

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Bart D. Withers
President and
Chief Executive Officer

January 14, 1988

WM 88-0009

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

Mr. R. D. Martin, Regional Administrator
U. S. Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

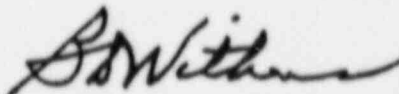
Subject: Docket No. 50-482: Response to NRC Bulletin 87-02

Gentlemen:

The purpose of this letter is to transmit a response to NRC Compliance Bulletin No. 87-02, "Fastener Testing To Determine Conformance With Applicable Material Specifications", for Wolf Creek Generating Station (WCGS), Unit No.1. Bulletin 87-02 requested NRC licensees to 1) review their receipt inspection requirements and internal controls for fasteners and 2) independently determine, through testing, whether fasteners in stores at their facilities meet required mechanical and chemical specification requirements. The attachment to this letter provides the information requested by the bulletin.

If you have any questions concerning this matter, please contact me or Mr. O. L. Maynard of my staff.

Very truly yours,



Bart D. Withers
President and
Chief Executive Officer

BDW/skw

Attachment:

cc: B. L. Bartlett (NRC)
P. W. O'Connor (NRC), 2

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PDR ADOCK 05000482
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STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Bart D. Withers, of lawful age, being first duly sworn upon oath says that he is President and Chief Executive Officer of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the content thereof; that he has executed that same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By *B. Withers*
Bart D. Withers
President and Chief Executive Officer

SUBSCRIBED and sworn to before me this 14 day of January, 1988.

Marlene Beachman
Notary Public

Expiration Date August 4, 1990



Response To NRC Compliance Bulletin 87-02

I. Introduction

On November 6, 1987, the Nuclear Regulatory Commission (NRC) issued NRC Compliance Bulletin 87-02, 'Fastener Testing To Determine Conformance With Applicable Material Specifications'. This bulletin was issued as a result of a limited testing program initiated by the NRC due to a concern over the potential use of inferior fasteners which demonstrated the need to obtain additional information on the adequacy of fasteners used in nuclear power plants.

The information requested concerns receipt inspection and internal control procedures for fasteners and the results of independent testing of fasteners. The bulletin requested six specific actions to be taken which are individually answered in Section II of this response. Section III of this response includes a summary of the data taken during the fastener testing.

II. Response To Actions Requested To Be Taken

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.
 - a) Quality Control (QC) receiving activities are controlled by procedure QCP 7.1, 'Receipt Inspection'. The purchase order identifies the applicable material specification, i.e. ASTM or ASME designation. During the receipt inspection process the QC Inspector reviews the applicable ASTM/ASME specification to identify the marking criteria that is required. Other attributes routinely verified include correct size, grade, and thread pitch.

Certified Material Test Reports are reviewed to verify chemical and physical test results are in compliance with the applicable material specification, and that they are traceable to the material received. Any additional testing that is invoked by the purchase order (additional ASME Section III requirements, or supplemental testing) is reviewed for acceptance to the specified criteria. Certificates of Conformance/Compliance (C of C) are reviewed for traceability to the items received. C of C's are reviewed to verify the correct certification statement is made as required by the purchase order. ASME certificates of compliance are reviewed to ensure compliance to the purchase order and ASME Section III requirements.

- b) Internal controls on materials utilized during storage and issuance from stock are described in procedures KP-2122, "Material and Services Receipt", KP-2123, "Material Storage and Handling", and KP-2124, "Material Issue".

Material is stored in such a manner as to provide ready access to items for inspection and to minimize the necessity for excessive handling and the risk of damage. Access control has been established in the warehouse facilities as a precaution against theft, vandalism, or misappropriation of materials. A quarterly inspection of designated material storage areas is performed and documented to assure that the integrity of stored items and containers is being maintained. Some of the characteristics and conditions verified during this inspection are as follows:

- Procedure conformance to assure adequacy of access control
- Signs of physical damage, corrosion or other deterioration of stored items.
- General housekeeping and cleanliness of storage areas. Report any signs of use of food, drink, tobacco or other potentially contaminating material.
- Adequacy of protection from fire, weather, movement of equipment and other factors which may result in damage to stored items.
- All items are clearly marked and identified.
- All protective covers and seals are in place and intact.

