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 AUTH. NAME AUTHOR AFFILIATION  
 EURY, L. W. Carolina Power & Light Co.  
 RECIP. NAME RECIPIENT AFFILIATION  
 GRACE, J. N. Region 2, Ofc of the Director

SUBJECT: Responds to NRC Compliance Bulletin 87-002, "Fastener  
 Testing to Determine Conformance W/Applicable Matl Specs."  
 Fifty-two fasteners tested met applicable ASTM specs. Two  
 noncompliant fasteners deemed acceptable for intended use.

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**Carolina Power & Light Company**

P. O. Box 1551 • Raleigh, N. C. 27602

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**JAN 22 1988**

LYNN W. EURY  
Senior Vice President  
Operations Support

Dr. J. Nelson Grace, Regional Administrator  
United States Nuclear Regulatory Commission  
101 Marietta Street, NW  
Atlanta, GA 30303

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-261/LICENSE NO. DPR-23  
RESPONSE TO COMPLIANCE BULLETIN NO. 87-02

Dear Dr. Grace:

Carolina Power & Light Company (CP&L) hereby submits information requested by NRC Compliance Bulletin No. 87-02, "Fastener Testing to Determine Conformance with Applicable Material Specifications," dated November 6, 1987. The subject bulletin required that licensees review fastener receipt inspection requirements and internal controls, the testing of a sampling of fasteners to determine if required specifications are met, and a safety significance evaluation for those fasteners which did not meet applicable specifications.

This letter provides the results of CP&L's review and testing program and is submitted within the time frame as discussed with Mr. C. W. Hehl (NRC-Region II) on January 15, 1988. The attached information is formatted such that the specific subheadings correspond to the bulletin item topics.

Fifty-two of the 54 fasteners tested met the applicable ASTM specifications. The 2 fasteners not in complete compliance with their specifications were evaluated and determined to be acceptable for their intended use.

Should you have any questions regarding this submittal, please contact Mr. Arnold Schmich of my staff at (919) 836-8759.

Yours very truly,



L. W. Eury

LWE/AWS/che (5366AWS)

Attachments

8802030476 880122  
PDR ADOCK 05000261  
Q PDR

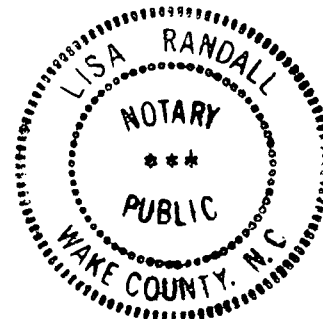
IE 11

L. W. Eury, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

Lisa M. Randall  
Notary (Seal)

My commission expires: 5-18-88

cc: NRC Resident Inspector - RNP  
Mr. R. Lo  
NRC Document Control Desk



## RESPONSE TO NRC COMPLIANCE BULLETIN NO. 87-02

The following sections provide specific detail for each of the Bulletin 87-02 action items:

**ACTION 1:** Describe a) the characteristics currently examined during receipt inspection of fasteners (i.e., head markings for grade and manufacturer symbols, review of certified material test report or certificate of conformance), and b) internal controls utilized during storage and issuance from stock to assure the appropriate use of fasteners.

### CP&L Response

Inspections are performed in accordance with applicable receipt inspection procedures (OQA-402, Receipt Inspection, and OQA-403, Material Verification). Specific inspection characteristics include dimensions as specified by purchase order, head markings as required by material specification, and tolerances as specified by ANSI B18.2.1 for square and hex screws and bolts and ANSI B18.2.2 for square and hex nuts. Vendor supplied documentation (i.e., certificates of compliance and certified mill test reports) are reviewed for compliance to applicable purchase order and material specifications. Additionally, nondestructive and destructive testing may be performed as described by OQA-403, Material Verification.

Internal controls utilized by HBR-2 to ensure appropriate fastener use are:

- Plant Operating Manual Plant Material Control procedures govern the receipt, storage, and issuance of fasteners. On arrival, fasteners are inspected for physical damage and to verify description and quantity. Discrepancies are recorded and resolved prior to issue for installation or use.
- Safety-related materials are segregated and controlled to prevent mixing with nonsafety-related material. Stock material including safety-related items are identified and stored by CP&L part number.
- Material with the same CP&L part number are purchased to the same requirements or similar requirements which have been evaluated as being acceptable.
- Storage of material with different CP&L part numbers in the same location is not permitted. Periodic inspections of storage areas are performed to verify compliance to this requirement.
- It is the responsibility of the end user to identify from design documents the correct bolting material for the application and its corresponding CP&L part number. Materials Control personnel ensure that the CP&L part number issued is the CP&L part number requested. Safety-related fasteners are also inspected by Quality Control prior to issue.

