SCE&G
A SCANA Company

South Carolina Electric & Gas Company
P.O. Box 764
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(803) 748-3513

Dan A. Nauman
Vice President
Nuclear Operations

January 12, 1988

Dr. J. Nelson Grace
Regional Administrator
U.S. Nuclear Regulatory Commission
Suite 2900
101 Marietta Street, NW
Atlanta, Georgia 30323

SUBJECT: Virgil C. Summer Nuclear Station
Docket No. 50/395
Operating License No. NPF-12
NRC Bulletin No. 87-02

Dear Dr. Grace,

On November 13, 1987, South Carolina Electric & Gas Company received NRC Compliance Bulletin No. 87-02, "Fastener testing to determine conformance with applicable material specifications." As requested, information is provided concerning our receipt inspection and our internal control procedures for fasteners along with results of the independent testing of our fasteners. The enclosures to this letter contain the information regarding the action that was taken in accordance with the compliance bulletin.

The information contained in this letter and its enclosures are true and correct to the best of my knowledge, information and belief.

If you have any questions, please advise.

Very truly yours,

D. A. Nauman

JSB/DAN:bjh

Enclosures

pc: O. W. Dixon, Jr./T. C. Nichols, Jr.
E. C. Roberts
O. S. Bradham
D. R. Moore
W. A. Williams, Jr.
Document Control Desk
Group Managers
W. R. Baehr
W. R. Higgins
R. B. Clary
G. G. Soult
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Surveillance Systems
T. L. Matlosz
C. L. Ligon (NSRC)
R. M. Campbell, Jr.
K. E. Nodland
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G. O. Percival
R. L. Prevatte
J. B. Knotts, Jr.
INPO Records Center
Marsh & McLennan
ANI Library
RTS
NPCF
File

JE11

ENCLOSURE I

REQUEST 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.

Response:

a. *Safety-related fasteners may be procured from an audited and approved supplier or from a commercial supplier. The level of receipt inspection depends upon the qualification of the vendor.*

If the fasteners are procured from an audited and approved supplier who accepts 10CFR21 responsibility, then the receipt inspection consists of the following:

a. review of the purchase order requirements
b. inspection of the shipping package
c. verification that identification and markings are in accordance with the procurement documents; i.e., tagging and labeling requirements
d. inspection for damage and deformation, cleanliness
e. review and verification that purchase order refers to items received.
f. review and approval of item certification (certified material test reports, certificates of conformance, mechanical test reports, etc.)[1]

Safety-related fasteners procured from a commercial supplier not accepting 10CFR21 responsibility require a more extensive receipt inspection. This method of procurement is generally used when ordering fasteners with diameters less than 1/4" since these items generally are not supplied as safety related. When the purchase requisition for fasteners is developed, the specifying engineer determines additional receipt inspection requirements. The additional requirements are developed through the use of machinist and metals handbooks, site mechanical maintenance procedures which provide torquing requirements, manufacturers' catalogs and evaluation of potential end-use design basis criteria. Additional requirements generally include material analysis and functional testing.

Receipt inspection of nonsafety-related fasteners consists of items a through e above. Item f does not apply since non-safety items would not require certification. If certification is provided, the documents are placed in the purchase order file and maintained as a record and retrievable in the event an on-site certification is required at a future date.[2]

[1] *Quality and Procurement Services Procedure No. 701, Revision 1 3/03/87.*
[2] *Quality and Procurement Services Procedure No. 401, Revision 1, 6/12/87.*

On-site certifications are utilized to upgrade existing non-safety warehouse items to safety related. Upgrade requirements are developed in the same manner as receipt inspection requirements for safety-related fasteners procured from commercial suppliers. For fasteners with diameters greater than 1/4", the corresponding standard is researched to develop appropriate testing requirements and acceptance criteria. The original documentation supplied with the item may also be used to obtain information; however, all information in these reports must be physically verified before acceptance.

All documents affecting or pertaining to the use of safety-related items are reviewed by Quality Engineering. These documents include purchase requisitions, on-site certifications, nonconformance notices, etc. The Quality Engineer is responsible for determining that applicable regulatory requirements, design bases, ASME code requirements, industry standard (ASTM, ANSI, etc.) requirements, and other requirements necessary to assure quality are incorporated into the procurement and testing requirements. In addition, the Quality Engineer assesses the vendor's qualifications and specifies additional requirements to assure the required level of quality.[3] This independent review provides additional assurance that items will be procured and/or tested commensurate with the degree of verification required for its intended use.

b. *All safety-related fasteners received at V. C. Summer Station are identified by an Item Identification Record (IIR). The IIR is affixed to the item or if physical tagging is not feasible, a serial number or other positive identification is recorded on the IIR tag and filed in the appropriate purchase order folder. Upon successful completion of the applicable receipt inspection requirements, the items are placed in safety-related stock.*

Access controls for each storage area are established consistent with the need for access by specific individuals. Safety-related items are physically separated from non-safety items.[4] At V. C. Summer Station, both safety and non-safety fasteners are stored consistent with ANSI N45.2.2 Level B requirements.

Fasteners are issued from the warehouse via an approved stores requisition. Requisitions for safety related fasteners contain the following information as appropriate:

a. *Work document number to which the fasteners will be used; i.e., Maintenance Work Request (MWR), Modification Request Form (MRF), Surveillance Test Task Sheet (STTS), etc.*
b. *Equipment number to which fasteners are being issued.*
c. *Accounting information*
d. *Part number, description and quantity issued.*

The original requisition for safety related issues is sent to permanent records storage. A copy is given to the recipient. Maintenance Work Requests, Shop Work Orders, PM and Surveillance Task Sheets are also authorities for the

[3]*Quality and Procurement Services Procedure No. 501, Revision 0, 7/1/86.*
[4]*Quality and Procurement Services Procedure No. 401, Revision 1, 6/12/87.*

issuance of safety-related materials; however, a stores requisition containing the above information (items a through d) is still required.[5]

Once the items have been issued from stock, their use is controlled through the stores requisition to which the part was issued. All maintenance on station components, systems or structures is performed using an MWR, STTS, etc. Station Quality Control (QC) is notified prior to the start of any maintenance activity.[6]

QC review is required when maintenance and modification activities affect safety related structures, systems and components. As defined by the appropriate work document, fasteners used in performance of safety related work activities are verified by QC to be adequate for safety-related use. The QC inspector performs this verification by reviewing the stores requisition, on-site certification, or other pertinent documentation stating the item's acceptance for safety-related use. The fasteners may be used to complete the maintenance activity only after QC verification and approval.[7]

The stores requisition and maintenance/modification documents are the key internal controls utilized to assure the appropriate use of fasteners. Station Quality Control serves as the final assurance that all fasteners used in safety-related equipment meet the required level of quality for their intended end use.

