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SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards info re SER Open Item 9 concerning GDC 51,per Halapatz request.Submittal includes summary of primary containment fracture toughness results & requested info re Bonney Forge sock-o-let. 46

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May 3, 1985
(NMP2L 0401)

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Schwencer:

Re: Nine Mile Point Unit 2
Docket No. 50-410

Enclosed is information relating to Safety Evaluation Report Open Item 9 regarding General Design Criterion 51 of 10 CFR 50. This information provides responses for Nine Mile Point Unit 2 that were requested by Mr. Halapatz of your staff.

The following list describes the enclosures provided for staff evaluation:

a. A summary of primary containment fracture toughness results are provided in Enclosure 1.

b. The Bonney Forge sockolet information requested is provided in Enclosure 2. This information is submitted to explain the differences in sockolet sizes between the ITT Grinnell shop travellers and certified material test reports numbered SWF-180 and SWF-185 previously provided with our letter dated December 6, 1984.

c. A complete certified material test report for penetration Z-14 flued head is included as Enclosure 3.

d. A copy of the results of the minimum wall calculations for the High Pressure Core Spray Isolation Valve (2CSH*MOV111) is provided in Enclosure 4.

Very truly yours,

C. V. Mangan
Vice President
Nuclear Engineering & Licensing



DS:ja
Enclosure
xc: R. A. Gramm, NRC Resident Inspector
Project File (2)

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Enclosure 1

Compliance of the primary containment pressure boundary materials with General Design Criteria (GDC) 51 was evaluated by identifying the materials which were limiting under operation, maintenance, test and postulated accident conditions based on material type, thickness and metallurgical characterization. The fracture toughness of these materials was evaluated on the basis of ASME III NC-2300, 1977 Edition including the summer 1977 addendum and NUREG 0577, Potential for Low Fracture Toughness and Lamellar Tearing on PWR Steam Generator and Reactor Coolant Pump Supports, October 1979.

Except for the high pressure core spray system (HPCS) test isolation valve bonnet, the limiting materials were found to have a permissible lowest service metal temperature (PLSMT) at or below the design lowest service metal temperature (LSMT). The PLSMT for the HPCS test isolation valve bonnet was found to be +71°F, whereas the LSMT is +70°F. This LSMT is the lowest possible temperature which could be reached during an extended outage, taking no credit for heat contributions of nearby operating equipment. Since the probability is very remote that the HPCS would be needed before the fluid and environment temperature increased by 1°F, assuming the LSMT had actually been reached, the HPCS test isolation valve bonnet is considered acceptable.

In the case of the feedwater system (FWS) and reactor water cleanup system (WCS), there are situations where the actual metal temperature may be less than +70°F. However, these situations are during startup from the cold shutdown condition, where the loads are very low and the probability of rapidly propagating fracture, as referenced in GDC 51, is minimal. The FWS and WCS are above +70°F for all conditions where the pressure exceeds 660 psi.

In the following discussion, the fracture toughness of each of the specific limiting materials is evaluated in detail. This information also is presented in summary form in Table 1.

1. Equipment Hatch

SA516 Grade 70 quenched and tempered material with a nominal thickness of 4.875 in. was applied for the equipment hatch cover flange. Actual drop weight tests performed on this material indicate a nil ductility

transition temperature (TNDT) of -10°F or less. Thus, the permitted lowest service metal temperature (PLSMT) is +45°F when the rules of ASME III NC-2300, 1977 Edition, including the summer 1977 addendum, are applied.

2. Drywell Head Pins

SA564 Grade 630, H1075 material with a nominal diameter of 3.25 in. was applied for the drywell head pins. The heat of material used had a relatively high nickel content (4.42 percent) and was age hardened at a relatively high temperature (1,075°F minimum). An estimated PLSMT of +70°F for this material is derived from Armco data on H1100 material. Armco report A.I. 71.6-16, Report No. 1, June 11, 1969, shows Charpy transition curves for relatively high nickel heats where the curve midheight temperatures are at or below +5°F. This is consistent with a PLSMT of +70°F.

3. Penetrations

a. Z-1A sleeve. SA155 Grade CMSH80 applying SA537 Class 2, quenched and tempered and the finished pipe normalized and tempered, with a nominal wall thickness of 1.5 in. was applied for the penetration Z-1A sleeve. Due to its similarity to SA516 Grade 65 (SA155 Grade KCF65) with respect to melting practice, chemistry and heat treatment, ASME III NC-2300, 1977 Edition, including the summer 1977 addendum, would assign a TNDT of 0°F and a PLSMT of +30°F.

b. Z-11 sleeve. SA333 Grade 6 normalized with a nominal wall thickness of 1 in. was applied for the penetration Z-11 sleeve. NUREG 0577, in a "worst case" characterization of this material as a "mild" steel, indicates a TNDT at or below the NDT of +40°F. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summary 1977 addendum, assigns a PLSMT of +70°F.

c. Z-1A flued head. SA508 Class 1 quenched and tempered with a nominal web thickness of 6 in. was applied for the penetration Z-1A flued head. Actual drop weight tests performed on this material indicate a TNDT of 0°F or lower. Thus, the PLSMT is +62°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

d. Z-4A flued head. SA508 Class 2 quenched and tempered with a design web thickness of 6.16 in. was applied for the penetration Z-4A flued head. Actual drop weight tests performed on this material indicate a TNDT of 0°F or lower. Thus, the PLSMT is +62°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

e. Z-14 sleeve. SA333 Grade 6 normalized with a nominal wall thickness of 3/4 in. was applied for the HPCS injection penetration sleeve. NUREG 0577, in a "worst case" classification of this material as a "mild" steel, indicates a TNDT at or below the NDT of +40°F. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F.

f. Z-14 flued head. SA508 Class 1, quenched and tempered with a nominal web thicknesses of 4-1/4 inches was applied for the HPCS injection penetration flued head. Actual drop weight tests performed on this material indicate a TNDT of 0°F or lower. Thus, the PLSMT is +51°F when the rules of ASME III, NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

g. Z-12 and Z-13 penetrations. SA312 type 304 was applied for the HPCS suppression pool suction and return penetrations. This is an austenitic stainless steel which is exempt.

4. Pipe

a. MSS pipe (mark no. NM-1-85). SA106 Grade C normalized with a manufactured minimum wall thickness of 1.177 in. (by Cameron Iron Works) was applied for the main steam piping. NUREG 0577 indicates a TNDT for this material at or below the mean nil ductility transition temperature (NDT) of +40°F for mild carbon steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F.

b. MSS sockolet (26" x 3/4" x 6000#). SA105 as forged with a design thickness of 0.156 in. was applied for the main steam sockolet. Although this material has a design thickness of less than 0.625 in., the philosophy of NC-2300 can still be applied.

NUREG 0577 categorizes this material as an as-hot rolled carbon manganese steel and assigns it a TNDT of +39°F. Thus, the PLSMT is +69°F when the "worst case" rules for 5/8 inch thick material of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

c. FWS pipe and WCS pipe (mark nos. NM-47-112, NM-47-113, NM-09-142 and NM-09-144). SA106 Grade B normalized with a nominal wall thickness of 0.906 in. and SA106 Grade C normalized with a nominal wall thickness of 2.062 in. were applied for the feedwater piping. NUREG 0577 indicates a TNDT for this material at or below the NDT of +40°F for mild carbon steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F.

d. WCS pipe (mark nos. NM-09-98, NM-09-143, NM-09-145 and NM-09-146). SA333 Grade 6 normalized with a nominal wall thickness of 0.906 in. was applied for the reactor water cleanup piping. NUREG 0577, in a "worst case" characterization of this material as a "mild" steel indicates a TNDT at or below the NDT of +40°F. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F.

e. WCS sockolet (mark no. NM-09-143). SA105 with a design thickness of 0.092 in. was applied for the reactor water cleanup sockolet. Although this material has a design thickness of less than 0.625 in., the philosophy of NC-2300 can still be applied. NUREG 0577 categorizes this material as an as-hot rolled carbon-manganese steel and assigns it a TNDT of +39°F. Thus, the PLSMT is +69°F when the "worst case" rules for 5/8 inch thick material of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

f. WCS elbows (mark nos. NM-09-98, NM-09-142, NM-09-143, NM-09-144, NM-09-145 and NM-09-146). SA234 Grade WPB fabricated from SA106 and the final fitting normalized, with a nominal thickness of 0.906 in., was applied for the reactor water cleanup elbows. NUREG 0577 indicates a TNDT for normalized SA106 at or below the NDT of +40°F for mild carbon steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F.