ACTION 2: Select a minimum sample of ten (10) nonsafety-related fasteners (studs, bolts, and/or cap screws), and ten (10) safety-related fasteners (studs, bolts, and/or cap screws) from current, in-use, stock. The sample is to be obtained by the licensee with the participation of an NRC inspector. Fasteners procured to meet the following chemical and mechanical properties are of interest: A-193 grades B7, B8, and B16; SAE J429 grades 5 and 8; A-449; A-325 Types 1, 2, or 3; A-354 grades BB, BC, BD; A-490; A-320 LTM; A-307; A-563; or equivalent.

CP&L Response

Refer to our response for Action 3.

ACTION 3: For the selected sample of fasteners in Item 2, include a sample of typical nuts that would be used with each fastener (one-for-one). In particular, nuts purchased to the chemical and mechanical specifications of A-194 are of interest.

CP&L Response

A total of 54 nuts and bolts were sampled, 35 of which are safety-related. The NRC Site Resident Inspector for HBR-2 participated in the sampling. The "one-for-one" relationship to sampled fasteners requested by the bulletin proved impractical; however, the sample included nuts procured to meet the chemical and mechanical specifications of interest.

ACTION 4: Chemical testing shall be performed on all samples. Mechanical testing shall be performed on each safety-related fastener. Hardness testing shall be performed on each nut and nonsafety-related fastener. All testing shall be performed by a laboratory which the licensee has qualified for this type of testing and appears on the licensee's approved vendor list. Testing performed shall be done in accordance with the requirements of the fastener's specification, grade, and class, and the test shall evaluate the ultimate tensile strength, hardness, and chemical properties as required by the fastener's specification, grade, and class. Each sample shall be tagged with the sample's ID number.

CP&L Response

Mechanical testing of the samples was performed by CP&L's Metallurgy Laboratory which falls under CP&L's Corporate Quality Assurance Program and meets the qualifications necessary to perform the testing. Per discussions with Mr. J. T. Conway (NRC) on November 18, 1987 and Mr. P. E. Fredrickson (NRC-Region II) on December 1, 1987, the NRC concurred with the use of the CP&L Metallurgy Laboratory. Chemical testing was performed by National Spectrographic Laboratories, which is on CP&L's approved vendor list. The testing program was in accordance with ASTM-approved methods required by the fastener's specification, grade, and class. Each sample was provided a unique identification number.

ACTION 5: The results of all tests, together with supporting information, are to be reported to the NRC utilizing the format shown in Attachments 1 and 2 of this bulletin. Include the names and addresses of suppliers and manufacturers of safety-related fasteners and, to the extent possible, of nonsafety-related fasteners. For any fastener found out of specification, provide an evaluation of the safety significance including consideration of the most limiting application.

#### CP&L Response

Results of CP&L Bulletin 87-02 testing are presented on Table 1, "HBR-2 Fastener Testing Data Summary." Table 1 is formatted in the manner suggested by the bulletin. The fasteners are categorized by the applicable ASTM specification they were tested against and are listed by their unique identification number assigned at the time of sampling. Results which do not meet the applicable specification requirement are denoted by an asterisk (\*).

Table 2 lists the fastener supplier and manufacturer names and addresses.

Two of the 54 HBR-2 fasteners (Sample Nos. RNP-SA193-GrB8-SR-CAP-006 and RNP-SR-CAP-047) were determined to not completely meet their applicable ASTM specifications. Sample No. RNP-SA193-GRB8-SR-CAP-006 met the testing requirements with the exception of hardness. The small difference between the measured value of 26 Rockwell C scale (equivalent to 102 Rockwell B Scale) and a specification maximum of 100 Rockwell B scale is not considered to be significant. Sample No. RNP-SR-CAP-047 met the testing requirements except for a higher silicon content. Silicon content for this sample was determined to be 0.52% versus a specified range of 0.15 to 0.35% (0.13 to 0.37% allowable for product variation). This difference is not considered to have a deleterious effect on the sample's mechanical or chemical properties. A tested hardness value of 26 Rockwell C Scale indicates acceptable tensile strength. The slight increase in silicon will therefore not significantly effect the ability of the material to perform its safety-related function.