[5]*Station Administrative Procedure No. 136, Revision 0, 7/28/86.*
[6]*Station Administrative Procedure No. 300, Revision 3, 10/14/86.*
[7]*Quality and Procurement Services Procedure No. 804, Revision 3, 11/4/87.*

ENCLOSURE II

REQUEST 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.

Response:

Safety-related fasteners to be tested were selected using the grades listed in the Bulletin. Fasteners most widely stocked were selected for multiple samples in order to complete the safety related fastener group since certain grades of fasteners were not carried as stock items. Non-safety fasteners were selected using the same criteria as for safety related fasteners. All fastener sample selections were obtained with the concurrence of the NRC Senior Resident Inspector.

Fasteners procured to meet the following specifications were selected: A-193 grades B7 and B8; A-449; A-325 type 2; A-354 grade BD; A-490; A-307.

ENCLOSURE III

REQUEST 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.

Response:

Nuts were selected as appropriate with bolts chosen for testing. Seven types of nuts were selected for testing with a total of eleven in the sample. Several samples were chosen that had been procured to meet the specifications of A-194. All nut sample selections were obtained with the concurrence of the NRC Senior Resident Inspector.

Nuts procured to meet the following specifications were selected: A-194; A-563.

ENCLOSURE IV

REQUEST 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.

Response:

The Licensee procured the services of Law Engineering Industrial Services as the approved vendor to perform independent testing on the fastener samples. All testing was performed under purchase order number Q478707 in accordance with the requirements of Bulletin 87-02.

Since many non-safety related fasteners are procured by description only i.e. ASTM standards are not specified in the purchase order, the ASTM standard most closely relating to the item was utilized as the testing standard. If the standard could be determined from the head marking, then that standard was used for testing.

ENCLOSURE V

REQUEST 5:

The results of all tests, together with supporting information, are to be reported to the NRC utilizing the format shown in Attachments I and II 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.

Response:

The information requested has been provided as attachments to this enclosure. Attachment I contains the individual fastener data sheet for each sample slected in accordance with the Attachment I provided in Bulletin 87-02. The results of the testing have been provided in Attachment II which contains the individual sample test results sheets from Law Engineering Industrial Services. Attachment II data sheets have been submitted in lieu of the Attachment II format given in Bulletin 87-02. An engineering evaluation was performed on the eight fasteners that did not meet the acceptance criteria for portions of the testing. The engineering evaluation has been included as Attachment III.

The data and results sheets provided in Attachment I and Attachment II are ordered according to sample tag identification number and item letter. Sheets which contain the same item number indicate that a non-safety fastener and nut were selected together. When an item letter is followed by a number, it indicates that more than one specimen was tested in that sample.

ATTACHMENT I

OF

ENCLOSURE V

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81557 Item: A

Fastener Description: 5/8" Nut

Purchase Order: #SN10218SR

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records: ASTM - A325 GRADE A (Fasteners ordered to ASTM A325 Grade A were shipped with the associated nut which is an ASTM - A563 Grade A).

Head Marking (Specification and Manufacturer):

None

**Class/Procurement Level: Nuclear Safety Related

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

Various - Previous applications include steam dump valve IFV-2016-MB, Main H.P. Turbine, and RC Pump B.

Vendor: Applied Eng. Co. Inc.
P.O. Box 1327
Orangeburg, S.C. 29115 (803-534-2424)

Supplier: N/A

Manufacturer: Commercial Fasteners Corp.
241 Lafayette St.
New York, NY 10012

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81568 Item: B

Fastener Description: 1/2" Nut

Purchase Order: # SN10218SR

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records: ASTM - A307 GRADE A (Fasteners ordered to ASTM A307 Grade A specifications were shipped with the associated nut wnich is an ASTM-A563 Grade A.)

Head Marking (Specification and Manufacturer): None

**Class/Procurement Level: Nuclear Safety Related

General Plant Application (e.g., Pressure Boundary, Structural) Various - Previous applications include Circulating Water Pump C and the Reactor Building Instrument Air Supply Isolation Valve.

Vendor: Applied Engineering Co. Inc.
P.O. Box 1327
Orangeburg, S.C. 29115 (803-534-2424)

Supplier: ***

Manufacturer: ***

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/14/88

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

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

***Due to the age, length of time the purchase remained open and the way the purchase order was filed, this information would require an extensive and costly search.

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81556 Item: C

Fastener Description: 1" Nut

Purchase Order: #A392838

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A194 GRADE 2H

Head Marking (Specification and Manufacturer):

**Class/Procurement Level: Nuclear Safety Related

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

Various - Procured for the Reactor Building Equipment Hatch.

Vendor: Energy Steel & Supply Co.
5941-18 Providence Dr.
Charlotte, N.C. 28226

Supplier: N/A

Manufacturer: Hamanaka Nut Mfg. Co. LTD
Himfji, Japan

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81540 Item: D

Fastener Description: 1" Nut

Purchase Order: #Q257804

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records: ASTM-A307 GRADE A (fasteners ordered to ASTM-A325 Grade A were shipped with the associated nut which is an ASTM - A563 Grade A)

Head Marking (Specification and Manufacturer):

Bethlehem Steel

**Class/Procurement Level: Nuclear Safety Related

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

Various

Vendor: Capitol Pipe & Steel Products Co.
#5 Woodlawn Gran, Suite 136
Charlotte, N.C. 28210 (Out of Business)

Supplier: N/A

Manufacturer: Bethlehem Steel
701 East 3rd St.
Bethlehem, Pennsylvania 18016

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature _____ Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81543 Item: E

Fastener Description: 5/8" Nut

Purchase Order: #Q437287

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM A563 GRADE A

Head Marking (Specification and Manufacturer):

Bethlehem Steel

**Class/Procurement Level: Nuclear Safety Related

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

Various

Vendor: Hub, Inc.
2146 Flintstone Dr.
Tucker, GA 30084

Supplier: N/A

Manufacturer: Bethlehem Steel
701 East 3rd St.
Bethlehem, Pennsylvania 18016

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81544 Item: F

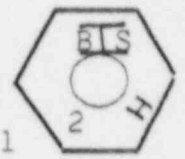
Fastener Description: 1/2 Nut

Purchase Order: #Q311260

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records: ASTM - A194-2H

Head Marking (Specification and Manufacturer):



Bethlehem Steel

**Class/Procurement Level: Nuclear Safety Related

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

Various - Previous applications include the Diesel Generator Fuel Oil Day Tank A, Reactor Building Cooling Unit Fan 65A normal motor and the steam packing condenser.

