent with Section VI.A of the NRC Enforcement Policy, issued on May 1, 2000 (65FR25368). If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region I, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001, and the NRC Resident Inspector at the Oyster Creek facility.

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Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

Docket No: 05000219
License No: DPR-16

Enclosure: NRC Inspection Report No. 05000219/2001-005

cc w/encl:
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R. Brown, Manager, Experience Assessment
J. A. Hutton, Director-Licensing
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REGION I

Docket No.	05000219
License No.	DPR-16
Report No.	05000219/2001-005
Licensee:	AmerGen Energy Company, LLC
Facility:	Oyster Creek Generating Station
Location:	Forked River, NJ 08731
Dates:	April 09-13 and April 23-27, 2001
Inspectors:	G. Morris, Reactor Inspector, Team Leader M. Modes, Senior Reactor Inspector, Assist. Team Leader (part time) A. DellaGreca, Senior Reactor Inspector P. Kaufman, Senior Reactor Inspector S. Pindale, Reactor Inspector B. Gupta, Consultant, Beckman Associates
Approved by:	L. Doerflein, Chief Systems Branch Division of Reactor Safety

SUMMARY OF FINDINGS

NRC INSPECTION REPORT 50-219/2001-05

IR 05000219/2001-005, on 04/09-04/27/2001; AmerGen Energy Company, LLC; Oyster Creek Generating Station; Safety System Design and Performance Capability.

The inspection was conducted by regional based inspectors and a contractor. The inspection identified two Green findings, both of which were non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using the Significance Determination Process (SDP) in Inspection Manual Chapter 609. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://www.nrc.gov/NRR/OVERSIGHT/index.html. Findings for which the SDP does not apply are indicated by "No Color" or the severity level of the applicable violation.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. The team's review of the adequacy of the 125 Volts dc supplied to the 4160 Volt switchgear control circuits determined that the voltage drop calculation used non-conservative battery voltage inputs. The failure to use the correct inputs was determined to be of very low safety significance (Green) by the significance determination process screening process. This conclusion was based on the fact the battery was new and had sufficient margin. (Section 1R21.2, DC Voltage Drop Calculation)

- Green. The team's review of the material condition of the emergency diesel generators (EDGs) and their supporting systems determined that the apparent corrosion the licensee had identified on a fuel oil piping support had spread to the pipe itself and resulted in a pipe leak immediately following this onsite inspection. The failure to properly identify the degraded pipe and take adequate corrective action was determined to be of very low safety significance (Green) by the significance determination process screening process. This conclusion was based on the availability of the redundant EDG and the availability of the blackout gas turbines. (Section 1R21.3, Material Condition)

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R02 Evaluations of Changes, Tests, or Experiments (IP71111.02)

a. Inspection Scope

The team reviewed selected safety evaluations (SEs) performed by AmerGen. The review was conducted to verify changes to the facility or to procedures as described in the Updated Final Safety Analysis Report (UFSAR) were evaluated and documented by the licensee in accordance with 10 CFR 50.59. The SEs were selected from changes performed during the last two years taking into consideration the safety significance of the change, risk to the structures, systems, and components affected, and impact on the three reactor safety cornerstones.

The team also reviewed a sample of changes and tests for which the licensee determined that a safety evaluation was not required. This review was performed to verify that AmerGen's threshold for performing safety evaluations was consistent with 10 CFR 50.59. Lastly, the team reviewed a sample of AmerGen's identification and resolution of problems related to SEs. The review was conducted to verify that the licensee appropriately identified modification issues and entered them in the corrective action program, and to evaluate the adequacy of the resulting corrective actions.

b. Findings

No findings of significance were identified.

1R21 Safety System Design and Performance Capability (IP71111.21)

a. Inspection Scope

Using guidance provided in inspection procedure IP 71111.21, the team selected the emergency diesel generators (EDG) and the 4160 Volt ac systems (both of which comprise the emergency power system) for review because of their significant contribution to core damage frequency as calculated in the Oyster Creek Probabilistic Risk Assessment (PRA). The team also reviewed selected supporting systems that interfaced with those subject systems.

The team reviewed selected portions of the EDG and the 4160 Volt ac design and licensing bases documents, including applicable sections of the Updated Final Safety Analysis Report (UFSAR), and the plant Technical Specifications (TS). This review was performed to determine whether the system and component functional requirements during, normal, abnormal, and accident conditions were being met. This review also verified that: (1) the system design bases were in accordance with the licensing commitments and regulatory requirements; and (2) the design documents, such as drawings and design calculations, were correct.

For the emergency diesel generator system, the team reviewed: the controls and loading (including the load sequencers, voltage and frequency recovery from dynamic loading) of the diesel generators, and voltage related calculations, system modification packages, including major and temporary modifications, engineering evaluations and instrument calibrations; the diesel generator cooling subsystems, including radiators, jacket water coolers, lube oil coolers and related testing; overall system performance, including the automatic governor and voltage regulator response; and the operator's interface with the system, including the normal and abnormal operation procedures and maintenance-related issues.

The team reviewed loads on the safety-related buses to ensure that the loads were within emergency diesel generators design and performance capabilities under various plant conditions for which EDGs were required to supply the loads. The team also reviewed various design drawings, design specifications and plant criteria documents for disconnecting (or shedding) the loads that were not supposed to be supplied by EDG to ensure that actual EDG loading conformed to calculated loads.