Identity and traceability of items are maintained in storage by use of WCNOG assigned material code numbers and lot numbers. Lot numbers provide traceability between the items and the records for the items. During storage, safety-related and non-safety-related items are divided and stored separately. Description of items maintained in storage is provided via a warehouse database. This database is utilized to select the correct item for a given plant application.

To control material during issuance from stock, the requestor must prepare a Requisition On Stores (ROS), which provides the material code number and other information to adequately describe the item(s) requested and its intended use. This information includes the Plant Modification Request, or Work Request number controlling the use or installation of the requested item. The name and number of the equipment for which the requested item will be used is also included. The requestor then obtains an approval signature and date from an authorized individual who is cognizant of where the material, item, or part is to be used or installed. A list of personnel authorized to approve an ROS is maintained by Purchasing and Material Services. After the approval is received, the requestor gives the ROS to Material Control for completion of the form and fulfillment of the requisition. Once the material is issued from stock, the requisitioning organization is responsible for assuring appropriate use.

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; Types 1, 2, or 3; A-354 grades BB, BC, BD; A-490; A-320 LTM; A-307; A-563; or equivalent.

A sample of 10 safety-related fasteners and 10 non-safety-related fasteners were selected on December 8, 1987. These samples were taken with the participation of D. E. Norman, NRC Region IV inspector, and B. L. Bartlett, NRC Resident Inspector.

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.

At the same time the fastener samples were taken, a sample of nuts that would be used with each fastener was also taken. The NRC inspectors also participated in this selection process.

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 identification (ID) number.

Prior to shipment, the samples were uniquely identified in accordance with existing WCGS procedures. Samples were tagged with ID numbers WCGS-SP-039 thru WCGS-SP-078. Samples were then taken to Metlab Testing Services, Inc., in Tulsa, Oklahoma, for testing which was performed during the week of December 14, 1987. Metlab is a qualified laboratory for this type of testing and is on the Wolf Creek Nuclear Operating Corporation (WCNOC) qualified suppliers list. The testing requirements of Bulletin 87-02 were conveyed to Metlab by a WCNOC purchase order and all testing was witnessed by a WCNOC Supplier Quality Representative.

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.

Test results were provided by Metlab which meet the requirements of Bulletin 87-02. Test results were reviewed by WCNOC's Quality Engineering group and found to be in full compliance with specified requirements. Data sheets containing information requested by the bulletin are included in Section III of this response.

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.

At this time, no further action is warranted based on the acceptable testing results received from Metlab and the results of the review of current procedures by WCNOG and D. E. Norman of NRC Region IV.

III. Summary Of Data From Tests Performed For Bulletin 87-02

As stated in Section II of this response, test results of samples sent to Metlab were reviewed by WCNOG and found to be in compliance with specified requirements. Data sheets were then prepared containing the information required by the bulletin and are being included for NRC review. The suggested data sheets in Bulletin 87-02 requested a description of the procurement level used to procure the subject fasteners. Rather than adding it to each individual data sheet, the description of the procurement level used for the fasteners is generically discussed here.

The fasteners selected for sampling were designated for use in safety-related applications and procured as safety-related/Level IV. As safety-related/Level IV, the following requirements apply:

- a. Items are simple and standard in design and are typically "off the shelf" items.
- b. Supplier is qualified and on the qualified suppliers list based on WCNOG Supplier Quality approval of a 10 CFR 50 Appendix B Quality Program.
- c. 10 CFR 21 provisions are invoked in the purchase order.
- d. Item acceptance is based on supplier certification and receipt inspection.

