2. To: (Receiving Organization) Distribution
3. From: (Originating Organization) SNF Project
4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: Spent Nuclear Fuel Project
6. Design Authority/Design Agent/CoG Engr.: C. Van Katwijk
7. Purchase Order No.: N/A
8. Originator Remarks: N/A
9. Equip./Component No.: N/A
10. System/Bldg./Facility: Spent Nuclear Facility
12. Major Assm. Dwg. No.: N/A
13. Perim/Permit Application No.: N/A
14. Required Response Date: N/A

15. DATA TRANSMITTED

<table>
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<tr>
<th>(A) Item No.</th>
<th>(B) Document/Drawing No.</th>
<th>(C) Sheet No.</th>
<th>(D) Rev. No.</th>
<th>(E) Title or Description of Data Transmitted</th>
<th>Approval Designator</th>
<th>Reason for Transmittal</th>
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<td>1</td>
<td>SNF-3892</td>
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<td>MKS Baratron MCO Absolute Pressure Transmitter</td>
<td>Q 2</td>
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16. KEY

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<th>Reason for Transmittal (G)</th>
<th>Disposition (H) &amp; (I)</th>
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<tr>
<td>E, S, Q, D or N/A</td>
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<tr>
<td>(see WHC-CM-3-5,</td>
<td>2. Release</td>
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</tr>
<tr>
<td>Soc 12.7)</td>
<td>3. Information</td>
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<td>6. Dist. (Receipt Acknow. Required)</td>
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17. SIGNATURE/DISTRIBUTION

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<th>(G) Reason</th>
<th>(H) Disp.</th>
<th>(J) Name</th>
<th>(K) Signature</th>
<th>(L) Date</th>
<th>(M) MSIN</th>
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<tr>
<td>2</td>
<td>1</td>
<td>Designated Engineer C. Van Katwijk</td>
<td></td>
<td>2-29-99</td>
<td></td>
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<tr>
<td>2</td>
<td>1</td>
<td>Design Authority R. Whitchurst</td>
<td></td>
<td></td>
<td>2-29-99</td>
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<tr>
<td>2</td>
<td>1</td>
<td>QA T. D. Hays</td>
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<td></td>
<td>3-30-99</td>
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</table>

18. Signature of EDT Originator: C. Van Katwijk

19. Signature of EDT Author: T. Choko

20. Design Authority/COgnizant Manager: R. Whitehurst

21. DOE APPROVAL (If required)

<table>
<thead>
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<th>Ctrl. No.</th>
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<tr>
<td>[ ] Approved</td>
</tr>
<tr>
<td>[ ] Approved w/comments</td>
</tr>
<tr>
<td>[ ] Disapproved w/comments</td>
</tr>
</tbody>
</table>
MKS Baratron MCO Absolute Pressure Transmitter

Carl Van Katwijk
Numatec Hanford Co, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

Key Words: Absolute Pressure Transmitter - MCO

Abstract: MKS Baratron MCO Absolute Pressure Transmitter
CGI-SNF-D-13-P4-019

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Approved for Public Release

A-6400-073 (01/97) GEF321
### Section 1: Part Information

<table>
<thead>
<tr>
<th>Item No.:</th>
<th>NA</th>
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<tbody>
<tr>
<td>Manufacturer:</td>
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<td>Supplier:</td>
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<td>Mfg. Part/Model No.:</td>
<td></td>
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<tr>
<td>Supplier's P/N:</td>
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</tr>
</tbody>
</table>

| Part Description: | |
| End Use Description: | |

### Section 2a: Component Information

| Equipment No.: | He-PT-1*35 |
| Specification No.: | W-441-P4 Rev. 2 |
| Manufacturer: | MKS Instruments |
| Past P.O. No.: | NA |
| Equipment Supplier (if different from manufacturer): | TBD |
| Equip. Supplier's Part No.: | NA |

| Manufacturer's Part/Model No.: | MKS Baratron PT 430C A 00100 |

**Component Description:** MKS Baratron high resolution absolute pressure transmitter designed for MCO vacuum processes (100 TORR) using capacitance manometer. Measure and transmit MCO pressure. Electronic output signal is NON-SAFETY (GS).

