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SUBJECT: Responds to NRC Compliance Bulletin 87-002, "Fastener Testing to Determine Conformance w/Applicable Matl"							
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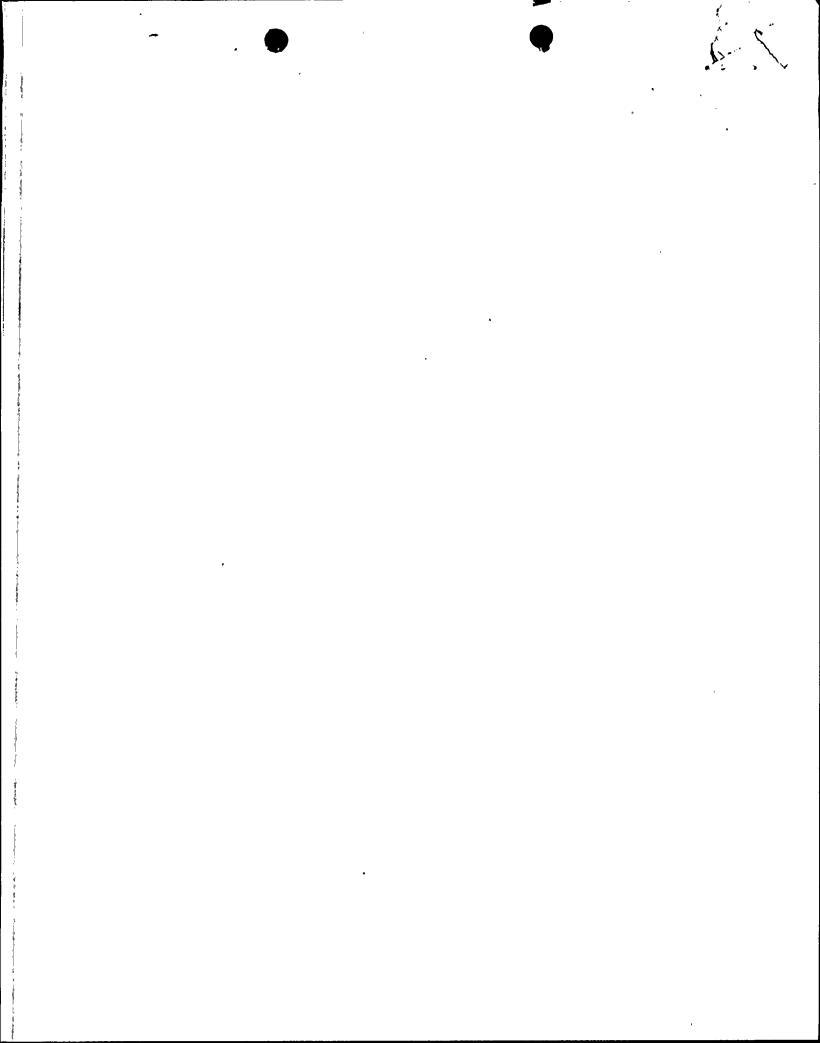
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Arizona Nuclear Power Project

P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

January 15, 1988 161-00746-EEVB/JBK

Docket Nos. STN 50-528/529/530

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

Dear Sir:

Subject: Palo Verde Nuclear Generating Station (PVNGS)

NRC Bulletin 87-02: Fastener Testing to Determine Conformance with Applicable Material Specifications

File: 88-055-026

The subject bulletin requested ANPP to review receipt requirements and internal controls for fasteners, and determine through testing if fasteners meet required mechanical and chemical material specifications.

Attached please find ANPP's response for each bulletin item.

If you have any questions or require additional information, do not hesitate to call.

Very truly yours,

E. E. Van Brunt, Jr. Executive Vice President

Project Director

EEVB/JBK/dlm
Attachment

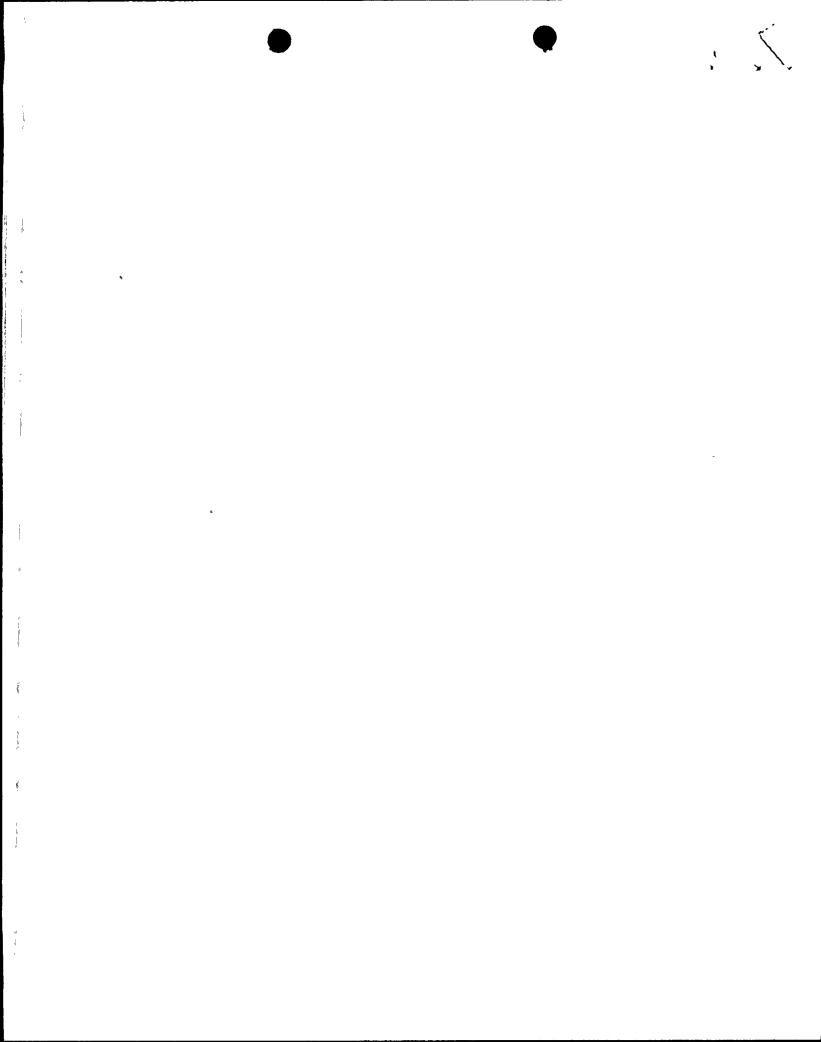
cc: O. M. De Michele (all w/a)

J. B. Martin

E. A. Licitra

A. C. Gehr

J. R. Ball



STATE OF ARIZONA) ss.

COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Executive Vice President Project Director of Arizona Nuclear Power Project, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Clubic County OF MARICOPA

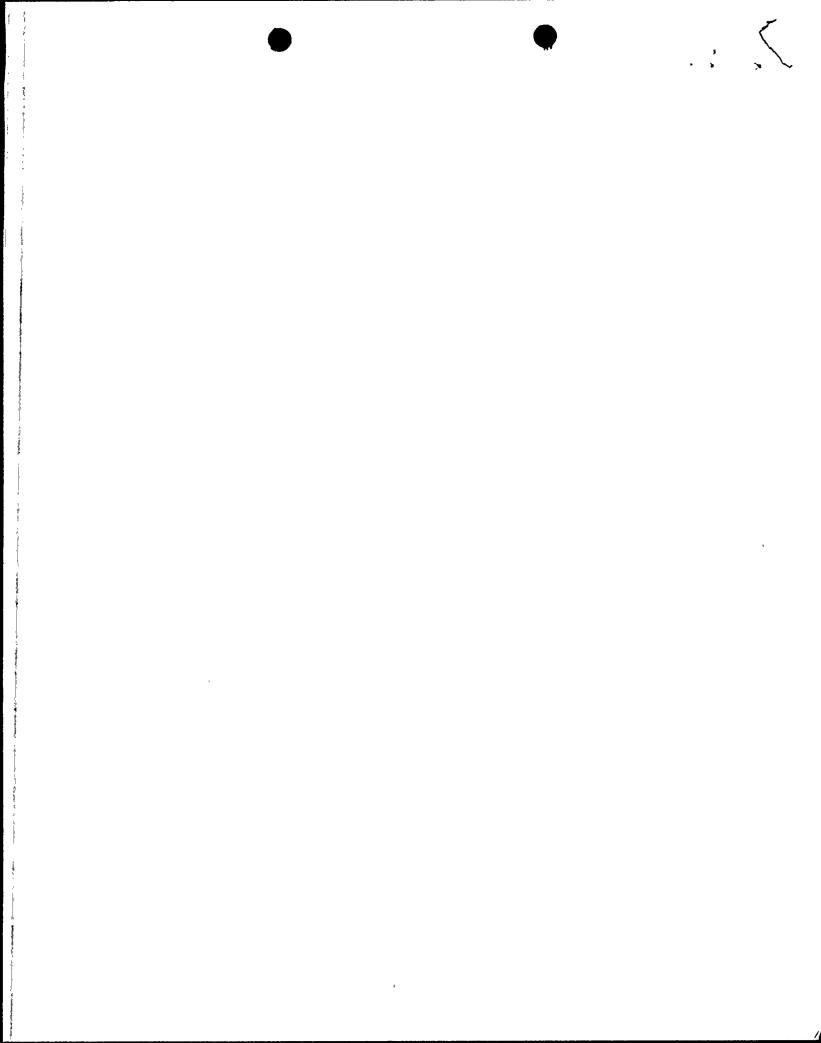
Edwin E. Van Brunt, Jr.

Sworn to before me this 15 day of Annahy, 1989: ... meaker 1/15/28

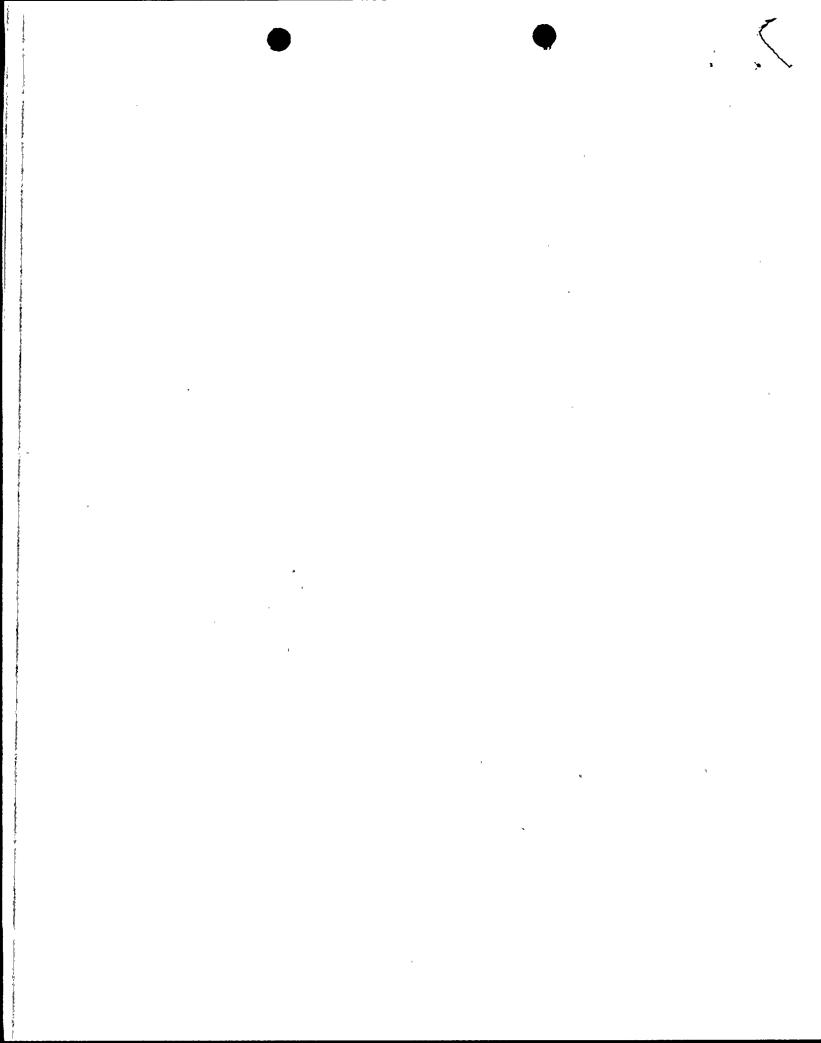
Out C. Meaker

Notary Public

My Commission Expires:



ATTACHMENT A ANPP RESPONSES TO BULLETIN ITEMS

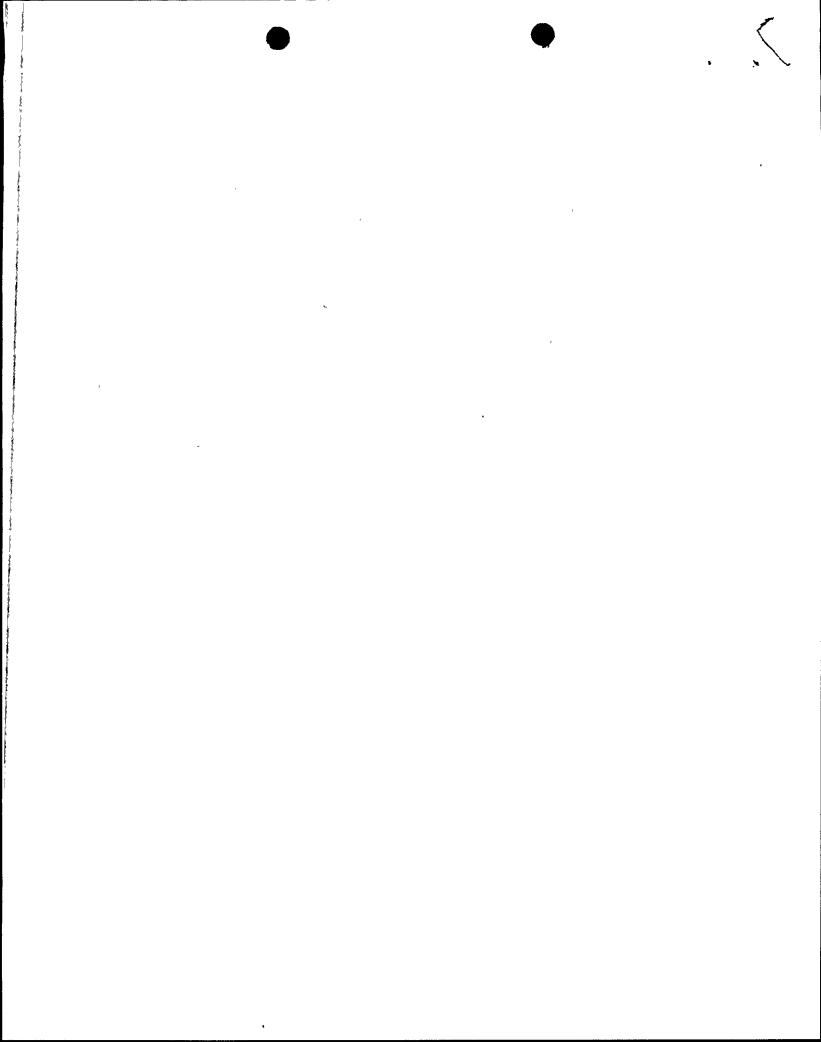


Within 60 days from the receipt of this bulletin, licensees are requested to provide the following information concerning their receipt inspection and internal control procedures for fasteners and the results of independent testing of fasteners:

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.

ANPP RESPONSE

- a) Fasteners are receipt inspected on a sample basis by Quality Control in accordance with ANPP department instructions and the Operations Quality Assurance Criteria Manual. Characteristics inspected during receipt inspection of fasteners typically include markings, size, number of threads per inch, plating, head type, Rockwell hardness, packaging and applicable documentation such as the certified material test report or certificate of conformance.
- b) Storage and issuance from stock of fasteners is controlled in accordance with ANPP procedures. Fasteners are tagged and stored in separate bins in a controlled access warehouse. Only material which has been receipt inspected and tagged with a Quality Control Item Tag by Quality Control can be issued from storage for usage as quality-related material. Additionally, all quality-related fasteners are presently re-verified by Quality Control prior to issuance.



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.

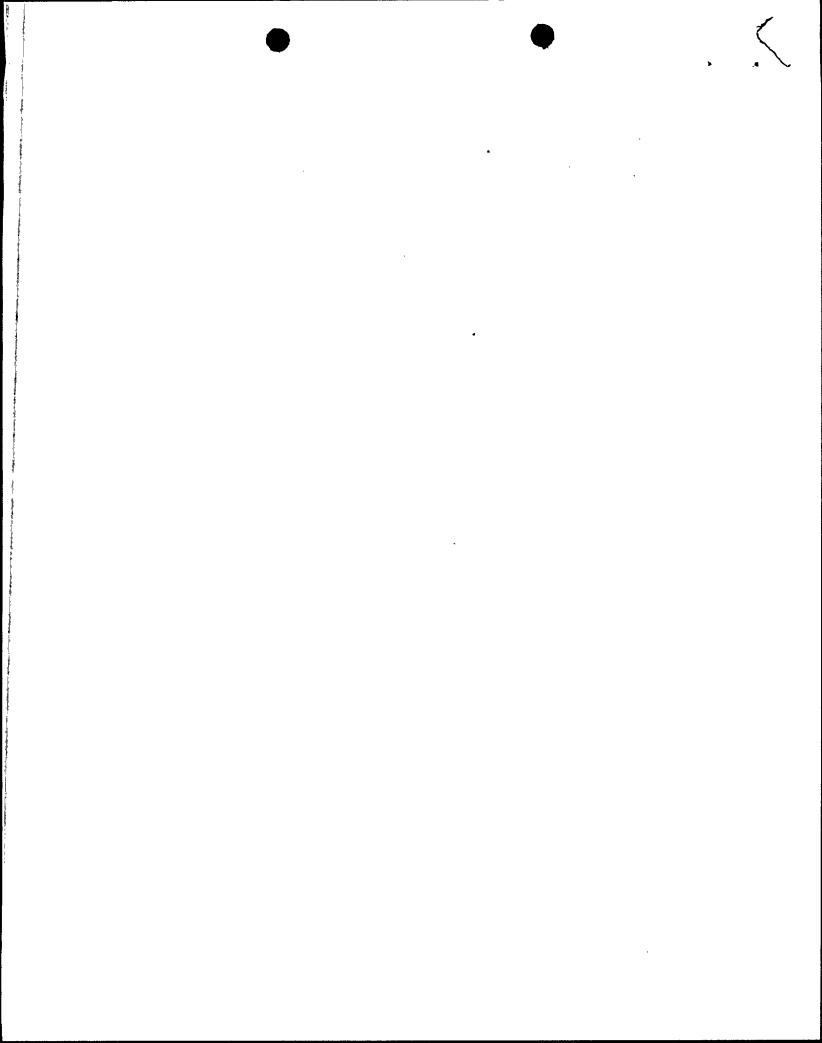
ANPP RESPONSE

Safety-related and nonsafety-related fasteners were selected from current, in use stock by ANPP with the participation of NRC Resident Inspector, Mr. Jay Ball.