Sample No. RNP-SA325-Type 1-SR-Bolt-001 was originally tested by the Metallurgy Laboratory using a reduced section tensile test method. As indicated on Table 1, this bolt did not meet the required mechanical properties. However, the manufacturer (Texas Bolt) had tested this bolt full-size and the certified Material Test Report indicated that the bolt type meets the requirements. ASME SA325 requires that when there is controversy between the two test method results that the full-size test shall govern. For this reason, CP&L Metallurgy Laboratory and Corporate QA personnel witnessed the full-size testing of three additional samples of this type bolt from HBR-2. The three retest bolts met the mechanical properties required by specification. The results are as follows:

<u>Bolt Identifier</u>	<u>Tensile Strength lbf</u>	<u>Proof load</u>	<u>Hardness</u>
(SA325 Requirements)	(80,100 min)	(56,450 min)	(19-31)
F	85,800	56,450	20
I	86,400	57,000	23
H	88,300	57,000	23

In addition, Texas Bolt QA records were reviewed and determined to be acceptable. These CP&L actions at Texas Bolt were taken to ensure independent test results in accordance with the intent of the bulletin.

Based on the above evaluations, it is CP&L's position that the fasteners are acceptable for use in safety-related applications, and no further actions are required regarding these fasteners.

**ACTION 6:** Based on the results of the testing and review of current procedures, describe any further actions being taken to ensure that fasteners used in the plant meet the requisite specifications and requirements and that the operability of safety-related plant components is not affected.

#### CP&L Response

Based on the results of CP&L's review of current procedures and testing program, we believe that our receipt inspection and material handling programs are adequate and meet or exceed the applicable requirements. No further actions are therefore considered to be necessary.

NRC Compliance Bulletin No. 87-02  
Table 1  
HBR2 Fastener Testing Data Summary

ID NUMBER	MECHANICAL ANALYSIS				CHEMICAL ANALYSIS		
	HARDNESS	UTS	YS	RA	EL	C	
ASTM A 193 Gr7							
RNP-A193-GrB7-SR-CAP-010A	N/R	134,000	120,500	60.00	22.00	0.380	0.
RNP-A193-GrB7-SR-STOCK-010B	N/R	132,500	117,500	60.00	42.00	0.400	0.
RNP-B7-NSR-STUD-021	Rc 36	**	**	**	**	0.370	0.
RNP-A193-GrB7-NSR-CAP-022	Rc 25	N/R	N/R	N/R	N/R	0.410	0.
RNP-SR-CAP-041	Rc 32	**	**	**	**	0.500	0.
RNP-SR-CAP-042	Rc 32	**	**	**	**	0.430	0.
RNP-SR-CAP-044	N/R	143,400	126,000	60.00	22.00	0.410	0.
RNP-SR-STUD-045	N/R	160,000	145,000	55.00	36.00	0.450	0
RNP-SR-CAP-047	Rc 26	**	**	**	**	0.490	0
RNP-GrB-SR-CAP-050	N/R	146,600	131,400	60.00	19.00	0.440	0
RNP-SR-CAP-052	Rc 27	**	**	**	**	0.420	0
RNP-A193-GrB7-SR-STUD-054	N/R	146,250	132,500	60.00	36.00	0.410	0
ASTM A 193 GRB8							
RNP-SA193-GrB8-SR-CAP-006	Rc 26*	93,250	74,500	75.00	68.00	0.085	1
RNP-A193-GrB8M-SR-CAP-046	Rb 96	90,600	69,400	80.00	37.00	0.046	1
ASTM A 193 GrB8M							
RNP-A193-GrB8M-SR-CAP-004	Rb 82	89,000	41,000	80.00	57.00	0.064	1
ASTM A 193 GrB16							
RNP-A193-GrB16-NSR-STOCK-030	Rc 37	N/R2	N/R2	N/R2	N/R2	0.470	0
RNP-SA193-GrB16-SR-STUD-003	N/R	145,000	135,000	55.00	39.00	0.430	0
ASTM A 194 Gr2H							
RNP-SA194-Gr2H-SR-NUT-011	Rc 26	N/R2	N/R2	N/R2	N/R2	0.460	N
RNP-SA194-Gr2H-SR-NUT-012	Rc 29	N/R2	N/R2	N/R2	N/R2	0.420	N
RNP-A194-Gr2H-SR-NUT-014	Rc 30	N/R2	N/R2	N/R2	N/R2	0.470	N
RNP-A194-Gr2H-SR-NUT-017	Rc 29	N/R2	N/R2	N/R2	N/R2	0.440	N
RNP-A194-Gr2H-SR-NUT-019	Rc 31	N/R2	N/R2	N/R2	N/R2	0.440	N