Vendor: Power Engineering Products Co., Inc.
P.O. Box 382
South Plainfield, N.J. 07080 (Out of Business)

Supplier: N/A

Manufacturer: Bethlehem Steel
701 East 3rd St.
Bethlehem, Pennsylvania 18016

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 11/1/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81542 Item: G

Fastener Description: 9/16" Stainless Steel Nut

Purchase Order: #Q311260

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A194 Grade 8

Head Marking (Specification and Manufacturer):

**Class/Procurement Level: Nuclear Safety Related

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

Vendor: Power Engineering Products Co., Inc.
P.O. Box 382
South Plainfield, N.J. 07080 (Out of Business)

Supplier: ***

Manufacturer: ***

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/4/88

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

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

***Due to the age, length of time the purchase remained open and the way the purchase order was filed, this information would require an extensive and costly search.

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81567 Item: H

Fastener Description: 9/16 Stud-12x6"

Purchase Order: #Q311260

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A193-B7

Head Marking (Specification and Manufacturer): B7S

**Class/Procurement Level: Nuclear Safety Related

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

Vendor: Power & Engineering Products Co., Inc.
P.O. Box 382
South Plainfield, N.J. 07080 (Out of Business)

Supplier: ***

Manufacturer: ***

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/14/88

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

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

***Due to the age, length of time the purchase remained open and the way the purchase order was filed, this information would require an extensive and costly search.

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81559 Item: I

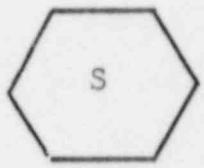
Fastener Description: 7/8" - 14 x 3" Hex Head Bolt

Purchase Order: #Q311260

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
A307 Grade B

Head Marking (Specification and Manufacturer):



**Class/Procurement Level: Nuclear Safety Related

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

Vendor: Power & Engineering Products Co., Inc.
P.O. Box 382
South Plainfield, N.J. 07080 (Out of Business)

Supplier: N/A

Manufacturer: Standard Nut & Bolt Company
49 Abbott Street
Cumberland, RI 02864

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature _____ Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81562 Item: J

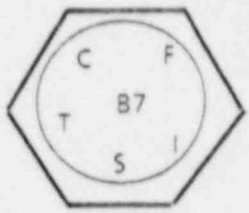
Fastener Description: 5/8" - 11 x 4" Hex Head Bolt

Purchase Order: 0Q257979

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A193 Grade B7

Head Marking (Specification and Manufacturer):



**Class/Procurement Level: Nuclear Safety Related

General Plant Application (e.g., Pressure Boundary, Structural)
Various - Previous applications include the Diesel Building Sprinkler System Deluge Valve Inlet Valve.

Vendor: Atlantic Bolt & Screw Co.
P.O. Box 164
Cayce, S.C. 29033

Supplier: ***

Manufacturer: ***

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M G Curtiss Date 4/6/88

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

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

***Due to the age, length of time the purchase remained open and the way the purchase order was filed, this information would require an extensive and costly search.

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81558 Item: K

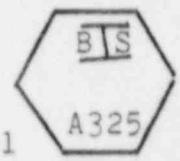
Fastener Description: 7/8" - 9 x 2-3/4" Hex Head Bolt

Purchase Order: #Q292985

Description of Sample Stock Location: Safety Related Bins
Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A325

Head Marking (Specification and Manufacturer):



Bethlehem Steel

**Class/Procurement Level: Nuclear Safety Related

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

Various

Vendor: Southern Bolt & Fastener Corp.
P.O. Box 7196
Shreveport, Louisiana 71107

Supplier: N/A

Manufacturer: Bethlehem Steel
701 East 3rd St.
Bethlehem, Pennsylvania 18016

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81565 Item: L

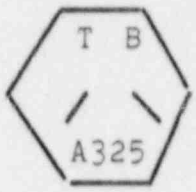
Fastener Description: 1/2" - 13 x 2-1/2" Hex Head Bolt

Purchase Order: #Q260946

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A325

Head Marking (Specification and Manufacturer):



Texas Bolt

**Class/Procurement Level: Nuclear Safety Related

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

Various - Previous applications include the Turbine Generator Bearings Sprinkler System Deluge Inlet Valve.

Vendor: Texas Bolt Company
P.O. Box 1211
Houston, Texas 77001

Supplier: N/A

Manufacturer: Same as Vendor

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M G Curtiss Date 4/4/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81564 Item: M

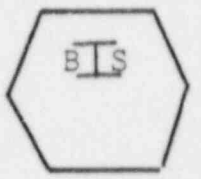
Fastener Description: 1/2" - 13 x 2-1/2" Hex Head Bolt

Purchase Order: #SN10218 SR

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A307 Grade A

Head Marking (Specification and Manufacturer):



Bethlehem Steel

**Class/Procurement Level: Nuclear Safety Related

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

Vendor: Applied Engineering Co. Inc.
P. O. Box 1327
Orangeburg, S. C. 29115 (803-534-2424)

Supplier: N/A

Manufacturer: Bethlenem Steel
701 East 3rd St.
Bethlehem, Pennsylvania 18016

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81560 Item: N

Fastener Description: 7/8" - 9 x 4-1/2" Hex Head Bolt

Purchase Order: #Q334040

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A490

Head Marking (Specification and Manufacturer):

**Class/Procurement Level: Nuclear Safety Related

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

Various - Previous applications include the Diesel Generator Cooler B Fire Service Supply Valve.