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.

ANPP RESPONSE

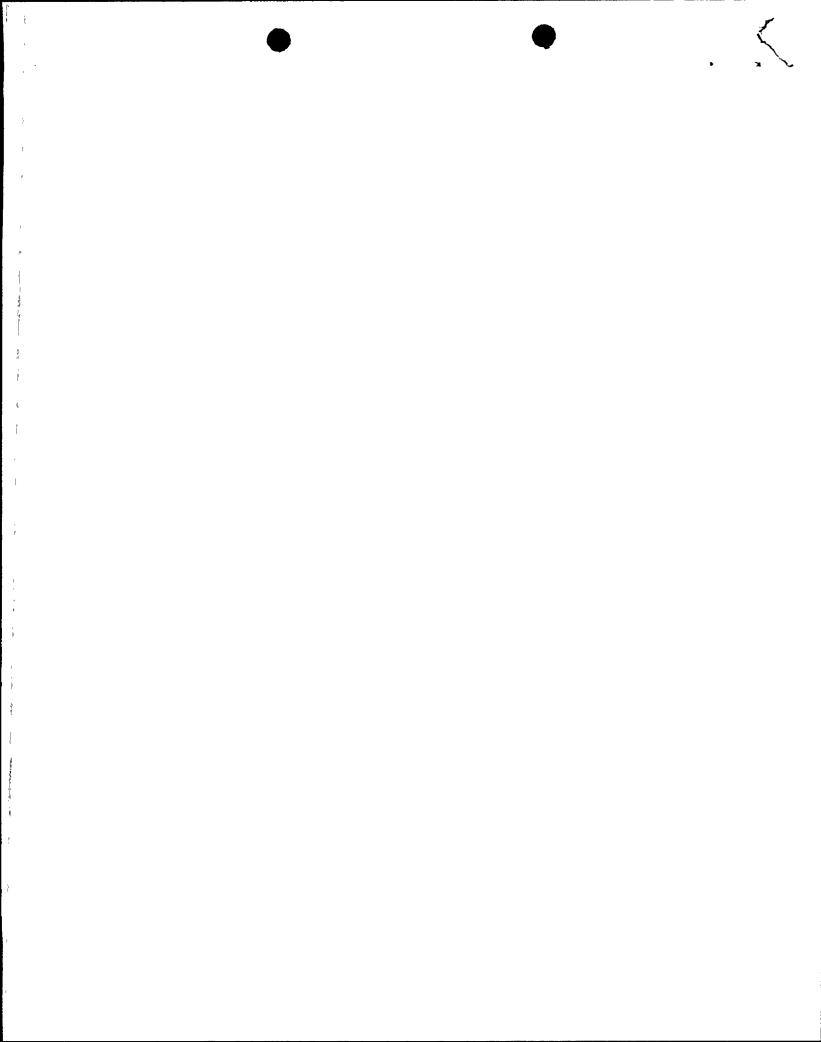
For the selected sample of fasteners in item 2, a sample of typical nuts were also chosen with some of the fasteners as indicated in Attachment B.



Chemical testing shall be performed on all Mechanical testing shall be performed on safety-related fastener. Hardness testing shall 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 requirements of the fastener's specification, grade, class, and the test shall evaluate the ultimate tensile strength, hardness and chemical properties as required by the fastener's specification, grade, and class. sample shall be tagged with the sample's ID number.

ANPP RESPONSE

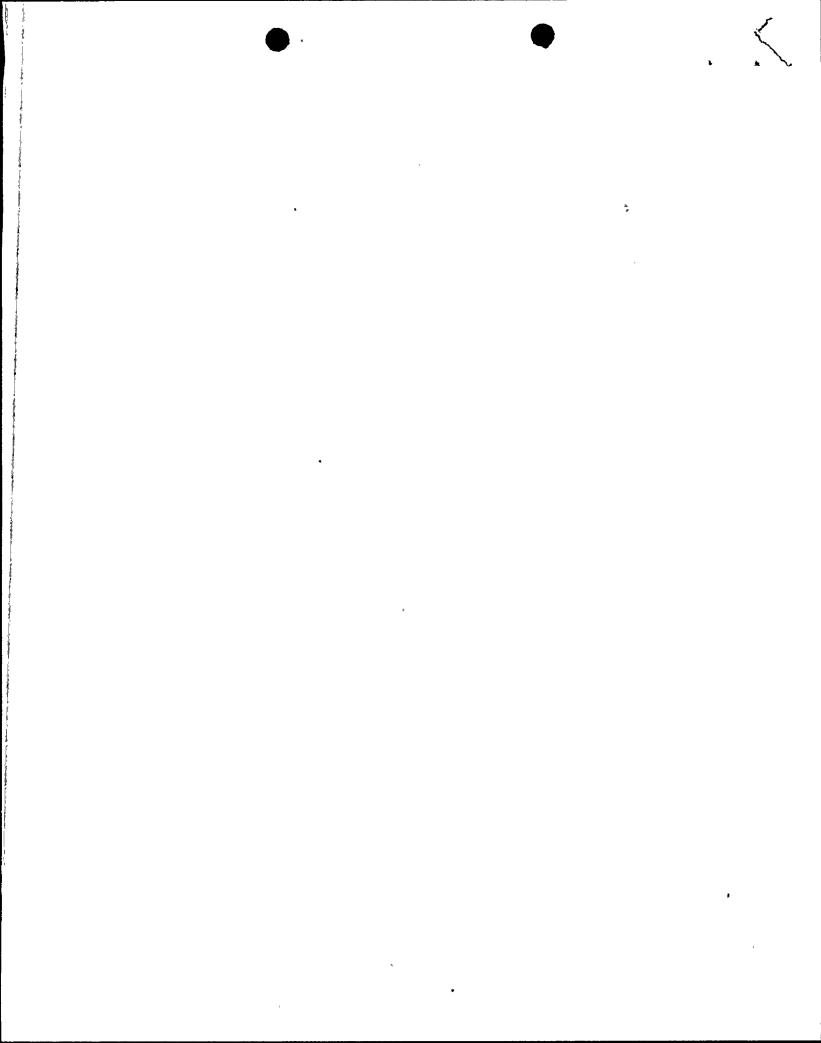
Testing of each selected safety-related and nonsafety-related fastener was performed by Metals Engineering and Testing Laboratories which appears on the ANPP approved vendor list. Each fastener's testing results are summarized in Attachment B.



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.

ANPP RESPONSE

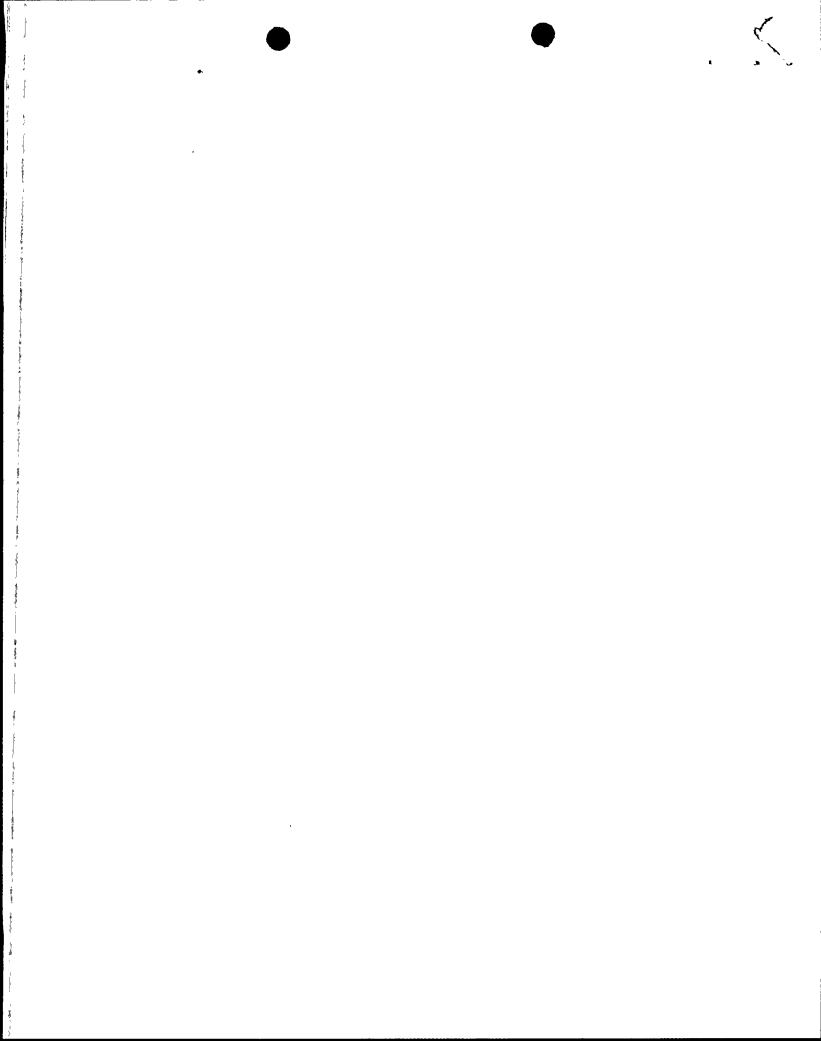
The results of the mechanical and chemical analysis for each selected safety-related and nonsafety-related fastener are summarized in Attachment B with detailed information specific to each selected fastener. The testing results do not reveal any fasteners which would adversely impact safety-related component operability.



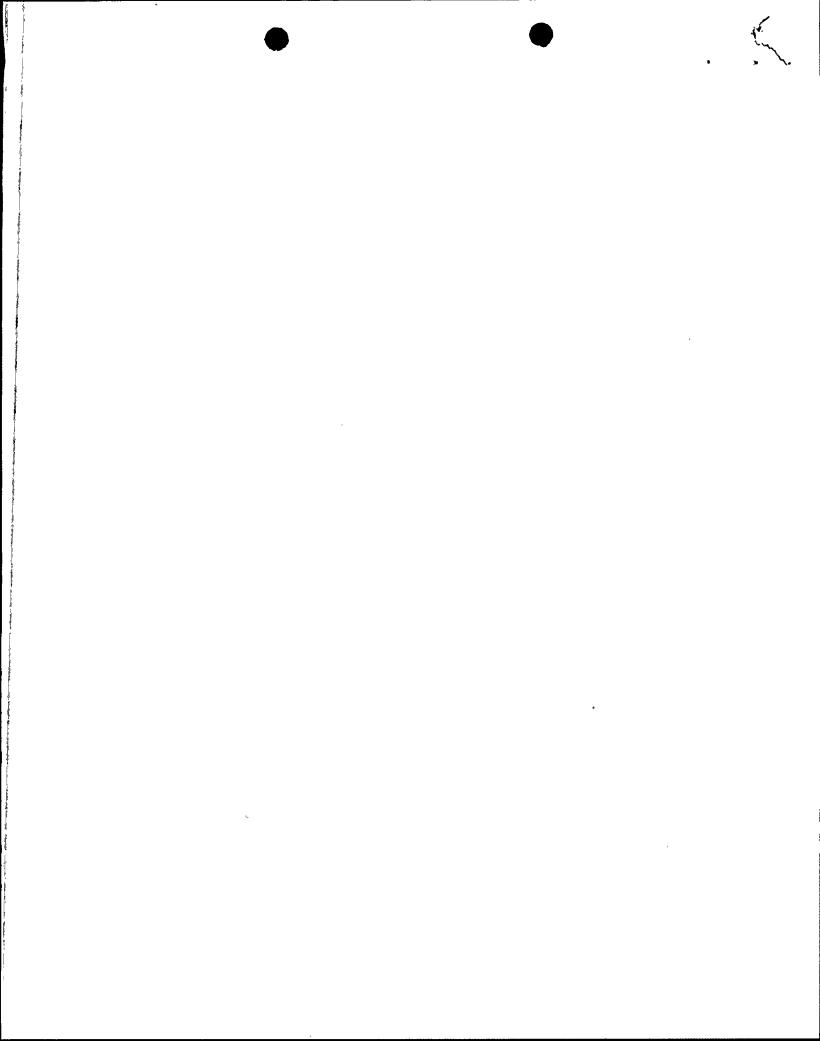
6. Based on the results of the testing and review of current procedures, describe any further actions being taken to assure that fasteners used in the plant meet the requisite specifications and requirements and that the operability of safety-related components is not affected.

ANPP RESPONSE

Present controls and procedures used by ANPP are considered to adequately ensure fasteners used in the plant meet requisite specifications and requirements. Additionally, the testing results do not reveal any fasteners which would adversely impact safety-related component operability.



ATTACHMENT B



Fastener Description: #1 Bolt, 3/8" - 16 x 1"

Material: Carbon Steel

Specification: ASTM-A-307-84, Grade B

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): BIS, Bethlehem

Steel Corp.

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive,

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order Number

33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 86.0

Ultimate Tensile Strength: 8180 lbs.1

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .254 Sulfur .014 Phosphorus .010

1 Hardness and chemistry meet specification requirements. Fastener could not be tensile tested in accordance with ASTM A-307-84 due to size limitations. Therefore, an axial tensile test was performed per ASTM A-370-77 for information only. Failure occurred in the threads.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.

Additional QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their volume but are available for review upon request.



Fastener Description: #2 Stud, 7/8" - 9 x 4-1/2"

Material: Low Alloy Steel

Specification: ASME SA 193, Grade B7/ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B7T LB95 (Stud)

2HT LB97 (Nuts) Texas Bolt

Class/Procurement Level:

Quality-Related

General Plant Application:

Pressure Boundary Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #13-PM-300, Q

Mechanical Analysis

Average Hardness: HRC 35.0

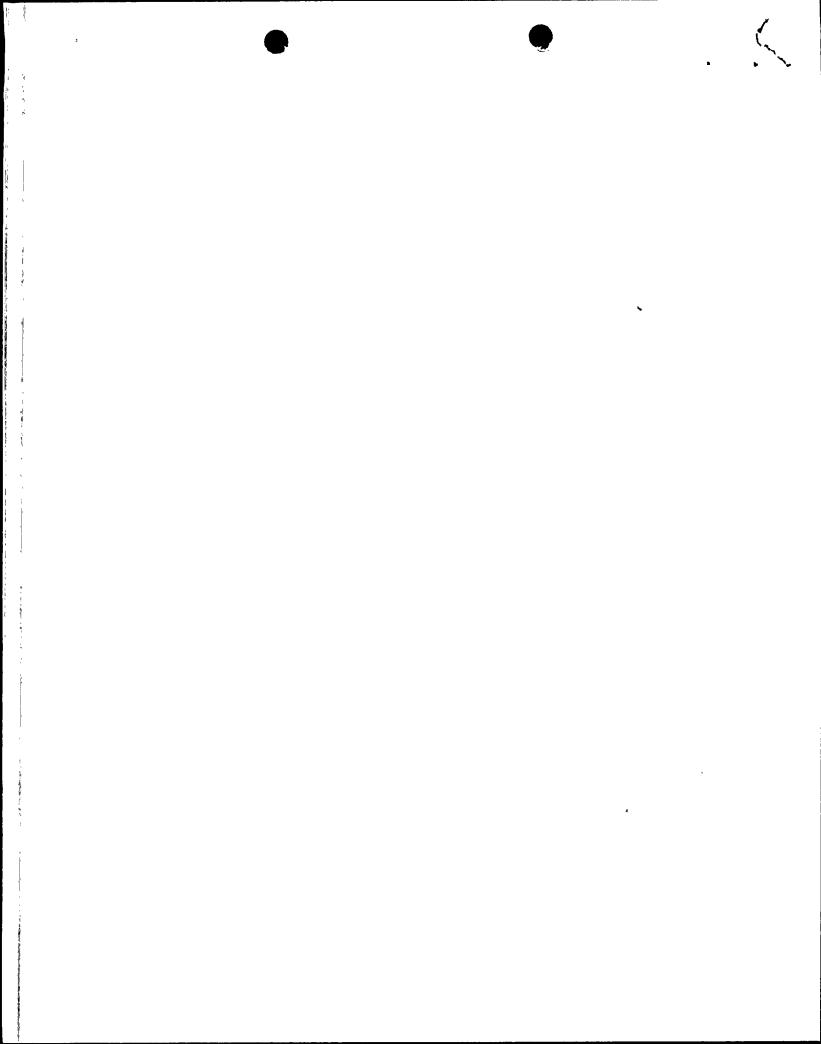
Ultimate Tensile Strength: 167,200 psi

0.2% Yield Strength: 156,200 psi

Chemical Analysis (w/o)

Carbon .422
Sulfur .023
Phosphorus .008
Silicon .234
Chromium l.00
Manganese .894
Molybdenum .219
Vanadium .006

Mechanical and chemical properties meet specification requirements.



Fastener Description: #3 Stud, 7/8" - 9 x 4-1/2"

Material: Low Alloy Steel

Specification: ASME SA 193, Grade B7/ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B7T LB95 (Stud)

2HT LB97 (Nuts) Texas Bolt

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #13-PM-300, Q

Mechanical Analysis

Average Hardness: HRC 31

Ultimate Tensile Strength: 163,300 psi

0.2% Yield Strength: 149,700 psi

Chemical Analysis (w/o)

Carbon .443 Sulfur .023 Phosphorus .008 .238 Silicon Chromium 1.01 Manganese .879 Molybdenum .223 Vanadium .006

Mechanical and chemical properties meet specification requirements.