g. CSH pipe, ASME III Class 1 (Mark No. NM-25-59X). SA106 Grade B manufactured by Phoenix Steel, Phoenixville, PA with a nominal wall thickness of 0.844 in. was applied for the HPCS injection line piping. Information obtained from Phoenix Steel during the preparation of the Salem Nuclear Generating Station, Unit No. 2 Safety Evaluation Report indicates that the mill finishes the material at 1600°F. (Reference Salem Unit 2 SER [NUREG 0517] Supplement No. 5 and PSE&G letter to the Director of Nuclear Reactor Regulation, USNRC, dated December 19, 1980, regarding Containment Boundary Fracture Toughness.) Since this finishing temperature is in the range of normalizing temperatures, data for normalized SA106 Grade B can be applied. NUREG 0577 indicates a TNDT for this material at or below the NDT of +40°F for mild carbon steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F. In addition, this material was CVN impact tested at +40°F and met the acceptance criteria of ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

h. CSH pipe, ASME III Class 2, except between the HPCS test isolation valve and the HPCS test throttling valve. (Mark Nos. NM-25-25X, NM-25-116X, NM-25-117X, NM-25-118X, NM-25-119X, NM-25-120X, NM-25-121X and NM-25-138X). SA106 Grade B with a nominal wall thickness ranging from 0.237 in. to 0.562 in. was applied for the HPCS suppression pool suction and the HPCS suppression pool return piping, except for the pipe between the HPCS test isolation and throttling valves. This material is exempt from testing, due to its nominal thickness, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

i. CSH pipe, ASME III Class 2, between the HPCS test isolation valve and the HPCS test throttling valve (Mark No. NM-25-115X). SA106 Grade B manufactured by Phoenix Steel, Phoenixville, PA with a nominal wall thickness of 0.844 in. was applied for the pipe between the HPCS test throttling and isolation valves. As in Item 4g above, data for normalized SA106 Grade B can be applied. NUREG 0577 indicates a TNDT for this material at or below the NDT of 40°F for mild carbon

steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition including the summer 1977 addendum, assigns a PLSMT of +70°F. In addition, this material was subsequently CVN impact tested at +65°F and met the acceptance criteria of ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

j. CSH elbows (Mark Nos. NM-25-116X, NM-25-117X, NM-25-118X, NM-25-119X, NM-25-120X and NM-25-121X). SA234 Grade WPB with a nominal wall thickness of 0.280 in. to 0.406 in. wall applied for the CSH elbows. This material is exempt from testing, due to its nominal thickness, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

k. CSH sockolets/weldolets (Mark Nos. NM-25-59X, NM-25-120X and NM-25-121X). SA105 with a nominal thickness of 0.237 in. and less (applying the ASME III definition) was applied for the CSH sockolets and weldolets. This material is exempt from testing, due to its nominal thickness, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum. However, an analysis of this material was performed as requested by the NRC using the "worst case" thickness of 0.843 in. and indicated the following. NUREG 0577 categorizes this material as an as-hot rolled carbon manganese steel and assigns it a TNDT of +39°F. Thus, the PLSMT is +69°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

l. CSH reducer, outlet side of 2CSH*HCV133 (Mark No. NM-25-120X). SA234 Grade WPB, fabricated from SA106 and the final fitting normalized, with a nominal wall thickness of 0.375 in. was applied for the reducer on the outlet side of the high pressure core spray system test throttling valve. This material is exempt from testing due to its nominal thickness, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

m. CSH reducer, inlet side of 2CSH*HCV133 (Mark No. NM-25-115X). SA234 Grade WPB, fabricated from SA106 and the final fitting normalized, with a nominal wall thickness of 0.844 in. was applied for the reducer on the inlet side of the high pressure core spray system test throttling valve. NUREG-0577 indicates a TNDT for normalized SA106 at or below the NDT of +40°F for mild carbon steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°.

5. Feedwater Thermal Tees (2FWS*FTG1A)

a. Flued head. SA350 Grade LF2 normalized with a manufactured minimum web thickness of 1.804 in. was applied for the feedwater thermal tee flued head. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

b. Extruded outlet fitting. SA420 Grade WPL6, fabricated from SA350 Grade LF2, normalized with a manufactured minimum web thickness of 2.625 in. was applied for the feedwater thermal tee extruded outlet fitting. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +28°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

c. Thermal sleeve. SA350 grade LF2 normalized with a manufactured minimum wall thickness of 0.793 in. was applied for the feedwater thermal tee thermal sleeve. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

d. Reducer. SA350 Grade LF2 normalized with a manufactured minimum wall thickness of 1.804 in. was applied for the feedwater thermal tee reducer. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

e. Thermal sleeve run. SA516 Grade 70 normalized, cold formed into pipe and stress relieved, with a nominal thickness of 0.375 in. was applied for the feedwater thermal tee thermal sleeve run. Although this material is less than 5/8 inch thick, the philosophy of NC-2300 can still be applied. ASME III NC-2300, 1977 edition, including the summer 1977 addendum assigns a TNDT of 0°F to normalized SA516 Grade 70. According to the discussion on "Effects of Cold Work" in Welding Research Council Bulletin Number 158, January 1971, when this type of material is cold worked 1% and then stress relieved, it completely regains its fracture toughness; when it is cold worked 5% and then stress relieved, its transition curve midheight temperature increases 20°F. As the material for the thermal sleeve run was strained just under 2%, a conservative assumption of a 20° increase in TNDT can be made. Based on a TNDT of 0° + 20°, or 20°F, the PSLMT is +50°F when the "worst case" rules for 5/8 inch thick material of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

6. Main Steam Isolation Valve (2MSS*HYV7A)

a. Body. SA350 Grade LF2 quenched and tempered with a minimum design wall thickness of 2.55 in. was applied for the main steam isolation valve body. NUREG 0577 indicates a TNDT for quenched and tempered SA350 Grade LF2 at or below the NDT of -28°F for normalized carbon manganese steel. Based on a TNDT of -28°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +2°F.

b. Bonnet. SA350 Grade LF2 quenched and tempered with a minimum design thickness of 4.94 in. was applied for the main steam isolation valve bonnet. NUREG 0577 indicates a TNDT for quenched and tempered SA350 Grade LF2 at or below the NDT of -28°F for normalized carbon manganese steel. Based on a TNDT of -28°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +27°F.

c. Ball. SA351 Grade CF8M was applied for the main steam isolation valve ball. This is an austenitic stainless steel material which is exempt.

d. Bolting. The main steam isolation valve bolting is not pressure retaining.

7. Feedwater Isolation Valve (2FWS*MOV21A)

a. Body. SA105 quenched and tempered with a manufactured minimum wall thickness of 2.28 in. was applied for the feedwater isolation valve body. NUREG 0577 indicates a TNDT for quenched and tempered SA105 at or below the NDT of -28°F for normalized carbon manganese steel. Based on a TNDT of -28°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +2°F.

b. Bonnet. SA105 normalized with a manufactured minimum thickness of 2.47 in. was applied for the feedwater isolation valve bonnet. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

c. Wedge. SA105 normalized with a design thickness of 1.7128 in. was applied for the feedwater isolation valve wedge. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

d. Bolting. The feedwater isolation valve bolting is not pressure retaining.

e. Thrust ring. SA182 Grade F6 with a design thickness of 1.000 in. was applied for the feedwater isolation valve thrust ring. This material was tempered at a relatively high temperature of 1400°F, which serves to enhance its fracture toughness. An estimated PLSMT of +70°F for this material is derived from Republic Steel data, Universal-Cyclops Steel data and other data in the literature that exhibit very good toughness properties after tempering at 1400°F. In addition, the thrust ring is loaded in compression and shear only, which minimizes the possibility of crack propagation.

8. Feedwater Swing Check Valve (2FWS*AOV23A)

a. Body. SA216 Grade WCB normalized with a manufactured minimum wall thickness of 2.28 in. was applied for the feedwater swing check valve body. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat-treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

b. Bonnet. SA105 normalized with an actual thickness of 4.498 in. was applied for the feedwater swing check valve bonnet. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +50°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

c. Disc. SA105 normalized with a manufactured minimum thickness of 2.28 in. was applied for the feedwater swing check valve disc. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

d. Bolting. SA193 Grade B7 and SA194 Grade 2H, both quenched and tempered, with a nominal diameter of 0.625 in. were applied for the feedwater swing check valve bolting. This material is categorized by NUREG 0577 as having least susceptibility to brittle failure.