Vendor: Southern Bolt & Fastener Corp.
P.O. Box 7196
Shreveport, Louisiana 71107

Supplier: N/A

Manufacturer: Same as Vendor

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 11/1/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81555 Item: O

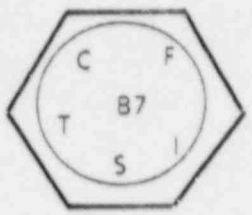
Fastener Description: 3/4" - 10 x 7" Hex Head Bolt

Purchase Order: #Q256236

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM - A193 Grade B7

Head Marking (Specification and Manufacturer):



**Class/Procurement Level: Nuclear Safety Related

General Plant Application (e.g., Pressure Boundary, Structural)
Various - Procured for Spray Ring Hangers.

Vendor: Atlantic Bolt & Screw Co.
P.O. Box 516
West Columbia, S.C. 29169 Phone: 794-6902

Supplier: Southeastern Bolt and Screw Division
United States Pipe and Foundary Co.

Manufacturer: Cardinal Threading
A Division of Cardinal American Corp.
5185 Richmond Road
Bedford Hts., Ohio 44146
Phone: 216-831-3800

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/14/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81563 Item: P

Fastener Description: 1/2" - 13 x 3" Stainless Hex Head Bolt

Purchase Order: #Q311260

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
A193 Grade B8 Class 1

Head Marking (Specification and Manufacturer):

**Class/Procurement Level: Nuclear Safety Related

General Plant Application (e.g., Pressure Boundary, Structural)
Various - Previous Applications include Intermediate Building sump pumps and auxiliary condenser cleaning pit sump pumps.

Vendor: Power & Engineering Products Co., Inc.
P.O. Box 382
South Plainfield, N.J. 07080 (Out of Business)

Supplier: N/A

Manufacturer: Standard Nut & Bolt Company
49 Abbott Street
Cumberland, RI 02864

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 11/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81561 Item: Q

Fastener Description: 3/4" - 16 x 3" Stainless Steel Hex Head Bolt

Purchase Order: #Q311260

Description of Sample Stock Location: Safety Related Bins - Warehouse C

Material Specification as Documented by Licensee Records:
ASTM-A193 Grade B8 Class 1

Head Marking (Specification and Manufacturer):

**Class/Procurement Level: Nuclear Safety Related

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

Vendor: Power Engineering Products Co., Inc.
P. O. Box 382
South Plainfield, N. J. 07080 (out of business)

Supplier: ***

Manufacturer: ***

QA Requirements Imposed on Vendor: 10CFR50 APP. B

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 4/4/88

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

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

***Due to the age, length of time the purchase order remained open, and the way the purchase order was filed this information would require an extensive and costly search.

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81534 Item: R

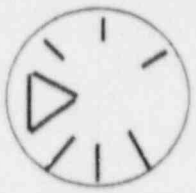
Fastener Description: Hex Head Cap Screw, 3/4" - 16 x 4"

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records:
Not on file

Head Marking (Specification and Manufacturer)



ASTM A354 GRADE BD
PARKER-KALON
DIVISION USM
CORPORATION
COMMERCIAL GRADE
(SYMBOL MATCH
ONLY)

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File.

Manufacturer: Not on File.

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/6/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81547 Item: R

Fastener Description: 3/4" Nut

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer): None Assumed A-563 Grade B

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature _____ Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81536 Item: S

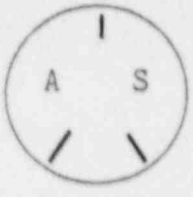
Fastener Description: Hex Head Bolt, 3/4" - 10 x 6"

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer) ASTM A449 ARMCO STEEL CORP. (SYMBOL MATCH ONLY)



**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature _____ Date 1/16/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81545 Item: S

Fastener Description: 3/4" Nut

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer): None Assumed ASTM A563 Grade B

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81541 Item: T

Fastener Description: Socket Head Capscrew 3/4" x 3"

Purchaser Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer): None Assumed ASTM A574

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M G Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81537 Item: U

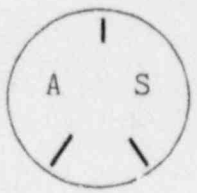
Fastener Description: Capscrew 1" - 14 x 6"

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer) ASTM A449 ARMCO STEEL CORP. (SYMBOL MATCH ONLY)



**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature _____ Date 4/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81533 Item: V

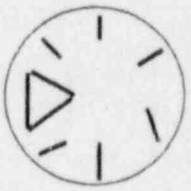
Fastener Description: Cap Screw, 1/2" x 3" (Hex Head)

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer)



ASTM A354 GRADE BD
PARKER-KALON
DIVISION
USM CORPORATION
(SYMBOL MATCH
ONLY)

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature _____ Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81531 Item: W

Fastener Description: Stainless Steel Hex Head Cap Screw, 1/2" x 2-1/4"

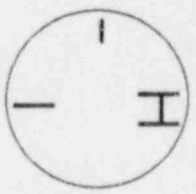
Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records:
Not on File

Head Marking (Specification and Manufacturer)

Assumed Alloy 303



Markings could not be absolutely identified - assumed standard commercial grade.

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81538 Item: X

Fastener Description: Stainless Steel Hex Head Cap Screw 3/4" - 10 x 3"

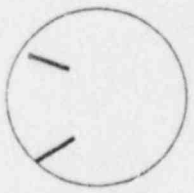
Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer) Markings could not be absolutely identified - assumed standard commercial grade:

Assumed Alloy 303



**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M.G. Curtiss Date 1/14/88

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

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

Attachment I

Fastener Testing Data Sheet

Item: Y

The letter "Y" was not used; therefore, no Item Y exists.

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81539 Item: Z

Fastener Description: Socket Steel Socket Head Cap Screw 5/8" - 11 x 3"

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer): None

Assumed Alloy 303

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M G Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81530 Item: AA

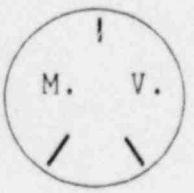
Fastener Description: Hex Head Capscrew 1/2" x 3-1/2"

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer) ASTM A449 TYPE 1 MANUFACTURER UNDETERMINED



**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File.

Manufacturer: Not on File.

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81535 Item: BB

Fastener Description: Capscrew 1/2" - 20 x 3"

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer) ASTM A449 TYPE 1 MANUFACTURER UNDETERMINED

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File

Manufacturer: Not on File

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature _____ Date 1/11/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81546 Item: BB

Fastener Description: 1/2" Nut

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer): None Assumed ASTM A563 Grade B

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File.

Manufacturer: Not on File.