Fastener Description: #4 Stud, 1/2" x 13 x 3"
Material: Precipitation Hardened Stainless Steel

Specification: SA 564 Grade 630/HT1100, ASME III Cl. 2 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 74W75 630 (-)

HSL (Stud) 8MT CTL (Nuts)

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: A&G Engineering

4640 E. LaPalma Avenue

Anaheim, CA

QA Requirements Imposed on Vendor: Purchase Order #F-183727, Q

Mechanical Analysis

Average Hardness: HRC 36.0

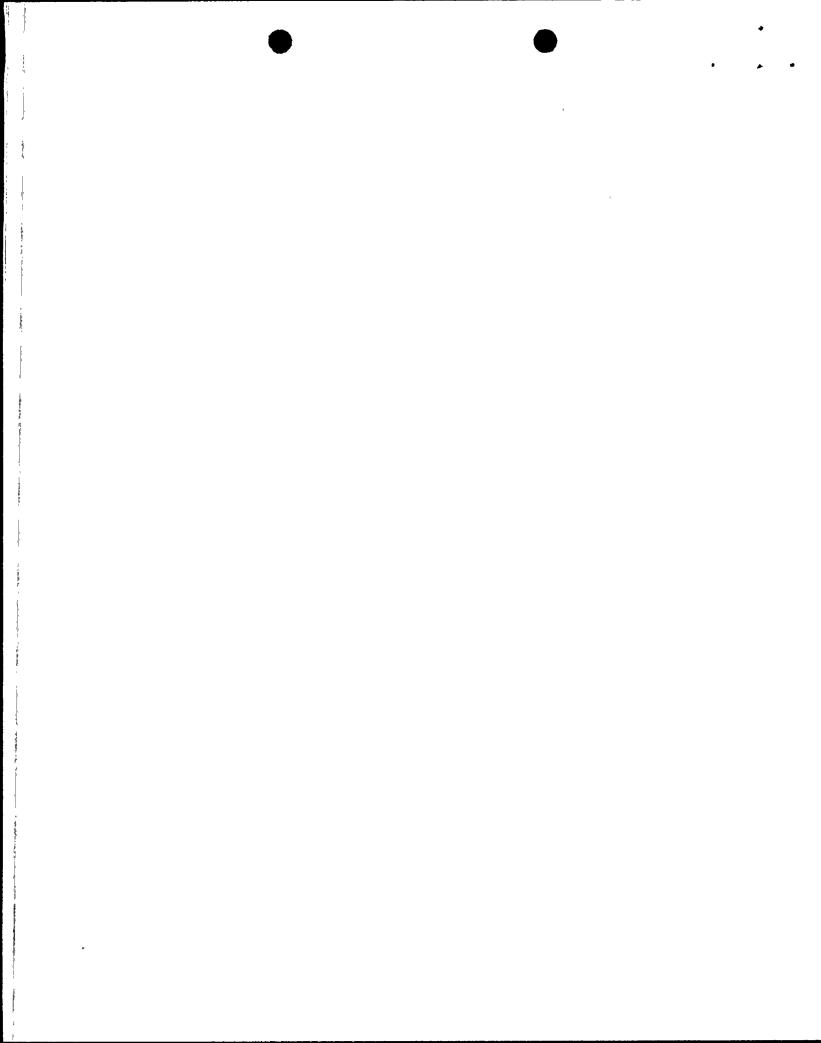
Ultimate Tensile Strength: 178,200 psi

0.2% Yield Strength: 176,200

Chemical Analysis (W/O)

.048 Carbon Sulfur .002 Phosphorus .026 Silicon .393 Chromium 16.08 3.74 Nickel .646 Manganese Cb + Ta .273

Mechanical and chemical properties meet specification requirements.



Fastener Description: #5 Stud, 1/2" - 13 x 3"

Material: Gr. Precipitation Hardened Stainless Steel

Specification: SA 564 Grade 630/HT1100, ASME III Cl. 2 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 630 (-)

HSL (Stud) 8MT CTL (Nuts)

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: A&G Engineering

4640 E. LaPalma Avenue

Anaheim, CA

QA Requirements Imposed on Vendor: Purchase Order #F-183727, Q

Mechanical Analysis

Average Hardness: HRC 35.5

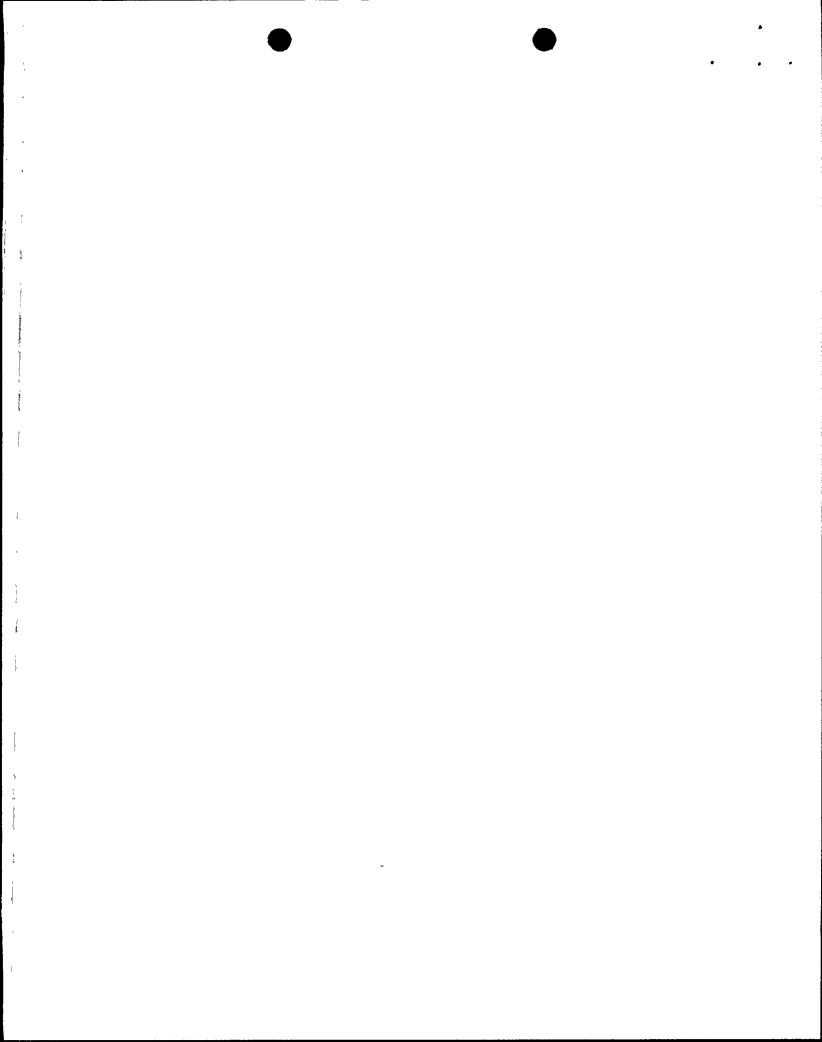
Ultimate Tensile Strength: 179,000 psi

0.2% Yield Strength: 176,800 psi

Chemical Analysis (w/o)

Carbon .049 Sulfur .002 .022 Phosphorus Silicon .387 16.17 Chromium Nickel 3.64 Manganese .647 3.69 Copper Cb + Ta .252

Mechanical and chemical properties meet specification requirements.



Fastener Description: #6 Cap Screw, 1/2 - 13 x 1"

Material: Stainless Steel

Specification: ASME SA 193 Grade B8, C1.1, 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): K1, B8, C;

Cardinal Industrial

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: Cardinal Industrial 3873 West Oquendo Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Purchase Order #F-161718, Q

Mechanical Analysis

Average Hardness: HRB 72

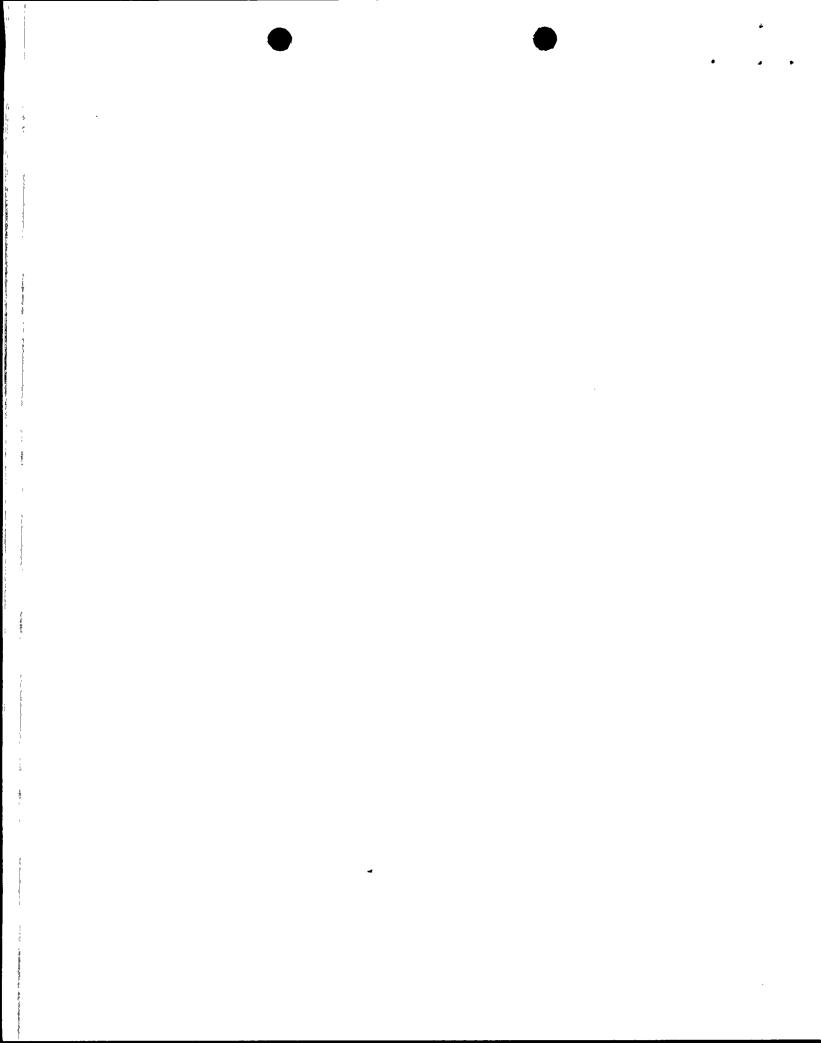
Ultimate Tensile Strength: 84,600 psi

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .025
Sulfur .005
Phosphorus .028
Silicon .421
Chromium 18.22
Nickel 9.52
Manganese 1.64

Mechanical and chemical properties meet specification requirements.



Fastener Description: #7 Cap Screw, 1/2 - 13 x 1"

Material: Stainless Steel

Specification: ASME SA 193, Grade B8, 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): K1, B8, C;

Cardinal Industrial

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: Cardinal Industrial 3873 West Oquendo

Las Vegas, NV 89118

QA Requirements Imposed on Vendor: Purchase Order #F-161718, Q

Mechanical_Analysis

Average Hardness: HRB 76.0

Ultimate Tensile Strength: 81,748 psi

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .026
Sulfur .005
Phosphorus .030
Silicon .506
Chromium 18.25
Nickel 9.37
Manganese 1.68

Mechanical and chemical properties meet specification requirements.

Fastener Description: #8A Bolt, 1/2" - 13 x 3"

Material: Carbon Steel

Specification: ASTM-A-325-84 Type I Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): A325, O F 8

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #60151277; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRC 28.0

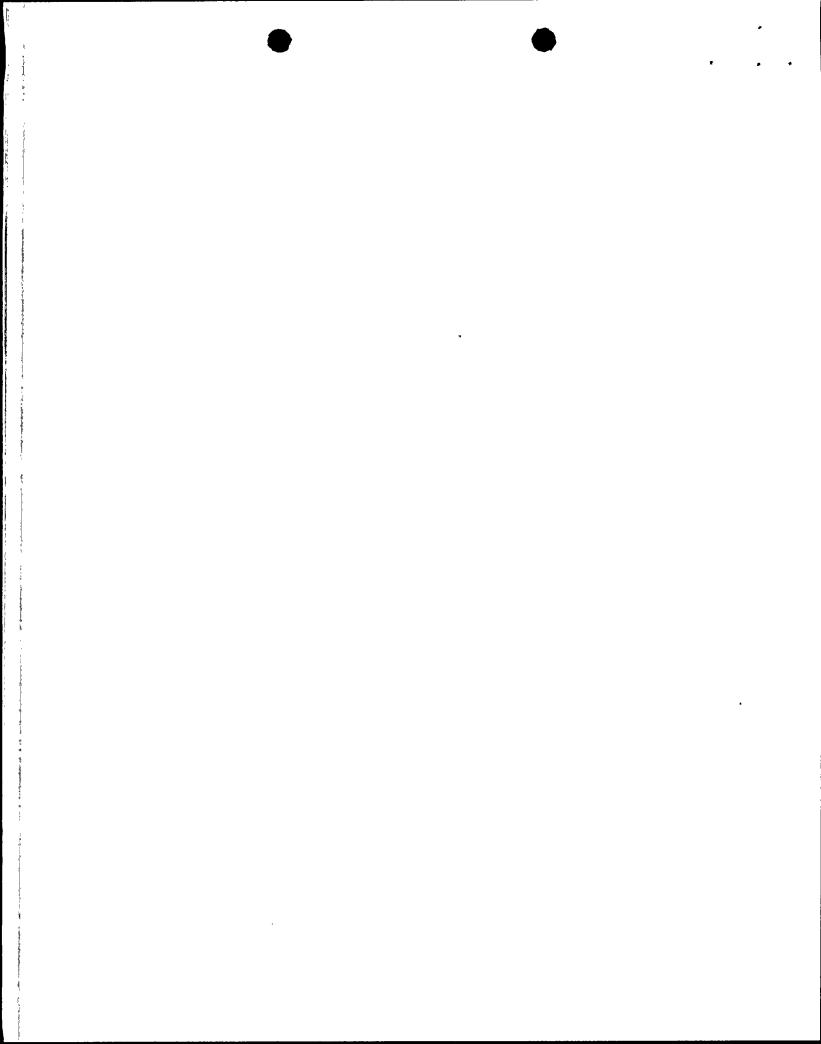
Ultimate Tensile Strength: 19,300 lbs.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .442
Sulfur .017
Phosphorus .012
Manganese .618

Mechanical and Chemical properties meet specification requirements.



Fastener Description: #9A Bolt, 1" - 8 x 6"

Material: Carbon Steel

Specification: ASTM-A-307-84 Gr. A Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): TB; Texas Bolt

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #F-176872, Q

Mechanical Analysis

Average Hardness: HRB 72

Ultimate Tensile Strength: 45,000 lbs.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .161 Sulfur .013 Phosphorus .011

Mechanical and Chemical properties meet specification requirements.

Quality Class Q - Any structure, system or component which, as a result of being defective or inoperative, could cause or increase the severity of a nuclear incident that would impose undue risk to the health and safety of the public. All engineered safeguards fall within this category. The requirement of 10CFR50, Appendix B shall be met to ensure the highest quality standard. Note: Specific QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their large volume but are available for review upon request.

Fastener Description: #10 Cap Screw, 3/4" - 10 x 1/-5/4"

Material: Carbon Steel

Specification: SAE J 429, Grade 5, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): Triangle

Marking, Triad Metal Products
Class/Procurement Level: Quality-Related
General Plant Application: Structural

General Plant Application: Structural Vendor: Grantham Fire Protection, Inc.

2226 West Shangri La Road

Phoenix, AZ 85029

QA Requirements Imposed on Vendor: Purchase Order #F-173824; S, Certificate of Compliance

Mechanical Analysis

Average Hardness: HRC 28.0

Ultimate Tensile Strength: 130,200 psi

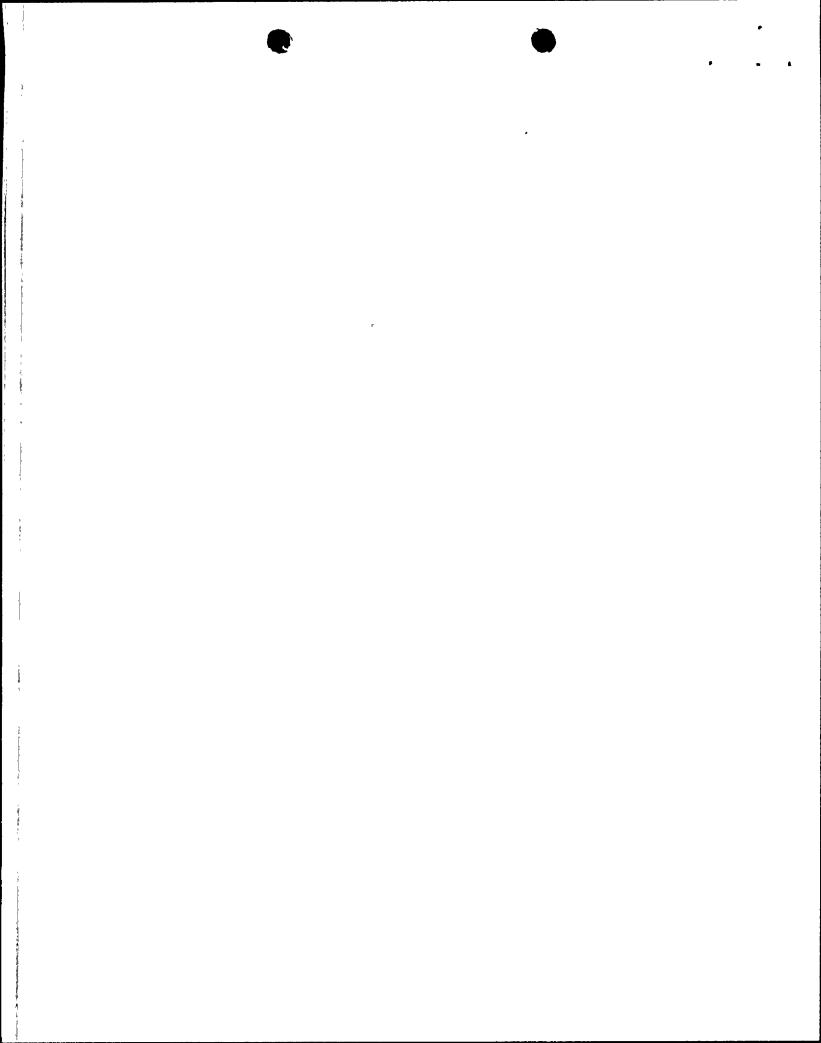
0.2% Yield Strength: 123,200 psi

Chemical Analysis (w/o)

Carbon .390
Sulfur .011
Phosphorus .019

Mechanical and chemical properties meet specification requirements.

Quality Class S - Any structure, system or component not designated Quality Class Q or R shall be designated Quality Class S. In general, no special quality requirements beyond the industry standard is needed for this equipment. Note: QA requirements can be obtained in each individual purchase order (P.O.) and are not reproduced in this report due to their large volume but are available for review upon request.