The 125 Volt dc power was supplied from the EDG batteries and the station batteries, and was used as power to start the EDGs and for power to the breaker controls circuits, instrumentation, DC motor operated valves (MOV) and miscellaneous loads. The team reviewed adequacy of available voltage levels to the breaker control circuits and vital instrumentation.

The team also reviewed EDG instrumentation, instrument setpoints, and protective devices to ensure their conformance with the design basis documents, plant operations, design specifications and design drawings.

For the Emergency AC Power System, the team reviewed selected documentation to confirm that: 1) the system design bases have been maintained to ensure that selected safety-related components at each interfacing voltage level receive adequate voltage; 2) the system availability, reliability, and functional capability have been maintained; and 3) the safety margins have been maintained.

In particular, the team reviewed the short circuit and voltage regulation studies; the setting of the degraded voltage relays and timers; the short circuit capability of the 4160 Volt switchgear; the adequacy of the station blackout (SBO) supply to power the required loads; the station battery supply for the 4160 Volt ac switchgear control and the 480 Volt ac supply for the battery chargers; and the operators' interface with the system, including the normal and abnormal operation procedures and maintenance-related issues, maintenance and testing, fan room heating and ventilation, and overall system performance.

The team also reviewed the Design Basis Document for the Emergency Power System (Document No. SDBD-OC-740 Rev. 0) to ensure its conformance with other design basis documents and for consistency with various design documents, design specifications and control wiring diagrams.

The team reviewed selected documentation for the EDG and 4160 Volt switchgear room ventilation (Including the "C" battery room) systems to verify that the system design

bases, the system availability, reliability and functional capability, and the safety margins have been adequately maintained.

The team reviewed the available acceptance criteria for the heating, ventilation, and air conditioning (HVAC) systems supporting the EDG building switchgear rooms and battery rooms. No HVAC calculations were available which established the maximum and minimum temperature range for the EDG room and 4160 Volt switchgear rooms.

The team reviewed the operators' interfaces with the system, including the normal, abnormal and emergency operation procedures and maintenance-related issues, maintenance and testing, and overall system performance.

The team reviewed the electrical power and instrumentation and control associated with selected support systems, including instrument set-point calculations, instrument calibrations, louver, valve and pump control logics, electrical wiring diagrams, voltage and current requirements, and the adequacy of the electrical protective devices for those components.

Plant walkdowns of the EDG and 4160 Volt ac systems were performed to verify that the physical installation of the systems and components were consistent with design document assumptions, design drawings and installation specifications. During these walkdowns, the team examined the design and condition of major components.

Finally, the team reviewed the licensee's effectiveness in identifying problems associated with the emergency diesel generators and the 4160 Volt systems. The team reviewed licensee Corrective Action Program items, Job Orders (JO), Significant Events and other such miscellaneous items to assess plant performance and licensee actions.

b. Findings

.1 Diesel Generator Fuel Oil Storage and Transfer System

The safety related 15,000 gallon EDG fuel oil storage tank provides the technical specification (TS) required fuel oil volume for the EDGs. The team identified inconsistencies concerning EDG fuel oil storage capacity and fuel oil consumption during postulated design basis conditions.

The UFSAR (Section 9.5.4) and technical specifications indicated that a volume of 14,000 gallons would be sufficient to power the standby EDGs for three days. TS 3.7.C requires a minimum volume of 14,000 gallons of diesel fuel oil in the 15,000 gallon fuel oil storage tank. However, the basis of TS 3.7.C states that there would not be three days fuel supply in the event of a loss of off-site power plus loss of coolant with both EDGs operating. The basis further stated that it was reasonable to expect that within eight hours of the initiating event, several safety loads would be curtailed, thereby ensuring that the 14,000 gallons of fuel oil would be a sufficient amount for three days.

The team found that there was no calculation to confirm the useable fuel oil volume in the safety-related storage tank. The team reviewed calculation C-1302-862-5360-002, Rev. 0, which was performed to determine the fuel oil consumption for EDG operation

for three days in the event of a loss of off-site power with a loss of coolant accident. The team determined that the calculation was inadequate because it only considered operation of one EDG. It also assumed that one core spray pump and one core spray booster pump would be removed from the single operating EDG after eight hours of fully loaded conditions. This calculation was inadequate because it did not evaluate realistic conditions (both EDGs start and load), nor did it bound the EDG fuel oil consumption based upon potential worst case conditions (both EDGs operating at full load). Prior to the inspection, the licensee had identified a question related to the bases for the EDG fuel oil inventory supporting the 14,000 gallon TS limit, and entered this concern into their corrective action program (CAP) as CAP No. O2001-0507 on March 29, 2001. The team reviewed the CAP, and identified a weakness with the operability assessment in that it did not identify and document whether analyzed conditions would result in maintaining a sufficient supply of fuel oil.

Although the UFSAR, TS Bases, and the above calculation assumed that some loads would be removed from the operating EDG that was analyzed, the team identified that there was no written guidance to implement that important assumption. Emergency operating procedures are symptom-based, and do not consider EDG fuel oil inventory conservation. The licensee entered this deficiency in their corrective action program as CAP O2001-0685.