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M. G. Curtiss Date 11/1/88

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

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

Attachment I

Fastener Testing Data Sheet

*Sample ID# VCS-81529 Item: CC

Fastener Description: 1/2" Hex Nut

Purchase Order: # Unknown

Description of Sample Stock Location: Non-Safety Bins - Warehouse C

Material Specification as Documented by Licensee Records: Not on File

Head Marking (Specification and Manufacturer): None Assumed ASTM A563 Grade B

**Class/Procurement Level: Non-Safety

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

Vendor: Not on File

Supplier: Not on File.

Manufacturer: Not on File.

QA Requirements Imposed on Vendor: None

Licensee Representative: Mark G. Curtiss

Signature M G Curtiss Date 1/11/88

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

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

ATTACHMENT II

OF

ENCLOSURE V

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERIFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 1 of 31
Date: December 18, 1987

Material: Reported as Item A, 5/8"-11 UNC, A-563, Gr A, HH, CS Nut
Sample ID: VCS-81557
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-A-H1	12/4/87	90.8, 90.0, 92.2	91.0	90	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-A-C1	12/17/87	0.46	----	0.01	0.01	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 2 of 31
Date: December 18, 1987

Material: Reported as Item B, 1/2"-13 UNC, A-563, Gr A, HH, CS Nut
Sample ID: VCS-81568
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-B-H1	12/4/87	97.4, 97.6, 97.8	97.6	98	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-B-C1	12/17/87	0.12	----	0.02	0.01	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
P.O. BOX 1297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 3 of 31
Date: December 18, 1987

Material: Reported as Item C, 1"-8 UNC, A-194, Gr 2H, HH, CSA Nut
Sample ID: VCS-81556
Date Tested: See Below
Tested Per: IAW, ASTM A-194-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-C-H1	12/4/87	27.4, 26.5, 26.7	26.9	27	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-C-C1	12/17/87	0.43	----	0.02	0.01	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 4 of 31
Date: December 18, 1987

Material: Reported as Item D, 1"-8 UNC, A-563, Gr A, HH, CS Nut
Sample ID: VCS-81540
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-D-H1	12/4/87	93.6, 94.5, 94.1	94.1	94.0	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-D-C1	12/17/87	0.19	----	0.02	0.01	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.
501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 5 of 31
Date: December 18, 1987

Material: Reported as Item E, 5/8"-11 UNC, A-563, Gr A, HH, CS Nut
Sample ID: VCS-81543
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-E-H1	12/4/87	97.4, 97.4, 96.4	97.1	97	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-E-C1	12/17/87	0.07	----	0.02	0.02	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERIFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 6 of 31
Date: December 18, 1987

Material: Reported as Item F, 1/2"-20 UNF, A-194, Gr 2H, HH, CSA Nut
Sample ID: VCS-81544
Date Tested: See Below
Tested Per: IAW, ASTM A-194-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-F-H1	12/4/87	28.7, 28.3, 28.9	28.6	29	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-F-C1	12/17/87	0.40	----	0.02	0.01	----	----	----	---	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

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REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 7 of 31
Date: December 18, 1987

Material: Reported as Item G, 9/16"-12 UNC, A-194, Gr 8, HH, SS Nut
Sample ID: VCS-81542
Date Tested: See Below
Tested Per: IAW, ASTM A-194-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-G-H1	12/4/87	71.3, 73.4, 73.4	72.7	73	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-G-C1	12/17/87	0.077	1.07	0.01	0.01	0.38	9.01	19.17	----	----	-----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
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Larry E. Coble, Metals Labcratory Supervisor

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REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
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Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 8 of 31
Date: December 18, 1987

Material: Reported as Item H, 9/16"-12 UNC, A-193, B7, CSA Stud
Sample ID: VCS-81567
Date Tested: See Below
Tested Per: IAW, ASTM A-193-85a Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
NOT REQUIRED					

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-H-T1	12/8/87	-----	0.377	0.1116	14,750	132,200	16,960	152,000	18.3	57.8	Passed

*Offset=0.2%
**Gage=1.500"

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-H-C1	12/17/87	0.41	0.99	0.02	0.01	0.27	----	0.97	0.21	----	-----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

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REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 9 of 31
Date: December 18, 1987

Material: Reported as Item I, 7/8"-14 UNF, A-307, Gr B, HH, CS Bolt
Sample ID: VCS-81559
Date Tested: See Below
Tested Per: IAW, ASTM A-307-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-I1-H1	12/4/87	66.1, 66.7, 66.0	66.3	66	Failed-Low
12-4-87-I2-H1	12/4/87	69.7, 69.8, 69.9	69.8	70	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-I2-T1	12/8/87	-----	0.502	0.1979	10.750	54,300	13,840	69,900	20.9	62.9	Passed-***

*Offset=0.2%
**Gage=2.000"
***Unable to test full size

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-I1-C1	12/17/87	----	----	0.02	0.02	-----	----	----	----	----	----	Passed
12-4-87-I2-C1	12/17/87	0.22	----	0.02	0.01	-----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

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REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 10 of 31
Date: December 18, 1987

Material: Reported as Item J, 5/8"-11 UNC, A-193, B7, HH, CSA Bolt
Sample ID: VCS-81562
Date Tested: See Below
Tested Per: IAW, ASTM A-193-85 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
NOT REQUIRED					

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-J-T1	12/8/87	———	0.379	0.1128	15,000	133,000	16,640	147,500	17.2	60.5	Passed

*Offset=0.2%
**Gage=1.500"

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-J-C1	12/17/87	0.42	0.75	0.02	0.01	0.26	———	0.97	0.20	———	———	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

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(704) 523-2022

REPORT OF MATERIAL VERIFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 11 of 31
Date: December 18, 1987

Material: Reported as Item K, 7/8"-9 UNC, A-325, Type 2, HH, CSA Bolt
Sample ID: VCS-81558
Date Tested: See Below
Tested Per: IAW, ASTM A-325-85 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-K-H1	12/4/87	26.4, 24.0, 25.9	25.4	25	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-K-T1	12/8/87	--Full Size----------			———	———	61,440	———	———	———	Passed

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-K-C1	12/17/87	0.39	0.72	0.02	0.01	———	———	———	———	———	<0.0005	Failed-*

*Material Spec. requires carbon of 0.13-0.37 and boron of 0.0005 minimum.