9. Reactor Water Cleanup Isolation Valve (2WCS*MOV200)

a. Body. SA105 normalized with a design thickness of 0.880 in. was applied for the reactor water cleanup isolation valve body. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

b. Bonnet. SA105 normalized with a design thickness of 0.875 in. was applied for the reactor water cleanup isolation valve bonnet. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

c. Disc. SA105 normalized with a design thickness of 2.25 in. was applied for the reactor water cleanup isolation valve disc. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum, are applied.

d. Bolting. The reactor water cleanup isolation valve bolting is not pressure retaining.

e. Thrust ring. SA182 Grade 6 with a design thickness of 1.253 in. was applied for the reactor water cleanup isolation valve thrust ring. This material was tempered at a relatively high temperature of 1400°F, which serves to enhance its fracture toughness. An estimated PLSMT of +70°F for this material is derived from Republic Steel data, Universal-Cyclops Steel data and other data in the literature that exhibit very good toughness properties after tempering at 1400°F. In addition, the thrust ring is loaded in compression and shear only, which minimizes the possibility of crack propagation.

10. High Pressure Core Spray Recirculation Isolation Valve (2CSH*MOV105)

The HPCS recirculation isolation valve is located in and connected to 4 inch diameter, 0.337 inch nominal wall pipe. Therefore, the materials of this valve are exempt from testing, due to the nominal pipe size and nominal wall thickness of the connecting pipe, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum. However, an analysis of the materials of this valve was performed as requested by the NRC and indicated the following.

a. Body. SA216 Grade WCB normalized with a design thickness of 1-3/4 in. was applied for the HPCS recirculation isolation valve body. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

b. Bonnet. SA216 Grade WCB normalized with a design thickness of 1-3/4 in. was applied for the HPCS recirculation isolation valve bonnet. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

c. Disc. SA216 Grade WCB normalized with a design thickness of 1/2 in. was applied for the HPCS recirculation isolation valve disc. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, using the "worst case" rules for 5/8 inch thick material assigns a PLSMT of +65°F.

d. Bolting. SA193 Grade B7 and SA194 Grade 2H, both quenched and tempered, with a nominal diameter of 1 inch were applied for the HPCS recirculation isolation valve bolting. These materials are categorized by NUREG 0577 as having least susceptibility to brittle failure.

11. High Pressure Core Spray Test Isolation Valve (2CSH*MOV111)

a. Body. SA216 Grade WCB normalized and tempered with a design thickness of 2.585 in. was applied for the HPCS test isolation valve body. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +67°F. In addition, this material was CVN impact tested at +40°F and met the acceptance criteria of ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

b. Bonnet. SA216 Grade WCB normalized and tempered with a design thickness of 2.836 in. was applied for the HPCS test isolation valve bonnet. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +71°F. Also, this material was CVN impact tested at +40°F and met the acceptance criteria of ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

c. Disc. SA216 Grade WCB normalized and tempered with a design thickness of 1.51 in. was applied for the HPCS test isolation valve disc. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F. In addition, this material was CVN impact tested at +40°F and met the acceptance criteria of ASME III NC-2300, 1977 edition, including the summer 1977 addendum..

d. Bolting. SA193 Grade B7 and SA194 Grade 7, both quenched and tempered, with a nominal diameter of 1-3/8 inches was applied for the HPCS test isolation valve bolting. This material is categorized by NUREG-0577 as having least susceptibility to brittle failure.

e. Drain connection. SA105 was applied for the 3/4 inch nominal pipe size half coupling drain connection on the HPCS test isolation valve. This material is exempt from testing, due to its nominal pipe size and thickness, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

12. High Pressre Core Spray Injection Valve (2CSH*MOV107)

a. Body. SA216 Grade WCB normalized and tempered with an actual thickness of 2.440 in. was applied for the HPCS injection valve body. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

b. Bonnet. SA216 Grade WCB normalized and tempered with an actual thickness of 2.40 in. was applied for the HPCS injection valve bonnet. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

c. Disc. SA216 Grade WCB normalized and tempered with a design thickness of 1-3/8 in. was applied for the HPCS injection valve disc. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

d. Bolting. SA193 Grade B7 and SA194 Grade 2H, both quenched and tempered, with a nominal diameter of 1-1/4 in. were applied for the HPCS injection valve bolting. This material is categorized by NUREG 0577 as having least susceptibility to brittle failure.

13. High Pressure Core Spray Recirculation Check Valve (2CSH*V7)

The HPCS recirculation check valve is located in and connected to 4 inch diameter, 0.237 inch nominal wall pipe. Therefore, the materials of this valve are exempt from testing, due to the nominal pipe size and nominal wall thickness of the connecting pipe, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum. However, an analysis of the materials of this valve was performed as requested by the NRC and indicated the following.

a. Body. SA105 normalized with a design thickness of 0.250 inch was applied for the HPCS recirculation check valve body. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the "worst case" rules for 5/8 in. thick material of ASME III NC-2300, 1977 edition, including the summer 1977 addendum are applied. In addition, this material is exempt due to its thickness.

b. Cover (bonnet). SA105 normalized with a design thickness of 1.038 in. was applied for the HPCS recirculation check valve cover. NUREG 0577 categorizes this material as a normalized carbon manganese steel and assigns it a TNDT of -5°F. Thus, the PLSMT is +25°F when the rules of ASME III NC-2300, 1977 edition, including the summer 1977 addendum are applied.

c. Disc. The HPCS recirculation check valve disc does not perform a primary containment pressure boundary function.

d. Bolting. SA193 Grade B7 and SA194 Grade 2H, both quenched and tempered, with a nominal diameter of 5/8 in. were applied for the HPCS recirculation check valve bolting. This material is categorized by NUREG 0577 as having least susceptibility to brittle failure.

14. High Pressure Core Spray Suppression Pool Suction Isolation Valve (2CSH*MOV118)

The HPCS suppression pool suction isolation valve is located in and connected to 18 inch diameter, 0.375 inch nominal wall pipe. Therefore, the materials of this valve are exempt from testing, due to the nominal wall thickness of the connecting pipe, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum. However, an analysis of the materials of this valve was performed as requested by the NRC and indicated the following.

a. Body. SA216 Grade WCB normalized and tempered with an actual thickness of 2-1/2 in. was applied for the HPCS suppression pool suction isolation valve body. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

b. Bonnet. SA216 Grade WCB normalized and tempered with a design thickness of 2-1/2 in. was applied for the HPCS suppression pool suction isolation valve bonnet. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

c. Disc. SA216 Grade WCB normalized and tempered with an actual thickness of 1-1/2 in. was applied for the HPCS suppression pool suction isolation valve disc. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition including the summer 1977 addendum, assigns a PLSMT of +65°F.

d. Bolting. SA193 Grade B7 and SA194 Grade 2H, both quenched and tempered, with a nominal diameter of 1-1/4 in. were applied for the HPCS suppression pool suction isolation valve bolting. This material is categorized by NUREG 0577 as having least susceptibility to brittle failure.

15. High Pressure Core Spray Recirculation Throttling Valve (2CSH*HCV116)

The HPCs recirculation throttling valve is located in and connected to 4 inch diameter 0.337 inch nominal wall pipe. Therefore, the materials of this valve are exempt from testing, due to the nominal pipe size and nominal wall thickness of the connecting pipe, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum. However, an analysis of the materials of this valve was performed as requested by the NRC and indicated the following.

a. Body. SA217 Grade C5 normalized and tempered with an actual thickness of 0.500 in. was applied for the HPCS recirculation throttling valve body. SA217 Grade C5, because of its alloy content, can be expected to exhibit toughness properties at least as good as a normalized cast carbon steel. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels, and this can also be applied as a "worst case" characterization of normalized and tempered SA217 Grade C5. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, using the "worst case" rules for 5/8 in. thick material, assigns a PLSMT of +65°F.

b. Bonnet. SA217 Grade C5 normalized and tempered with an actual thickness of 1.6385 in. was applied for the HPCS recirculation throttling valve bonnet. SA217 Grade C5, because of its alloy content, can be expected to exhibit toughness properties at least as good as normalized case carbon steel. NUREG 0577 indicates a TNDT for normalized SA216 Grade WCB at or below the NDT of +35°F for heat treated cast steels, and this can also be applied as a "worst case" characterization of normalized and tempered SA217 Grade C5. Based on a TNDT of +35°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +65°F.

c. Plug. The HPCS recirculation throttling valve plug does not perform a primary containment pressure boundary function.

d. Nipples. SA106 Grade B with nominal wall thicknesses of 0.337 and 0.237 in. was applied for the HPCS recirculation throttling valve inlet and outlet nipples. This material is exempt from testing based on its nominal thickness, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

e. Bolting. SA193 Grade B7 and SA194 Grade 2H, both quenched and tempered, with a nominal diameter of 1 in. were applied for the HPCS recirculation throttling valve bolting. This material is categorized by NUREG 0577 as having least susceptibility to brittle failure.