The team determined that pending the licensee performing calculations to verify the EDG fuel oil supply would meet the design bases stated in the UFSAR and TS, with the appropriate EDG configuration and loading, this issue is unresolved. **(URI 05000219/2001-005-01)**

.2 DC Voltage Drop Calculations

The team determined that AmerGen used non-conservative battery voltage inputs to the DC voltage drop calculations.

The team reviewed the 125 Volt dc voltage drop calculation No. C-1302-735-E320-044 (OC 125V DC Voltage Drop) to verify the adequacy of available voltage to the switchgear dc coils and charging motors, control relays and other devices.

The team found that the input voltage values used in this calculation were derived from the 17R refueling outage battery service test data. These input voltage data were not conservative in that they did not envelope the battery design basis conditions of aging and minimum battery temperature. The input data also did not agree with the stated battery service test acceptance criteria. The input voltage and battery service test acceptance criteria issues were entered into the Corrective Action Program. (CAP No. O2001-0690).

This issue was considered to be more than minor because it had a credible impact on safety. Not accounting for battery degradation could result in the failure to provide sufficient voltage for safety-related components, and impact various mitigating systems. Because the battery was new with sufficient margin, and did not affect mitigating system operability, the issue was determined to be of very low risk significance (Green) and was screened out in phase 1 of the significant determination process (SDP). The failure

to verify that the battery input voltage was adequate for the design basis calculation was contrary to 10 CFR 50, Appendix B, Criterion III, Design Control, which requires measures to assure that design basis are correctly translated into specifications, drawings, procedures, and instructions. Due to the overall low risk significance, this violation of 10 CFR 50, Appendix B, Criterion III, was treated as a non-cited violation, consistent with Section VI.A of the NRC Enforcement Policy, issued May 1, 2000 (65FR25368). **(NCV 05000219/2001-005-02)**

.3 Material Condition

The team determined that AmerGen had failed to take adequate corrective action to identify and correct degraded EDG fuel oil piping.

The team observed that an EDG fuel oil supply line inside the No. 2 EDG building was severely corroded upstream of valve V-39-24. The 1" schedule 80 (A106 grade A) carbon steel pipe with a nominal wall thickness of 0.179" and a design pressure of 150 psi., had a 2" to 3" long degraded portion on the bottom of the pipe. The licensee attributed the corrosion to rain water exposure. The team was concerned of possible pipe wall thinning as a result of the corrosion. The licensee removed a u-bolt pipe support that was also corroded at the same location as the corroded piping per JO 550262. The licensee documented this degraded piping condition and operability evaluation in CAP O2001-0580, dated April 10, 2001. The licensee's operability assessment determined that the degraded portion of piping would remain operable for 12 months based on the local nature of the degradation, limited amount of corrosion and a preliminary wall thickness calculation. The licensee's inspection of the degraded piping area was based on visual inspection only, since no actual pipe wall thickness measurements were taken using Non-Destructive Examination (NDE) techniques, such as ultrasonic testing (UT) or radiography. However, after a biweekly test of the No. 2 EDG on April 30, 2001, the corroded portion of piping began to leak fuel oil and the licensee declared the No. 2 EDG inoperable and entered a 7 day Limiting Condition for Operation (LCO).

The emergency diesel generators (EDGs) are used to mitigate both internal and external plant initiating events that result in the loss of offsite power. The purpose of the EDGs is to provide a safety-related backup source of electric power for the normal non safety-related offsite power.

The team considered this issue to be more than minor since it had a credible impact on safety; the corrosion degraded the integrity of the piping. The issue affects the mitigating systems cornerstone since it affected the reliability of a train of emergency AC power. Since the other train of emergency AC power was operable and the station blackout gas turbines were operable, the issue was determined to be of very low safety significance (Green) and was screened out in phase 1 of the significant determination process.

The failure to identify and correct the degraded EDG fuel oil piping was contrary to 10 CFR 50, Appendix B, Criterion XVI, which requires that conditions adverse to quality be promptly identified and corrected. Due to the overall low risk significance, this violation of 10 CFR 50, Appendix B, Criterion XI, was treated as a non-cited violation,

consistent with Section VI.A of the NRC Enforcement Policy, issued May 1, 2000 (65FR25368). The issue associated with this violation is in the licensee's corrective action program as listed above. **NCV 05000219/2001-005-03**

4OA6 Meetings, Including Exit

.1 Management Meeting

On April 27, 2001, the team presented the preliminary inspection results to Messrs. V. Aggarwal and E. Harkness, and other members of licensee management. The licensee acknowledged the inspection findings presented.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

A. Agarwal -Electrical Design Supervisor
V. Aggarwal-Director of Engineering
M. Carlson-Cable Engineer
R. Damtuluri-Electrical Consultant Engineer, Kennett Square
M. Heck-DC System Engineer
S. Hutchins-Electrical Consultant Engineer, Kennett Square
D. Hynes-4KV System Engineer
D. Jones-Component Engineer
P. Proccacci-Electrical Design Engineer
D. Slear-Design Engineering Manager
R. Skelskey-EDG System Engineer
J. Yuen-HVAC System Engineer