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

_____
Larry E. Coble, Metals Laboratory Supervisor

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(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 12 of 31
Date: December 18, 1987

Material: Reported as Item L, 1/2"-13 UNC, A-325, Type 2, HH, CSA Bolt
Sample ID: VCS-81565
Date Tested: See Below
Tested Per: IAW, ASTM A-325-85 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-L-H1	12/4/87	29.5, 28.9, 29.2	29.2	29	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-L-T1	12/8/87	—Full Size—			———	———	20,320	143,100	——	——	Passed

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-L-C1	12/17/87	0.40	0.72	0.02	0.01	———	———	———	———	———	<0.0005	Failed-*

*Material Spec. requires carbon of 0.13-0.37 and boron of 0.0005 minimum.

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

_____
Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
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(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 13 of 31
Date: December 18, 1987

Material: Reported as Item M, 1/2"-13 UNC, A-307, Gr A, HH, CSA Bolt
Sample ID: VCS-81564
Date Tested: See Below
Tested Per: IAW, ASTM A-307-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-M-H1	12/4/87	101.5, 101.2 100.2	101.0	101	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-M-T1	12/8/87	--Full Size----------			-----	-----	14,240	100,300	---	---	Passed

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-M-C1	12/17/87	0.00	---	0.03	0.01	----	---	---	---	---	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

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(704) 523-2022

REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 14 of 31
Date: December 18, 1987

Material: Reported as Item N, 7/8"-9 UNC, A-490, Type 1, HH, CSA Bolt
Sample ID: VCS-81560
Date Tested: See Below
Tested Per: IAW, ASTM A-490-84 Guidelines and Client's Instructions

ROCKWELL "C & B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-N-H1	12/4/87	22.8, 22.9, 20.9	22.2	22	Failed-Low
12-4-87-N-H2	12/4/87	95.3, 97.6, 92.0	95.0	95	Failed-Low

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-N-T1	12/8/87	--Full Size----					74,080	160,300	---	---	Passed

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-N-C1	12/17/87	0.46	---	0.03	0.01	---	---	---	---	---	---	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

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REPORT OF MATERIAL VERFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 15 of 31
Date: December 18, 1987

Material: Reported as Item O, 3/4"-10 UNC, A-193, Gr B7, HH, CSA Bolt
Sample ID: VCS-81555
Date Tested: See Below
Tested Per: IAW, ASTM A-193-85 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
NOT REQUIRED					

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-O-T1	12/8/87	-----	0.499	0.1956	25,750	131,600	29,520	150,900	18.8	63.9	Passed

*Offset=0.2%
**Gage=2.000"

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-O-C1	12/17/87	0.38	0.77	0.02	0.01	0.24	----	1.02	0.19	----	----	Passed

Reviewed by:
Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

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REPORT OF MATERIAL VERIFICATION TEST

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P.O. Box 88
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Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 16 of 31
Date: December 18, 1987

Material: Reported as Item P, 1/2"-13 UNC, A-193, Gr B8, Cl 1, HH, SS Bolt
Sample ID: VCS-81563
Date Tested: See Below
Tested Per: IAW, ASTM A-193-85 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-P-H1	12/4/87	82.7, 79.7, 79.8	80.7	81	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-P-T1	12/8/87	-----	0.252	0.0499	2,000	40,100	4,480	89,800	59.9	72.5	Passed

*Offset=0.2%
**Gage=1.000"

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-P-C1	12/17/87	0.06	1.06	0.01	0.02	0.34	8.15	18.71	----	----	-----	Passed

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
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Larry E. Goble, Metals Laboratory Supervisor

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REPORT OF MATERIAL VERIFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 17 of 31
Date: December 18, 1987

Material: Reported as Item Q, 3/4"-16 UNF, A-193, Gr B8, Cl 1, HH, SS Bolt
Sample ID: VCS-81561
Date Tested: See Below
Tested Per: IAW, ASTM A-193-85 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-Q-Hi	12/4/87	81.6, 84.2, 83.2	83.0	83	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
12-4-87-Q-T1	12/8/87	———	0.379	0.1128	7,000	62,100	10,720	95,000	51.1	74.3	Passed

*Offset=0.2%
**Gage=1.500"

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-Q-C1	12/17/87	0.07	0.13	0.01	0.02	0.43	8.25	19.01	———	———	———	Passed

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

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Larry E. Coble, Metals Laboratory Supervisor

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DIVISION OF LAW ENGINEERING, INC.

501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

REPORT OF MATERIAL VERIFICATION TEST

Client: SOUTH CAROLINA ELECTRIC & GAS CO.
V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 18 of 31
Date: December 18, 1987

Material: Reported as Item R, 3/4"-16 UNF, A-354, Gr BD, HH, CSA Cap Screw
Sample ID: VCS-81534
Date Tested: See Below
Tested Per: IAW, ASTM A-354-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-R-H1	12/4/87	35.9, 35.5, 35.1	35.5	36	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(1)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-R-C1	12/17/87	0.39	---	0.03	0.01	---	---	---	---	---	---	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

LAW ENGINEERING INDUSTRIAL SERVICES

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REPORT OF MATERIAL VERFICATION TEST

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V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 19 of 31
Date: December 18, 1987

Material: Reported as Item E, 3/4"-16 UNF, A-563, Gr B, HH, CS Nut
Sample ID: VCS-81547
Date Tested: See Below
Tested Per: IAW, ASTM A-583-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-R-H2	12/4/87	95.4, 95.4, 91.6	94.1	94	Passed
12-4-87-R-H3	12/4/87	95.7, 95.0, 96.2	95.6	96	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-R-C2	12/17/87	0.12	----	0.02	0.02	-----	----	----	----	----	-----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
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Larry E. Coble, Metals Laboratory Supervisor

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P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 20 of 31
Date: December 18, 1987

Material: Reported as Item S, 3/4"-10 UNC, A-449, HH, CS Bolt
Sample ID: VCS-81536
Date Tested: See Below
Tested Per: IAW, ASTM A-449-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-S-H1	12/4/87	24.5, 25.2, 24.9	24.9	25	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-S-C1	12/17/87	0.33	0.80	0.02	0.02	-----	----	----	----	----	-----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
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V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 21 of 31
Date: December 18, 1987

Material: Reported as Item S, 3/4"-10 UNC, A-563, Gr B, HH, CS Nut
Sample ID: VCS-81545
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-S-H2	12/4/87	95.4, 96.5, 97.9	96.6	97	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-S-C2	12/17/87	0.12	—	0.02	0.02	—	—	—	—	—	—	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

