



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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September 14, 2007

J. V. Parrish (Mail Drop 1023)
Chief Executive Officer
Energy Northwest
P.O. Box 968
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SUBJECT: COLUMBIA GENERATING STATION - NRC COMPONENT DESIGN BASIS
INSPECTION REPORT 05000397/2007007

Dear Mr. Parrish:

On August 2, 2007, the U.S. Nuclear Regulatory Commission completed a team inspection at your Columbia Generating Station. The enclosed report documents the assessments and conclusions, which were discussed on August 2, 2007, with you and other members of your staff during an exit meeting.

This 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 inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no findings of significance were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

William B. Jones, Chief
Engineering Branch 1
Division of Reactor Safety

Docket: 50-397
License: NPF-21

Enclosure:
NRC Inspection Report 05000397/2007006
w/Attachment: Supplemental Information

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SUNSI Review Completed: WJB ADAMS: **Yes** No Initials: WBJ
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ENCLOSURE

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 05000397
License: NPF-21
Report: 05000397/2007007
Licensee: Energy Northwest
Facility: Columbia Generating Station
Location: Richland, Washington
Dates: July 9 through August 2, 2007
Team Leader: W. Sifre, Senior Reactor Inspector, Engineering Branch 1
Inspectors: R. Azua, Reactor Inspector, Engineering Branch 1
B. Henderson, Reactor Inspector, Engineering Branch 1
G. Apger, Operations Engineer, Operations Branch
Contractors: C. Baron, Mechanical Contractor
P. Wagner, Electrical Contractor
Approved By: William B. Jones, Chief
Engineering Branch 1
Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000397/2007007; 05000323/2006011; 07/09/2007 – 08/03/2007; Columbia Generating Station: NRC Inspection Procedure 71111.21, *Component Design Basis Inspection*.

The report covers an announced inspection by a team of four regional inspectors and two contractors. No violations were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

No findings of significance were identified.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events/Mitigating Systems/Barrier Integrity

1 REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and an important design feature may be altered or disabled during a modification. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than two or Birnbaum value greater than 1E-6.

a. Inspection Scope

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed independent calculations to verify the appropriateness of the licensee engineers' analysis methods. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience information to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios associated with the selected components simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions because of modification, or margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review.

These included items, such as, failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded, conditions; NRC resident inspector input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins.

The inspection procedure requires a review of 15-20 risk-significant and low design margin components, 3-5 relatively high-risk operator actions, and 4-6 operating experience issues. The sample selection for this inspection was 17 components, 7 operator actions, and 4 operating experience items.

The components selected for review were:

- Ultimate heat sink
- Residual heat removal pump 2B
- Main steam safety relief valves
- Turbine bypass valves
- Emergency diesel generator 3
- Reactor core isolation cooling pump P1
- Service water valve 12A
- Reactor core isolation cooling valves V45 and V22
- Switchgear ventilation 53A and 53B
- Control air compressors
- Containment instrument air
- Main steam isolation valves
- Air operated valve TMU-LCV-1A
- Service water motor operated valve 12A
- Transformer 7-73
- Station batteries 1B-1, 1B-2, and 2B-1
- Battery chargers

The selected operator actions were:

- Initiation of suppression pool cooling
- Initiation of the automatic depressurization system
- Control of reactor feedwater
- Control reactor core isolation cooling
- Control of low pressure injection
- Power conversion system recovery
- Vent containment utilization

The operating experience issues were:

- NRC Bulletin 88-04, Potential Safety -Related Pump Loss
- NRC Information Notice 2006-22, New Ultra-Low Sulfur Diesel Fuel Oil Could Adversely Impact Diesel Engine Performance
- NRC Information Notice 1983-08, DC System Voltage Problems
- Periodic verification of design-basis capability of safety-related motor-operated valves

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On August 2, 2007, the team presented the inspection results to, Mr. D. Atkinson, Vice President Nuclear Generation and other members of the Columbia Generating Station's staff who acknowledged the findings. The inspectors confirmed that proprietary information was provided and examined during this inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

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D. Brown, Manager, Operations Support
A. Chiang, Principal Engineer, PRA
D. Coleman, Manager, Regulatory Programs
J. Dittmer, Supervisor, Design Engineering
J. Frisco, Manager, Engineering
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B. LaFramboise, Manager, Design Engineering
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T. Morace, Project Manager, Design Engineering
S. Sawyer, Supervisor, Quality Assurance