### Section 2b: Commercial Availability of the Item

1. Is the item available from a catalogue from a qualified NQA1 supplier or ISO-9000 supplier (coordinate with project CGI interface Engineer or BTR)?
   - [ ] YES (go to #2 below)
   - [X] NO (go to procedure step 5.3.2, proceed to dedicate Item)

2. List of Candidate qualified suppliers or ISO-9000 suppliers:
   - Company name & type
   - Contact name
   - Phone
   - NA

3. Recommended Procurement Strategy (coordinate with project CGI interface Engineer or BTR):
   - NA

### Section 2c: CGI Determination

1. Question #1: Is the item subject to design or specification requirements that are unique to nuclear facilities or activities?
   - [ ] YES (the item is not commercial grade)
   - [X] NO (continue)

2. Question #2: Is the item used in applications other than nuclear facilities or activities?
   - [ ] NO (the item is not commercial grade)
   - [X] YES (continue)

12/21/98
### Question #3:

Is the Item ordered from manufacturer/supplier on the basis or specifications set forth in the manufacturers catalog?

- [ ] NO (the Item is not commercial grade)
- [X] YES (continue)

**[X]** All three criteria have been satisfied. The Item meets the definition of commercial grade.

**Section 2d Reason for Dedication**

The above described Item is being Dedicated for use in the application cited for the following reasons:

- [X] Item is being purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Class application.
- Item is being purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Significant application.
- Item was purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Class application.
- Item was purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Significant application.
- Other ('like-for-like', similar, substitution, replacement evaluation)

**Section 3 Failure Effects Evaluation**

**A. Part/Component Safety Function:**

1. **Pressure Boundary**

2. **Maintain Pressure Boundary After Seismic Event**

3. **B. Part/Component Functional Mode:**

   Safety Function #1:

   - [ ] Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function
   - [X] Passive – Change of state is not required for the component to perform its safety function

   Safety Function #2:

   - [ ] Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function
   - [X] Passive – Change of state is not required for the component to perform its safety function

   Safety Function #3:

   - [ ] Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function
   - [ ] Passive – Change of state is not required for the component to perform its safety function

**C. Host Component Safety Function (if applicable):**

1. **NA**

2. 

3.
### D. Failure Mode(s) and the effects on component or system safety function (see Worksheet 1):

1. **PT process connection break/PT body break - inleakage of air.**

2. **Inaccurate pressure signal due to damage from pressure outside instrument indicator range.**

<table>
<thead>
<tr>
<th>Section 4: Environmental &amp; Natural Phenomenon Hazard Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Qualification Required:</td>
</tr>
<tr>
<td>Yes [ ]</td>
</tr>
<tr>
<td>No [X]</td>
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<tr>
<td>Environmental Condition B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Natural Phenomenon Hazard (NPH) Design Required:</th>
<th>If yes: NPH Design Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes [X]</td>
<td>Performance Category: PC-3</td>
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<tr>
<td>No [ ]</td>
<td>NPH Design Req'ts.:</td>
</tr>
<tr>
<td></td>
<td>Required Safety Functions:</td>
</tr>
</tbody>
</table>

HNF-PRO-97, Rev. 0  
W-441-P4, Rev. 2

### Section 5: Component Functional Classification

<table>
<thead>
<tr>
<th>Safety Class (SC)</th>
<th>General Service</th>
<th>Safety Significant (SS)</th>
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<tbody>
<tr>
<td>[X]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If part/component classification is different from host component/system, document basis.