16. High Pressure Core Spray Test Throttling Valve (2CSH*HCV133)

a. Body. SA217 Grade WC9 normalized and tempered with a design thickness of 1.07 in. was applied for the HPCS test throttling valve body. Metallography was performed on a sample of this material having a more conservative (greater) thickness and subjected to the same heat treatment as the body. Light microscopy at magnifications up to 1000X showed that the microstructure is tempered bainite/tempered bainite plus ferrite. This is consistent with predictions of continuous cooling diagrams for this cast material. Drop weight nil ductility transition temperature tests performed by Maino, Gomez-Gallardo and Wallace, "Section Size Effects on Toughness of Various Cast Steel," yielded a TNDT of +1°F for the same material, heat treatment, section size and microstructure as the HPCS test throttling valve body. Based on a TNDT of +1°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +31°F.

b. Bonnet. SA217 Grade WC9 normalized and tempered with a design thickness of 3.672 in. was applied for th HPCS test throttling valve bonnet. Metallography was performed on a sample of this material having a similar thickness, subjected to the same heat treatment, and cast by the same foundry that produced the bonnet. Light microscopy at magnifications up to 1000X showed that the microstructure is tempered bainite/tempered bainite plus ferrite. This is consistent with predictions of continuous cooling diagrams for this cast material. Drop weight nil ductility transition temperature tests performed by Maino, Gomez-Gallardo and Wallace, "Section Size Effects on Toughness of Various Cast Steel," yielded a TNDT of +1°F for the same material, heat treatment, section size and microstructure as the HPCS test throttling valve body. Based on a TNDT of +1°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +49°F.

c. Inlet nipple. SA106 Grade B manufactured by Phoenix Steel, Phoenixville, PA with a nominal wall thickness of 0.719 in. was applied for the HPCS test throttling valve inlet nipple. As in Item 4g discussed earlier, data for normalized SA106 Grade B can be

applied. NUREG 0577 indicates a TNDT for this material at or below the NDT of +40°F for mild carbon steel. Based on a TNDT of +40°F, ASME III NC-2300, 1977 edition, including the summer 1977 addendum, assigns a PLSMT of +70°F.

d. Outlet nipple. SA106 Grade B with a nominal wall thickness of 0.365 in. was applied to the HPCS test throttling valve outlet nipple. The connecting pipe to the outlet side of the valve is 12 inch diameter, 0.375 inch nominal wall pipe. Therefore, the outlet nipple of this valve is exempt from testing, due to the nominal wall thickness of the connecting pipe, in accordance with ASME III NC-2300, 1977 edition, including the summer 1977 addendum.

e. Plug. SA479 type 304L was applied for the HPCS test throttling valve plug. This is an austenitic stainless steel which is exempt.

f. Bolting. SA193 Grade B7 and SA194 Grade 2H - both quenched and tempered, with a nominal diameter of 1-3/4 in. were applied for the HPCS test throttling valve bolting. This material is categorized by NUREG-0577 as having least susceptibility to brittle failure.