LIST OF ACRONYMS USED

AC	Alternating Current
ARP	Alarm Response Procedure
CAP	Corrective Action Program
DC	Direct Current
EDG	Emergency Diesel Generator
IP	Inspection Procedure
JO	Job Order
LCO	Limiting Condition for Operation
MOV	Motor Operated Valve
NDE	Non-Destructive Examination
PI&R	Problem Identification and Resolution
PRA	Probabilistic Risk Assessment
SBO	Station Blackout
SDP	Significance Determination Process
SE	Safety Evaluation
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic Testing

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000219/2001-005-01	URI	Inconsistent Fuel Oil Storage Capacity Design Basis

Opened/Closed

05000219/2001-005-02	NCV	Inadequate DC Voltage Drop Calculation Inputs
05000219/2001-005-03	NCV	Inadequate Corrective Action for Corroded Fuel Oil Piping

LIST OF DOCUMENTS REVIEWED

Drawings

BR-2009, Turbine Building H & V Flow Diagram, Sheet 1, Rev. 42
BR 2015, Sh. 5, Flow Diagram - Main Fuel Oil Storage and Transfer, Rev. 37
BR 3000, Electrical Power System - Key one line diagram, Rev. 8
BR 3001 Sh. 1, Plant Electrical Generation - Main One Line Diagram, Rev. 7
BR 3001 Sh. 2, Emergency Power System One Line Diagram - Emerg Diesel Generators, Rev 4
BR 3001A, 4160V System One Line Diagram - 4160V Swgr Bus 1A, Rev. 9
BR 3001B, 4160V System One Line Diagram - 4160V Swgr Bus 1B & Dilution Plant, Rev. 13
BR 3001C, 4160V System One Line Diagram - 4160 V Emergency Swgr Bus 1C & 1D , Rev. 0
BR 3002 Sh. 2 & 3, 480V System One Line Diagram - 460V Unit Substations
BR 3004 Sh. 1 - 4, Reactor Building 460V MCC One Line Diagram
BR 3004 Sh. 5 & 6, Radwaste Building 460V MCC One Line Diagram
BR 3005 Sh. 1, 2 & 5, Misc. Building 460V MCC One Line Diagram
BR 3006, 4160V Switchgear Elementary Diagram Sheet No 1, Rev. 4
BR 3013 Sh. 1 & 2, AC Vital Power System One Line Diagram
BR 3028 Sh. 1, 125 DC Distr. Center A & B, MCC DC-1, Rev. 12
BR 3028 Sh. 2, 24 Station DC - Battery Chargers & MCC DC-1, Rev. 7
BR E1126, Elementary Diagram 1B2 U042C - Reactor Bldg Closed Cooling Water Pump 1-2
BR E1128, Elementary Diagram 1B3 U062A - Service Water Pump 1-2
BR E1131, Elementary Diagram 1B2 U043C - CRD Feed Pump NC08B
BR E1132, Elementary Diagram 1A2 U033C - CRD Feed Pump NC08A
EB D-3033, 125V DC Distr. Center C and MCC DC-2, Rev. 30
EM 8393039, Sh. 1, EDG # 1 Switch Developments - Electrical Elem. Wiring Diagram, Rev.5
EM 8393039, Sh. 2, EDG # 1 DG 3 Line, Voltage Regulator, Governor Control, Rev. 34
EM 8393039, Sh. 3, EDG # 1 DG DC Control Circuits, Rev. 10
EM 8393039, Sh. 4, EDG # 1 DG SWGR DC Control Circuits, Rev. 4
EM 8393039, Sh. 5, EDG # 1 DG SWGR - 3 Line Diagram, Rev. 2
EM 8393039, Sh. 6, EDG # 1 DG Annunciator Circuits, Rev. 4
EM 8393039, Sh. 7, EDG # 1 DB AC & DC Auxiliaries, Rev. 4
EM 8397907, Sh. 1, EDG # 2 Switch Developments - Electrical Elem. Wiring Diagram, Rev. 23
EM 8397907, Sh. 2, EDG # 2 DG 3 Line, Voltage Regulator, Governor Control, Rev. 28
EM 8397907, Sh. 3, EDG # 2 DG DC Control Circuits - Elementary Wiring Diagram, Rev. 10
EM 8397907, Sh. 4, EDG # 2 DG DC Control Circuits - Elementary Wiring Diagram, Rev. 5
EM 8397907, Sh. 5, EDG # 2 DG SWGR - 3 Line Diagram - Elementary Wiring Diagram, Rev. 2
EM 8397907, Sh. 6, EDG # 2 DG Annunciator Circuits - Elementary Wiring Diagram, Rev. 4
EM 8397907, Sh. 7, EDG # 2 DG AC & DC Auxiliaries - Elementary Wiring Diagram, Rev. 4
GE 116B8328, Sh. 9 & 10, 480V System Electrical Elementary Diagram
GE 116B8328, Sh. 11 & 11A, Containment Spray Sys Electrical Elementary Diagram
GE 116B8328, Sh. 13, RB Closed Clg Water Sys Electrical Elementary Diagram, Rev 18
GE 116B8328, Sh. 15, RB Ventilation Sys Electrical Elementary Diagram, Rev 19
GE 116B8328, Sh. 15A & 15D, Core Spray System Electrical Elementary Diagram
GE 116B8328, Sh. 16, 460V USS 1B2 Unit 045B RB Exh. EF-1-6,FN-28-015, Rev. 20
GE 116B8328, Sh. 17, 460V USS 1B2 Unit 041B, Main Breaker 1B2M, Rev. 13
GE 116B8328, Sh. 19, 480V System Electrical Elementary Diagram, Rev 13
GE 116B8328, Sh. 20, Service Water System Electrical Elementary Diagram, Rev 19
GE 116B8328, Sh. 24, 460V USS 1A3 Unit 052C HI Press Screen Wash Pump 1-1, P-3-005A - Elementary Wiring Diagram, Rev. 1