Fastener Description: #11 Cap Screw, 7/16" x 3-1/2"

Material: Low Alloy Steel

Specification: SAE J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): KS; Kosaka

Kogyo Co., Ltd., Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Mar-Bro Fasteners 5129 W. Latham

Phoenix, AZ 85043

QA Requirements Imposed on Vendor: Purchase Order #60113820, 5M, P5

Mechanical Analysis

Average Hardness: HRC 35.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

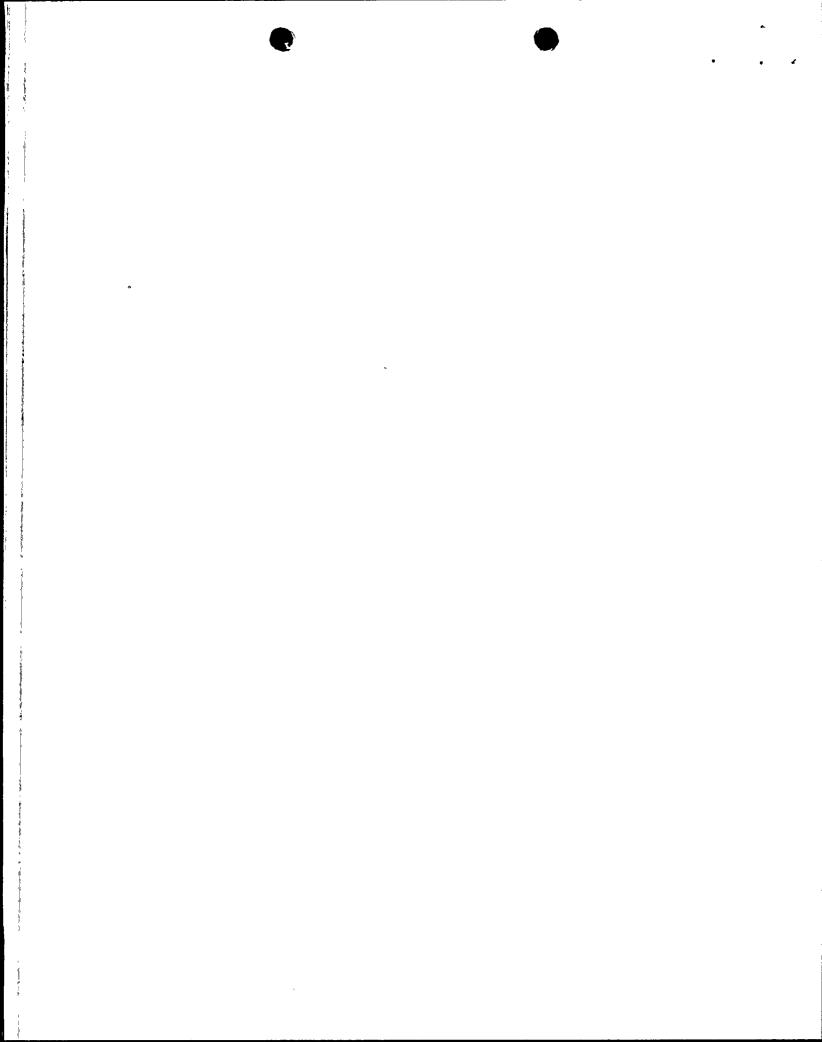
Chemical Analysis (w/o)

Carbon .294 Sulfur .019 Phosphorus .012

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #12 Cap Screw, 7/16" x 2"

Material: Low Alloy Steel

Specification: SAE J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): M; Minimida

Slaybo, Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural Vendor: RB&W Fastening Service Center

3717 E. Broadway #5 Phoenix, AZ 85040

QA Requirements Imposed on Vendor: Purchase Order #60113815, 5M, P5

Mechanical_Analysis

Average Hardness: HRC 33.5

Ultimate Tensile Strength: 182,300 psi

0.2% Yield Strength: N.R.

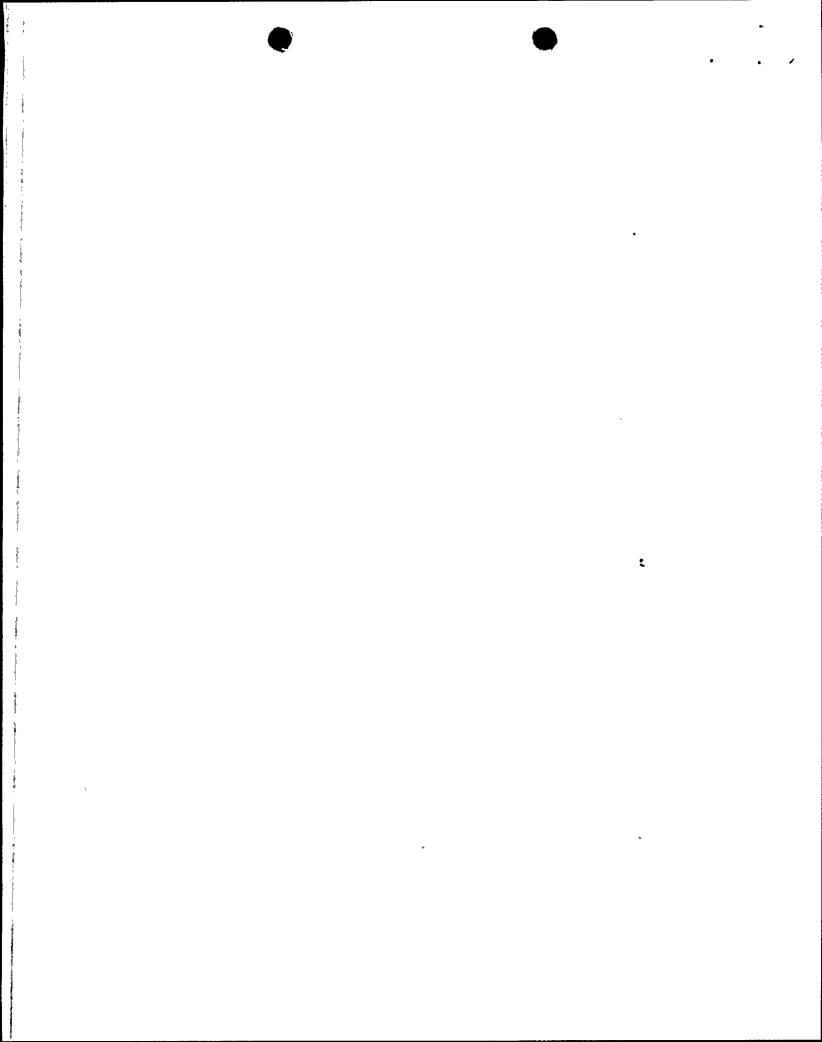
Chemical Analysis (w/o)

Carbon .296 Sulfur .024 Phosphorus .021

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., 'specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #13 Cap Screw, 7/16" x 2"

Material: Low Alloy Steel

Specification: SAE J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): H

Class/Procurement Level: Quality-Related General Plant Application: Structural Vendor: RB&W Fastening Service Center

3717 E. Broadway #5 Phoenix, AZ 85040

QA Requirements Imposed on Vendor: Purchase Order #60113815; 5M, P5

Mechanical Analysis

Average Hardness: HRC 33.0

Ultimate Tensile Strength: 183,300 psi

0.2% Yield Strength: 169,000 psi

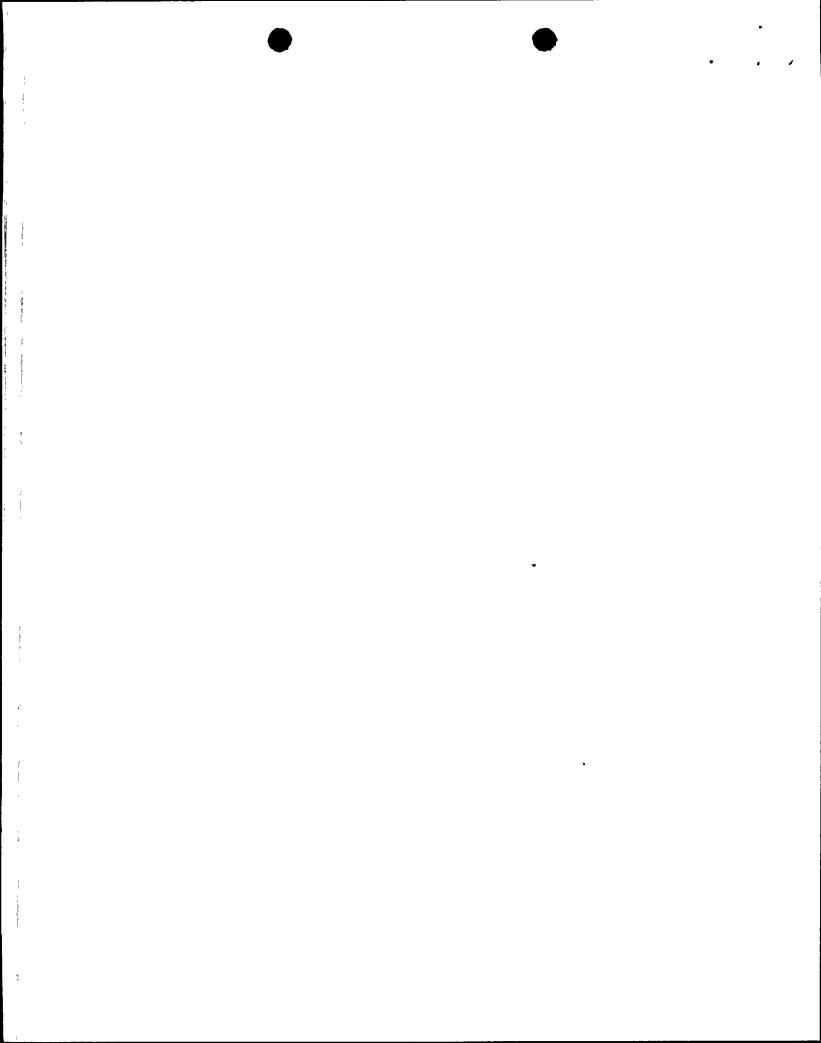
Chemical Analysis (w/o)

Carbon .291 Sulfur .022 Phosphorus .026

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #14 Stud, 1-1/4" x 7-1/2"

Material: Low Alloy Steel

Specification: ASTM-A-193-84A, Grade B16

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B16W, CF

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: Leslie Co.

399 Jefferson Road Parsippany, NJ 07054

QA Requirements Imposed on Vendor: Non Quality Purchase

Mechanical Analysis

Average Hardness: HRC 32.0

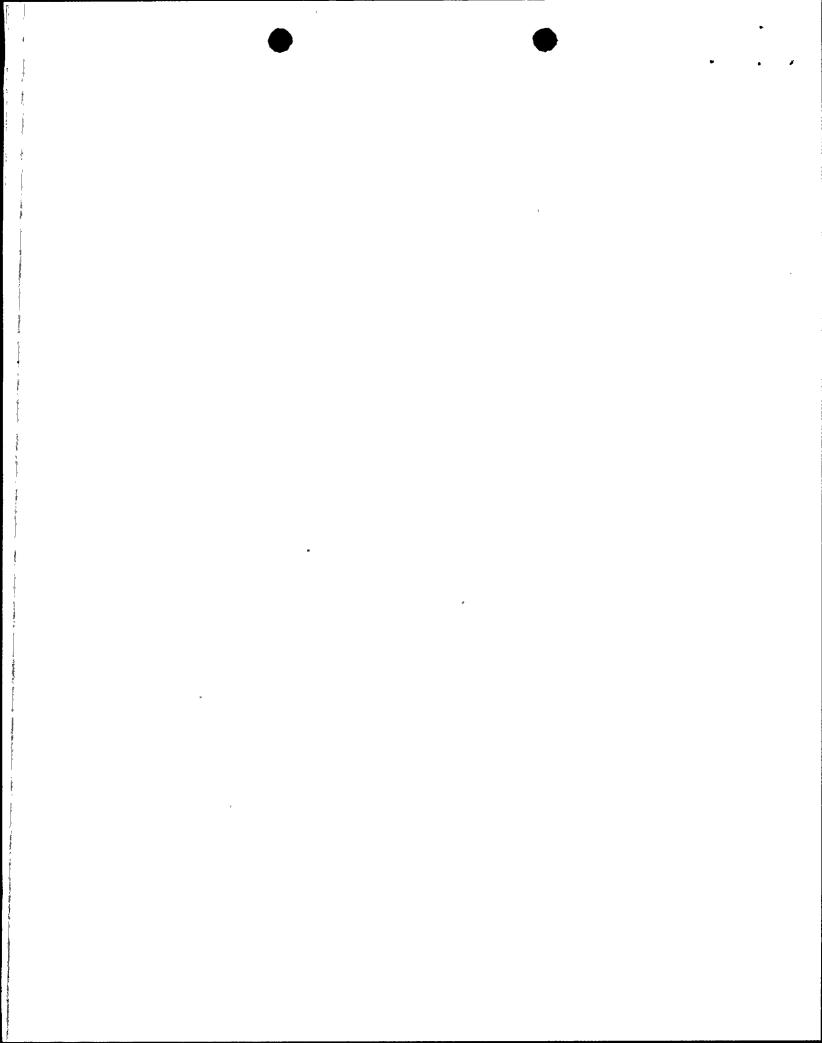
Ultimate Tensile Strength: 145,100 psi

0.2% Yield Strength: 126,300 psi

Chemical Analysis (w/o)

Carbon .441 Sulfur .032 .012 Phosphorus Silicon .323 Chromium 1.05 Manganese .678 .554 Molybdenum .292 Vanadium

Mechanical and chemical properties meet specification requirements.



Fastener Description: #15 Bolt, 5/16" - 18 x 1"

Material: Carbon Steel

Specification: ASTM-A-307-84, Grade B

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): BIS;

Bethlehem Steel

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #60151477;

1M, P4, Q1, N1, ZZ

Mechanical Analysis

Average Hardness: HRB 86.0

Ultimate Tensile Strength: 4700 lbs.1

0.2% Yield Strength: N.R.

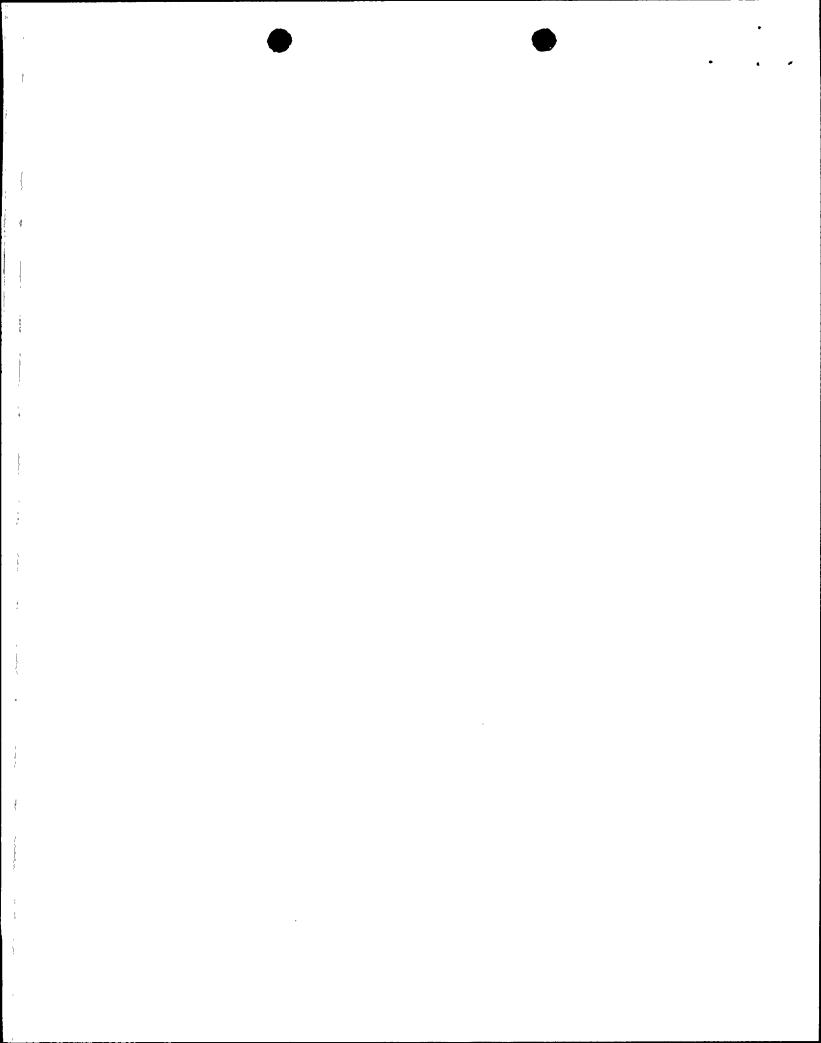
Chemical Analysis (w/o)

Carbon .252 Sulfur .020 Phosphorus .015

1 Hardness and chemistry meet specification requirements. Fastener could not be tensile tested in accordance with ASTM A-307-84 due to size limitations. Therefore, an axial tensile test was performed per ASTM A-370-77 for information only. Failure occurred in the threads.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #16 Bolt, 5/8" - 11 x 3"

Material: Stainless Steel

Specification: ASTM-A-193-84A. Grade B8M/C1. 1

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B8M, 316

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: Combustion Engineering

10010 N. 25th Drive, Suite 310

Phoenix, AZ 85021

QA Requirements Imposed on Vendor: Purchase Order #13-NM-001A, Q Class

Mechanical Analysis

Average Hardness: HRC 38.0

Ultimate Tensile Strength: 100,000 psi

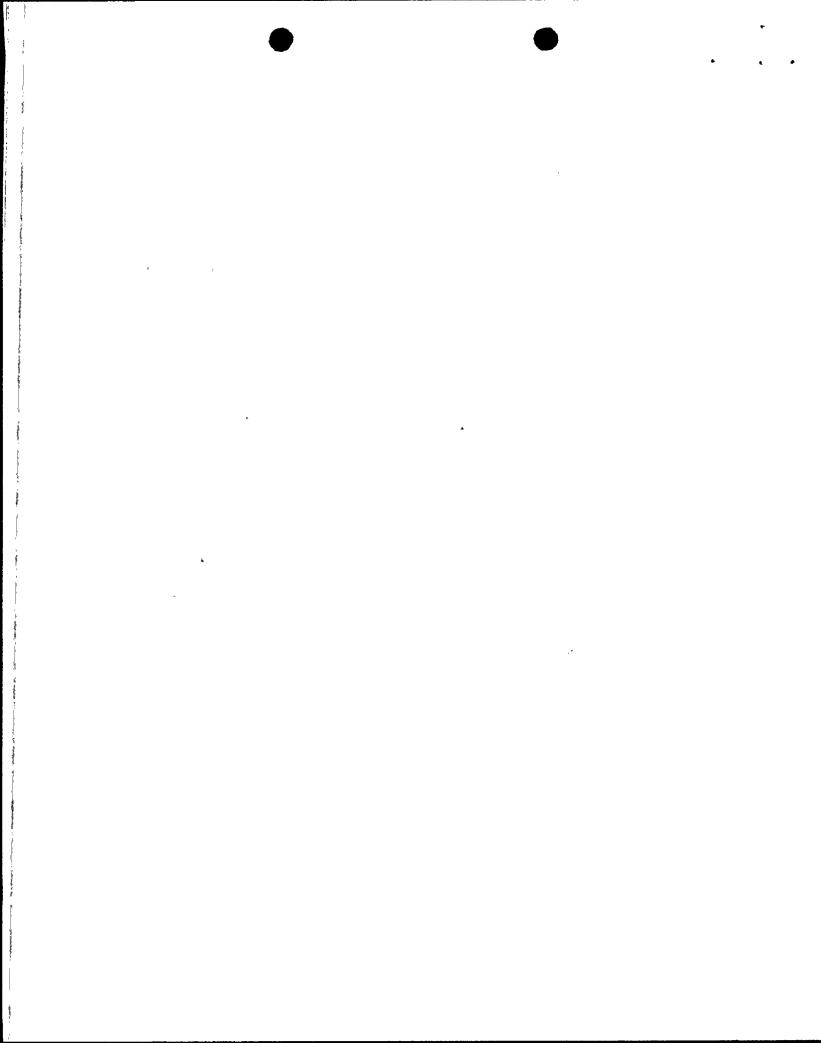
0.2% Yield Strength: 74,100 psi

Chemical Analysis (w/o)

Carbon √ .055 Sulfur .029 Phosphorus .029 Silicon .418 Chromium 17.40 11.20 Nickel · 1.14 Manganese Molybdenum 2.04

Mechanical and chemical properties meet specification requirements.