TABLE 1

GDC 51 COMPLIANCE REVIEW

Nine Mile Point Nuclear Station - Unit 2

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| Equipment Hatch Cover Flange | SA516-70 Quenched and tempered | 4 7/8 in. (n) | +45 - Based on drop weight test (DWT) indicating a nil ductility transition temperature (TNDT) of -10 | +70 | |
| Drywell Head Pins | SA564, Grade 630 H1075 | 3 1/4 in. (n) | +70 - Based on chemistry, heat treatment and data from Armco Steel. | +70 | Note 3 |
| Penetration Z-1A Sleeve | SA155 CMSH80 Normalized and tempered | 1.5 in. (n) | +30 - Based on summer '77 Class 2 TNDT data for SA516-65 | +70 | |
| Penetration Z-11 Sleeve | SA333, Grade 6 Normalized | 1 in. (n) | +70 - Based on NUREG 0577 for "worst case" analysis as "mild" steel. Also based on Charpy V-notch tests at -50 which is consistent and adequate for a design lowest service metal temperature of +70 | +70 | Note 4 |
| Penetration Z-14 Sleeve | SA333 Grade 6 Normalized | 3/4 in (n) | +70 - Based on NUREG-0577 for "worst case" analysis as "mild" steel. Also based on Charpy V-notch tests at -50°F which is consistent and adequate for a design lowest service metal temperature of +70°F. | +70 | Note 4 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| Penetrations Z-12 Z-13 | SA312 Type 304 | --- | Excluded - Based on austenitic stainless steel | | |
| Flued Head Penetration Z-1A | SA508 Class 1 Quenched and tempered | 6 in. (n) | +62 - Based on actual DWT indicating TNDT 0 | +70 | |
| Flued Head Penetration Z-4A | SA508 Class 2 Quenched and tempered | 8 in. (n), 6.16 in. (d) | +62 - Based on actual DWT indicating TNDT 0 and design thickness | +70 | Note 5 |
| Flued head Penetration Z-14 | SA508 Class 1 Quenched and tempered | 4-1/4 in. (n) | +51 - Based on actual DWT indicating TNDT 0 | +70 | |
| MSS Pipe NM-01-85 | SA106-C Normalized | 1.177 in. (m) | +70 - Based on NUREG 0577 for "mild" steel not heat treated (better than) | +70 | Note 6 |
| MSS Sockolet | SA105 | 0.156 in. (d) | +69 - Based on NUREG 0577 for C-Mn steel not heat treated | +70 | |
| FWS Pipe and Reactor Water Cleanup (WCS) Pipe - 24 in. and 8 in. | SA106B and C Normalized | 2.062 in. (n) 0.906 in. (n) | +70 - Based on NUREG 0577 for "mild" steel not heat treated (better than) | +70 | Note 5 |
| WCS Pipe 8 in. | SA333, Grade 6 Normalized | 0.906 in. (n) | +70 - Based on NUREG 0577 for "worst case" analysis as "mild" steel. Also based on Charpy V-notch tests at -50 which is consistent and adequate for a design lowest service metal temperature of +70 | +70 | Note 4,5 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| WCS Sockolet | SA105 | 0.092 in. (d) | +69 - Based on NUREG 0577 for C-Mn steel not heat treated | +70 | Note 5 |
| WCS Elbows | SA234 WPB (SA106) Normalized | 0.906 in. (n) | +70 - Based on NUREG 0577 for "mild" steel not heat treated (better than) | +70 | Note 5 |
| CSH Pipe ASME III Cl. 1 | SA106 Grade B | 0.844 in. (n) | +70 - Based on NUREG 0577 for "mild" steel not heat treated (better than) and Phoenix Steel mill practice. Also, CVNs at +40. | +70 | |
| CSH Pipe ASME III Cl. 2 | SA106 Grade B | 0.237 in. (n) to 0.375 in. (n) | Exempt based on thickness criteria of summer 1977 Class 2 and SRP 6.2.7 | --- | |
| CSH Pipe ASME III Cl. 2 | SA106 Grade B | 0.844 in. (n) | +70 - Based on NUREG-0577 for "mild" steel not heat treated (better than) and Phoenix Steel mill practice. Also, CVNs at +65. | +70 | |
| CSH Elbows | SA234 Grade WPB | 0.280 in. (n) to 0.375 in. (n) | Exempt - Based on thickness criteria of summer 1977 Class 2 and SRP 6.2.7 | --- | |
| CSH Sockolets/ Weldolet | SA105 | 0.237 in. (n) and less (or 0.843 in. "worst case" thickness) | Exempt - Based on thickness criteria of summer 1977 Class 2 and SRP 6.2.7 or<br><br>+69 - Based on NUREG-0577 for C-Mn steel not heat treated and worst case thickness | --- | |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| CSH Reducer, Outlet | SA234-WPB (SA106) Normalized | 0.365 in. (n) | Exempt - Based on thickness criteria of summer 1977 Class 2 and SRP 6.2.7 | --- | |
| CSH Reducer, Inlet | SA234-WPB (SA106) Normalized | 0.844 in. (n) | +70 - Based on NUREG-0577 for "mild" steel not heat treated (better than) | +70 | |
| 2FWS*FTG1A | | | | | |
| FWS Thermal Tee Flued Head | SA350, Grade LF2 | 1.804 in. (m) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Thermal Tee Extruded Outlet Fit | SA240, Grade WPL6 (SA350 LF2) Normalized | 2.625 in. (m) | +28 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Thermal Tee Thermal Sleeve | SA350, Grade LF2 Normalized | 0.793 in. (m) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Thermal Tee Reducer | SA350, Grade LF2 | 1.804 in. (m) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Thermal Tee Thermal Sleeve Run | SA516, Grade 70 Normalized, cold formed and stress relieved | 3/8 in. (n) | +50 - Based on summer '77 Class 2 TNDT data and NRC Bulletin No. 158 | +70 | Note 5,7 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| 2MSS*HYV7A | | | | | |
| MSIV Body | SA350, Grade LF2 Quenched and tempered | 2.55 in. (d) | +2 - Based on NUREG 0577 for C-Mn steel normalized (better than) | +70 | |
| MSIV Bonnet | SA350, Grade LF2 Quenched and tempered | 4.94 in. (d) | +27 - Based on NUREG 0577 for C-Mn steel normalized (better than) | +70 | |
| MSIV Ball | SA351, Grade CF8M | | Excluded - Based on austenitic stainless steel | | |
| MSIV Bolting | -- | -- | -- | -- | Note 8 |
| 2FWS*MOV21A | | | | | |
| FWS Valve Body | SA105 Quenched and tempered | 2.28 in. (m) | +2 - Based on NUREG 0577 for C-Mn steel normalized (better than) | +70 | Note 5 |
| FWS Valve Bonnet | SA105 Normalized | 2.47 in. (m) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Valve Wedge | SA105 Normalized | 1.7128 in. (d) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Valve Bolting | -- | -- | -- | -- | Note 8 |
| FWS Valve Thrust Ring | SA182, Grade F6 Normalized and tempered | 1.253 in. (d) | +70 - Based on heat treatment and data from Republic Steel and Universal-Cyclops Steel | +70 | Note 5,9 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| 2FWS*AOV23A | | | | | |
| FWS Swing Check Valve Body | SA216, Grade WCB Normalized | 2.28 in. (m) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 5 |
| FWS Swing Check Valve Bonnet | SA105 Normalized | 4.498 in. (a) | +50 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Swing Check Valve Disc | SA105 Normalized | 2.28 in. (m) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| FWS Swing Check Valve Bolting | SA193-B7 SA194-2H Quenched and tempered | 5/8 in. (n) | Excluded from GDC 51 review based on NUREG 0577 categorization as least susceptible to brittle failure | -- | Note 5 |
| 2WCS*MOV200 | | | | | |
| WCS Valve Body | SA105 Normalized | 0.880 (d) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| WCS Valve Bonnet | SA105 Normalized | 0.875 (d) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| WCS Valve Disc | SA105 Normalized | 2.25 (d) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 5 |
| WCS Valve Bolting | -- | -- | -- | -- | Note 8 |
| WCS Valve Thrust Ring | SA182 Grade F6 Normalized and tempered | 1.0 (m) | +70 - Based on heat treatment and data from Republic Steel and Universal-Cyclops Steel | +70 | Note 5,9 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| 2CSH*MOV105 | | | Entire valve is exempt based on thickness of connecting pipe | | Note 10 |
| Body | SA216 Grade WCB Normalized | 1-3/4 in. (d) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 10 |
| Bonnet | SA216 Grade WCB Normalized | 1-3/4 n. (d) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 10 |
| Disc | SA216 Grade WCB Normalized | 1/2 in. (d) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 10 |
| Bolting | SA193-B7 SA194-2H Quenched and tempered | 1 in. (n) | Excluded from GDC 51 review based on NUREG 0577 categorization as least susceptible to brittle failure | +70 | Note 10 |
| 2CSH*MOV111 | | | | | |
| Body | SA216-WCB Normalized and tempered | 2.585 (d) | +67 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | |
| Bonnet | SA216-WCB Normalized and tempered | 2.836 (d) | +71 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | |
| Disc | SA216-WCB Normalized and tempered | 1.51 (d) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| Bolting | SA193-B7 SA194-7 Quenched and tempered | 1-3/8 in. (n) | Excluded from GDC 51 review based on NUREG-0577 categorization as least susceptible to brittle failure. | - | |
| Drain Connection | SA105 | 3/4" NPS (n) | Exempt - Based on thickness criteria of summer 1977 Class 2 and SRP 6.2.7. | - | |
| 2CSH*MOV107 | | | | | |
| Body | SA216-WCB Normalized and tempered | 2.440 in. (a) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | |
| Bonnet | SA216-WCB Normalized and tempered | 2.40 in. (a) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | |
| Disc | SA216-WCB Normalized and tempered | 1-3/8 in. (d) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | |
| Bolting | SA193-B7 SA194-7 Quenched and tempered | 1-1/4 in. (n) | Excluded from GDC 51 review based on NUREG 0577 categorization as least susceptible to brittle failure | +70 | |
| 2CSH*V7 | | | Entire valve is exempt based on connecting pipe nominal pipe size | | Note 11 |
| Body | SA105 Normalized | 0.250 in. (d) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 11 |
| Cover | SA105 Normalized | 1.038 in. (d) | +25 - Based on NUREG 0577 for C-Mn steel normalized | +70 | Note 11 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| Disc | SA216-WCB Normalized and tempered | 7/8 in. (n) | Exempt - Not a primary containment pressure boundary part | - | Note 11 |
| Bolting | SA193-B7 SA194-2H Quenched and tempered | 5/8 in. (n) | Excluded from GDC 51 review based on NUREG 0577 categorization as least susceptible to brittle failure | - | Note 11 |
| 2CSH*MOV118 | | | Entire valve is exempt based on thickness of connecting pipe | | Note 10 |
| Body | SA216-WCB Normalized and tempered | 2-1/2 in. (a) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 10 |
| Bonnett | SA216-WCB Normalized and tempered | 2-1/2 in. (a) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 10 |
| Disc | SA216-WCB Normalized and tempered | 1-1/2 in. (a) | +65 - Based on NUREG 0577 for cast steel heat treated (better than) | +70 | Note 10 |
| Bolting | SA193-B7 SA194-2H Quenched and tempered | 1-1/4 in. (n) | Excluded from GDC 51 review based on NUREG 0577 categorization as least susceptible to brittle failure | - | Note 10 |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| 2CSH*HCV116 | | | Entire valve is exempt based on connecting pipe nominal pipe size | | Note 11 |
| Body | SA217-C5 Normalized and tempered | 0.500 in. (a) | +65 - Based on NUREG 0577 for heat treated cast steel as worst case | +70 | Note 11 |
| Bonnet | SA217-C5 Normalized and tempered | 1.6385 in. (a) | +65 - Based on NUREG 0577 for heat treated cast steel as worst case | +70 | Note 11 |
| Plug | SA564 Grade 630 Aged at 1100°F | -- | Exempt - Not a primary containment pressure boundary part | - | Note 11 |
| Nipples | SA106 Grade B | 0.337 in. (n) | Exempt - Based on thickness criteria of summer 1977 Class 2 and SRP 6.2.7 | - | Note 11 |
| Bolting | SA193-B7 SA194-2H Quenched and tempered | 1 in. (n) | Excluded from GDC 51 review based on NUREG 0577 categorization as least susceptible to brittle failure | - | Note 11 |
| 2CSH*HCV133 | | | | | |
| Body | SA217-WC9 Normalized and tempered | 1.07 in. (d) | +31 - Based on metallography and data from the literature | +70 | |
| Bonnet | SA217-WC9 Normalized and tempered | 3.672 in. (d) | +49 - Based on metallography and data from the literature | +70 | |
| Nipple (inlet) | SA106 Grade B | 0.719 in. (n) | +70 - Based on NUREG 0577 for "mild" steel not heat treated (better than) and Phoenix steel mill practice. | +70 | |

| Item | Material | Thickness (Note 1) | Permissible Lowest Service Metal Temperature (PLSMT) (°F) and Basis | Lowest Service Metal Temp. (LSMT) (°F) (Note 2) | Remarks |
|---|---|---|---|---|---|
| Nipple (outlet) | SA106 Grade B | 0.365 in. (n) | Exempt - Based on thickness of connecting pipe criteria of summer 1977 Class 2 and SRP 6.2.7 | -- | Note 10 |
| Plug | SA479 Type 304L | --- | Exempt - Based on austenitic stainless steel | -- | |
| Bolting | SA193-B7 SA194-2H Quenched and tempered | 1-3/4 in. (n) | Excluded from GDC 51 review based on NUREG-0577 categorization as least susceptible to brittle failure | -- | |