Fastener Testing Data Sheet

Sample ID# WCGS-SP-039

Fastener Description: 7/8" - UNC Nut Gr 6

Description of Sample Stock Location: Whse 01 B3290603C

Material Specification as Documented by Licensee Records: SA194 Gr 6

Head Marking (Specification and Manufacturer): 6CF

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundry

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS


Hardness: C22, C23

CHEMICAL ANALYSIS

C: .14
Mn: .73
P: .023
S: .009
Si: .33
Cr: 11.50
Ni: .34

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-040

Fastener Description: 1" UNC x 6 Stud B7

Description of Sample Stock Location: Whse 01 B3450503E

Material Specification as Documented by Licensee Records: SA-193 Gr B7

Head Marking (Specification and Manufacturer): C B7 K10

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundry

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Ultimate Tensile: 143,401

Yield Strength: 131,455

Elongation: 21%

Reduction of Area: 61.9%

CHEMICAL ANALYSIS

C: .40

Mn: .83

P: .012

S: .014


Si: .24

Cr: 1.08

Mo: .25

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-041

Fastener Description: 1" UNC Nut Gr 2H

Description of Sample Stock Location: Whse 01 B3290301

Material Specification as Documented by Licensee Records: SA-194 Gr 2H

Head Marking (Specification and Manufacturer): D, DH, 2H, A8, C

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundry

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: C25, C26

CHEMICAL ANALYSIS

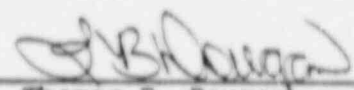
C: .40

P: .013

S: .016

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-042

Fastener Description: 5/8 UNC x 6 Stud Gr 630

Description of Sample Stock Location: Whse 01 B1810805A

Material Specification as Documented by Licensee Records: SA-564 Gr 630

Head Marking (Specification and Manufacturer): C 630 H3

Class/Procurement Level: Safety-related/Procurement Level IV

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

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

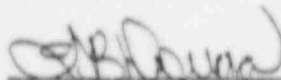
Hardness: C38, C39
Ultimate Tensile: 176,981
Yield Strength: 167,224
Elongation: 14%
Reduction of Area: 57.5%

CHEMICAL ANALYSIS

C: .02
Mn: .73
P: .018
S: .008
Si: .39
Cr: 15.76
Ni: 4.05
Cu: 3.26
Cb+Ta: .22

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Attachment to WM 88-0009

Page 10 of 45

Sample ID# WCGS-SP-043

Fastener Description: 5/8 UNC Nut Gr 6

Description of Sample Stock Location: Whse 01 B34440507C

Material Specification as Documented by Licensee Records: SA-194 Gr 6

Head Marking (Specification and Manufacturer): 6CF

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundry

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

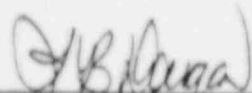
Hardness: C26, C22

CHEMICAL ANALYSIS

C: .14
Mn: .80
P: .026
S: .009
Si: .32
Cr: 11.50

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-044

Fastener Description: 1/2 UNC x 3 Stud B8

Description of Sample Stock Location: Whse 01 B28503040

Material Specification as Documented by Licensee Records: A193 B8

Head Marking (Specification and Manufacturer): HB B8

Class/Procurement Level: Nonsafety

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

Supplier: Mid States Supply
Box 192
Wichita, KS 67201

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

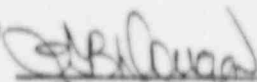
Hardness: B93, B94

CHEMICAL ANALYSIS

C: .06
Mn: .79
P: .023
S: .012
Si: .68
Cr: 18.70
Ni: 8.40

Licensee Representative:

Signature



Thomas B. Pougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-045

Fastener Description: 1/2 UNC Nut Gr B8

Description of Sample Stock Location: Whse 01 B28503040

Material Specification as Documented by Licensee Records: A-194 Gr B8

Head Marking (Specification and Manufacturer): (←) 8

Class/Procurement Level: Nonsafety

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

Pressure Boundry

Supplier: Mid States Supply
Box 192
Wichita, KS 67201

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: B98, B96

CHEMICAL ANALYSIS

C: .08
Mn: 1.63
P: .025
S: .016
Si: .29
Cr: 18.34
Ni: 8.25

Licensee Representative:

Signature



Thomas B. Dugan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-046

Fastener Description: 1/2 UNC x 3 Stud Gr B7

Description of Sample Stock Location: Whse 01 B3130407E

Material Specification as Documented by Licensee Records: A193

Head Marking (Specification and Manufacturer): T B7

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C28, C27

CHEMICAL ANALYSIS

C: .42

Mn: .93

P: .017

S: .022

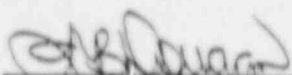
Si: .29

Cr: .89

Mo: .25

Licensee Representative:

Signature



Thomas B. Dugan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-047

Fastener Description: 1/2 UNC Nut Gr 2H

Description of Sample Stock Location: Whse 01 B3130407E

Material Specification as Documented by Licensee Records: A 194 Gr 2H

Head Marking (Specification and Manufacturer): 2H - T or 7

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C29, C29

CHEMICAL ANALYSIS

C: .41

P: .015

S: .020

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-048

Fastener Description: 1/2" UNC x 3 Stud Gr B7

Description of Sample Stock Location: Whse 01 B3280707A

Material Specification as Documented by Licensee Records: A 193-B7

Head Marking (Specification and Manufacturer): JB7 CRY

Class/Procurement Level: Nonsafety

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

Supplier: Kamen Supply
623 E. Murdock
Wichita, KS 67201

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS


Hardness: C24, C24

CHEMICAL ANALYSIS

C: .40
Mn: .80
P: .022
S: .016
Si: .25
Cr: 1.07
Mo: .21

Licensee Representative:

Signature



Thomas B. Dougen
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-049

Fastener Description: 1/2 UNC Nut Gr 2H

Description of Sample Stock Location: Whse 01 B3280707C

Material Specification as Documented by Licensee Records: A 194-2H

Head Marking (Specification and Manufacturer): U-2H S-2H

Class/Procurement Level: Nonsafety-related

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

Pressure Boundry

Supplier: Kamen Supply
623 E. Murdock
Wichita, KS 67201

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C28, C31

CHEMICAL ANALYSIS

C: .41

P: .019

S: .015

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-050

Fastener Description: 5/8 UNC x 6 Stud Gr B7

Description of Sample Stock Location: Whse 01 B3200206C

Material Specification as Documented by Licensee Records: A 193 Gr B7

Head Marking (Specification and Manufacturer): S B
B7 B7

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C25, C28

CHEMICAL ANALYSIS

C: .40
Mn: .86
P: .023
S: .015
Si: .28
Cr: 1.05
Mo: .19

Licensee Representative:

Signature



Thomas B. Douglas
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-051

Fastener Description: 5/8 UNC Nut Gr 2H

Description of Sample Stock Location: Whse 01 B3200206D

Material Specification as Documented by Licensee Records: A 194 Gr 2H

Head Marking (Specification and Manufacturer): 2) F-2H 1) S-2H

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C25, C27

CHEMICAL ANALYSIS

C: .47

P: .013

S: .021

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-052

Fastener Description: 7/8" UNC x 5-1/4 Stud Gr B7

Description of Sample Stock Location: Whse 01 B2820806L

Material Specification as Documented by Licensee Records: A 193 Gr B7

Head Marking (Specification and Manufacturer): B7 V TD

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C27, C30

CHEMICAL ANALYSIS

C: .39
Mn: .88
P: .014
S: .015
Si: .27
Cr: .96
Mo: .24

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-053

Fastener Description: 7/8 UNC Gr 2H Nut

Description of Sample Stock Location: Whse 01 B21300705H

Material Specification as Documented by Licensee Records: A 194 2H

Head Marking (Specification and Manufacturer):