Quality Class Q - Any structure, system or component which, as a result of being defective or inoperative, could cause or increase the severity of a nuclear incident that would impose undue risk to the health and safety of the public. All engineered safeguards fall within this category. The requirement of 10CFR50, Appendix B shall be met to ensure the highest quality standard. Note: Specific QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their large volume but are available for review upon request.



Fastener Description: #17 Cap Screw, 5/8" x 2"

Material: Low Alloy Steel

Specification: SAE J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): NF; Nippon

Fastener Corp., Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Mar-Bro Fasteners 5129 W. Latham

Phoenix, AZ 85043

QA Requirements Imposed on Vendor: Purchase Order #33501124; 5M, P5

Mechanical Analysis

Average Hardness: HRC 33.0

Ultimate Tensile Strength: 177,600 psi

0.2% Yield Strength: N.R.

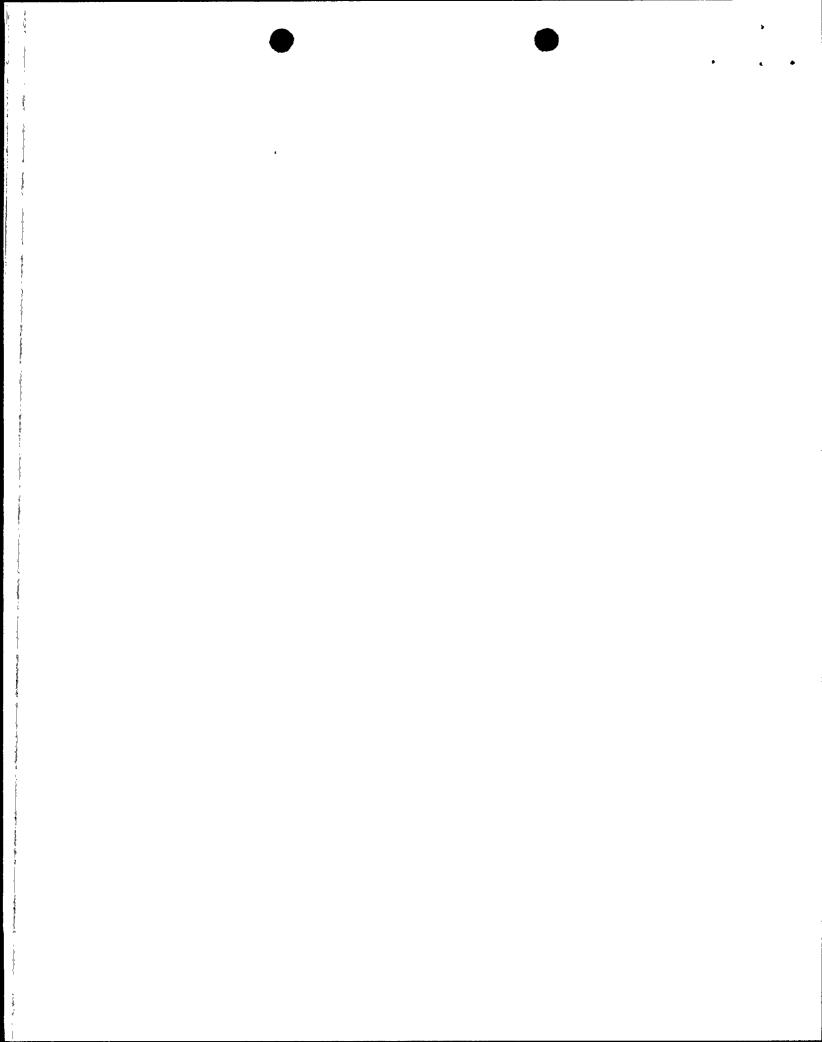
Chemical Analysis (w/o)

Carbon .282 Sulfur .014 Phosphorus .012

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #18 Cap Screw, 5/8" x 2"

Material: Low Alloy Steel

Specification: SAE-J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): NF; Nippon

Fastener Corp., Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Mar-Bro Fasteners 5129 W. Latham

Phoenix, AZ 85043

QA Requirements Imposed on Vendor: Purchase Order #33501124;

5M, P5

Mechanical Analysis

Average Hardness: HRC 33.0

Ultimate Tensile Strength: 179,900 psi

0.2% Yield Strength: 170,900 psi

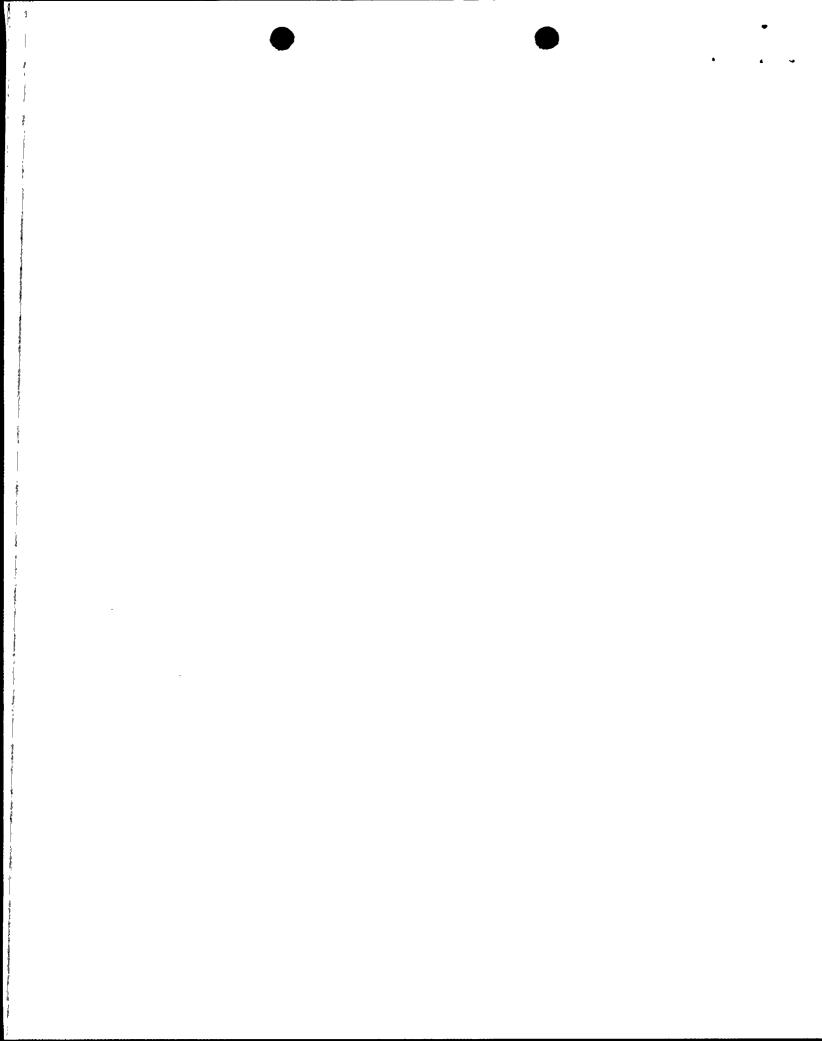
Chemical Analysis (w/o)

Carbon .287 Sulfur .014 Phosphorus .012

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #19 Cap Screw, 5/8" x 2"

Material: Low Alloy Steel

Specification: SAE J429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): NF; Nippon

Fastener Corp., Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Mar-Bro Fasteners 5129 W. Latham

Phoenix, AZ 85043

QA Requirements Imposed on Vendor: Purchase Order #33501124; 5M, P5

Mechanical Analysis

Average Hardness: HRC 33.0

Ultimate Tensile Strength: 178,400 psi

0.2% Yield Strength: 170,100 psi

Chemical Analysis (w/o)

Carbon .291 Sulfur .015 Phosphorus .012

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.

Fastener Description: #20 Cap Screw, 1/2" x 6"

Material: Low Alloy Steel

Specification: SAE J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): NF; Nippon

Fastener Corp., Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural Vendor: Copperstate Bolt & Nut Co.

3637 N. 34th Avenue

Phoenix, AZ 85017

QA Requirements Imposed on Vendor: Purchase Order #60114701; 5M, P5

Mechanical Analysis

Average Hardness: HRC 33.0

Ultimate Tensile Strength: 178,100 psi

0.2% Yield Strength: 174,300 psi

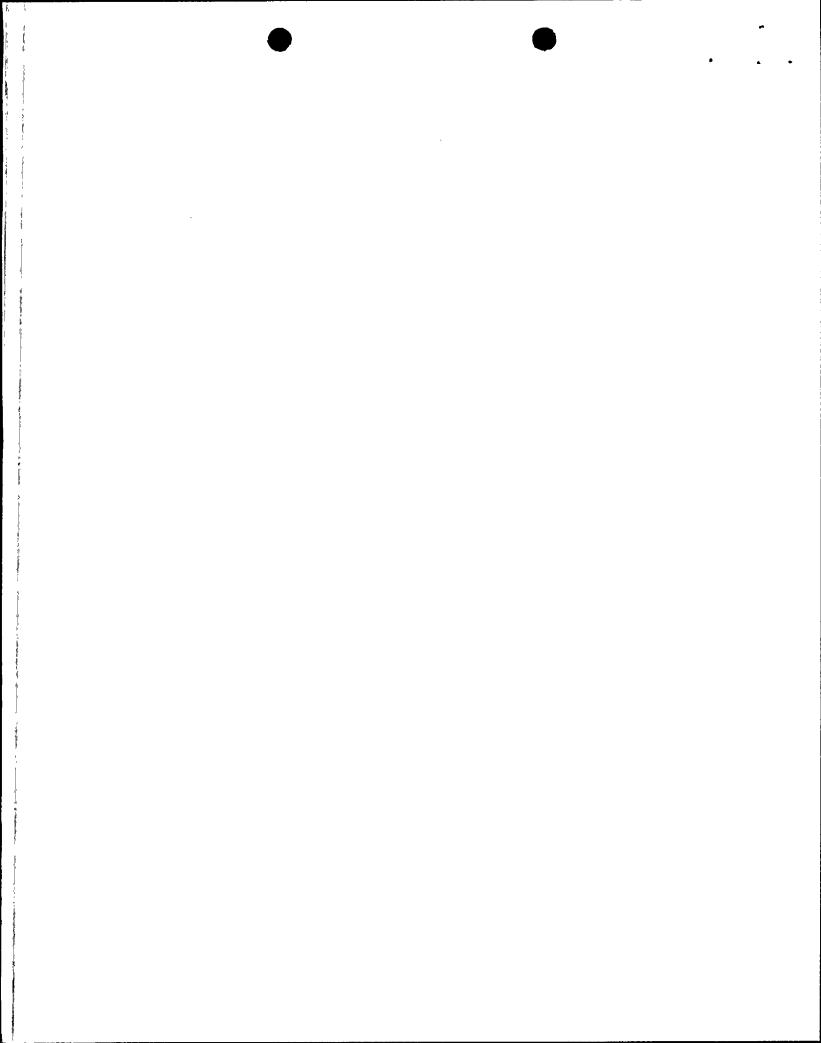
Chemical Analysis (W/O)

Carbon .284 Sulfur .029 Phosphorus .013

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #21 Cap Screw, 1/2" x 6"

Material: Low Alloy Steel

Specification: SAE J 429, Grade 8, Aug. 83

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): NF; Nippon

Fastener Corp., Japan

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Copperstate Bolt & Nut Co.

3637 N. 34th Avenue Phoenix, AZ 85017

QA Requirements Imposed on Vendor: Purchase Order #60114701; 5M, P5

Mechanical Analysis

Average Hardness: HRC 35.0

Ultimate Tensile Strength: 179,400 psi

0.2% Yield Strength: 174,700 psi

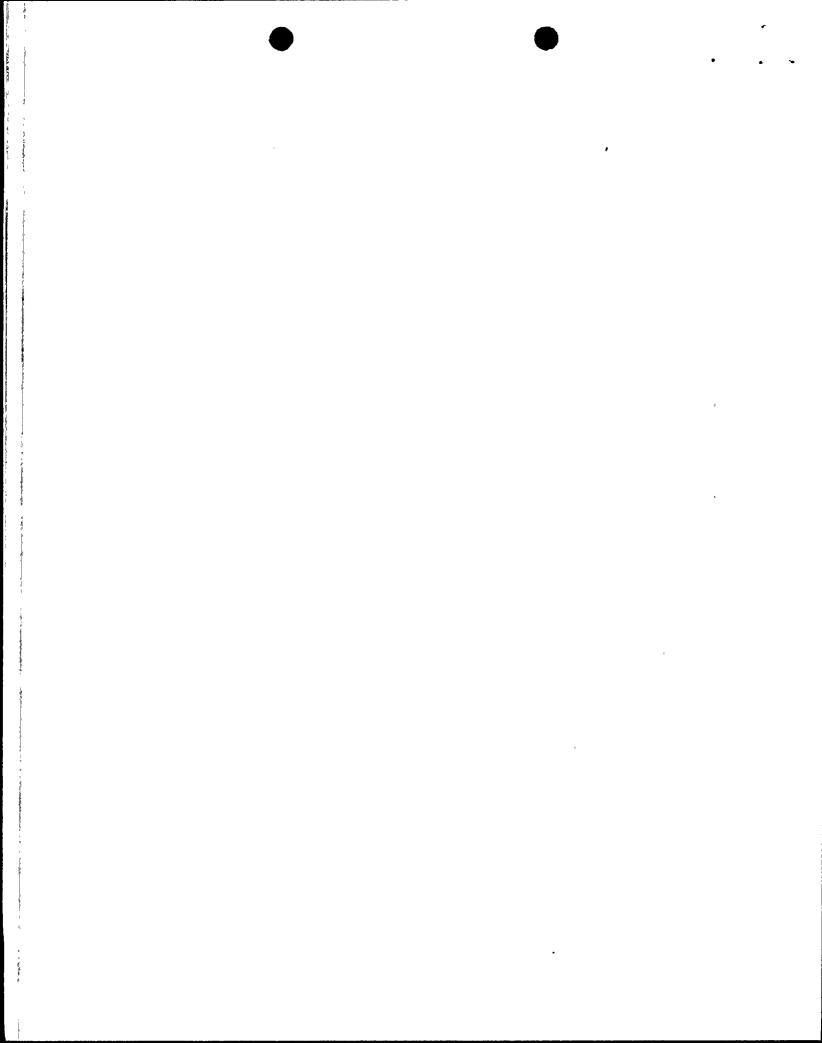
Chemical Analysis (w/o)

Carbon .288 .024 Sulfur .012 Phosphorus

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment according to manufacturer original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #22A Bolt, 7/8" x 2-1/2"

Material: Carbon Steel

Specification: ASTM-A-307-84 Gr. B Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): TB, Texas Bolt

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 95

Ultimate Tensile Strength: 41,000 lbs.

0.2% Yield Strength: N.R.

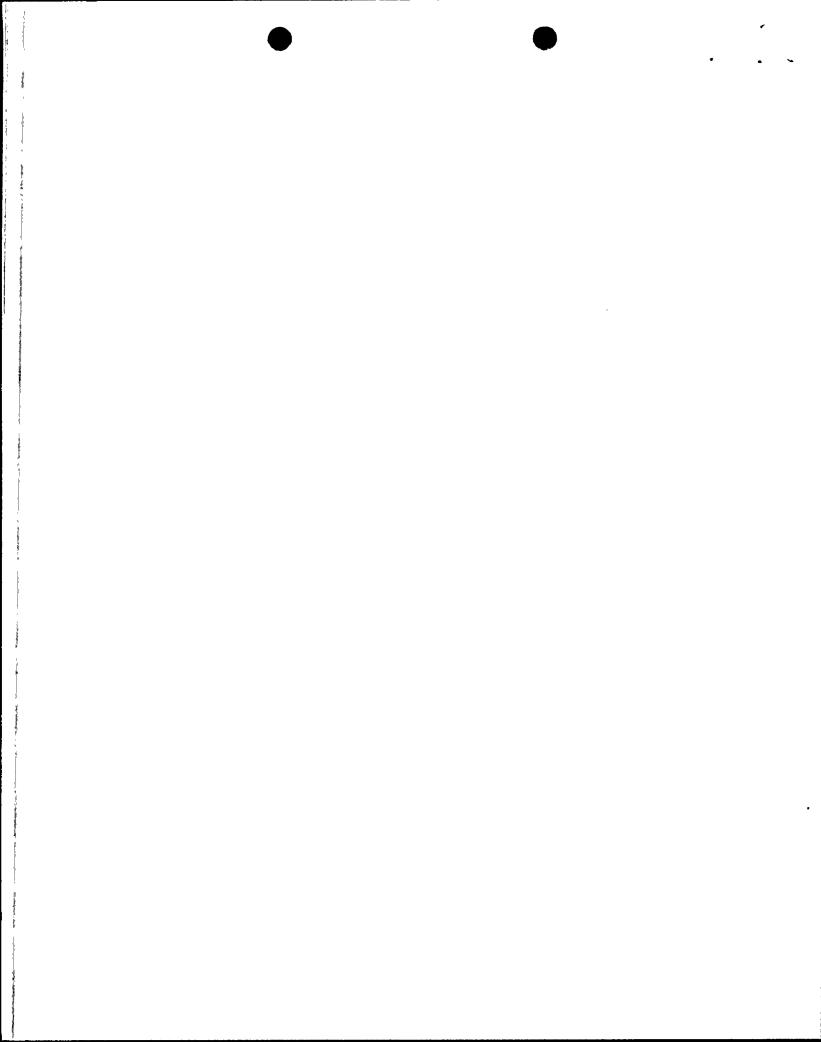
Chemical Analysis (W/O)

Carbon .212 Sulfur .030 Phosphorus .008

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #23A Bolt, 7/8" x 2-1/2"

Material: Carbon Steel

Specification: ASTM-A-307-84 Gr. B Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): TB, Texas Bolt

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993;

1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 93

Ultimate Tensile Strength: 42,300 lbs.