### Section 6 (Reserved)

### Section 7 (Reserved)

### Section 8 References (for Functional Classification)

<table>
<thead>
<tr>
<th>National Codes/Standards:</th>
<th>Safety Analysis Report (SAR):</th>
<th>Drawings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE 344, ISA-S5.1, S5.4, S18.1, S20</td>
<td>HNF-SD-SNF-SAR-002, Rev. 4A</td>
<td>H-1-82161, Rev. 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HNF-SD-SNF-SEL-002, Rev. 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vendor Manual/Manufacturer/Supplier Information:</th>
<th>MKS Instruments Baratron Absolute Pressure Transmitters 400 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>
### Notes and Legend:

1. The instrument has ceramic electrodes and non-metallic terminal strips. These materials are not subject to Degradation at 40°F and 60% RH or 115°F and 22% RH and are suitable for Condition B application.

2. Maintain pressure boundary after Seismic event. W-441-P4, Rev. 2, Appendix L, page L-12, provides a seismic testing plan for these components at a (TBDI seismic spectra. “Confinement” leakage acceptance criteria is $< 10^{-4}$ scc/sec.

3. Pressure test at 110% of design accident condition pressure of 150 psig (Destructive Test). Vendor sheet states overpressure limit of 35 psig, consequently this test is considered to be a destructive test.

4. Testing (Seismic and pressure boundary) is being performed for PT-1*08 (CGI-SNF-D-07-P4-010). Both instruments are Baratron Series 400 and have identical pressure boundaries. Destructive testing of PT-1*08 will provide verification of the critical characteristics for this component.

---

### Critical Characteristics

<table>
<thead>
<tr>
<th>Critical Characteristics Verification Document: Vendor Specifications: HNF-SD-SNF-SEL-002 Rev. 4</th>
<th>Acceptance Criteria/Tolerances</th>
<th>Acceptance Method</th>
<th>ID</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nameplate Data</td>
<td>Per Vendor Manual</td>
<td>1, IN</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Model/Part Number</td>
<td>430C A00100</td>
<td>1, IN</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>NEMA 4</td>
<td>1, IN</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Process Connection</td>
<td>¾” - 18 NPT</td>
<td>1, IN</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

2. Physical Critical Characteristics (for reasonable assurance that the Item delivered is the Item specified)

| Material, Body | Cast Aluminum | 1, T | X |
| Material, Process Connection | Stainless Steel | 1, T | X |

3. Performance Critical Characteristics (for reasonable assurance that the Item will perform its intended safety function(s))

| Pressure Boundary | Pressure Test at Pressure of 165 Psig (No Leakage) Notes 3 and 4 | 1, T | X |
| Repeatability | NA |
| Input/Output Voltage/ Operating Range/ Accuracy | NA |
| Insulation Resistance | NA |
| Environmental | Note 1 |
| Seismic Condition B | Notes 2 and 4 | 1, T | X |

Acceptance Method:

1. Special Test and Inspection
2. Commercial Grade Survey
3. Source Verification
4. Vendor/Item History

12/21/98
Commercial Grade Item Upgrade Dedication Form

ECN No. NA  CGI No. CGI-SNF-D-13-P4-019

Title: MKS BARATRON MCO ABSOLUTE PRESSURE TRANSMITTER

Section 10 Initial Review and Approval

Approvals:
Designated Engineer: 12/22/98
Design Authority: 12/21/98
QA Engineer: 12/29/98
## Worksheet 1
### Determination of Failure Mechanisms/Modes