NRC Personnel

Z. Dunham, Senior Resident Inspector
R. Cohen, Resident Inspector

LIST OF DOCUMENTS REVIEWED

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
CMR 5696	Revisions to Calc. 2.12.58	7/02/07
E/I-02-91-03	Standby Diesel Generator (DG-2) Load Calculation	8
E/I-02-92-01	Fuse Coordination Study for DC Distribution Systems	0
E/I-02-92-02	Calculation for Voltage & Torque for DC MOVs	1
E/I-02-92-17	Overcurrent Coordination for Medium Voltage Components	1
E/I-02-94-02	Calculation for DC Voltage Drop	1
E/I-02-94-1352	Setting Range Determination for Time Delay Relays	1
E/I-02-95-01	Overcurrent Settings and Coordination for 480V System	1
ME-02-02-26	DC MOV Thrust & Set-point Calculation	0
ME-02-93-28	Operator Torque Ratings for Butterfly Valves	1
OER81007E-1D	Overvoltage Rating of Class 1E DC Devices	Feb. 1990
RTS 90-05-175	Review of OER81007E-1D Open Items	9/ 7/1990
2.05.01	Battery Sizing, Voltage Drop, and Charger Studies	11
2.12.18	Primary Undervoltage Relays for Buses SM-4, -7 & -8	3
2.12.58	Secondary Undervoltage Relays for Buses SM-4, -7 & -8	5
ME-02-03-10	Main Steam Isolation Valve Leakage	5

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
CE-02-95-14	Service Water Pump SW-P-1B Dynamic Absorber	0
QID-213034	Qualification of Service Water Pump SW-P-1B Motor and Dynamic Absorber	1
5.20.20	Pressure Drop Calculation - RCIC System	2
5.44.14	NPSH for ECCS Pumps with Suction Line Break	0
5.46.05	Maximum CIA System Pressure	4
216-92-018	Weaklink Analysis for Valve No. RCIC-V-45	0
216-92-026	Weaklink Analysis for Valve No. RCIC-V-22	0
216-92-040	Weaklink Analysis for Valve No. SW-V-12A,B	0
C106-92-03.04	SSW System MOV Design Basis Review	2
C106-92-03.05	RCIC System MOV Design Basis Review	3
E/I-02-91-03	Determine the Steady State Continuous Output for Each Standby Diesel Generator	13
E/I-02-93-1272	Setting Range Determination for Instrument Loops RCIC-LS-15A and RCIC-LS-15B	0
ME-02-01-30	Determination of RCIC Availability without Standby Service Water	0
ME-02-02-25	MOV Thrust and Setpoint Calculation	0
ME-02-02-26	DC Gate and Globe Valves - MOV Thrust and Setpoint Calculation	0
ME-02-04-09	Pressure Drop Verification for RCIC System	0
ME-02-83-21	Spray Pond Water Level Range	2
ME-02-89-21	Station Blackout (SBO) Coping Evaluation	0
ME-02-92-41	Ultimate Heat Sink Analysis	5
ME-02-92-43	Room Temperature Calculation for DG Building, Reactor Building, Radwaste Building, and Service Water Pumphouse under Design Basis and Accident Conditions	7
ME-02-92-44	Diesel Starting Air System Capabilities to Meet the # of Starts Requirements	1
ME-02-92-234	On Site Diesel Fuel Storage for Emergency Diesel Generators DG-1, DG-2, and DG-3	0
NE-02-03-06	EOP/SAG Calculations	0
NE-02-87-20	Oil Tank Capacity vs. Level	1
EC 3084	CMR for Calc 5-17-19 RHR Pressure Drop	3
CMR-1352	5.17.19 Effect of As-Built Strainer Head Losses and the Increase of Suppression Pool Temperature on RHR PERA 200-2096-01	0
CMR-9500497	5.17.19 Voiding of BDC 86-0323-OB	0
CMR-3084	5.17.19 Rev 3 - Correct Calc Discrepancies Noted in CR 2-04-01600	0

Condition Reports

0-05-00069	2-04-04235	2-05-01844	2-05-07748	2-06-07549	2-07-05799
2-04-01284	2-04-04236	2-05-01882	2-05-08784	2-07-03280	2-07-06405
2-04-01494	2-04-04309	2-05-04684	2-06-02034	2-07-05256	2-07-06908