GE 116B8328, Sh. 25, 460V USS 1B3 Unit 062D HI Press Screen Wash Pump 1-2, P-3-005B - Elementary Wiring Diagram, Rev. 2
GE 157B6350, Sh. 51, MCC 1AB2 Unit A01 - 100A Automatic Transfer Switch, Rev. 10
GE 157B6350, Sh. 96 A, 96B & 97A, Drywell Cooling Electrical Elementary Diagram
GE 223R0173, Sh. 1, 1A & 2, 4160V System Electrical Elementary Diagram
GE 223R0173, Sh. 11 - 15, 4160V System Electrical Elementary Diagram
GE 223R0173, Sh. 16 - 16C, Emerg Svc Water Sys Electrical Elementary Diagram
GE 223R0173, Sh. 17 - 17E, 4160V System Electrical Elementary Diagram
GE 223R0173, Sh. 18 & 24 - 26, Core Spray System Electrical Elementary Diagram
GE 223R0173, Sh. 19 - 23, 4160V System Electrical Elementary Diagram
GE 237E901, Sh. 1 & 2, Containment Spray Logic Electrical Elementary Diagram
NU 5060E6003, Sh 1 - 5, Core Spray/RBCCW Drywell Isolation - Electrical Elementary Diagram
OC-ACU10, Sh. 01, Control Room HVAC Modification A/C Unit Circuits, Rev. 1
OC-12010, Sh. 01, Control Room HVAC Modification 120VAC Control Circuit Schematic, Rev. 2
3C-733-11-001, 480/277V AC Vital Power Lighting Distribution Panel VLDP-1, Rev. 1
3C-735-11-001, Sh. 1 & 2, 125V DC Power Panel D (DC-D)
3C-735-11-002, Sh. 1 & 2, 125V DC Power Panel E (DC-E)
3C-735-11-003, 125V DC Power Panel DC-F, Rev. 4
3C-733-11-004, 120V AC Vital Power System - Vital AC Power Panel VACP-1, Rev. 3
3C-733-11-006, 120V AC Vital Power System Instrument Panel Number 4 (IP-4), Rev. 4
3C-733-11-008, 120V AC Vital Power System - Instrument Panel 4 B (IP - 4B), Rev.4
3C-733-11-010, 120V AC Vital Power System - Protection System Panel No. 1 (PSP-1), Rev. 4
3C-733-11-011, 120V AC Vital Power System - Protection System Panel No. 2 (PSP-2), Rev. 5
3C-734-11-030, Lighting and Power Panel 1B2A (LPP-1B2A), Rev. 6
3C-735-11-001 Sh. 1 & 2, 125V DC Power Panel D (DC-D)
3C-735-11-002 Sh. 1 & 2, 125V DC Power Panel E (DC-E)
3C-735-11-003, 125V DC Power Panel DC-F, Rev. 4
3C-737-11-077, Diesel Generator No. 1 Pnl (PD3T11-3B1) Data Acquisition System, Rev 0.
3C-737-11-078, Diesel Generator No. 2 Pnl (PD3T11-3B2) Data Acquisition System, Rev 0.
3D-157-38-002, Diesel Generator Building Battery Seismic Stops, Rev. 0
3E-533-17-009, HI & LO Press Screen Wash System - Local Control Panel and Remote Annunciator, Rev.7
3E-700-10-001, Electrical Power Sys. Standard Drawing, Rev. 3
3E-743-11-001, Emergency Power Sys. One Line Diagram, Rev. 2
3E-743-11-007, Sh. 1 & 2, Emergency Power Sys. Logic Diag. - Combustion Turbine Operation
3E-743-11-008, Sh. 1 - 3, Emerg. Power Sys. Logic Diag. - FRCT 480V Double Ended Substa.
3E-743-11-009, Emergency Power System Logic Diag. - Generator Auxiliary Breakers, Rev 0.
3E-743-11-012, Emergency Power System Logic Diag. - 4160V Switchgear Bus 1B Brkr, Rev 0
3E-743-11-013, Sh. 1 & 2, Emergency Power System Logic Diag. - Rgas Turbine, Rev 1.
3E-861-21-1000, Flow Diagram - Air Cooling System, Rev. 11
3E-861-21-1001, Flow Diagram - Water Cooling System, Rev. 10
3E-861-21-1002, Flow Diagram - Lube Oil System, Rev. 11
3E-862-21-1000, Flow Diagram - Fuel Oil Storage & Transfer System, Rev. 20
3431 E1126, Reactor Bldg. Closed Cooling Water Pump 1-2, Rev. 11
3431 E1130, Shutdown Cooling Pump NU02B - Elementary Diagram, Rev. 9
7023-56754-43, Sh. 2, Local Shutdown Panel LSP-DG2 - Wiring Diagram
082-1, 15000 Gallon Diesel Oil Storage Tank, Rev. 6