0.2% Yield Strength: N.R.

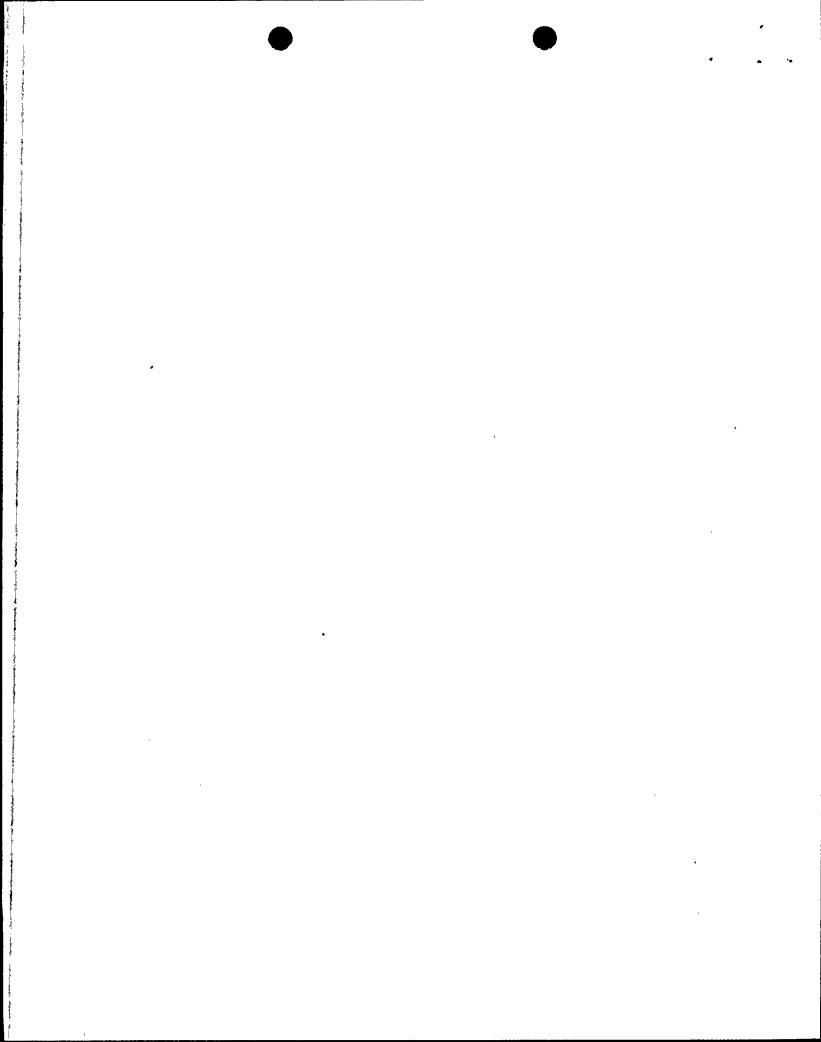
Chemical Analysis (w/o)

Carbon .209
Sulfur .033
Phosphorus .008

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #24A Bolt, 7/8" - 9 x 2-1/2"

Material: Carbon Steel

Specification: ASTM-A-325-84 Type I

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): A325, LE, Lake

Erie Screw Corp.

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993;

1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRC 28.2

Ultimate Tensile Strength: 60,800 lbs.

0.2% Yield Strength: N.R.

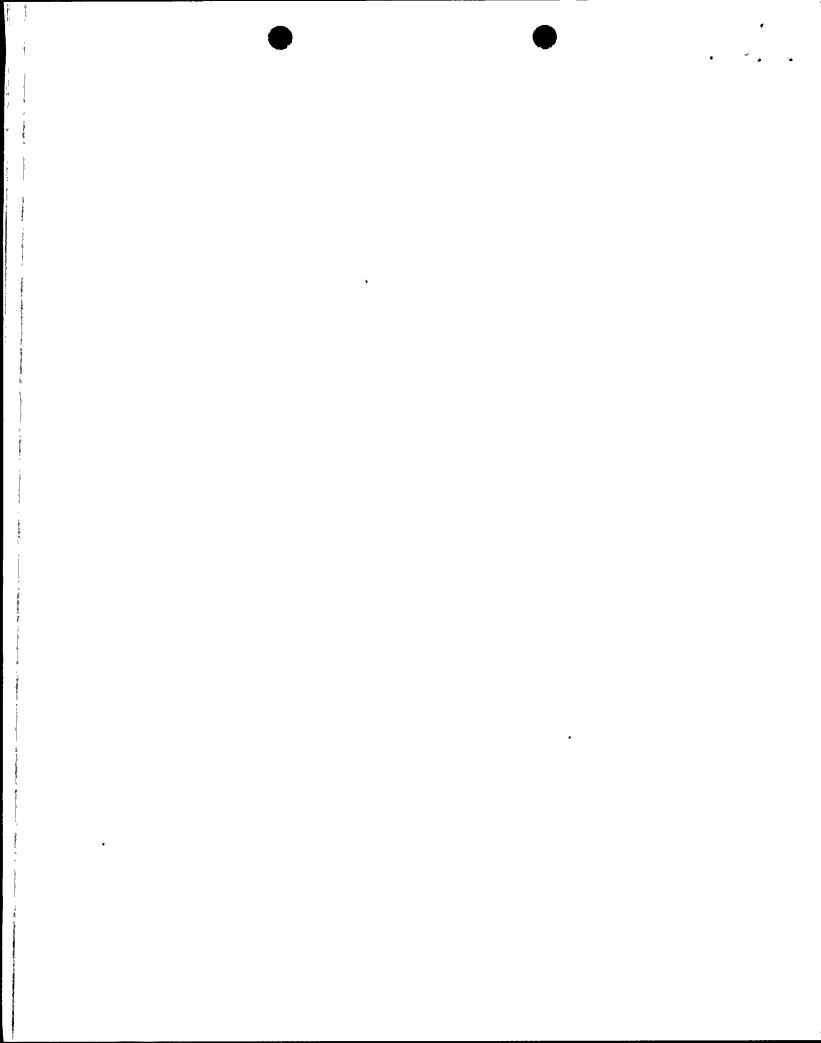
Chemical Analysis (w/o)

Carbon .414
Sulfur .018
Phosphorus .019
Manganese 1.00

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #25 Bolt, 3/8" - 16 x 1"

Material: Carbon Steel

Specification: ASTM-A-307-84, Grade B

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): BIS, Bethlehem

Steel Corp.

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 98.0 (maximum 95.0 HRB) *

Ultimate Tensile Strength: 8000 lbs. 1

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .276 Sulfur .017 Phosphorus .010

¹Chemistry meets specification requirements. Fastener could not be tensile tested in accordance with ASTM A-307-84 due to size limitations. Therefore, an axial tensile test was performed per ASTM A-370-77 for information only. Failure occurred in the threads.

*Slightly higher average hardness is not considered to be safety-significant. The deviation is very minor such that the bolt would be expected to behave in a ductile manner in structural applications.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.
 Additional QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their volume but are available for review upon request.

Fastener Description: #26 Nut

Material: Carbon Steel

Specification: ASTM-A-194-84, 2H Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 2H T; Texas Bolt

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #F-176872, Q

Mechanical Analysis

Average Hardness: HRC 24.1

Ultimate Tensile Strength: N.R.

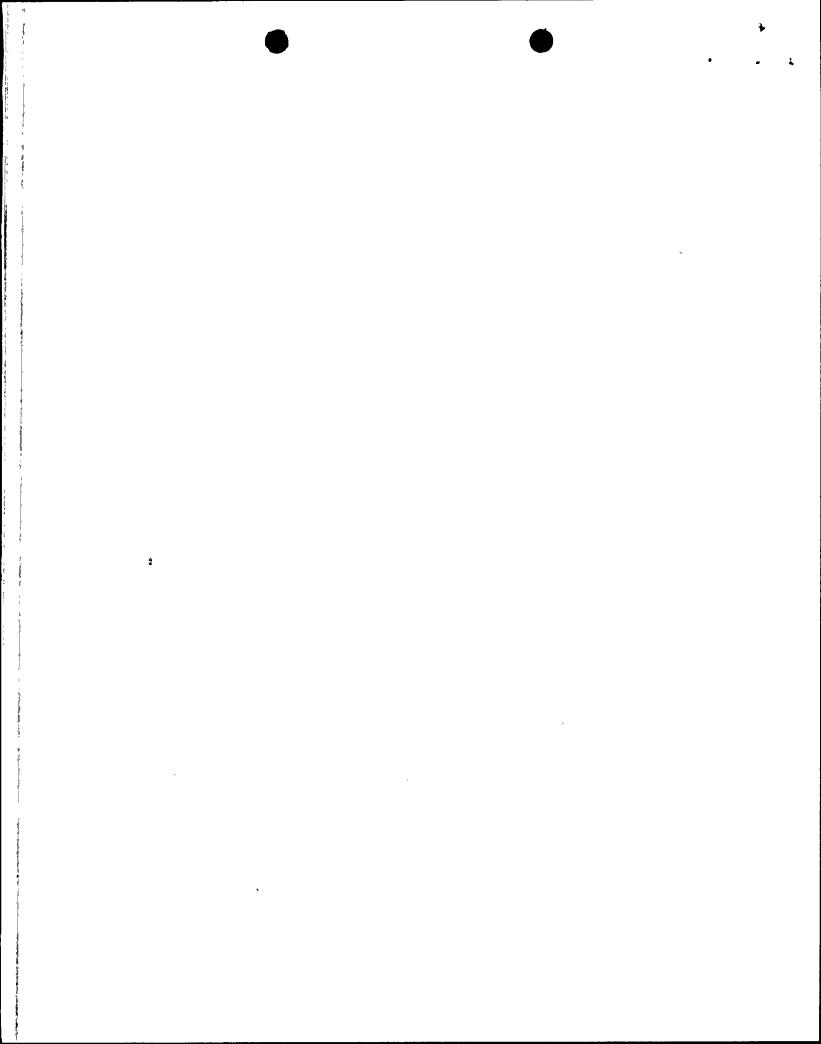
0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .407 Sulfur .023 Phosphorus .020

Mechanical and chemical properties meet specification requirements.

Quality Class Q - Any structure, system or component which, as a result of being defective or inoperative, could cause or increase the severity of a nuclear incident that would impose undue risk to the health and safety of the public. All engineered safeguards fall within this category. The requirement of 10CFR50, Appendix B shall be met to ensure the highest quality standard. Note: Specific QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their large volume but are available for review upon request.



Fastener Description: #27 Nut

Material: Carbon Steel

Specification: ASTM-A-307-84/A563-84, Grade B

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Fisher Controls

1717 N. 77th Street Scottsdale, AZ 85257

QA Requirements Imposed on Vendor: Purchase Order #F-179722;
R Class, Certificate of Compliance

Mechanical Analysis

Average Hardness: HRB 94.0

Ultimate Tensile Strength: N.R.

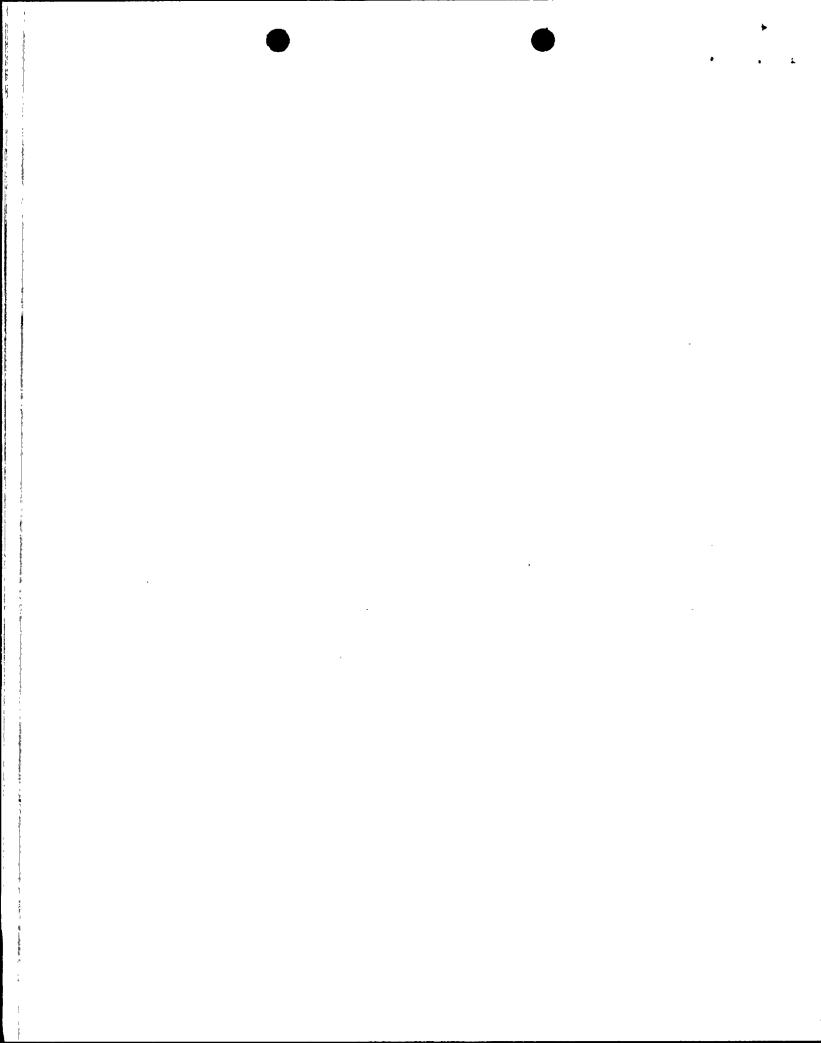
0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .190 Sulfur .029 Phosphorus .021

Mechanical and chemical properties meet specification requirements.

Quality Class R - Any structure, system, or component which, as a result of being defective or inoperative, could cause a safety hazard to station personnel, an unscheduled reduction in unit output, or a unit trip. The quality requirements of Quality Class R items may be similar to those of Quality Class Q except that 10CFR50, Appendix B is not applicable. Note: Specific QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their large volume but are available for review upon request.



Fastener Description: #28 Nut

Material: Carbon Steel

Specification: ASTM-A-307-84/A563-84, Grade B

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Fisher Controls 1717 N. 77th Street Scottsdale, AZ 85257

QA Requirements Imposed on Vendor: Purchase Order #179722; R;

Certificate of Compliance

Mechanical Analysis

Average Hardness: HRB 94.0

Ultimate Tensile Strength: N.R.

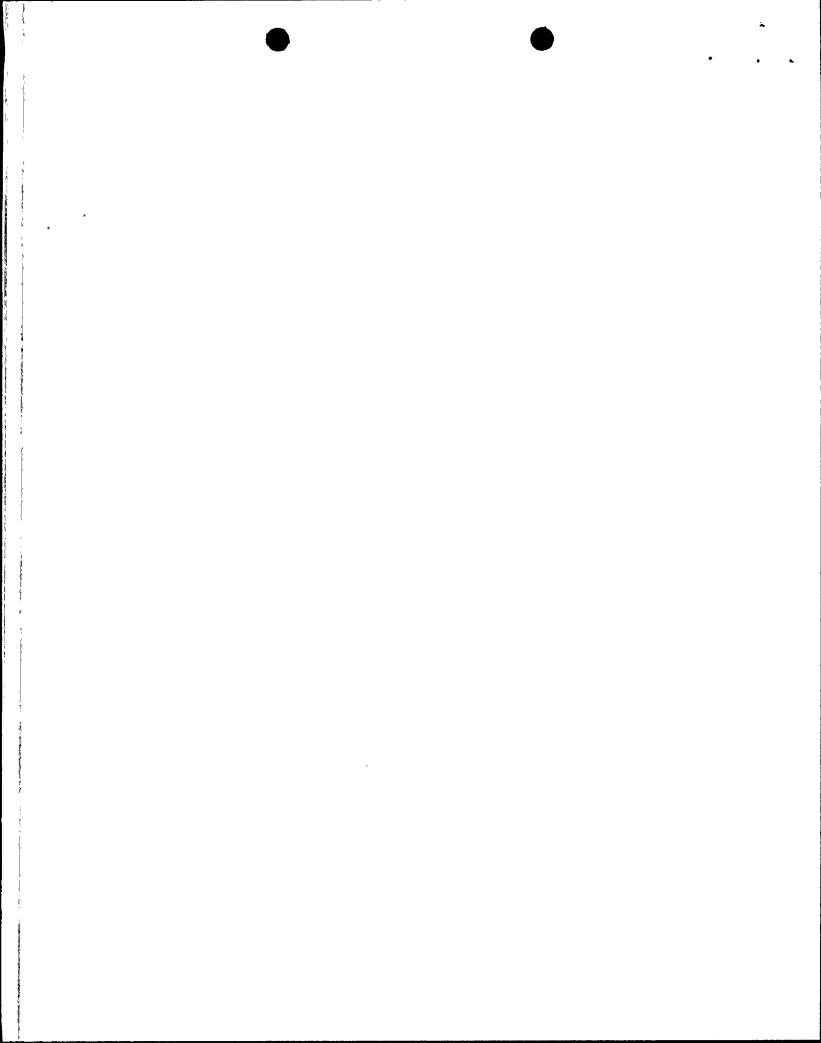
0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .197 Sulfur .029 Phosphorus .022

Mechanical and chemical properties meet specification requirements.

Quality Class R - Any structure, system, or component which, as a result of being defective or inoperative, could cause a safety hazard to station personnel, an unscheduled reduction in unit output, or a unit trip. The quality requirements of Quality Class R items may be similar to those of Quality Class Q except that 10CFR50, Appendix B is not applicable. Note: Specific QA requirements can be obtained in each individual purchase order and are not reproduced in this report due to their large volume but are available for review upon request.



Fastener Description: #29 Nut

Material: Carbon Steel

Specification: ASTM-A-194-84, Grade 2H

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 2H, T, Texas.

Bolt

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993;

1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRC 27.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .458 Sulfur .028 Phosphorus .018

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.