2-04-04117	2-04-05186	2-05-06080	2-06-05849	2-07-05323	2-07-06953
2-04-04180	2-04-01863	2-04-03027	2-04-03107	2-04-03713	2-04-03750
2-05-03035	2-05-07154	2-06-00489	2-06-00648	2-06-00719	2-06-00818
2-06-05755	2-06-05849	2-06-07092	2-06-07896	2-07-00963	2-07-01014
2-07-01101	2-07-01237	2-07-01622	2-07-02156	2-07-04508	2-07-04977
2-07-05077	2-07-05182	2-07-05187	2-07-05337	2-07-06251	2-07-06385
2-07-07418	2-07-07418	2-07-07463	2-07-07518	02-07-04222	02-07-05461
02-07-05461	02-07-06426	2-07-01014			

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
E502-1	Main One Line Diagram	42
E502-2	Main One Line Diagram	53
E503-1	MCC General Notes, MCC & Starter Index	75
E503-6	Auxiliary One Line Diagram	85
E503-7	Auxiliary One Line Diagram	79
E503-8	Auxiliary One Line Diagram	83
E503-9	Auxiliary One Line Diagram	66
E503-11	Auxiliary One Line Diagram	55
E503-12	Auxiliary One Line Diagram	77
E504	Vital One Line Diagram	53
E505-1	DC One Line Diagram	90
E505-2	DC One Line Diagram	3
E514-7	4160V SWGR Relay Settings SM-7	19
E514-19	Diesel Generator 1 Relay Settings	7
E514-23	DC System Relay Settings List	10
E515-3	480V SWGR Breaker Settings	16
E528-22	MCC Equipment Summary	14
E528-45	MCC Equipment Summary	15
EWD-6E-008	MOV RCIC-V-45 Wiring Diagram	21
EWD-6E-008A	MOV RCIC-V-45 Wiring Diagram	2
EWD-6E-035	MOV RCIC-V-22 Wiring Diagram	14
EWD-6E-035A	MOV RCIC-V-22 Wiring Diagram	1
EWD-46E-80A	SWGR SM-7 FDR BRKR E-CB-7/1 Wiring Diagram	2
EWD-46E-106A	SWGR SM-7 Undervoltage Relay Wiring Diagram	16
EWD-46E-107A	SWGR SM-8 Undervoltage Relay Wiring Diagram	19
EWD-46E-327	SWGR E-SM-4 Undervoltage Relay Wiring Diagram	8
EWD-47E-042	Diesel Generator 1 Engine Start/Stop Controls	14
EWD-47E-042A	Diesel Generator 1 Engine Start/Stop Controls	5
EWD-47E-048	Diesel Generator 1 Protection Circuits Schematic	14
EWD-50E-006A	DC Distribution Panel E-DP-S1/1D Circuit Details	6
EWD-50E-35A	DC Distribution Panel E-DP-S1/1F Circuit Details	9
EWD-58E-002	Standby Service Water Pump SW-P-1A Breaker Details	22
EWD-58E-002B	Standby Service Water Pump SW-P-1A Wiring Diagram	3
EWD-58E-020	Standby Service Water Valve SW-V-1A Details	13
46E080	SWGR SM-7 FDR BRK E-CB-7/1 Wiring Diagram	17

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
46E106	E-SM-7 Critical Bus 7 Undervoltage Schematic Diagram	16
46E107	E-SM-8 Critical Bus 8 Undervoltage Schematic Diagram	22
46E159	480V SWGR SL-73 Protection Schematic Diagram	8
46E178	Ground Fault Indicating PNL SWGR SL-73 Diagram	6
90838-013	Wiring Diagram 20/25E, MFV, S-CTL, AC/WC, LUB/KT	5
M828	HVAC - Standby Service Water Pump Houses Plans and Sections	6
M551	HVAC - Circ. Water, Make-Up Water and Service Water Pump Houses and Diesel Generator Bldg	57
M501	Flow Diagram Legend, Symbols and Abbreviations	50
M524-1	Flow Diagram - Standby Service Water System	109
M510-1	Flow Diagram Control and Service Air System	80
M510-2	Flow Diagram Control and Service Air System	31
M510-2A	Flow Diagram Control and Service Air Systems CAS Tables and Details	11
M510-3	Flow Diagram Control, Service and Breathing Air Systems	20
M510-4	Flow Diagram Control and Service Air Systems	8
M512-1	Flow Diagram - Diesel Oil and Miscellaneous Systems	40
M512-2	Flow Diagram - Diesel Oil and Miscellaneous Systems	33
M512-3	Flow Diagram - Diesel Oil and Miscellaneous Systems	35
M512-4	Flow Diagram - Diesel Oil and Miscellaneous Systems	9
M519	Flow Diagram - Rector Core Isolation Cooling System	88
M780	Composite Piping - Standby SW Pumphouse No. 1B	27
S513	Spray Pond	14
S516	Standby SW Pumphouse	16
M556	Flow Diagram, Containment Instrument Air System	49