# CHEMICAL ANALYSIS

	EL	C	Mn	P	S	Si	Cr	Ni	Mo	Other	
	N/R2	0.069	1.67	0.035	0.021	0.67	18.53	8.28	N/R		
	N/R	0.061	1.66	0.029	0.013	1.00	17.11	11.66	2.19		
0	51.00	0.057	1.69	0.037	0.010	0.69	17.80	12.66	2.39	N 0.026	
0	22.00	N/R	N/R	0.028	0.012	N/R	N/R	N/R	N/R		
0	25.00	N/R	N/R	0.021	0.016	N/R	N/R	N/R	N/R		
	N/R	0.390	0.62	0.027	0.030	N/R	N/R	N/R	N/R	***	
	N/R	0.460	0.70	0.014	0.025	N/R	N/R	N/R	N/R		
0	28.00	0.026	0.47	0.009	0.001	0.25	15.14	25.81	1.31	Ti 2.00 V 0.38	Al 0.1 B 0.00
	N/R	0.450	N/R	0.007	0.020	N/R	N/R	N/R	N/R		
	N/R	0.450	N/R	0.007	0.020	N/R	N/R	N/R	N/R		

# CHEMICAL ANALYSIS

	EL	C	Mn	P	S	Si	Cr	Ni	Mo	Other
	N/R2	0.320	0.71	0.020	0.010	N/D	N/D	N/D	N/D	
	N/R2	0.410	0.85	0.011	0.007	0.19	0.87	N/D	0.18	V .043
	N/R2	0.310	0.72	0.026	0.013	N/D	N/D	N/D	N/D	
	N/R2	0.390	1.38	0.016	0.014	N/D	N/D	N/D	N/D	
	N/R2	0.320	0.70	0.021	0.014	N/D	N/D	N/D	N/D	
	N/R2	0.400	0.91	0.009	0.012	N/D	N/D	N/D	N/D	
	N/R2	0.310	0.79	0.021	0.014	N/D	N/D	N/D	N/D	
	N/R2	0.420	0.69	0.017	0.007	0.20	N/D	N/D	N/D	
	N/R2	0.120	0.44	0.022	0.016	N/D	N/D	N/D	N/D	
	N/R2	0.460	0.56	0.018	0.024	0.14	N/D	N/D	N/D	
	N/R2	0.190	0.78	0.028	0.014	N/D	N/D	N/D	N/D	
	N/R2	0.280	0.68	0.020	0.024	N/D	N/D	N/D	N/D	
	N/R2	0.440	0.65	0.017	0.006	0.20	N/D	N/D	N/D	
	N/R2	0.071	0.43	0.019	0.013	N/D	N/D	N/D	N/D	
	N/R2	0.027	0.30	0.009	0.010	N/D	N/D	N/D	N/D	
	N/R2	0.150	0.32	0.019	0.017	N/D	N/D	N/D	N/D	
	N/R2	0.079	0.33	0.016	0.015	N/D	N/D	N/D	N/D	
0	45.00	0.220	1.43	0.030	0.011	0.53	17.28	10.34	2.12	
0	30.00	0.037	1.56	0.029	0.024	0.55	17.69	11.16	2.21	
0	87.00	0.020	1.93	0.026	0.025	0.67	17.77	13.06	2.29	
	**	0.060	1.88	0.029	0.022	0.52	17.83	13.98	2.24	
0	29.00	0.024	1.72	0.033	0.014	0.69	17.65	11.65	2.20	

A-% REDUCTION OF AREA;  
ILFUR; Si-SILICON;  
NUM; V-VANADIUM;

TABLE 2

HBR-2 FASTENER SUPPLIER AND MANUFACTURER  
NAMES AND ADDRESSES

Sample Nos.	RNP-SA193-GrB16-SR-STUD-003 RNP-A193-GrB8M-SR-CAP-004 RNP-A307-GrA-SR-CAP-008 RNP-SA563-GrC-SR-NUT-015 RNP-SA563-GrC-SR-NUT-018 RNP-A194-GrB8M-SR-NUT-013 RNP-A194-Gr2H-SR-NUT-017	
Vendor:	Texas Bolt Company	P. O. Box 1211 Houston, TX 77251
Manufacturer:	Not Available	
Sample Nos.	RNP-A276-TYPE 316-SR-CAP-007	
Vendor:	Bolts and Nuts, Inc.	Asheville, NC
Manufacturer:	Bell Fasteners Corp.	Paramus, NJ
Sample Nos.	RNP-SA194-GrB8-SR-NUT-016	
Vendor:	Power & Engineered Products	South Plainfield, NJ
Manufacturer:	Standard Nut & Bolt	Cumberland, RI
Sample Nos.	RNP-SA453-Gr660-CLA-SR-Bolt-002	
Vendor:	Westinghouse NSID	Pittsburgh, PA
Manufacturer:	Southern Bolt	Shreveport, LA
Sample Nos.	RNP-A194-Gr24-SR-NUT-019 RNP-A193-GrB7-NSR-CAP-022	
Vendor:	Mackson, Inc.	Charlotte, NC
Manufacturer:	Not Available	

