SSINS No.: 6820
OMB No.: 31500011
NRC Compliance
Bulletin 87-02

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

November 6, 1987

NRC COMPLIANCE BULLETIN NO. 87-02: FASTENER TESTING TO DETERMINE CONFORMANCE WITH APPLICABLE MATERIAL SPECIFICATIONS

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

The purpose of this bulletin is to request that licensees 1) review their receipt inspection requirements and internal controls for fasteners and 2) independently determine, through testing, whether fasteners (studs, bolts, cap screws and nuts) in stores at their facilities meet required mechanical and chemical specification requirements.

Description of Circumstances:

Over the past year, some NRC procurement inspections have included the collection and testing of a small sample of fasteners. This limited program was initiated in response to a concern by the Industrial Fastener Institute over the potential use of inferior fasteners in military and industrial applications, including nuclear power plants. The results of NRC testing of fasteners obtained from San Onofre, Palo Verde and Rancho Seco indicates that 11 out of the 32 fasteners tested do not meet specification requirements for mechanical and/or chemical properties. Nine of the nonconforming bolts from Palo Verde and San Onofre were out of specification based on chemistry. Five nonconforming bolts came from Palo Verde and were all marked as SAE Grade 8 but were actually found to be SAE Grade 8.2. The four nonconforming fasteners from San Onofre were slightly out of specification for nickel or chromium. Two bolts from Rancho Seco with ASTM A193 B7 head markings were determined to have an average ultimate tensile strength of approximately 55 ksi instead of the specified 125 ksi for ASTM A193 B7 bolting material. The chemical analysis of these bolts indicated that they were medium carbon steel material. Rancho Seco is still investigating the extent and safety significance of these substandard fasteners.

In a separate effort, Calvert Cliffs recently tested 1539 fasteners following their discovery that commercial grade fasteners had been used in safety-related applications. The test results indicated that 399 failed to meet specification requirements for mechanical and/or chemical properties. Based on evaluations performed by Calvert Cliffs, the fasteners which did not meet specification would have still fulfilled their safety function.

Actions to be Taken:

The results of the limited testing described above have demonstrated the need to obtain additional information on the adequacy of fasteners used in nuclear power plants.

Within 60 days from the receipt of this bulletin, licensees are requested to provide the following information concerning their receipt inspection and internal control procedures for fasteners and the results of independent testing of fasteners:

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.

2. Select a minimum sample of ten (10) non-safety 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.

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.

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 non-safety-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.

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 non-safety-related fasteners. For any fastener found out of specification, provide an evaluation of the safety significance including consideration of the most limiting application.

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

The written reports shall be submitted to the appropriate Regional Administrator under oath or affirmation under provisions of Section 182a, Atomic Energy Act of 1954, as amended. Also, the original copy of the cover letters and a copy of the reports shall be transmitted to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C., 20555 for reproduction and distribution.

This request for information was approved by the Office of Management and Budget under a blanket clearance number 31500011. Comments on burden and duplication may be directed to the Office of Management and Budget, Reports Management, Room 3208, New Executive Office Building, Washington, D.C., 20503.

If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: J. T. Conway, NRR
(301) 492-9740

E. T. Baker, NRR
(301) 492-4783

J. C. Harper, NRR
(301) 492-4143

Attachments:
1. Fastener Testing Data Sheet
2. Data Summary
3. List of Recently Issued Bulletins

Attachment 1

Fastener Testing Data Sheet

*Sample ID#

Fastener Description:

Description of Sample Stock Location:

Material Specification as Documented by Licensee Records:

Head Marking (Specification and Manufacturer):

**Class/Procurement Level:

General Plant Application (e.g., Pressure Boundary, Structural)

Vendor:

QA Requirements Imposed on Vendor:

Licensee Representative:

Signature _____ Date _____

*The sample ID# shall have a prefix that contains the licensee facility initials.

**If applicable, please provide an explanation for your classification system.

Attachment 2

Data Summary

	Mechanical Analysis			Chemical Analysis[1]						
ID#	Hardness	UTS	0.2% YS	C	Mn	P	S	Si	Mo	Cr

Note: UTS-ultimate tensile strength; YS-yield strength; C-carbon; Mn-Manganese; P-Phosphorous; S-Sulfur; Si-Silicon; Mo-Molybdenum; Cr - Chromium.

[1]The elements listed apply to ASTM A193 B7 or SA193 B7 material. The elements to be reported for other materials tested, shall conform to those reported in the applicable material specification. Properties found out of specification shall be noted with an asterisk.

Attachment 3
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LIST OF RECENTLY ISSUED
BULLETINS

Bulletin No.	Subject	Date of Issuance	Issued to
87-01	Thinning of Pipe Walls in Nuclear Power Plants	7/9/87	All licensees for nuclear power plants holding an OL or CP.
86-04	Defective Teletherapy Timer that May Not Terminate Dose	10/29/86	All NRC licensees authorized to use cobalt-60 teletherapy units.
86-03	Potential Failure of Multiple ECCS Pumps Due to Single Failure of Air-Operated Valve in Minimum Flow Recirculation Line	10/8/86	All facilities holding an OL or CP.
86-02	Static "O" Ring Differential Pressure Switches	7/18/86	All power reactor facilities holding an OL or CP.
86-01	Minimum Flow Logic Problems That Could Disable RHR Pumps	5/23/86	All GE BWR facilities holding an OL or CP.
85-03	Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings	11/15/85	All power reactor facilities holding an OL or CP.
85-02	Undervoltage Trip Attachments of Westinghouse DB-50 Type Reactor Trip Breakers	11/5/85	All power reactor facilities holding an OL or CP.
85-01	Steam Binding of Auxiliary Feedwater Pumps	10/29/85	Nuclear power facilities and CPs listed in Attachment 1 for action; all other nuclear power facilities for information.

OL = Operating License
CP = Construction Permit

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*SEE PREVIOUS CONCURRENCES

*VIB:DRIS:NRR	*VIB:DRIS:NRR	*VIB:DRIS:NRR	*AC:VIB:DRIS:NRR	*D:DRIS:NRR
JTConway	ETBaker	JCHarper	JStone	JPartlow
11/05/87	11/05/87	11/05/87	11/05/87	11/05/87
Tech Ed	C:OGCB:DOEA	D:DOEA:NRR		
AThomas	CBerlinger	CERossi		
11/ /87	11/ /87	11/ /87		

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JTConway	ETBaker	JCHarper	JStone	JPartlow
11/5 /87	11/5 /87	11/5 /87	11/5 /87	11/5 /87
Tech Ed	C:OGCB:DOEA	D:DOEA:NRR		
AThomas	CBerlinger	CERossi		
11/ /87	11/ /87	11/6 /87		