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Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 22 of 31
Date: December 18, 1987

Material: Reported as Item T, 3/4"-10 UNC, A-574, Gr 4140, SH, CSA Cap Screw
Sample ID: VCS-81541
Date Tested: See Below
Tested Per: IAW, ASTM A-574-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-T-H1	12/4/87	31.0, 34.2, 26.0	30.4	30	Failed-Low
12-4-87-T-H2	12/4/87	33.7, 34.7, 32.4	33.6	34	Failed-Low

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-T-C1	12/17/87	0.41	0.72	0.02	0.01	0.29	——	0.85	0.05	——	——	Passed

Reviewed by:
Edward M. Beck
Chief Engineer

Respectfully submitted,
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Larry E. Coble, Metals Laboratory Supervisor

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REPORT OF MATERIAL VERFICATION TEST

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V.C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 23 of 31
Date: December 18, 1987

Material: Reported as Item U, 1"-14 UNF, A-449, HH, CS Cap Screw
Sample ID: VCS-81537
Date Tested: See Below
Tested Per: IAW, ASTM A-449-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-U-H1	12/4/87	29.7, 31.0, 29.9	30.2	30	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-U-C1	12/17/87	0.42	0.96	0.02	0.03	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
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Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 24 of 31
Date: December 18, 1987

Material: Reported as Item V, 1/2"-20 UNF, A-354, Gr BD, SS, CSA Cap Screw
Sample ID: VCS-81533
Date Tested: See Below
Tested Per: IAW, ASTM A-354-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-V-H1	12/4/87	32.0, 31.9, 34.7	32.9	33	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-V-C1	12/17/87	0.40	----	0.02	0.02	----	----	----	----	----	----	Passed

Reviewed by: _____
Edward M. Beck
Chief Engineer

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Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 25 of 31
Date: December 18, 1987

Material: Reported as Item W, 1/2"-13 UNC, F-593, Alloy 303, Cond. CW, HH, SS Bolt
Sample ID: VCS-81531
Date Tested: See Below
Tested Per: IAW, ASTM F-593-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-W-H1	12/4/87	30.1, 30.3, 31.1	30.5	31	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-W-C1	12/17/87	0.09	1.63	0.01	0.01	0.57	7.89	17.90	----	----	-----	Failed-*

*Material Spec. requires nickel of 8.00-10.00 and sulfur of 0.15 minimum

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

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Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 26 of 31
Date: December 18, 1987

Material: Reported as Item X, 3/4"-10 UNC, F-593, Alloy 303, Cond. CW, HH, SS Bolt
Sample ID: VCS-81538
Date Tested: See Below
Tested Per: IAW, ASTM F-593-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-X-H1	12/4/87	35.1, 36.8, 35.7	35.9	36	Failed-High

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-X-C1	12/18/87	0.13	1.07	0.02	0.01	0.39	7.96	17.92	----	----	-----	Failed-*

*Material Spec. requires nickel of 8.00-10.00 and sulfur of 0.15 minimum.

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
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Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 27 of 31
Date: December 18, 1987

Material: Reported as Item Z, 5/8"-11 UNC, F-593, Alloy 303, Cond. CW, SH, SS Cap Screw
Sample ID: VCS-81539
Date Tested: See Below
Tested Per: IAW, ASTM F-593-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-Z-H1	12/4/87	101.7, 104.2, 95.7	100.5	101	Passed
12-4-87-Z-H2	12/4/87	99.3, 98.6, 99.9	99.3	99	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-Z-C1	12/18/87	0.09	1.48	0.02	0.01	0.51	8.04	17.99	---	---	-----	Failed-*

*Material Spec. requires sulfur of 0.15 minimum.

Reviewed by: _____
Edward M. Beck
Chief Engineer

Respectfully submitted,
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Larry E. Coble, Metals Laboratory Supervisor

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Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 28 of 31
Date: December 18, 1987

Material: Reported as Item AA, 1/2"-13 UNC, A-449, HH, CSA Cap Screw
Sample ID: VCS-81530
Date Tested: See Below
Tested Per: IAW, ASTM A-449-84 Guidelines and Client's Instructions

ROCKWELL "C" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-AA-H1	12/4/87	31.2, 29.8, 29.5	30.2	30	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED-BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-AA-C1	12/17/87	0.36	0.92	0.02	0.02	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

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Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 29 of 31
Date: December 18, 1987

Material: Reported as Item BB, 1/2"-20 UNF, A-449, HH, CS Cap Screw
Sample ID: VCS-81535
Date Tested: See Below
Tested Per: IAW, ASTM A-449-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-BB-H1	12/4/87	26.9, 28.0, 28.3	27.7	28	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-BB-C1	12/17/87	0.35	0.83	0.01	0.01	-----	----	----	----	----	-----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

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Larry E. Coble, Metals Laboratory Supervisor

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Jenkinsville, S.C. 29065
Attn: Ms. Kim Blough

Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 30 of 31
Date: December 18, 1987

Material: Reported as Item BB, 1/2"-20 UNF, A-563, Gr B, HH, CS Nut
Sample ID: VCS-81546
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-BB-H2	12/4/87	93.3, 93.5, 92.9	93.2	93	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-BB-C2	12/17/87	0.07	----	0.02	0.01	----	----	----	----	----	----	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

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Client's P.O. No.: Q478707
Office: Charlotte Metals
Lab No.: CHS2524 Pg 31 of 31
Date: December 18, 1987

Material: Reported as Item CC, 1/2"-13 UNC, A-563, Gr B, HH, CS Nut
Sample ID: VCS-81529
Date Tested: See Below
Tested Per: IAW, ASTM A-563-84 Guidelines and Client's Instructions

ROCKWELL "B" TEST RESULTS

LEIS Piece No.	Date Tested	Readings	Average Reading	Corrected Reading	Comment
12-4-87-CC-H1	12/4/87	79.0, 84.8, 88.6	84.1	84	Passed

TENSION TEST RESULTS

LEIS Piece No.	Date Tested	Width (in.)	Diameter or Thickness (in.)	Area (sq. in.)	Yield Load (lbs.)*	Yield Stress (psi.)*	Ultimate Load (lbs.)	Ultimate Stress (psi.)	Elongation in ** Ins. (%)	Reduction of Area (%)	Comment
NOT REQUIRED BY CLIENT											