Calculations/Engineering Analyses

C-1302-700-5350-012, OC Short Circuit Study for LOCA Scenario, Rev. 0
C-1302-700-5350-021, OCNGS - Protective Relays 4.16 kV Switchgear, Rev. 0
C-1302-723-5350-004, Increased Short Circuit Contribution Due to Permanent Installation of Repaired M1A and UP&L (M1B) Transformers, Rev 0
C-1302-731-E320-009, 4.16KV Bus C & D Undervoltage 27-11TD, 12TD, 13TD Stability Calculation, Rev. 1
C-1302-731-E320-017, 4160V Undervoltage (Degraded) Relay Setpoint Uncertainty, Rev. 1
C-1302-731-E510-015, OC Degraded Grid Undervoltage Relay Setpoint Evaluation Study, Rev 1
C-1302-735-E320-044, OC 125V DC Voltage Drop, Rev. 0
C-1302-741-5350.001, Loading of Emergency Diesel Generators and Sub-stations, Rev. 7
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TDR No. 630, Electrical Load Interrupting Device Coordination Study, Rev. 1
C-1302-862-5360-002, Diesel Generator Fuel Requirements, Rev. 0

Plant Modifications

MDD-OC-642B, Deletion of Containment Spray Auto Start Logic, Rev 0
OC-CCD-000741-001, EDG Switches Replacement, Rev. 0
OC-CCD-328383-002, EDG Relay Replacement / Upgrade, Rev. 3
OC- CCD-403024-002, EDG Battery Spacers
OC-MD-G075-007, 4160V Switchgear 1C & 1D Protective Relay Replacement, Rev 0
OC-MD-G845-001, Replace Degraded Voltage Relay, Rev 0
OC-MM-323713-001, EDG Control Changes & Upgrades, Rev. 2

Procedures

106, Conduct of Operations, Rev. 120
125.4, Administration of Setpoints, Rev. 12
328, Turbine Building Heating and Ventilation System, Rev. 32
337, 4160 Volt Electrical System, Rev. 48
341, Emergency Diesel Generator Operation, Rev. 60
01792E, Diesel Generator No. 1 Six-Month Preventive Maintenance
2000-ABN-3200.12, Generator Excitation Equipment Malfunction, Rev. 7
2000-ABN-3200.19, RBCCW Failure Response, Rev. 18
2000-ABN-3200.36, Loss of Off-Site Power, Rev. 8
2000-EMG-3200.02, Primary Containment Control, Rev. 16
2000-OPS-3024.10a, Electrical Distribution - 4160V Diagnostic and Restoration Actions, Rev.11
2000-RAP-3024.02, Electrical Alarm Response Procedures, Rev. 70
2000-RAP-3024.11, Emergency Diesel Generator - Diagnostic and Restoration Actions, Rev. 8
634.2.004, DG Battery Discharge Test,
634.2.012, Diesel Generator Battery Service Test,
634.2.201, Main Station B Battery Discharge and Low Voltage Relay Annunciator Test, Rev.5
634.2.207, Main Station B Battery Service Test, Rev. 4
634.2.301, Main Station C Battery Discharge Test, Rev. 4
634.2.307, Main Station C Battery Service Test, Rev. 4
635.2.001, 4160 Switchgear Buses (A, B, C, D) and Circulating Water Pump Protective Relay Surveillance, Rev. 34
636.1.010, Diesel Generator Inspection (24 Month), Rev. 18 [completed 9/1/00]
636.2.001, Diesel Generator Automatic Actuation Test, Rev. 38
636.2.002, Six Month Diesel Generator Inspection, Rev. 35

636.2.004, DG Battery Discharge Test, Rev. 24
636.2.005, Diesel Generator Weekly Battery Surveillance, Rev. 18
636.2.006, Diesel Generator Quarterly Battery Surveillance, Rev. 17
[dg2-completed 12/27/00 - Eq charge required]
[dg2-completed 1/03/01 - Eq charge required]
[dg2-completed 1/10/01 - Eq charge required]
[dg2-completed 1/17/01 - Eq charge required]
[dg2-completed 1/24/01 - Eq charge required]
636.2.012, Diesel Generator Batteries Service Test, Rev. 8
636.4.003 Diesel Generator #1 Load Test, Rev. 64
636.4.004, Diesel Generator #1 Load Test, Rev. 64
636.4.013, Diesel Generator #2 Load Test, Rev. 5
828.7, Secondary Systems Analysis: Plant Oil, Rev. 20
833.1, Chemistry Limits & Frequency, Rev. 9
ABN-3200.36, Loss of Offsite Power, Rev. 8
EMG-2000.01A, RPV Control - No ATWS, Rev. 10
EOP Support Procedure 10
EOP Support Procedure 29
ES-002,Instrument Error Calculation And Setpoint Determination, Rev. 5
SP-1302-38-010, Technical Specification for OCNGS Diesel Fuel Oil No. 2, Rev. 6
TP 248/2, D/G Alternate Fuel Oil Supply Test, Rev. 0 (Performed 3/27/86)
Generation Log, 11/99
Intake Tour Sheet, 02/26/01
Standing Order 48, Off-Site Power Availability and Switchyard Control, Rev. 8
Substation Tour Sheet, Rev. 120
Turbine Building Tour Sheet, 03/98