2 ea v 2HB DD 1 ea 2HB V DD

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C26, C25

CHEMICAL ANALYSIS

C: .42

P: .014

S: .018

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-054

Fastener Description: 1 1/8-7 x 6 Gr 630

Description of Sample Stock Location: Whse 01 01200230

Material Specification as Documented by Licensee Records: A564 Gr 630

Head Marking (Specification and Manufacturer): H1100 \emptyset H

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS


Hardness: C33, C37

CHEMICAL ANALYSIS

C: .04
Mn: .47
P: .015
S: .016
Si: .45
Cu: 3.52
Ni: 4.20
Cr: 15.96
Cb+Ta: .33

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-055

Fastener Description: 1 1/8-7 Nut Gr B6

Description of Sample Stock Location: Whse 01 B2131003L

Material Specification as Documented by Licensee Records: A-194 Gr B6

Head Marking (Specification and Manufacturer): J6B

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS


Hardness: C25, C26

CHEMICAL ANALYSIS

C: .11
Mn: .41
P: .019
S: .011
Si: .45
Cr: 11.57

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-056

Fastener Description: 3/8-16 Nut Gr A

Description of Sample Stock Location: Whse 01 B10021609L

Material Specification as Documented by Licensee Records: A-563

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Nonsafety

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

Supplier: KC Bolt/Nut/Screw
1324 W. 12th
Kansas City, MO 64101

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: B83, B86

CHEMICAL ANALYSIS

C: .04

P: .018

S: .018

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-057

Fastener Description: 3/8-16 Nut Gr A

Description of Sample Stock Location: Whse 01 B10021609L

Material Specification as Documented by Licensee Records: A-563 Gr A

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Nonsafety

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

Structural - Scaffolding

Supplier: BOSCO Fastening
5801 Front St.
Kansas City, MO 64120

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: B86, B84

CHEMICAL ANALYSIS


C: .08

P: .024

S: .015

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-058

Fastener Description: 3/8-16 x 2 1/2 Bolt Gr A

Description of Sample Stock Location: Whse 01 B10021610K

Material Specification as Documented by Licensee Records: A 307

Head Marking (Specification and Manufacturer): None - No Mfg Marking

Class/Procurement Level: Nonsafety

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

Structural - Scaffolding

Supplier: KC Bolt/Nut/Screw
1324 W. 12th
Kansas City, MO 64101

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS


Hardness: B93, B92

CHEMICAL ANALYSIS

P: .015
S: .015

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-059

Fastener Description: 5/8-11 x 2 Bolt Gr B

Description of Sample Stock Location: Whse 01 B3450403I

Material Specification as Documented by Licensee Records: A 307 Gr B

Head Marking (Specification and Manufacturer): C

Class/Procurement Level: Safety-related/Procurement Level IV

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

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: B91.4, B93

Ultimate Tensile: 78,407


CHEMICAL ANALYSIS

P: .013

S: .011

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-060

Fastener Description: 5/8-11 Nut Gr B

Description of Sample Stock Location: Whse 01 B3450403I

Material Specification as Documented by Licensee Records: A 563 Gr B

Head Marking (Specification and Manufacturer): C 12

Class/Procurement Level: Safety-related/Procurement Level IV

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

Structural

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: B95, B95

CHEMICAL ANALYSIS


C: .06

P: .015

S: .016

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-061

Fastener Description: 3/8-16 1 1/2 Bolt Gr A

Description of Sample Stock Location: Whse 01 B1820206D

Material Specification as Documented by Licensee Records: A 307 Gr A

Head Marking (Specification and Manufacturer): None No Mfg Marking

Class/Procurement Level: Nonsafety

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

Structural

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

* MECHANICAL ANALYSIS

Hardness: B92, B93

CHEMICAL ANALYSIS

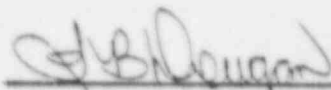
P: .029

S: .017

*Only mechanical test required for bolts which are too short or have insufficient thread length for full size testing in accordance with ASTM A 307, para. 4.1.

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-062

Fastener Description: 1/4-20 x 2 1/4 Bolt Gr A

Description of Sample Stock Location: Whse 01 B1820206H

Material Specification as Documented by Licensee Records: A 307 Gr A

Head Marking (Specification and Manufacturer): \wedge or \vee

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: B95, B99


CHEMICAL ANALYSIS

P: .015

S: .027

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-063

Fastener Description: 1/4-20 Nut Gr A

Description of Sample Stock Location: Whse 01 B1821/206H

Material Specification as Documented by Licensee Records: A 563

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: B91, B87

CHEMICAL ANALYSIS

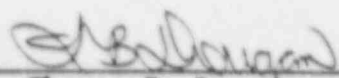
C: .07

P: .012

S: .034

Licensee Representative:

Signature



Thomas B. Dougah
Quality Engineering

Date

1-5-88

Sample ID# WGS-SP-064

Fastener Description: 7/8-9 x 2 3/4 Bolt Type 1

Description of Sample Stock Location: Whse 01 R1431101

Material Specification as Documented by Licensee Records: A-325 Type 1

Head Marking (Specification and Manufacturer): A-325 C-M1

Class/Procurement Level: Safety-related/Procurement Level IV

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

Structural

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: C24, C24.5

Ultimate Tensile: 137,229

CHEMICAL ANALYSIS

C: .30


Mn: .88

P: .015

Si: .016

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-065

Fastener Description: 7/8-9 Nut Gr C

Description of Sample Stock Location: Whse 01 R1431101

Material Specification as Documented by Licensee Records: A 563 Gr C

Head Marking (Specification and Manufacturer): D DH 2H C AB

Class/Procurement Level: Safety-related/Procurement Level IV

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

Structural

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: C26, C28

CHEMICAL ANALYSIS


C: .37

P: .017

S: .014

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-066

Fastener Description: 3/4-10 x 4 Bolt Type 1

Description of Sample Stock Location: Whse 01 B1810504K

Material Specification as Documented by Licensee Records: A 325-Type 1

Head Marking (Specification and Manufacturer): A 325 NKYM

Class/Procurement Level: Safety-related/Procurement Level IV

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

Structural

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: C26.2, C29.5

Ultimate Tensile: 152,665

CHEMICAL ANALYSIS

C: .31


Mn: .79

P: .016

S: .014

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-067

Fastener Description: 3/4-10 Nut Gr 2H

Description of Sample Stock Location: Whse 01 B1810504K

Material Specification as Documented by Licensee Records: A 194-2H

Head Marking (Specification and Manufacturer): 2H D DH 1 C

Class/Procurement Level: Safety-related/Procurement Level IV

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

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B program

MECHANICAL ANALYSIS

Hardness: C26, C27

CHEMICAL ANALYSIS

C: .40

P: .023

S: .015

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-068

Fastener Description: 1" - 9 x 4 Bolt Type 1

Description of Sample Stock Location: Whse 01 B160807L

Material Specification as Documented by Licensee Records: A 325

Head Marking (Specification and Manufacturer): \triangle A325

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: C25, C25

CHEMICAL ANALYSIS

C: .33


Mn: .30

P: .014

S: .010

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Fastener Testing Data Sheet

Sample ID# WCGS-SP-069

Fastener Description: 1" - 9 Nut Gr C

Description of Sample Stock Location: Whse 01 B2131004D

Material Specification as Documented by Licensee Records: A-563

Head Marking (Specification and Manufacturer): F \triangle 2H

Class/Procurement Level: Nonsafety

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

Supplier: Unknown

Manufacturer: Unknown

QA Requirements Imposed on Vendor: None

MECHANICAL ANALYSIS

Hardness: B99, B99

CHEMICAL ANALYSIS

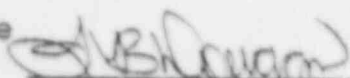
C: .44

P: .014

S: .019

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WQJS-SP-070

Fastener Description: 1" - 8 x 2 1/2 Bolt

Description of Sample Stock Location: Whse 01 B1810602

Material Specification as Documented by Licensee Records: A-490

Head Marking (Specification and Manufacturer): A 490 TB

Class/Procurement Level: Safety-related/Procurement Level IV

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

Structural

Supplier: A&G Engineering Co.
4640 E. Lapalma Ave.
Anaheim, CA 92807

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

QA Requirements Imposed on Vendor: Appendix B Program

* MECHANICAL ANALYSIS

Hardness: C36, C34.5

*Bolts too short for tension testing
shall only have hardness testing as
required by para. 5.1 of ASTM A-490.

CHEMICAL ANALYSIS

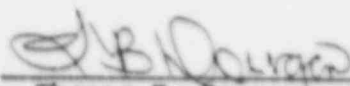
C: .43

P: .018

S: .014

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-071

Fastener Description: 1" - 8 Nut Gr 2H

Description of Sample Stock Location: Whse 01 R1430601

Material Specification as Documented by Licensee Records: A-194 Gr 2H

Head Marking (Specification and Manufacturer): 2H - "A"