*Offset=0.2%
**Gage=

CHEMICAL ANALYSIS TEST RESULTS(%)

LEIS Piece No.	Date Tested	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Boron	Comment
12-4-87-CC-C1	12/17/87	0.11	——	0.02	0.02	———	———	———	———	———	———	Passed

Reviewed by:

Edward M. Beck
Chief Engineer

Respectfully submitted,
LAW ENGINEERING INDUSTRIAL SERVICES

Larry E. Coble, Metals Laboratory Supervisor

ATTACHMENT III

OF

ENCLOSURE V

EVALUATION OF TEST RESULTS

In order to comply with NRC Compliance Bulletin No. 87-02, a total of 31 samples of fasteners, representing both safety related and non-safety related items, were tested by Law Engineering Industrial Services (LAW) to determine compliance with specification requirements for ultimate tensile strength, hardness, and chemistry. The following evaluation of the test results concerns only those fasteners which did not meet the independent testing acceptance criteria as specified through the purchase order to Law Engineering Industrial Services.

SAMPLE VCS-81559/Item I, ASTM A307 BOLT, 7/8"Ø, SAFETY RELATED

There were two pieces (bolts) tested in sample Item I. Piece number I1 met chemistry requirements but did not meet the minimum hardness requirements. Since I1 did not meet the hardness requirements, piece number I2 was tested. Piece number I2 met the chemistry, hardness, and tensile requirements and was therefore acceptable. Piece I1 was not tested for tension in view of the test results for piece I2.

The minimum required Rockwell "B" hardness is 69. Piece I1 has a hardness of 66, which should actually be 68 (corrected) because ASTM E18 for Rockwell Hardness Testing indicates that a correction factor of +2 R_B points may be added for 7/8" dia. specimens. ASTM A307 Section 5.1 indicates that hardness test should govern for the maximum hardness requirement only, unless the bolt is less than 3 diameters in length in which case the tension test cannot be run and the minimum hardness gives an indication of strength. Since LAW did not perform a tension test on I1, minimum hardness requirements in accordance with ASTM A307 Section 5.4 could not be precluded. Therefore, SCE&G selected a sample of remaining stock items for on-site hardness testing. The sampling plan was based on MIL STD 105D. The sample was tested in accordance with the arbitration method described in ASTM F606 which provides greater accuracy in the hardness reading. Hardness readings for all bolts in the sample were well within the specified range. Based on these results,

the low hardness reading for I1 is considered random; however, to gain further assurance, LAW has been requested to return the test specimens. I1 will be retested using the ASTM F606 arbitration method.

SAMPLE VCS-81558/Item K, and VCS-81565/Item L, ASTM A325 Bolts, 7/8" Ø AND 1/2" Ø, SAFETY RELATED

Both of these samples (Item numbers K and L) meet hardness and tension requirements, but do not meet chemistry requirements for Type 2 bolts. Both samples have high carbon content (0.39 and 0.40 versus a required range of 0.13 to 0.37 per ASTM A325-85) and a low boron content (both less than 0.0005 versus a required minimum of 0.0005). ASTM A325 Type I is a medium carbon steel (required carbon content range of 0.25 to 0.58). Type 2 is a low carbon steel that has a boron addition (at least 0.0005) to achieve the hardenability that is obtained in Type 1 with carbon alone. Since hardness and strength requirements are met, these bolts are considered acceptable. Based on the wording in ASTM A325 Section 1.2, Types 1 and 2 are virtually interchangeable. Type 1 is actually preferred for high temperature applications. Additionally, the more recent ASTM A325-86 requires a carbon content of 0.13 to 0.41 for Type 2 bolts, which would render these bolts acceptable.

SAMPLE VCS-81560/Item N, ASTM A490 BOLT, 7/8" Ø, SAFETY RELATED

This sample (Item number N) meets tension and chemistry requirements, but does not meet minimum hardness requirements, having hardness values of R_C 22 and R_B 95, versus the required minimum of R_C 33 and BHN 311, respectively. In accordance with ASTM A490 Section 7.4, tension tests preclude hardness tests, acceptance is based on tensile requirements in the event hardness test results are low. Therefore, this sample is acceptable.

SAMPLE VCS-81541/Item T, ASTM A574 CAP SCREW, 3/4" Ø, NON SAFETY RELATED

This sample (Item number T) does not meet the minimum hardness requirement of R_C37 and was not required to be tested for tension. This item was taken from non-safety stock items which

were not procured to a specific ASTM standard. ASTM standard A-574 was utilized as the testing standard because it most closely related to the item. This is a non-safety item which would not have any effect on the safety related function of the plant.

SAMPLES VCS-81531/Item W, VCS-81538/Item X, and VCS-81539/Item Z, ASTM F593 BOLT, 1/2Ø, 3/4" Ø 5/8"Ø, NON SAFETY RELATED

All of these samples (Item numbers W, X, and Z) have a low sulfur content (0.01 versus 0.15 minimum required). Since Grade 303 is an austenitic stainless steel to which sulfur is added to improve machinability, the low sulfur content should have no detrimental effects on the performance of the samples. Two of the samples (Item numbers W and X) have slightly low nickel content (7.89 and 7.96 versus 8 to 10 required). The check analysis limits for the 5.0 to 10.0 range of nickel content per ASTM A555 is ±0.10. ASTM E353 requirements for rounding off indicate one significant decimal place for nickel analysis in this chemistry range. Therefore the following table applies for nickel content:

	LAW TEST RESULT	ROUND OFF PER E353	CORRECT PER A555	CORRECTED RESULT
Piece W	7.89	7.9	+0.1	8.0
Piece X	7.96	8.0	+0.1	8.1

Therefore, the nickel content is actually acceptable.

One of the samples (Item number X) has a hardness of 36, which is higher than the maximum allowable Rockwell C of 32 required by ASTM F593. This item was taken from non-safety stock items which were not procured to a specific ASTM standard. ASTM standard F593 was utilized as the testing standard because it most closely related to the item. This is a non-safety item which would not have any effect on the safety related function of the plant.

ENCLOSURE VI

REQUEST 6:

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

Response:

Due to the acceptability of the test results, V. C. Summer Station concludes that the current program and procedures are sufficient to assure that fasteners used in the plant meet the necessary requirements to perform their intended functions.