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
ABN-WIND	ECP - Tornado/High Winds	9
ESP-BAT-W101	Weekly Battery Testing	11
ESP-B11-Q101	Quarterly Battery Testing 125 VDC E-B1-1	8
ESP-RLY277172-X301	4.16KV Emergency Bus Primary Undervoltage Relays	3
ESP-DIV1TRSTDR-B301	Division 1 TR-S Loss of Voltage Time Delay Relays	4
IEEE-450-2002	EnerSys (Factory) Discharge Test - Group 1 (B1-1)	2/28/06
IEEE-450-2002	EnerSys (Factory) Discharge Test - Group 6 (B1-2)	3/2/06
IEEE-450-2002	EnerSys (Factory) Discharge Test - Group 2 (B2-1)	2/28/06
IEEE-450-2002	EnerSys (Factory) Discharge Test - Spares	3/3/06
OSP-INST-H101	Shift and Daily Instrumentation Checks	59
PPM 5.6.1	Station Blackout (SBO)	6
PPM 10.2.53	Seismic Requirements for Scaffolding, Ladders, Man-Lifts, Tool Gang Boxes, Hoists, Metal Storage Cabinets, and Temporary Shielding Racks	25

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
PPM 1.4.1	Plant Modifications	28
PPM 1.3.9	Temporary Modifications	41
PPM 10.2.60	Installation of Fixed Ladders - Columbia Generating Station	5
PPM 2.8.1A	Planned Control Air and Service Air Outage	6
OSP-MSIV/IST-R701	MSIV Accumulator Check Valve Operability	5
PPM ABN-CAS	Control Air System Failure	5
PPM ABN-ASH	Ash Fall	7
PPM 1.5.13	Preventive Maintenance Optimization Living Program	14
PPM 10.25.187	Motor Control Center Starter (Bucket) Maintenance	10
OSP-INST-H101	Shift and Daily Instrument Checks (Modes 1, 2, 3)	59
TSP-RHRB/ RHRC - 501	RHRB/RHRC Logic System Functional Test	10
PPM 10.24.125	PM CAL/TEST - Magnetrol Electronic Transmitter	6
PPM 18.1.4	HPCS-P-1 Preservice Test	1
CSP-DO-C101	Diesel Generator New Fuel Test	7
ICP-CIA-X101	Plant Systems	1
ISP-RCIC-Q902	RCIC Suction Transfer on CST Low Level CFT/CC	2
OSP-HPCS/IST-Q701	HPCS System Operability Test	27
OSP-RCIC-M101	RCIC Fill, Flow Controllers, and Valve Lineup Verification	6
OSP-RCIC/IST-Q70	RCIC System Operability Test	34
OSP-RCIC/IST-Q702	RCIC Valve Operability Test	23
OSP-RCIC/IST-Q703	RCIC Valve Operability - Shutdown	3
OSP-SW-Q101	SW Spray Pond Average Sediment Depth Measurement	3
OSP-SW/IST-Q703	HPCS Service Water Operability Test	9
SOP-RCIC-DRAIN	RCIC Drain	1
SOP-RCIC-INJECTION	RCIC RPV Injection	4
SOP-RCIC-FILL	RCIC Fill and Vent	0
SOP-RCIC-START	RCIC Start in Test Return Mode	1
SOP-RCIC-STBY	Placing RCIC in Standby Status	2