Completed Surveillance
632.2.002, Grid Undervoltage channel Functional Test, 3/21/01
635.2.1, Protective Relay Surv(C8) - Overcurrent, 10/98
635.2.1, Protective Relay Surv (C7), (C8) & (D1) - Undervoltage, 10/98
635.2.1, Protective Relay Surv (C4), (C8), (A4) & (A12) - Overcurrent, 10/00
635.2.1, Protective Relay Surv (C7), (C8), (D1) & (D2) - Undervoltage, 10/00
636.2.009, Diesel Generator Numbers 1 & 2 Protective Relay Surveillance, Rev 7, 10/98

Training Materials
2611-PGD-2621, Training Content Record - OC Industry Events - Degraded Grid Voltage, Rev 0
Scenario #10, Degraded Grid Voltage (Just In Time Training)

Corrective Action Program Reports (CAPs)
O1999-0078, EDG #1 auto-started due to lube oil low temperature.
O1999-0411, EDG battery surveillance - two cells had low specific gravity.
O1999-0514, PM to replace ED breaker was not performed.
O1999-0541, DG protective relay surveillance not performed as scheduled
O1999-0606, Potential deviation from plant design as described in the UFSAR
O1999-1126, EDG #1 failed to start during surveillance.
O1999-1137, EC Relay Pick-up was found low out of Specification
O1999-1150, D3 Relay Pick-up was found low out of Specification
O1999-1438, Grid UV time delay relay 27-11c found out of spec fast

O2000-0261, EDG surveillance procedure deficiencies
O2000-0450, 4160 V Circuit breaker would not charge when performing pm
O2000-0664, Grid UV relays 27-13c and 27-13d were observed having red targets
O2000-0992, Grid UV time delay relay 27-13c was fast and 27-12d was slow
O2000-1025, Errors Identified during Verification of Degraded Grid Voltage Analysis
O2000-1126, EDG No.1 failed to start during load test
O2000-1292, Standby Gas Treatment Exhaust Fans have Calculated Voltage below Minimum
O2000-1293, Several Calculations Require Update to Maintain Configuration Control
O2000-1363, Diesel Generator No.1 did not reach required kW rating during Test
O2000-1653, S1A Circuit Breaker tripped unexpectedly during Surveillance
O2000-1716, USS-1B3 Feeder Breaker 1B3P did not close from Control Room during Test
O2000-1765, Seal-in unit of two 1C breaker protective relays out of specification
O2000-1828, Degraded grid relays on C Bus were High out of Specification
O2000-2041, Core Spray Pump NZ03A failed to start during auto start test.
O2000-2081, ESW pump 52B circuit breaker failure to charge
O2001-0133, Grid UV time delay relay 27-11TD for “C” 4160 V bus degraded voltage was low out of spec.
O2001-0427, Grid UV time delay relays 27-11TD and 27-13TD were outside acceptance criteria for as-found data.
O2001-0438, Nonconservative Battery Technical Specification
O2001-0476, Potential for Fuel Oil Temperature to Reach the Waxing Point, 3/26/2001
O2001-0484, EDG procedures 341 and 2000-ABN-3200.36 are inconsistent
O2001-0507, Calculation for EDG fuel inventory does not exactly indicate 3 day use requirement
shown in Technical Specification basis.
O2001-0555, Received an 86G lockout during EDG six-month surveillance.
O2001-0556, Adverse trend noted between various chemistry procedures.
O2001-0580, Local degraded condition on #2 EDG fuel transfer line.

Engineering Evaluations (PE 125-1 File)
Oyster Creek Nuclear Generating Station Fire Hazards Analysis Report, Volume 1, Rev. 4
OC Maintenance Rule (a)(1) Evaluation 01-001, 34.5 kV Bus, Lines & Associated Equipment, 2/2/01
303-93, Diesel Hot Restart at Minimum Battery Voltage

Safety Evaluations (SE)
SE-000020-004, Historical EQML Deletions
SE-000153-036, Removal of Reactor Cavity Shields at Hot Shut Down
SE-000215-021, Spent Fuel Cooling System Heat Removal Capacity
SE-000221-008, Control Rod Housing Roll Expansion Repair
SE–000711-004, Wiring Changes to Main Generator DPRS Cts and Setpoint Changers for Reverse Power Trip
SE-000723-002, Transformer M1B Permanent Use, Rev 0
SE-000731-012, Replace Degraded Voltage Relays
SE-000735-024, Removal of Auto Transfer Switch (ST-C)
SE-000741-017, EDG Pinion Failure Circuit
SE-403024-002, Seismic Battery Stops, Rev 0

Safety Evaluation Screen-outs

125-1 #0088-00, Reactor Feedwater Pump Motor 1A Cable Replacement
EE-0206-00, EDG Coolant Engineering Evaluation
EE-0211-00, Alternate Replacement of EDG Starter Motor".
125-1 #0077-00, 125-1#0077-00 for 'A', 'B', and 'C' Battery Testing Change in Charging Guidance
PE 125-1 0213-00, Engineering Evaluation for EDG-2 Circulating Oil Pump Motor P-39-004 Mounting
125-1 #0301-00, PMT for Battery Charger MG Set A Reverse Current Mod. (H246)
EE-031-00, Alternate Replacement of CR 104 Ind. Light
PE 125-1 0312-00, Engineering Direction
125-1 #0002-01, Station Blackout Control Cabinet Wire Harness Support
125-1 #0020-01, Temporary Power to Air Compressor
0023-01, Alternate Replacement for DPI-0011(10 & 12 future use)

