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VAN BRUNT,E.E. Arizona Nuclear Power Project (formerly Arizona Public Serv
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SUBJECT: Responds to NRC Compliance Bulletin 87-002, "Fastener Testing to Determine Conformance w/Applicable Matl...."

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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

IE11
1/1

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.

Edwin E. Van Brunt, Jr.

Sworn to before me this 15 day of January, 1988. n. meador 11/15/88

Notary Public

My Commission Expires:

_____

ATTACHMENT A

ANPP RESPONSES TO BULLETIN ITEMS

NRC ACTION ITEM

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.

NRC ACTION ITEM

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.

NRC ACTION ITEM

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.

NRC ACTION ITEM

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

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.

NRC ACTION ITEM

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.

NRC ACTION ITEM

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 DATA

Sample I.D. Number: PVNGS-127-257
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.

Sample I.D. Number: PVNGS-127-258
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	1.00
Manganese	.894
Molybdenum	.219
Vanadium	.006

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.

Sample I.D. Number: PVNGS-127-259
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
Silicon	.238
Chromium	1.01
Manganese	.879
Molybdenum	.223
Vanadium	.006

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.

Sample I.D. Number: PVNGS-127-260
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)

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

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.

Sample I.D. Number: PVNGS-127-261
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
Phosphorus	.022
Silicon	.387
Chromium	16.17
Nickel	3.64
Manganese	.647
Copper	3.69
Cb + Ta	.252

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.

Sample I.D. Number: PVNGS-127-262
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.

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.

Sample I.D. Number: PVNGS-127-263
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.

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.

Sample I.D. Number: PVNGS-127-699
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.

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.

Sample I.D. Number: PVNGS-127-700
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.

Sample I.D. Number: PVNGS-127-266
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
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.

Sample I.D. Number: PVNGS-127-267
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.

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.

Sample I.D. Number: PVNGS-172-268
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.

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.

Sample I.D. Number: PVNGS-127-269
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.

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.

Sample I.D. Number: PVNGS-127-270
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
Phosphorus	.012
Silicon	.323
Chromium	1.05
Manganese	.678
Molybdenum	.554
Vanadium	.292

Mechanical and chemical properties meet specification requirements.

Sample I.D. Number: PVNGS-127-271
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.

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.

Sample I.D. Number: PVNGS-127-272
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
Nickel	11.20
Manganese	1.14
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.

Sample I.D. Number: PVNGS-127-273
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.

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.

Sample I.D. Number: PVNGS-127-274
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.

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.

Sample I.D. Number: PVNGS-127-275
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.

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.

Sample I.D. Number: PVNGS-127-276
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.

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.

Sample I.D. Number: PVNGS-127-277
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
Sulfur	.024
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.

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.

Sample I.D. Number: PVNGS-127-701
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.

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.

Sample I.D. Number: PVNGS-127-702
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.

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.

Sample I.D. Number: PVNGS-127-703
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.

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.

Sample I.D. Number: PVNGS-127-281
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

[1] Chemistry 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.

Sample I.D. Number: PVNGS-127-282
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.

Sample I.D. Number: PVNGS-127-283
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.

Sample I.D. Number: PVNGS-127-284
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.

Sample I.D. Number: PVNGS-127-285
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.

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.

Sample I.D. Number: PVNGS-127-286
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.

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.

Sample I.D. Number: PVNGS-127-287
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.

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.

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.

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.

Sample I.D. Number: PVNGS-127-289
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.

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.

Sample I.D. Number: PVNGS-127-290
Fastener Description: #34 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	.254
Sulfur	.039
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.

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.

Sample I.D. Number: PVNGS-127-291
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.

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.

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.

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.

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.

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.

Sample I.D. Number: PVNGS-127-294
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.

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.

Sample I.D. Number: PVNGS-127-295
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.

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.

Sample I.D. Number: PVNGS-127-296
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
Sulfur	.007
Phosphorus	.024
Silicon	.618
Chromium	17.05
Nickel	12.35
Manganese	1.68
Molybdenum	2.19

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.

Sample I.D. Number: PVNGS-127-297
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.

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.

Sample I.D. Number: PVNGS-127-298
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)

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

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.

Sample I.D. Number: PVNGS-127-299
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).

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.

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.

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.

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.

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.