Engineering Changes/Modifications

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
394	RCIC Waterhammer Prevention System Upgrades	4/9/01
5557	Assessment of Impact of 10CFR21 Communication SC06-01 on Design Margin of Suppression Pool Temperature Analysis	4/30/07
5622	Evaluate Impact of MPDC 4747, HPCS Motor Replacement on Calculation E/I-02-91-03	2/21/07
6008161	Certificate of Conformance (Exide Batteries)	3/9/06

Work Orders

01116054	01116055	01119256	01129207	01131265
01137297	01131438	01077291	01104378	01095497
01107535	01122002-01			

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
01723-005	Design Specification for Station Blackout (SBO)	
2-07-07463	CDBI Self Assessment	
AR 8232	RCIC-MO-22, Evaluate Margin Restoration	1/12/05
DBD Section 308	HPCS Design Basis Document	9
DBD Section 309	Standby SW Design Basis Document	8
DBD Section 310	Standby Power Systems Design Basis Document	6
DBD Section 315	RCIC Design Basis Document	6
GO2-88-150	NRC Letter - Potential Safety Related Pump Loss	7/8/88
Health Report	RCIC System Health Report	1st Qtr 2007
Health Report	MOV Program Health Report	4th Qtr 2006
	RHR, HPCS, LPCS Pumps Minimum Flow Evaluation	1/10/89
PER 205-0417	Replace HPCS-P-2	6/15/05
PER 206-0042	HPCS-P-2 May be Degraded based on SW-P-1A/1B Pump Failure	2/2/06
PER 206-0109	Identified Non-conformance with Analyses for Suppression Pool Water Temperature during LOCA	3/1/06
PER 206-0571	Ultra Low Sulfur Diesel Fuel	11/20/06
PER 207-0081	Ultra Low Sulfur Diesel Fuel	2/12/07
TM-1250	Volcano Ash Study	11/29/06
5059-06-003	10 CFR50.59 Evaluation for EC 4934, replacement of DEH Turbine Trip System with digital PLC	1
	RHR System Health Report	Mar 2007
	Examination at NWS Technologies of Six Valves Removed From Service at R15	June 2002
02-16	Mechanisms Resulting in Leakage from Main Steam Safety Valves	1
	Review of Certified Material Test Reports for Material Effect on Disc and Nozzle Reliability	August 2002
E/I-02-91-1059	Setpoint Range and Allowable Value Determination for Instrument Loop RHR-FIS-10A (RHR Minimum Flow)	0
IEB-88-04	Ingersoll Rand ECCS Pumps	0
GO-2-88-208	NRC Letter Subject: Potential Safety Related Pump Loss	0
SD000128	System Description - Main Steam System	4
SD000156	Containment Instrument Air	8
SD000201	System Description - Control Room, Cable Room and Critical Switchgear Rooms - HVAC (CR-HVAC)	10
SD000205	Main Steam System	9
DBD Section 307	Main Steam System	5
DBD Section 351	Radwaste Building Mixed Air System	0

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
DBD Section 305	Compressed Air Systems	4
TER 98-0103-0	Replace 480 Volt Motor WMA-FN-53A With Similar Sized Motor	11/04/98
CER C92-0196	Inboard Main Steam Isolation Valve (MSIV) Accumulator Check Valves 2-CIA-V-24A, B, C and D	0
CER C93-0690	Inboard Main Steam Isolation Valve (MSIV) Accumulator Check Valves 2-CIA-V-24A, B, C and D	0
PMR 90-0026-0	Removal of CIA Compressors	09/25/91
PER 205-0499	RPS-DISC-8A2C Opened, De-energizing RPS-SYS-B, Resulting in Half Scram	07/27/05
GE SIL 652	Lubrication Clarification for GE CR105X Contacts	
BDC 89-0266-0C	Replace the Three CAS Reciprocating Compressors with Three Sullair Rotary Screw Compressors	10/11/1990
EC 3671	Plant Design Changes for Extended Station Blackout	0
G02-91-091	Letter to NRC - Additional Information on SBO	5/7/1991
G02-94-002	Letter to NRC - Updated Information on SBO	1/6/1994
GI2-9-180	Letter to NRC - SSE SBO Analysis	6/26/1992
NFPA-70	National Electric Code	2002
PDC 3006	10CFR50.59 Evaluation of Battery Charger Power	3/29/05
RFQ0009326	EnerSys, Inc. Letter RE: Battery Material Changes	11/22/05