Job Orders (JO)

00527399 Need to perform two equalize charges on DG2 battery until problems with specific gravities are corrected..
00530034 DG loading issue during surveillance
00530123 Operators noticed governor oil level full while DG running, should be +/- 1/4" of the indicated line while DG running.
00530587 EDG No. 1 started on low temperature and won't shut down; believe switch is stuck closed
00530589 Oil temperature not being maintained by heater; EDG No. 1 started on low temperature.
00530633 DG loading issue during surveillance
00532345 After performance of surveillance 636.4.003, Woodward governor oil level was observed to be ~1/8" low. Need to add oil
00546764 Perform equalizing charge on DG2 starting batteries
00548123 Repair of Broken Wire on EDG relay PFS, 12/28/00
WR # 777988 dated 9/10/98
WR # 785536 dated 12/27/00

Quality Assurance/Self Assessment Documents

System Health Report, 4160 Volt System, 1st Quarter, 2001
System Health Report, Emergency Diesel Generators, 1st Quarter, 2001
Technical Data Report 986, Revision 1, 3/14/90, Oyster Creek SSFI

Vendor Manuals/Documents

VM-OC-0095, Operating Manual, M-20E Automatic Power Plants, Rev.3
EXIDE Curve T-1298, LMS Ironclad Battery Rated Discharge Characteristics (vs Temperature)
EXIDE Curve S-1074, MS-420 Average Capacity ("S") Curves, 1/3/1985
EMD Curve SC-5056, MP45 Dead Load Pickup Capability, 2/28/66
Siemens, 21-115527-004-03, JFR Distribution Step-Voltage Regulator & Accu/Stat MJ-3A Regulator Control

Specifications
S-2299-49, EMD Specification Section VI, Performance Curves
Sp-1302-38-010, Diesel Fuel Oil No. 2, Rev. 6, 8/3/1994
SP-9000-31-213, Class IE Electric Cable for Power, Control & Instrumentation, Rev. 8, 1/17/97
SP-9000-41-005, Cable & Raceways, Rev. 5
SPE-63, Medium Voltage Cable Requirements, Rev. 0, 1/11/2000

Licensing Documents
UFSAR Section 8.2, Offsite Power System, Update 10, 4/97
UFSAR Section 8.3, Onsite Power Systems, Update 11, 4/99
UFSAR Section 9.4.3, Turbine Building Heating and Ventilation, Update 11, 4/99
UFSAR Section 9.5.4, Diesel Generator Fuel Oil Storage and Transfer System, Update 10, 4/97
UFSAR Section 9.5.5, Diesel Generator Cooling Water System, Update 10, 4/97
UFSAR Section 9.5.6, Diesel Generator Starting System, Update 11, 4/99
UFSAR Section 9.5.7, Diesel Generator Lubrication System, Update 10, 4/99
UFSAR Section 9.5.8, Diesel Generator Combustion Air, Update 10, 4/99
UFSAR Section 9.5.9, Diesel Generator Controls and Instrumentation, Update 10, 4/99
UFSAR Table 9.5-9, Diesel Generator Annunciator Relays, Update 5 12/90
UFSAR Table 9.5-10, Diesel Generator Alarms, Update 9 6/95
Technical Specification, 2.3, Limiting Safety System Settings, Amendment No.208
Technical Specification, Table 3.1.1, Protective Instrumentation Requirements, Amendment No. 208
Technical Specification, 3.7, Auxiliary Electrical Power, Amendment No. 203
Technical Specification, Table 4.1.1, Minimum Check, Calibration and Test Frequency for Protective Instrumentation, Amendment No. 208
Technical Specification, 4.7, Auxiliary Electrical Power, Amendment No. 197
Licensing Action Item No.94060.01,Oyster Creek Review of NRC IN 94-019, 02/07/1995
GPU/Nuclear Review of NRC IN 92-053, 01/13/1993

Correspondence
MKW Power Systems to GPU, Cold Deadload Pickup, 10/6/1993
EXIDE Corporation to GPU Nuclear, Results of Discharge Tests (on four aged DG battery cells), 7/24/1990

Miscellaneous Documents
IN 92-053, Potential Failure of EDG Due to Excessive Rate of Loading, 7/29/1992
IN 94-019, EDG Vulnerability to Failure from Cold Fuel Oil,
IN 99-013, Medium Voltage Circuit Breaker Maintenance Programs
IN 00-006, Offsite Power Voltage Inadequacies,
GL 96-01, Testing of Safety Related Logic Circuits
Oyster Creek Nuclear Generating Station Fire Hazards Analysis Report, Volume 1, Rev. 4
EMG-2000.01A, RPV Control - No ATWS, Rev. 10
EDG Equipment Condition Report & Lubrication Condition Report, 5/3/01
MNCR-920087, Material Non-Conformance Report - 480V Vital Lighting Panel VLDP-1