Fastener Description: #30 Nut

Material: Carbon Steel

Specification: ASTM-A-194-84, Grade 2H

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 2H, T, Texas

Bolt

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993;

1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRC 29.6

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

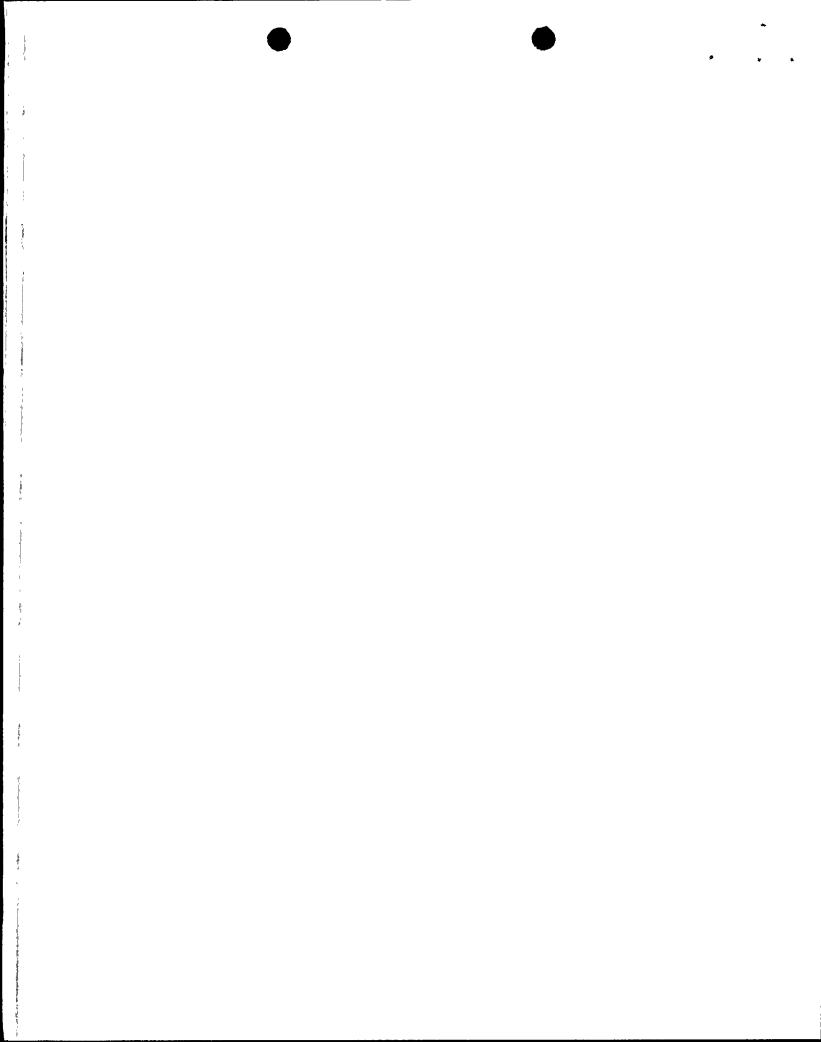
Chemical Analysis (w/o)

Carbon .417 Sulfur .028 Phosphorus .018

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #31 Nut

Material: Carbon Steel

Specification: ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 88.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

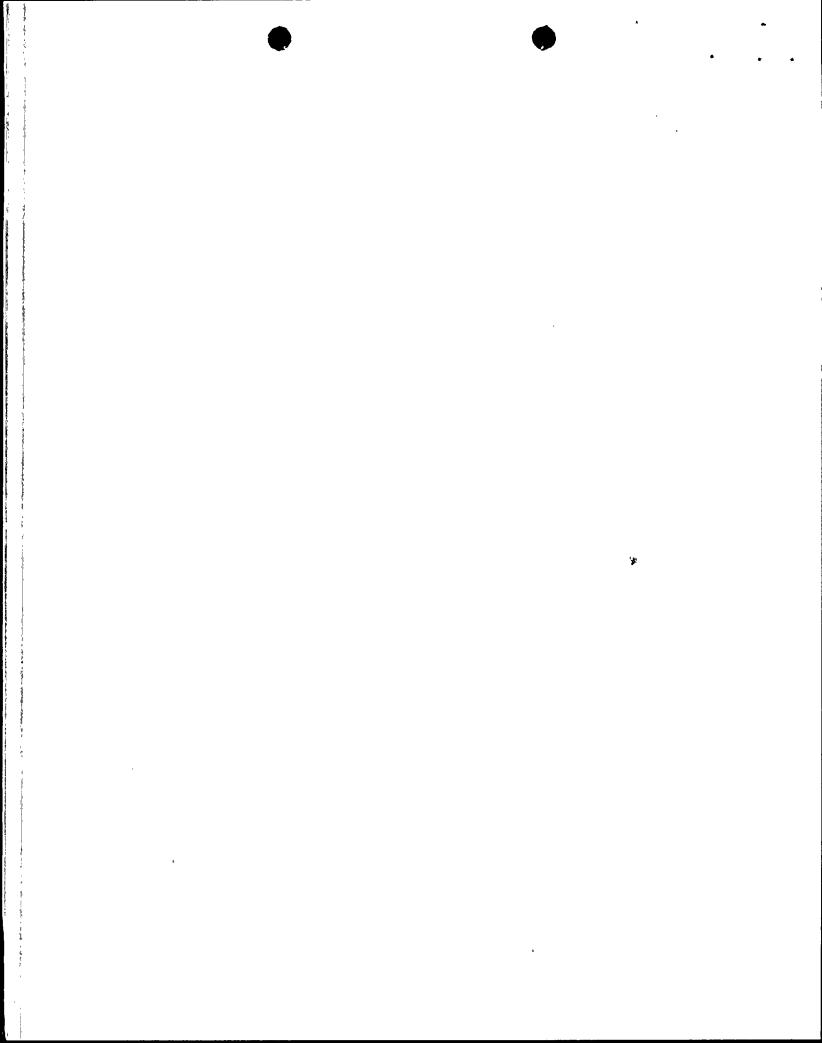
Chemical Analysis (w/o)

Carbon .164 Sulfur .031 Phosphorus .019

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Sample I.D. Number: PVNGS-127-288 Fastener Description: #32 Nut

Material: Carbon Steel

Specification: ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 86

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

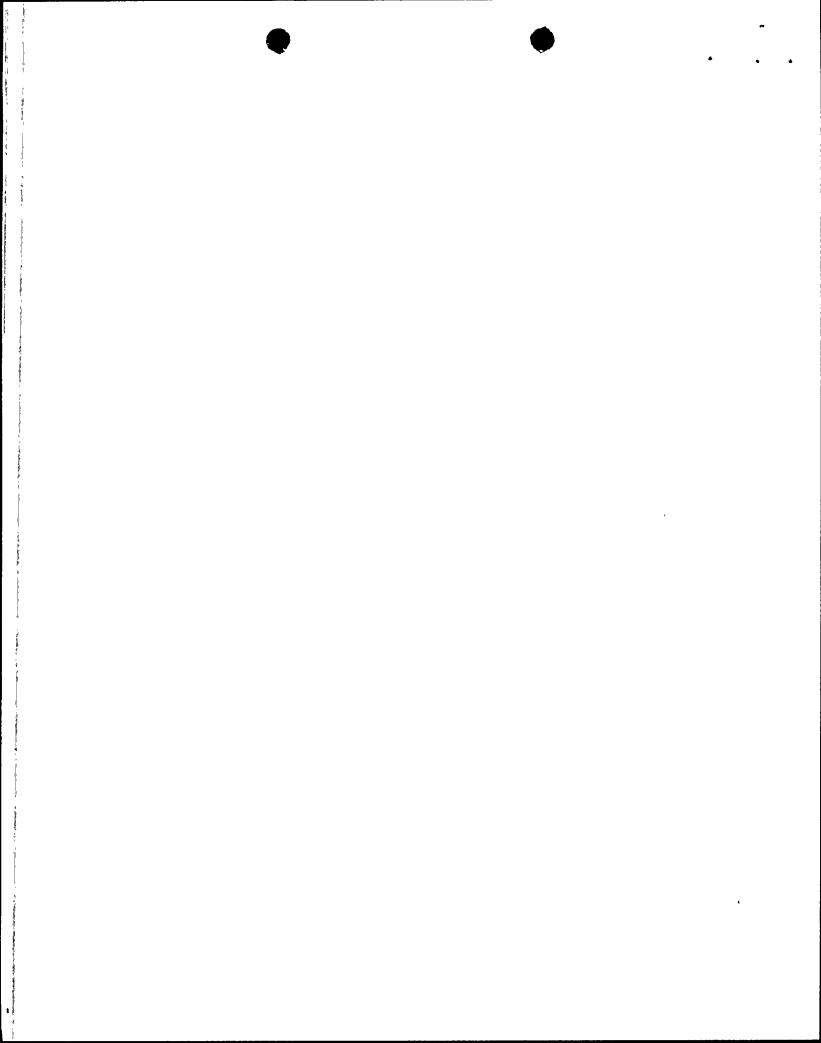
Chemical Analysis (w/o)

Carbon .146
Sulfur .036
Phosphorus .019

Mechanical and chemical properties meet specification requirements.

<u>Notes</u>

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #33 Nut

Material: Carbon Steel

Specification: ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): None

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 92.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (W/O)

Carbon .393 Sulfur .075 Phosphorus .013

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.

Fastener Description: #34 Nut

Material: Carbon Steel

Specification: ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer):

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor:

Hub, Inc. 2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33205993; 1M, P4, N1, R1 and V1

Mechanical Analysis

Average Hardness: HRB 92.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

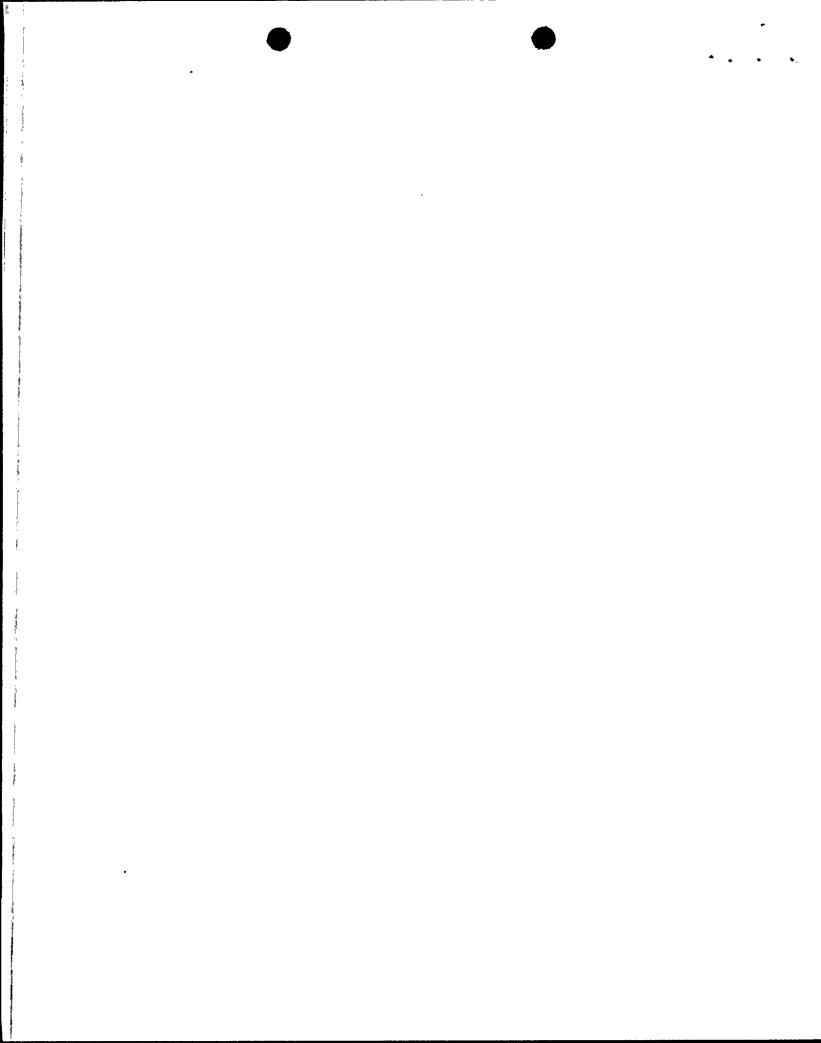
Chemical Analysis (w/o)

Carbon . 254 Sulfur .039 Phosphorus .018

Mechanical chemical properties and meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment according manufacturer to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.



Fastener Description: #35 Nut

Material: Carbon Steel

Specification: SA 194, Grade 2H, ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B7T LB95 (Stud)

2HT LB97 (Nuts) Texas Bolt

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #13-PM-300, Q

Mechanical Analysis

Average Hardness: HRC 25.5

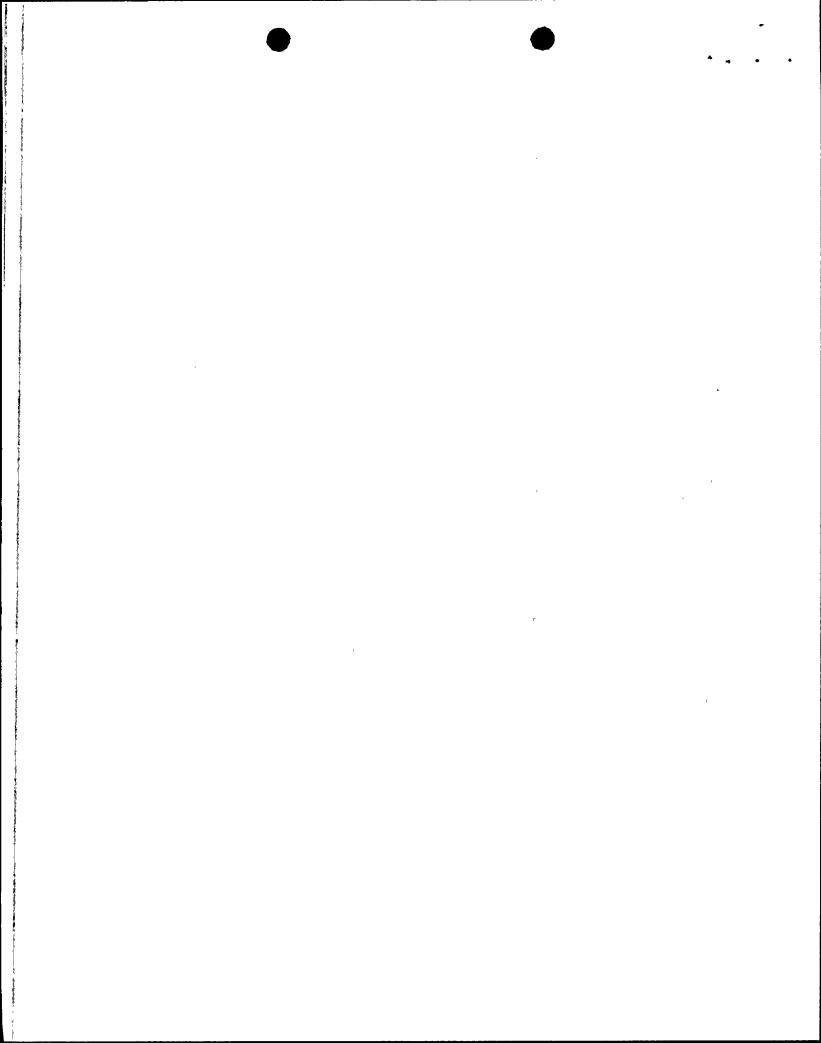
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .402 Sulfur .018 Phosphorus .013

Mechanical and chemical properties meet specification requirements.



Sample I.D. Number: PVNGS-127-292 Fastener Description: #36 Nut

Material: Carbon Steel

Specification: SA 194, Grade 2H, ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B7T LB95 (Stud)

2HT LB97 (Nuts) Texas Bolt

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #13-PM-300, Q

Mechanical Analysis

Average Hardness: HRC 27.0

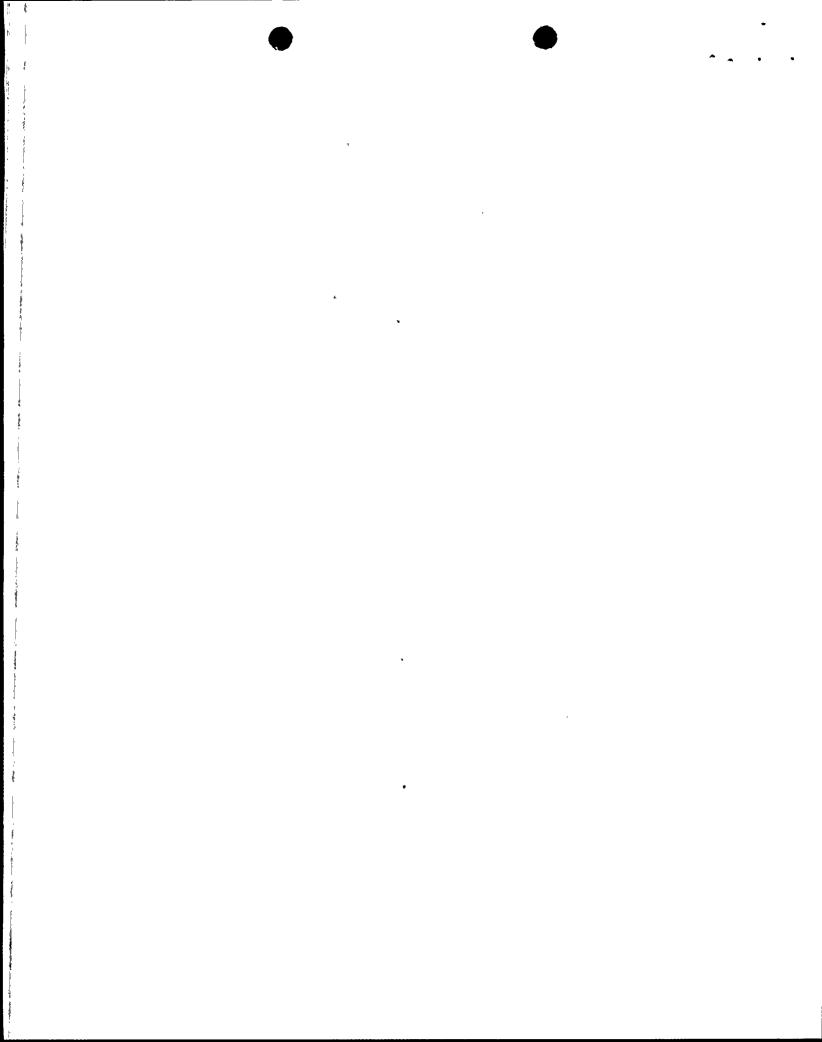
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .414 Sulfur .019 Phosphorus .013

Mechanical and chemical properties meet specification requirements.