## NOTES TO TABLE 1

Note 1 The values presented as "thickness" are as noted:

a. Actual thickness

d. Minimum design thickness

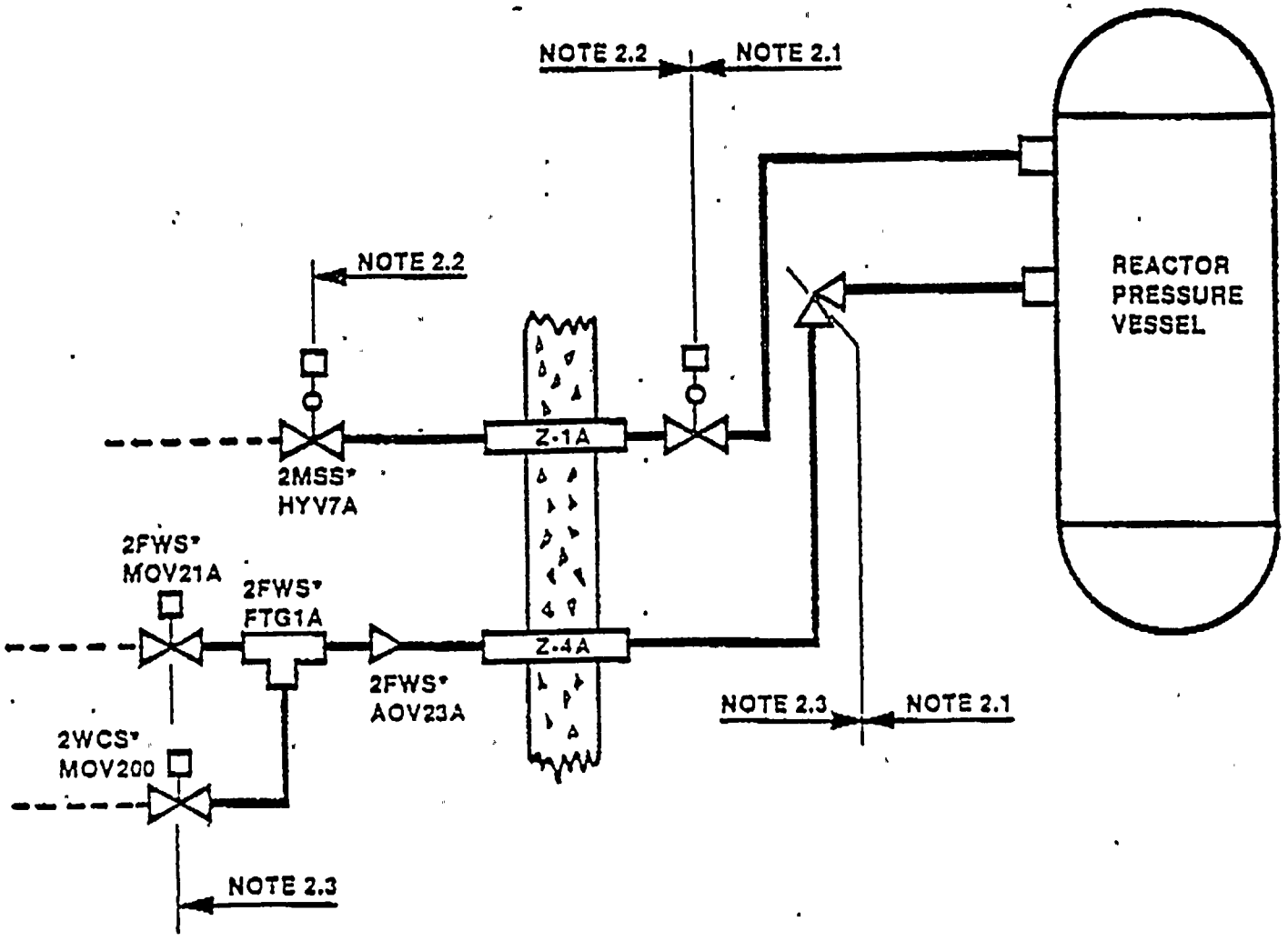
(The minimum design thickness for the flued head penetration Z-4A is based on all design loads minus temperature loads. Therefore, this value is conservative since it includes conditions that are not present at the LSMT, such as safety relief valve discharge loads. Other design thicknesses noted in this table are based on all worst-case design loads including temperature, and are therefore also conservative since they include conditions not present at the LSMT.)

m. Manufacturer's minimum thickness

n. Nominal thickness

Note 2 The lowest service metal temperature (LSMT) is limited either by the minimum local ambient temperature or by the minimum hydrotest temperature. When limited by the local ambient temperature, the LSMT is based on the minimum capacity of HVAC plus heat effects due to plant conditions necessary prior to the time the components are stressed. These heat contributions include, for example, heat from plant lighting and operating mechanical equipment. The following figure serves to clarify the LSMT when the hydrotest is the limiting condition.

# NOTE 2 (CONTD)
# LIMITING CONDITION — HYDROTEST




**NOTES:**

2.1 THIS PORTION TO BE HYDROTESTED WITH REACTOR PRESSURE VESSEL. 140°F MINIMUM TEMP.

2.2 THIS PORTION TO BE HYDROTESTED AT 70°F MINIMUM TEMP.

2.3 THIS PORTION TO BE HYDROTESTED AT 70°F MINIMUM TEMP.

Note 3 SA564, Grade 630 is a precipitation hardening steel which cannot be drop-weight tested. The deposition of the weld bead as required by ASTM E208 would alter the material properties and therefore render the test not meaningful. From a metallurgical consideration, the heat used had a relatively high nickel content (4.42 percent) and was age hardened at a relatively high temperature (1,075°F, minimum), both of which serve to enhance the fracture toughness of this material.

Note 4 The PLSMT for penetration Z-11 and for the 8-in. feedwater pipe, both fabricated of SA333, Grade 6, were evaluated as follows:

Generally, SA333 can be expected to perform significantly better than the "mild steel" group of NUREG 0577. SA333 is Specification for Seamless and Welded Steel Pipe for Low Temperature Service. When intended for low temperature service, materials are manufactured with built-in inherent toughness, accomplished mainly by tight controls on cleanliness, chemistry and heat treatment. This inherent toughness is evidenced by the high CVN absorbed energy values obtained at very low temperatures.

For the two items in question, CVNs were performed on each heat of material at -50°F in accordance with SA333, Grade 6 and demonstrated absorbed energy values of 60/41 ft/lb and 131/100 ft/lb (average of 3/lowest single value). In accordance with NUREG 0577, paragraph 4.4.1, the temperature at which CVNs demonstrate 20 to 25-ft/lb absorbed energy is considered to approximate the TNDT. Therefore, for the heats above, it can be conservatively assumed that the TNDT is at or below -50°F, and that the SA333, Grade 6 is adequate for these items.

Note 5 There are situations where the FWS and WSS actual metal temperature may be less than +70°F; however, these situations could occur only during startup from the cold shutdown condition where the loads are very low. At very low stresses, the probability of rapidly propagating fracture is also very low. As the pressure increases, the temperature also increases such that the temperature is greater

than +70°F for all conditions where the pressure exceeds 660 psi. A pressure of 660 psi correlates to 20% of the preoperational system hydrostatic test pressure, which is defined by ASME III NC-2300, 1977 edition, including the summer 1977 addendum as the reference point to be used in establishing the lowest service temperature.

Note 6 Actual fabrication of main steam piping which serves as primary containment pressure boundary did not include hot bending. The CMTRs included hot bending information as a qualification in case it was elected to hot bend in fabrication. The actual fabrication, however, used miters and the material is therefore in the normalized condition. NUREG 0577, Table 4.4, on the basis of Figure 8 data for normalized SA106, would assign a TNDT at or below +40°F. The ASME III summer 1977 addenda, Class 2 rules then would assign a PLSMT of +70°F.

Note 7 The normalized SA516 Grade 70 was cold worked approximately 1.9% in forming the thermal sleeve run. Welding Research Council Bulletin No. 158 presents data on the effects of cold work and cold work plus stress relief on the toughness properties of material such as this. The data demonstrate that the transition temperature increases with increasing cold work. After a stress relief of 1150°F, this ranges from an increse of 0°F for 1% cold work to an increase of 20°F for 5% cold work. Conservatively, a 20°F increase in the TNDT of the thermal sleeve run can be assumed, raising the ASME III summer 1977 Class 2 TNDT to +20°F and resulting in a PSLMT of +50°F.

Note 8 MSS*HYV7A, FWS*MOV21A and WCS*MOV200 bolting are not pressure-retaining parts.

Note 9 SA182 Grade F6 is a martensitic chromium stainless steel which cannot be drop weight tested. The deposition of the weld bead as required by ASTM E208 would alter the material properties and therefore render the test not meaningful. From a metallurgical consideration, the high tempering temperature of 1400°F produces a material with a significantly nign toughness. This is reflected in data from Republic Steel and other sources in the literature.

Note 10 ASME III summer 1977 addendum NC-2331 defines the nominal wall thickness for valves as the nominal pipe wall thickness of the connecting pipe. As the nominal pipe wall thickness of the pipe connecting to this valve is 5/8 inch or less, no testing is required. Also, NC-2311 (a)(5) of the same code exempts testing of material for valves with pipe connections of 5/8 inch wall and less. Therefore, this valve meets the summer 1977 addendum class 2 rules and SRP 6.2.7 acceptance criteria.