#### Section 1

<table>
<thead>
<tr>
<th>Typical Failure Mechanisms</th>
<th>Definition</th>
<th>Applicable to Component under Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture</td>
<td>Separation of a solid accompanied by little or no macroscopic plastic deformation.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Corrosion</td>
<td>The gradual deterioration of a material due to chemical or electrochemical reactions, such as oxidation, between the material and its environment.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Erosion</td>
<td>Destruction of materials by the abrasive action of moving fluids, usually accelerated by the presence of solid particles carried with the fluid.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Open Circuit</td>
<td>An electrical circuit that is unintentionally broken so that there is no complete path for current flow.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Short Circuit</td>
<td>An abnormal connection by which an electrical current is connected to ground, or to some conducting body, resulting in excessive current flow.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Blockage</td>
<td>Clogging of a filtering medium resulting in the inability to perform its purification function or blockage of flow.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Seizure</td>
<td>Binding of a normally moving item through excessive pressure, temperature, friction, jamming.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Unacceptable Vibration</td>
<td>Mechanical oscillations produced are beyond the defined permissible limits due to unbalancing, poor support, or rotation at critical speeds.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Loss of Properties</td>
<td>A loss of mechanical and physical properties of a material due to exposure to high temperatures, radiation exposure.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Excess Strain</td>
<td>Under the action of excessive external forces the material of the part has been deformed or distorted.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Mechanical Creep</td>
<td>From prolonged exposure to high temperature and stress, the object will show a slow change in its physical (shape and dimension) and mechanical characteristics.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
<tr>
<td>Ductile Fracture</td>
<td>Fracture characterized by tearing of metal accompanied by appreciable gross plastic deformation.</td>
<td>Yes [ ] No [ ]; if Yes, indicate failure</td>
</tr>
</tbody>
</table>

#### Section 2: Additional Failure Modes Applicable to the Component Under Evaluation

1. **Process Connection Break**
2. **Transmitter Body Break**
3. **Diaphragm Assembly Loss**
4. **Deformation due to excessive pressure.**
5. **...**

12/21/98
## Checklist 1

### Acceptance Method 1

**Special Test/Inspection Verification**

<table>
<thead>
<tr>
<th>Item Description: Baratron Absolute Pressure Transmitter</th>
<th>Equip #: He-PT-1*35</th>
</tr>
</thead>
<tbody>
<tr>
<td>System #: 13</td>
<td>Model #: BARATRON PT 430C A00100</td>
</tr>
</tbody>
</table>

**Manufacturer (Address/Phone):**

MKS Instruments  
Six Shattuck Road  
Andover, MA 01810  
(800) 227-8766  
P.O. #

**Supplier (Address/Phone):**


### Section 2 Critical Characteristics to Be Verified by Method 1.

<table>
<thead>
<tr>
<th>Inspect</th>
<th>Test</th>
<th>Post-Test</th>
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<tr>
<td>[ ]</td>
<td>[X]</td>
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</tbody>
</table>

### SECTION 3 By Inspection

* See Attachment G of Desk Instruction for Sampling Size

**Characteristic:** Nameplate Data

**Sample Size:** All Items

**Acceptance Criteria:** Per Vendor Manual

**Receipt Inspection Plan / Report #:**

**References (see Section 7):** Baratron Absolute Pressure Transmitter 400 Series

12/21/98
## Commercial Grade Item Upgrade Dedication Form

**ECN No.:** NA  
**CGI No.:** CGI-SNF-D-13-P4-019  
**Title:** MKS BARATRON MCO ABSOLUTE PRESSURE TRANSMITTER

### Characteristic: Model/Part Number
- **Sample Size:** All Items
- **Acceptance Criteria:** 430C A00100
- **Receipt Inspection Plan / Report #:**
- **References (see Section 7):**

### Characteristic: Housing
- **Sample Size:** All Items
- **Acceptance Criteria:** NEMA 4
- **Receipt Inspection Plan / Report #:**
- **References (see Section 7):**

### Characteristic: Process Connection
- **Sample Size:** All Items
- **Acceptance Criteria:** 1/4 - 18 NPT
- **Receipt Inspection Plan / Report #:**
- **References (see Section 7):**

---

**SECTION 4 BY SPECIAL TEST**

* See Attachment G of Desk Instruction for Sampling Size

<table>
<thead>
<tr>
<th>Test To Be Performed by</th>
<th>Number of Items to be Tested</th>
<th>Test/Inspection Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Purchaser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Supplier/Manufacturer**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Characteristic for Test: Material, Body**
- **Acceptance Criteria:** Cast Aluminum
- **Sample Size:** Normal Sampling Size
- **Actual Test Value:**
  - Test Plan and Report #:  
- **References (see Section 7):**