Sample Nos. RNP-SA194-Gr2H-SR-NUT-011  
RNP-A194-Gr24-SR-NUT-014  
RNP-A325-TYPE 1-SR-BOLT-009  
RNP-SA325-TYPE 1-SR-BOLT-001

Vendor: Mackson, Inc. Charlotte, NC

Manufacturer: Texas Bolt Company P. O. Box 1211  
Houston, TX 77251

Sample Nos. RNP-SA193-GrB8-SR-CAP-006  
RNP-SR-STUD-045  
RNP-SR-CAP-049

Vendor: KG Lilly Fasteners, Inc. P. O. Box 1878  
Shelby, NC

Manufacturer: Not Available

Sample Nos. RNP-A193-GrB7-SR-CAP-010A

Vendor: Ronson Manufacturing, Inc. 1491 E. 363rd. St.  
East Lake, OH 44094

Manufacturer: E M Jorgensen Company

Sample Nos. RNP-A307-SR-CAP-005

Vendor: Ebasco Services, Inc. Norcross, GA

Manufacturer: Fasteners of Georgia, Inc. Atlanta, GA

Sample Nos. RNP-SA194-Gr2H-SR-NUT-012  
RNP-A193-GrB7-SR-STOCK-010B  
RNP-NSR-NUT-031

Vendor: Mackon, Inc. Charlotte, NC

Manufacturer: A & G Engineering Company 4640 E. La Palma Ave.  
Anaheim, CA

Sample Nos. RNP-Gr5-NSR-NUT-039  
RNP-Gr5-NSR-NUT-040  
RNP-Gr5-NSR-NUT-032  
RNP-NSR-STUD-024  
RNP-Gr5-NSR-CAP-025  
RNP-Gr5-NSR-CAP-026  
RNP-Gr5-NSR-CAP-027  
RNP-Gr5-NSR-STUD-028  
RNP-Gr5-NSR-CAP-029  
RNP-Gr5-NSR-CAP-023  
RNP-NSR-NUT-033  
RNP-Gr5-NSR-NUT-034  
RNP-Gr5-NSR-NUT-035  
RNP-NSR-NUT-036  
RNP-Gr5-NSR-NUT-037  
RNP-Gr5-NSR-NUT-038  
RNP-Gr5-NSR-NUT-039

Vendor: Bowman Distributing Company

Manufacturer: Not Available

Sample Nos. RNP-B7-NSR-STUD-021

Vendor: Schmidt Tool & Machine

Manufacturer: Not Available

Sample Nos. RNP-A193-GrB16-NSR-STOCK-030

Vendor: Southern Fasteners Company

Manufacturer: Not Available

Sample Nos. RNP-316SS-SR-CAP-051

Vendor: Albany Products Co.

3943 Chesapeake Dr.  
Charlotte, NC

Manufacturer: Not Available

Sample Nos. RNP-SR-CAP-043  
RNP-SR-CAP-048  
RNP-316SS-SR-CAP-053  
RNP-A193-GrB7-SR-STUD-054

Vendor: Falcon Metal Corp.

367 J W. Tremont Ave.  
Charlotte, NC

Manufacturer: Not Available

Sample Nos.	RNP-SR-CAP-052 RNP-SR-CAP-047 RNP-SR-CAP-042 RNP-SR-CAP-041	
Vendor:	K. G. Lilly Fasteners, Inc.	P. O. Box 1878 Shelby, NC
Manufacturer:	B & G Manufacturing Co., Inc.	3067 Unionville Pike Hatfield, PA
Sample Nos.	RNP-A193-GrB8M-SR-CAP-046	
Vendor:	Sure-Loc, Inc.	3346 Pelton St. Charlotte, NC
Manufacturer:	Pawtucket Fasteners, Inc.	327 Pine St. Pawtucket, RI
Sample Nos.	RNP-SR-STUD-044	
Vendor:	Velan Valve Corp.	Plattsburgh, NY
Manufacturer:	Not Available	
Sample Nos.	RNP-GrB-SR-CAP-050	
Vendor:	H. C. Warner, Inc.	4508 St. Andrews Rd. Suite 12 Columbia, SC
Manufacturer:	Carborundum	State Road 32 West Lebannon, IN