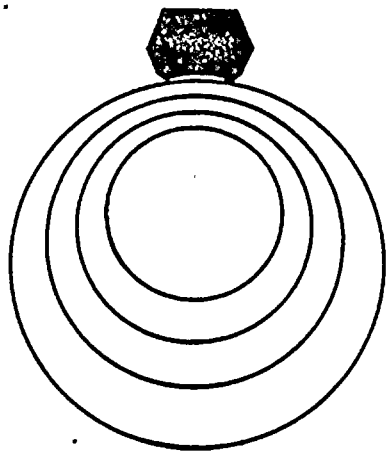
Note 11 ASME III summer 1977 addendum NC-2311 (a)(4) exempts testing for all thickness of material for valves with a nominal pipe size 6 inch and smaller. Therefore, this valve meets the summer 1977 addendum class 2 rules and SRP 6.2.7 acceptance criteria.

Enclosure 2

# REDUCED INVENTORY

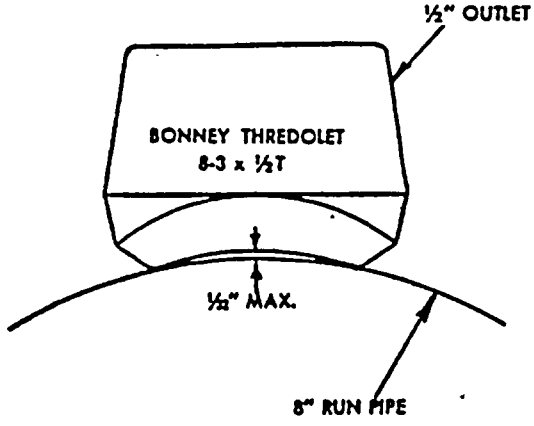
## INTERCHANGEABILITY OR CONSOLIDATION OF SIZES

The chart to the right outlines the full range of Thredolet, Sockolet and Weldolet size consolidation. This chart has been devised and the fittings designed to substantially reduce warehouse inventory. All fittings are manufactured and marked as shown on the chart. All outlet sizes over 4" should be ordered to specific run pipe size.



## HOW IT WORKS

Each outlet size 4" and under is designed to fit a number of run pipe sizes, e.g., the ½" fitting marked 8-3 x ½ will fit 3", 3½", 4", 5", 6", and 8" run pipes. When this ½" fitting is placed on a 3" run pipe, it will fit perfectly. When placed on an 8" run pipe, there will be a maximum gap of 1/32" between the top of the run pipe and the base of the fitting at the crotch as shown on sketch. This gap is negligible when welding.




### STANDARD WEIGHT AND EXTRA STRONG WELDOLETS
### 3000# THREDOLETS
### STANDARD WEIGHT AND EXTRA STRONG SOCKOLETS

| | | |
|---|---|---|
| ⅜ x ⅛ | 1¼ x 1¼ | 3 x 3 |
| ½ x ⅛ | 1½ x 1¼ | 3½ x 3 |
| 1—¾ x ⅛ | 2 x 1¼ | 4 x 3 |
| 2½—1¼— x ⅛ | 2½ x 1¼ | 5 x 3 |
| 36—3 x ⅛ | 3½—3 x 1¼ | 6 x 3 |
| | 5—4 x 1¼ | 8 x 3 |
| ⅜ x ¼ | 8—6 x 1¼ | 10 x 3 |
| ½ x ¼ | 18—10 x 1¼ | 14—12 x 3 |
| 1—¾ x ¼ | 36—20 x 1¼ | 20—16 x 3 |
| 2½—1¼ x ¼ | | 36—24 x 3 |
| 36—3 x ¼ | 1½ x 1½ | |
| | 2 x 1½ | 3½ x 3½ |
| ½ x ⅜ | 2½ x 1½ | 4 x 3½ |
| 1—¾ x ⅜ | 3 x 1½ | 5 x 3½ |
| 2½—1¼ x ⅜ | 4—3½ x 1½ | 6 x 3½ |
| 36—3 x ⅜ | 6—5 x 1½ | 8 x 3½ |
| | 12—8 x 1½ | 10 x 3½ |
| ½ x ½ | 24—14 x 1½ | 14—12 x 3½ |
| ¾ x ½ | 36—26 x 1½ | 20—16 x 3½ |
| 1 x ½ | | 36—24 x 3½ |
| 1½—1¼ x ½ | 2 x 2 | |
| 2½—2 x ½ | 2½ x 2 | 4 x 4 |
| 8—3 x ½ | 3 x 2 | 5 x 4 |
| 36—10 x ½ | 3½ x 2 | 6 x 4 |
| | 4 x 2 | 8 x 4 |
| ¾ x ¾ | 5 x 2 | 10 x 4 |
| 1 x ¾ | 6 x 2 | 14—12 x 4 |
| 1½—1¼ x ¾ | 10—8 x 2 | 20—16 x 4 |
| 2½2 x ¾ | 18—12 x 2 | 36—24 x 4 |
| 5—3 x ¾ | 36—20 x 2 | |
| 12—6 x ¾ | | Outlet sizes, 5, 6, 8, 10, 12 14, 16, 18, 20, 24, 26, 30 order to specific size combination. |
| 36—14 x ¾ | 2½ x 2½ | |
| | 3 x 2½ | |
| 1 x 1 | 3½ x 2½ | |
| 1¼ x 1 | 4 x 2½ | |
| 1½ x 1 | 5 x 2½ | |
| 2 x 1 | 6 x 2½ | |
| 2½ x 1 | 8 x 2½ | |
| 3½—3 x 1 | 12—10 x 2½ | |
| 5—4 x 1 | 18—14 x 2½ | |
| 10—6 x 1 | 36—20 x 2½ | |
| 36—12 x 1 | | |

### 6000# THREDOLETS
### SCHEDULE 160 AND DOUBLE EXTRA STRONG SOCKOLETS

| | | |
|---|---|---|
| 1—¼ x ⅛ | 1½ x 1¼ | 2½ x 2 |
| 2—1¼ x ½ | 2½—2 x 1¼ | 3 x 2 |
| 6—2½ x ½ | 3½—3 x 1¼ | 4 x 2 |
| 36—8 x ½ | 8—4 x 1¼ | 5 x 2 |
| | 20—10 x 1¼ | 6 x 2 |
| 1 x ½ | 36—24 x 1¼ | 10—8 x 2 |
| 2½—1¼ x ¾ | | 20—12 x 2 |
| 10—3 x ¾ | 2 x 1½ | 36—24 x 2 |
| 36—12 x ¾ | 2½ x 1½ | |
| | 3½—3 x 1½ | |
| 1½—1¼ x 1 | 5—4 x 1½ | |
| 2½—2 x 1 | 8—6 x 1½ | |
| 10—3 x 1 | 18—10 x 1½ | |
| 36—12 x 1 | 36—20 x 1½ | |

### SCHEDULE 160 AND DOUBLE EXTRA STRONG WELDOLETS

| | | |
|---|---|---|
| ½ x ½ | 1½—1¼ x 1¼ | 2 x 2 |
| 1¼—¾ x ½ | 2½—2 x 1¼ | 2½ x 2 |
| 36—1½ x ½ | 10—3 x 1¼ | 3½—3 x 2 |
| | 36—12 x 1¼ | 5—4 x 2 |
| 1—¼ x ¼ | | 8—6 x 2 |
| 2—1¼ x ¼ | 1½ x 1½ | 18—10 x 2 |
| 6—2½ x ¼ | 2½—2 x 1½ | 36—20 x 2 |
| 36—8 x ¼ | 3½—3 x 1½ | |
| | 8—4 x 1½ | Outlet sizes 2½, 3, 4, 5, 6, 8, 10, 12 order to specific size combination. |
| 1 x 1 | 20—10 x 1½ | |
| 2—1¼ x 1 | 36—24 x 1½ | |
| 10—3 x 1 | | |
| 36—12 x 1 | | |