**Characteristic for Test: Material, Process Connection**
- **Acceptance Criteria:** Stainless Steel
- **Sample Size:** Normal Sampling Size
- **Actual Test Value:**
  - Test Plan and Report #:  
- **References (see Section 7):**

---

12/21/98
**Characteristic for Test: Pressure Boundary**

Acceptance Criteria: **Pressure Test at Pressure of 165 Psig (No Leakage)**

Sample Size*: Destructively Test Only One Item. Pressure boundary testing is being performed for PT-1*08 (CGI-SNF-D-07-P4-010). Both instruments are Baratron Series 400 and have identical pressure boundaries. Destructive testing of PT-1*08 will provide verification of the critical characteristics for this component.

Actual Test Value:

<table>
<thead>
<tr>
<th>Test Plan and Report #</th>
<th>References (see Section 7):</th>
</tr>
</thead>
</table>

**Characteristic for Test: Seismic Condition B**

Acceptance Criteria: **Maintain Pressure Boundary After Seismic Event.** W-441-P4, Rev. 2, Appendix L, page L-12, provides a seismic testing plan for these components at a (TBD) seismic spectra. "Confinement" leakage acceptance criteria is < 10^-4 scc/sec.

Sample Size*: Seismic Testing is being performed for PT-1*08 (CGI-SNF-D-07-P4-010). Both instruments are Baratron Series 400 and have identical pressure boundaries. Destructive testing of PT-1*08 will provide verification of the critical characteristics for this component.

Actual Test Value:

<table>
<thead>
<tr>
<th>Test Plan and Report #</th>
<th>References (see Section 7):</th>
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</table>

**Characteristic:**

Acceptance Criteria:

<table>
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<tr>
<th>Sample Size*</th>
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Actual Test Value:

<table>
<thead>
<tr>
<th>Test Plan and Report #</th>
<th>References (see Section 7):</th>
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</table>

**If Supplier/Manufacturer or Other, Refer to CGI Checklist-2 for Support Information**

12/21/98
## SUMMARY OF VERIFIED CRITICAL CHARACTERISTICS, THEIR VERIFICATION METHODS, AND RESULTS

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Critical Characteristics</th>
<th>Acceptance Criteria/Tolerances</th>
<th>ID</th>
<th>Function</th>
<th>Method T/IN</th>
<th>Procedure or RR#</th>
<th>Check-list ID</th>
<th>Number Tested</th>
<th>Number Failed</th>
<th>Verifying Organization</th>
<th>Printed Name Signature</th>
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<td>Nameplate Data</td>
<td>Per Vendor Manual</td>
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### 2. DISPOSITION OF UNVERIFIED OR FAILED CRITICAL CHARACTERISTICS

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### 3. SIGNATURE INDICATES ALL CRITICAL CHARACTERISTICS VERIFIED SATISFACTORY OR ACCEPTABLY DISPOSITIONED AND COMMERCIAL GRADE DEDICATION IS SATISFACTORY AND COMPLETE.

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<th>Design Authority:</th>
<th>Date</th>
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<tr>
<td>Testing Agency QA Engineer:</td>
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### Section 6: Contacts/Phone Numbers

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### Section 7: Supporting Documentation for this Checklist

#### Initial Procurement Documents

- [ ] Drawings:
- [ ] Manuals (specify type & number):
- [ ] Design Calculations
- [ ] Installation Instructions
- [ ] Operation Instructions
- [ ] Calibration Instructions
- [ ] Manufacturer’s Recommended Spare Parts List
- [ ] Other:

#### Procurement Documents

- [ ] Certificate of Conformance/Compliance
- [ ] Seismic Qualification Certificate
- [ ] Environmental Qualification Certificate
- [ ] Test Report (s):
- [ ] Inspection Report (s):
- [ ] CMTRs for ASME Pressure Retaining Materials
- [ ] Valve Seat Leakage Report
- [ ] Weld Records
- [ ] Material Traceability Record
- [ ] Other:

12/21/98