Class/Procurement Level: Safety-related/Procurement Level IV

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

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

Hardness: C27, C25

CHEMICAL ANALYSIS

C: .40

P: .015

S: .014

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date


1-5-88

Sample ID# WCGS-SP-072

Fastener Description: 5/16 - 18 x 1 1/2 HHCS

Description of Sample Stock Location: Whse 01 B14509060

Material Specification as Documented by Licensee Records: A 449

Head Marking (Specification and Manufacturer): LE 

Class/Procurement Level: Safety-related/Procurement Level IV

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

General Stock

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

Hardness: C25.5, C26

Ultimate Tensile: 131,679

CHEMICAL ANALYSIS

C: .41


Mn: 1.53

P: .017

S: .018

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-073

Fastener Description: 5/16 - 18 Nut Gr A

Description of Sample Stock Location: Whse 01 B1291303P

Material Specification as Documented by Licensee Records: A 563 Gr A

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Safety-related/Procurement Level IV

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

General Bolting

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

Hardness: B81, B82

CHEMICAL ANALYSIS

C: .03

P: .019

S: .019

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date


1-5-88

Sample ID# WCGS-SP-074

Fastener Description: 1/2 - 13 x 1 1/2 HHCS

Description of Sample Stock Location: Whse 01 B1450905L

Material Specification as Documented by Licensee Records: A 449

Head Marking (Specification and Manufacturer): KS 

Class/Procurement Level: Safety-related/Procurement Level IV

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

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

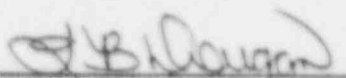
Hardness: C26, C27.5
Ultimate Tensile: 139,817

CHEMICAL ANALYSIS

C: .32
Mn: .72
P: .017
S: .019

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-075

Fastener Description: 1/2 - 13 Nut Gr A

Description of Sample Stock Location: Whse 01 B1291305D

Material Specification as Documented by Licensee Records: A 563-86 Gr A

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Safety-related/Procurement Level IV

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

General Bolting Stock

Supplier: Cardinal Industrial Products Manufacturer: Same
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

Hardness: B89, B90

CHEMICAL ANALYSIS

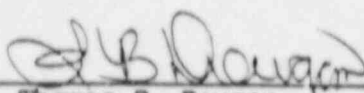
C: .05

P: .021

S: .012

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-076

Fastener Description: 3/4" UNC x 6 Stud B7

Description of Sample Stock Location: Whse 01 B3450502A

Material Specification as Documented by Licensee Records: SA-193 GR B7

Head Marking (Specification and Manufacturer): C B7 Y 14

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundary

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

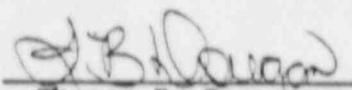
Yield Strength: 136,797
Ultimate Tensile: 144,910
Elongation: 17%
Reduction of Area: 61.2%

CHEMICAL ANALYSIS

C: .40
Mn: .79
P: .012
S: .018
Si: .29
Cr: 1.00
Mo: .20

Licensee Representative:

Signature


Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-077

Fastener Description: Nut - 3/4" UNC Gr 2H

Description of Sample Stock Location: Whse 01 B1290802L

Material Specification as Documented by Licensee Records: SA-194 GR 2H

Head Marking (Specification and Manufacturer): C 2H DH-1

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundary

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

Hardness: C27, C26

CHEMICAL ANALYSIS


C: .40

P: .028

S: .015

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88

Sample ID# WCGS-SP-078

Fastener Description: 7/8" UNC x 6 Stud Gr 630

Description of Sample Stock Location: Whse 01 B3480301I

Material Specification as Documented by Licensee Records: SA 564 GR 630

Head Marking (Specification and Manufacturer): C 630 HI

Class/Procurement Level: Safety-related/Procurement Level IV

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

Pressure Boundary

Supplier: HUB, Incorporated
2146 Flintstone Drive
Tucker, GA 30084

Manufacturer: Cardinal Industrial Products
3873 West Oquendo Road
Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Appendix B Program

MECHANICAL ANALYSIS

CHEMICAL ANALYSIS

Hardness: C34, C35

C: .01

Yield Strength: 161,914

Mn: .80

Ultimate Tensile: 162,831

P: .018

Elongation: 17%

S: .007

Reduction of Area: 62.6%

Si: .30

Impact Test: 75, 100, 71

Cu: 3.11

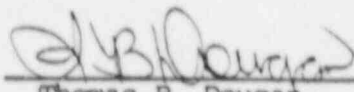
Ni: 3.66

Cr: 15.97

Cb+Ta: .20

Licensee Representative:

Signature



Thomas B. Dougan
Quality Engineering

Date

1-5-88