Enclosure 3

RECEIVED
MAR 25 1977

FORM NO. 10678

# NATIONAL FORGE COMPANY



## MATERIAL CERTIFICATION DOCUMENTATION PACKAGE

**Customer:** GRAVER TANK & MANUFACTURING CO.

**Forge Div. Irvine** [X] **Erie** [ ]

**Foundry Div.** [ ]

**Purchase Order No.:** 60840NX38 PENET. NO. X-61A
S & W PENET. NO. Z-14

**Drawing No.:** 332221, REV. 3

**NFC Order No.:** 60-A-3322

**Nomenclature:** FLUED HEAD PENETRATION

**NFC Serial No.:** 21-001

**Specification:** SA-508, CLASS 1, CODE CASE 1332-6 AND 9171 EDITION THRU S-73 ADDENDA
ASME SECT. 3, CLASS 1

**NATIONAL FORGE COMPANY DOCUMENTS APPROVED AND USED ON THIS CONTRACT**

Ultrasonic Procedure: UT-60-A-3322, REV. 0, ADD. 1, DTD 7/2/76
Magnetic Particle Procedure: MT-60-A-3322, REV. A, DTD 11/1/76 & LETTER DLM-76-053, DTD 11/30/76
Heat Treat Procedure: HT-60-A-3322-0A, ADD. 2, DTD 8/26/76
Impact Test Procedure: LT-60-A-3322-0A, REV. A, DTD 7/8/76
Forging Test Drawing:
Other: HYDROSTATIC TEST PROCEDURE: 61-GP99-006, REV. B, DTD 1/28/75 & AGGENDA S.O. 60-A-3322, REV. C, DTD 10/26/76

**DOCUMENTATION PACKAGE TABLE OF CONTENTS**



JUN 14 1977
S. W. E. C.
QC
INSPECTED 83

GRAVER TANK & MFG. CO.
EAST CHICAGO, IN
ORDER No. 60840NX38
ITEM No. X61A
CERT. No. [redacted]

*This is to certify that the material identified above has been processed, tested and inspected in accordance with the requirements of the purchase order and applicable specifications, including any amendments and conforms to the requirements thereof.*

**INFORMATION ONLY**

TRANSMITTAL 000233

R. S. Newark
Authorized Company Representative

Date: 12/3/76

Sally A. Veves
Embossed Hereon by Attorney
Irvine, Warren County, Pennsylvania, Notary Public Seal
My Commission Expires January 21, 1978

NIAGARA MOHAWK
NINE MILE POINT, UNIT 2
J. O. 12177, NMP2-P283B

QUALITY CONTROL DEPARTMENT

# TERIAL CERTIFICATION REPORT NO. 0- 06422

NFC SHOP NO. 60-A-3322 SERIAL NO. 21-001

CUSTOMER GRAVER TANK & MANUFACTURING CO.

CUSTOMER ORDER NO. 60840NX38 TRANSMITTAL NO. 00063



## CHEMICAL ANALYSIS

| HEAT NO. | C | Mn | P | S | Si | Ni | Cr | Mo | V | Al | Cu | Co | Ti |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6016 | .21 | 1.13 | .009 | .008 | .27 | .15 | .20 | .04 | .02 | | .07 | .007 | |
| ECK | .20 | 1.13 | .009 | .007 | .27 | | | | .02 | | | | |

## MECHANICAL PROPERTIES

| GEND | SPECIMEN IDENT. NO. | TENSILE psi | YIELD psi @ .2 | % ELONG | % R/A | GRAIN SIZE | HARDNESS |
|---|---|---|---|---|---|---|---|
| LONG | LA PIPE | 77,500 | 56,000 | 32.0 | 76.1 | 9-10 | |
| RAD | YC HEAD | 74,500 | 47,500 | 31.0 | 69.9 | | |
| TRAN | LB PIPE | 77,800 | 58,100 | 32.0 | 76.6 | | |
| TANG | | | | | | | |

JUN 1 4 1977 E.B. C. INSPECTED

GRAVER TANK & MFG. CO. EAST CHICAGO, IN. ORDER No. 60840NX38 ITEM No. KU-2 CERT. No. [redacted]

## MANUFACTURING NOTES AND HEAT TREATMENT DATA

C' BORE DIA.
LONG ARM - 11.230"
HEAD - 11.227"

DROP WEIGHT TESTS
A PIPE 2 NO BREAK @ -50°F
1 BREAK @ -60°F

C HEAD 2 NO BREAK @ 10°F

B PIPE 2 NO BREAK @ -40°F
1 BREAK @ -50°F

NIAGARA MOHAWK
NINE MILE POINT, UNIT 2
J. O. 12177, NMP2-P263B
SHIPMENT No. 2
DOCUMENTATION

SILE SPECIMEN SIZE = .505"
UND FLUTE; OT MOLD
EE OF MERC CONTAMINATION

| OPERATION | TO °F | HRS. HOLD |
|---|---|---|
| NORMALIZED | 1700 | 5 |
| AUSTENITIZED | 1550 | 5 |
| QUENCHED IN WATER | | |
| AUSTENITIZED | 1460 | 5 |
| QUENCHED IN WATER | | |
| TEMPERED | 1200 | 5 |

## IMPACT DATA

| SPCMN. IDNT. NO. | °F | FT. LBS. | %SHEAR | LATERAL EXPANSION |
|---|---|---|---|---|
| LA | -40 | 197.0 | 100 | .090 |
| | | 235.0 | 100 | .080 |
| | | 187.0 | 100 | .087 |
| LC | -40 | 122.0 | 41 | .090 |
| | | 163.0 | 71 | .092 |
| | | 113.0 | 51 | .085 |
| LB | -40 | 202.0 | 100 | .08 |
| | | 237.0 | 100 | .065 |
| | | 194.0 | 100 | .088 |

ULTRASONIC INSPECTED PER APPROVED PROCEDURE AND FOUND TO BE SATISFACTORY WITH NO REPORTABLE INDICATIONS.

MAGNETIC PARTICLE INSPECTED PER APPROVED PROCEDURE AND FOUND TO BE SATISFACTORY WITH NO REPORTABLE INDICATIONS.

HYDROSTATIC TESTED PER APPROVED PROCEDURE AND FOUND TO BE SATISFACTORY.

**INFORMATION ONLY**

COPIES OF ACTUAL TEST DATA AVAILABLE FOR REVIEW.

NATIONAL FORGE COMPANY

# NON-DESTRUCTIVE TEST REPORT

S.O. Order No. 60-3322-31 Serial No. 001 Customer Order No. 60R40WX38

Date 11/8/76 Customer GRAVER TANK

Product Description FLUID HEAD

Type Test ☐ Final ☐ Preliminary

☐ Scleroscope ☐ Brinell ☐ Bore Search ☐ Dye Penetrant ☐ Magnetic Parti

☐ Zyglo ☑ Other Hydro-Test

Remarks

## INFORMATION ONLY

Hydrostatic test to 1969 psi with 10 minute hold. O.K.

Hydrostatic Test Procedure: 61-GP99-006, Rev. B, dated January 28, 19

Test Agenda: S.O. 60-3322, Rev. C, dated 11/2/76

NIAGARA MOHAWK
NINE MILE POINT, UNIT 2
J. O. 12177, NMP2-P233B
SHIPMENT No. 2
Documentation

NOV 22 1977
S. W. E. C.
PDC
INSPECTED 83

GRAVER TANK & MFG. CO.
EAST CHICAGO, IN
ORDER No. 60R40WX38
ITEM No. X614
CERT. No. [illegible]

Disposition

☐ Hold ☑ Release ☐ Ship

☐ Other

Applicable Specification

Distribution

R. Pike
L. Guttierson
T. Olson

Ch ed by M. E Spunk

Customer Representative

Enclosure 4

ANCHOR/DARLING VALVE COMPANY

WILLIAMSPORT, PA. 17701

REPORT LOG NO. R85.050

SHEET NO. 1 OF 18

CALCULATION ORDER NO.: E6549-1

REVISION -

T. C. Bartlett — PREPARED BY — 2/15/85 — DATE

D. W. Lyons — CHECKED BY — 2/15/85 — DATE

A/DV ORDER NO. E6549

SUBJECT: MINIMUM WALL CALCULATIONS

CUSTOMER: STONE & WEBSTER ENGINEERING CORP.
NIAGARA MOHAWK POWER CORPORATION

EQUIPMENT
DESCRIPTION: 12"-900# GLOBE VALVE w/M.O.

CUSTOMER PURCHASE ORDER: NMP2-P303V

CUSTOMER SPECIFICATION:

APPLICABLE CODES: ASME B & PV-1971 ED.-WIN'73 ADD.-CL. 2

| A/DV I.D. | ECM | CUSTOMER ID/TAG NO. | ASSY. DWG. NO. |
|---|---|---|---|
| SJO 5219-7 | | 2CSH*MOV111 | 3001-3 |

## II. SUMMARY

The table below presents the component, minimum required thickness, stress @ minimum thickness and allowable stress limit.

| COMPONENT | MIN. THICK. | STRESS @ MIN THICKNESS | STRESS ALLOWED |
|---|---|---|---|
| BODY FLANGE | 2.585 IN | 26171 PSI | 26250 PSI |
| BONNET FLANGE | 2.836 IN | 26250 PSI | 26250 PSI |
| DISC | 1.51 IN | 26250 PSI | 26250 PSI |