Sample I.D. Number: PVNGS-127-293 Fastener Description: #37 Nut

Material: Carbon Steel

Specification: SA 194, Grade 2H, ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B7T LB95 (Stud)

2HT LB97 (Nuts) Texas Bolt

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #13-PM-300, Q

Mechanical Analysis

Average Hardness: HRC 25.2

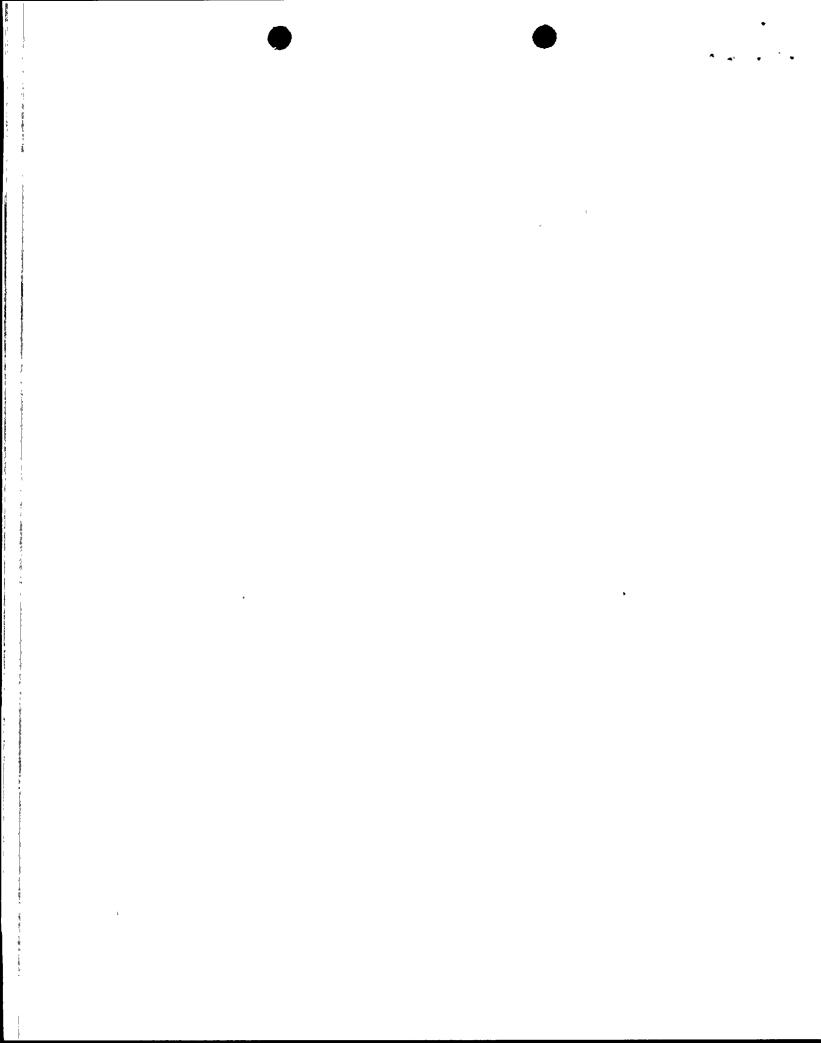
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .410 Sulfur .016 Phosphorus .012

Mechanical and chemical properties meet specification requirements.



Fastener Description: #38 Nut

Material: Carbon Steel

Specification: SA 194, Grade 2H, ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): B7T LB95 (Stud)

2HT LB97 (Nuts) Texas Bolt

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: Texas Bolt

P. O. Box 1211

Houston, TX 77001

QA Requirements Imposed on Vendor: Purchase Order #13-PM-300, Q

Mechanical Analysis

Average Hardness: HRC 27.0

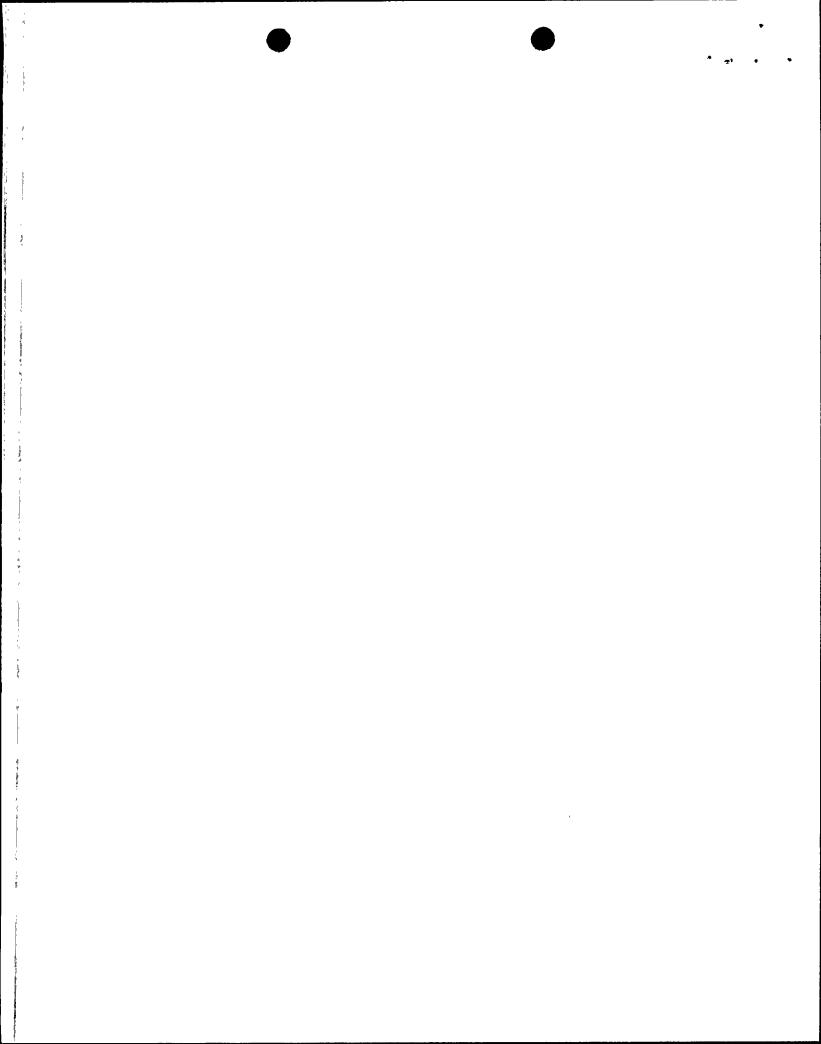
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .406 Sulfur .017 Phosphorus .013

Mechanical and chemical properties meet specification requirements.



Fastener Description: #39 Nut

Material: Stainless Steel

Specification: SA 194, Grade 8M, ASME III 74W 75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 630 (-), HSL

(Stud) 8MT CTL (Nuts)

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: A&G Engineering

4640 E. LaPalma Avenue

Anaheim, CA

QA Requirements Imposed on Vendor:

Licensee Representative: Purchase Order #F-183727, Q

Mechanical Analysis

Average Hardness: HRB 84.0

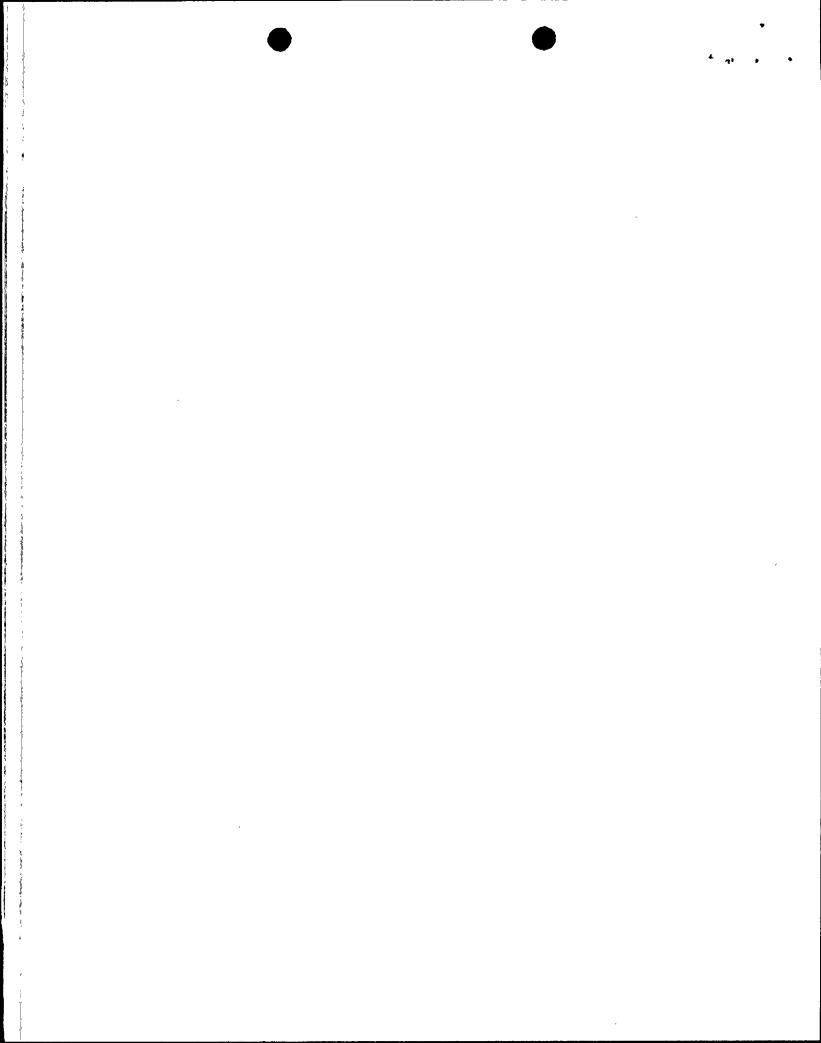
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .060
Sulfur .007
Phosphorus .027
Silicon .637
Chromium 17.14
Manganese 1.71
Molybdenum 2.20

Mechanical and chemical properties meet specification requirements.



Fastener Description: #40 Nut

Material: Stainless Steel

Specification: SA 194, Grade 8M, ASTM III 74W 75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 630 (-),

HSL (Stud) 8MT CTL (Nuts)

Class/Procurement Level: Quality-Related

General Plant Application: Pressure Boundary

Vendor: A&G Engineering

4640 E. LaPalma Avenue

Anaheim, CA

QA Requirements Imposed on Vendor: Purchase Order #F-183727, Q

Mechanical Analysis

Average Hardness: HRB 86.0

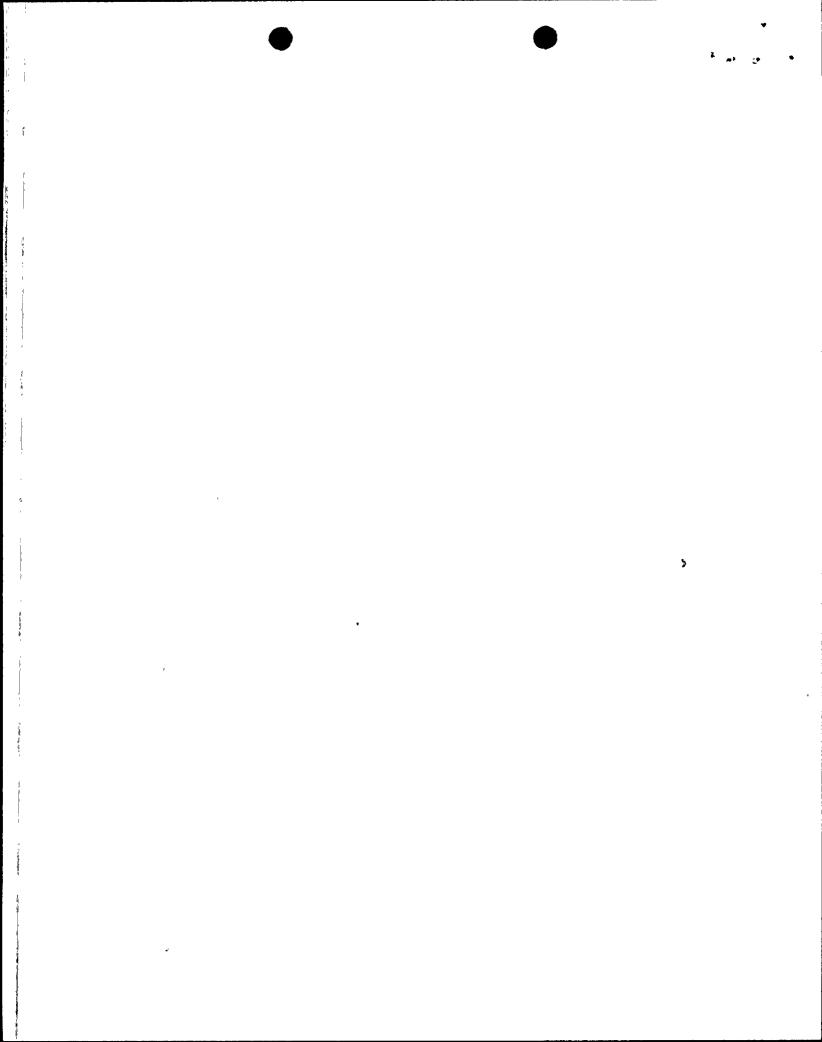
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (W/O)

Carbon .061 .007 Sulfur Phosphorus .024 .618 Silicon 17.05 Chromium 12.35 Nickel 1.68 Manganese 2.19 Molybdenum

Mechanical and chemical properties meet specification requirements.



Fastener Description: #41 Nut

Material: Stainless Steel

Specification: SA 194, Grade 8M, ASME III 74W 75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 630 (-),

HSL (Stud) 8MT CTL (Nuts)

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: A&G Engineering

4640 E. LaPalma Avenue

Anaheim, CA

QA Requirements Imposed on Vendor: Purchase Order #F-183727, Q

Mechanical Analysis

Average Hardness: HRB 86.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (W/O)

Carbon .062
Sulfur .009
Phosphorus .025
Silicon .607
Chromium 17.52
Manganese 1.77
Molybdenum 2.07

Mechanical and chemical properties meet specification requirements.

Fastener Description: #42 Nut

Material: Stainless Steel

Specification: SA 194, Grade 8M, ASME III 74W75

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): 630 (-),

HSL (Stud) 8MT CTL (Nuts)

Class/Procurement Level: Quality-Related General Plant Application: Pressure Boundary

Vendor: A&G Engineering

4640 E. LaPalma Avenue

Anaheim, CA

QA Requirements Imposed on Vendor: Purchase Order #F-183727, Q

Mechanical Analysis

Average Hardness: HRB 86.0

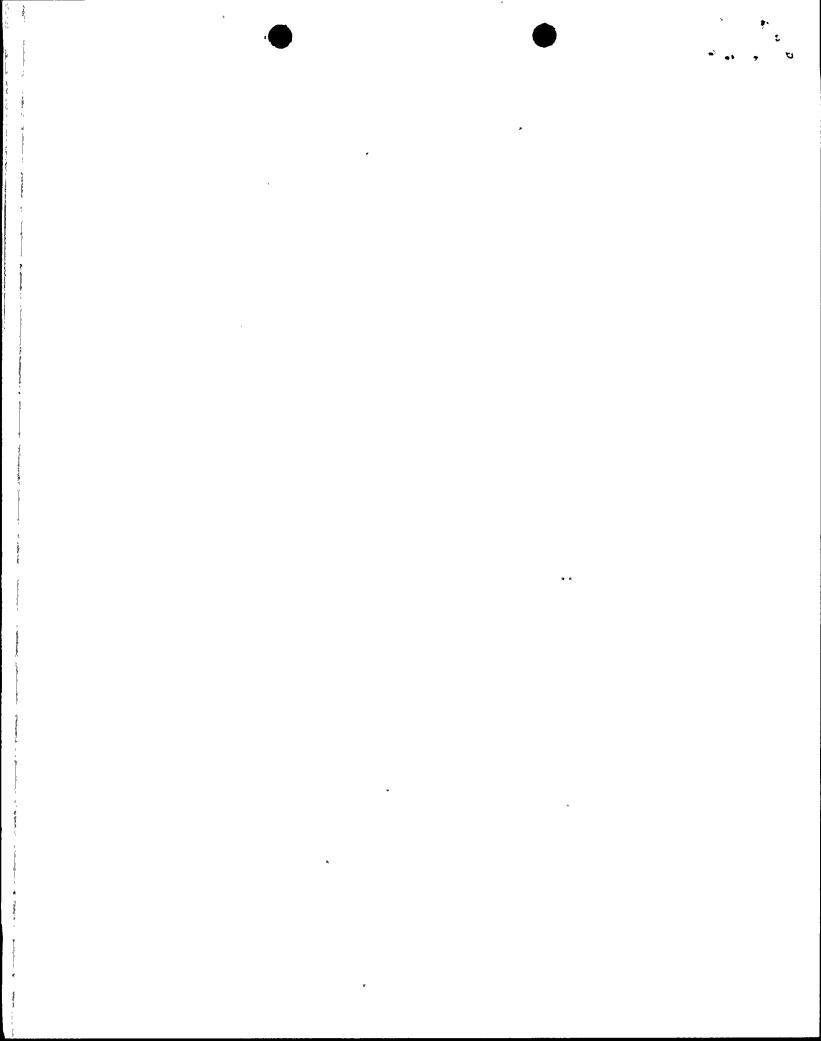
Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

.065 Carbon .011 Sulfur .028 Phosphorus Silicon .583 17.35 Chromium Nickel 11.80 1.64 Manganese 2.16 Molybdenum

. Mechanical and chemical properties meet specification requirements.



Fastener Description: #43 Nut

Material: Carbon Steel

Specification: ASTM-A-307-74/ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): Two vertical

bars

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33402534;

1M, P4, N1, ZZ

Mechanical Analysis

Average Hardness: HRB 91.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .286 Sulfur .042 Phosphorus .014

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).

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Sample I.D. Number: PVNGS-127-300 Fastener Description: #44 Nut

Material: Carbon Steel

Specification: ASTM-A-307-74/ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): Two vertical

bars

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33402534;
1M, P4, N1, ZZ

Mechanical Analysis

Average Hardness: HRB 80.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .407 Sulfur .022 Phosphorus .007

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.

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Sample I.D. Number: PVNGS-127-301 Fastener Description: #45 Nut

Material: Carbon Steel

Specification: ASTM-A-307-74/ASTM-A-563-84, Grade A

Sample Stock Location: Warehouse

Head Marking (Specification and Manufacturer): Two vertical

bars

Class/Procurement Level: Quality-Related General Plant Application: Structural

Vendor: Hub, Inc.

2146 Flintstone Drive

Tucker, GA 30084

QA Requirements Imposed on Vendor: Purchase Order #33402534; 1M, P4, N1, ZZ

Mechanical Analysis

Average Hardness: HRB 90.0

Ultimate Tensile Strength: N.R.

0.2% Yield Strength: N.R.

Chemical Analysis (w/o)

Carbon .235 Sulfur .121 Phosphorus .011

Mechanical and chemical properties meet specification requirements.

Notes

- 1M Material is procured and manufactured as specified in the purchase order.
- 2M Material is obtained from the Original Equipment manufacturer according to original procurement requirements (i.e., specifications and design drawings).
- 5M Material is commercial grade.