

WEP-05-318 NP-Attachment

## Point Beach Unit 2 Reactor Vessel CMTRs

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Westinghouse Electric Company LLC

P.O. Box 355

Pittsburgh, PA 15230-0355

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WESTINGHOUSE NON-PROPRIETARY CLASS 3

NATIONAL FORGE COMPANY  
HOLLOW BORED FORGING  
SPECIALISTS

IRVINE, WARREN COUNTY, PENNSYLVANIA

RVG. 0000003619

To The Babcock & Wilcox Company  
Boiler Division  
Barberton, Ohio 44203

CUSTOMERS ORDER NO. 329203  
N.F. ORDER NO. 79-3847  
DATE Sept. 18, 1968

Contract No. 61001405110

ITEM 01-#2 SHIPPED ----- HEAT NO. 9-5742 DESCRIPTION Inlet Nozzle Forging  
Dwg. 949240  
Rev. 5  
Spec. ASTM-A-508-64  
Cl. 2

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING	HEAT NO.	C.	MM.	P.	S.	SH.	ML.	CR.	NO.	VA.	AL.	Co.
(01) #2	9-5742	.25	.62	.007	.007	.25	.85	.34	.62	.00	.014	.010
Check		.24	.64	.006	.007	.25	.85	.34	.61	.00	.017	.011

D. H. Vacuum Steel

TEST	TENSILE STRENGTH LBS. PER SQ. IN.	Yield Str. @ .2% LBS. PER SQ. IN.	REDUCTION OF AREA %	ELONGATION %	FRACTURE
(01) #2					
X-1 X-2				b,c	Full cup 1/2 cup
Heat Treat Procedure NFM-H-12-4 Rev. 2 3/15/68. Impact Procedure NFM-T-16-4 12/26/67. Ultrasonic Procedure NFM-T-17-4 12/26/67. Magnetic Particle NFM-T-20-4 Rev. 1 2/16/68.					
All tests Stress Relieved @ 1100o-1150oF for 30 hrs. Furnace cooled to below 600oF.					

B-6010-1  
4869  
Inlet Noz.  
mk 12-1

Page. 1

State of Pennsylvania } ss:  
Warren County

Before me, a Notary Public in and for above County, personally appeared  
Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and  
says that the above Report is a True and Correct copy of tests shown on our Laboratory Records.

Subscribed and Sworn to  
this \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

My Commission expires \_\_\_\_\_

*[Signature]*

32420

REV. 0000003619

**NATIONAL FORGE COMPANY  
HOLLOW BORED FORGING  
SPECIALISTS**

IRVINE, WARREN COUNTY, PENNSYLVANIA

Contract No. 61001405110

To The Babcock & Wilcox Company  
Boiler Division  
Barberton, Ohio 44203

CUSTOMERS ORDER NO. G29208  
N.F. ORDER NO. 79-3847  
DATE Sept. 18, 1968

ITEM SHIPPED HEAT NO. DESCRIPTION

01-#2 Continued

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING:

HEAT NO.

Temp.

#

% Ductile

Lateral Expansion

b,c

AA  
AB  
AC  
BA  
BB  
BD

State of Pennsylvania } ss:  
Warren County

Page. 2

Before me, a Notary Public in and for above County, personally appeared E. K. Oviatt, Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and says that the above Report is True and Correct to the best of His knowledge and belief.

*E. K. Oviatt*

Subscribed and Sworn to  
this 18th day of Sept. 19 68

E. K. Oviatt,  
Test Engineer.

My Commission expires \_\_\_\_\_

RVG-0000003619

Purchaser: Babcock & Wilcox Co.  
 Contract No. 610-014-05110

No. NPMH-42-4 Rev. 2  
 Date March 15, 1968

1. Company performing heat treatment National Forge Co.
2. Name of part Inlet Nozzle Purchaser Dwg. No. 94924C Rev. 2 Modified ASTM-A-508-64
3. Material composition and type ASTM-A-508-64 Class 1 Specification ASME Code Case 1332-2
4. Approx. size of part as quenched, inches: Length 54 3/8 Width 5 1/2 Dia. 5 1/2 ASME Sec. III Article 3.  
 Max. section thickness 13.375 Thickness at test prolong 13.375" wt. 25000 lbs.
5. Part forged individually yes Multiple length No
6. Part quenched individually yes Multiple length No
7. Forging operations: Prior to H.T. yes During H.T.        After H.T.
8. Normalize temp. 1700 °F Austenitizing temp. 1570 °F Tempered 220 °F
9. Time at austenitizing for quench 15 Hrs. (Max & Min) Time at temper temp. 15 Hrs.
10. Temperature control austenitizing for quench: Thermocouples on parts No  
 Thermocouples not attached yes Recording chart used Yes
11. Max. number of parts in furnace load for quench one
12. Rate of cooling during quench: From 1570 °F To cold °F in 1 hr. / 45 min. Minutes
13. Cooling medium: Water X or Oil       : Still        Agitated X Spray
14. Cooling medium temp. Normal Range 70 °F Min. 90 °F Max. Max. allowed 90 °F
15. Approx. quench tank liquid volume 2000 Cu. Ft. or        Gallons
16. Approx. total flow rate if spray is used:        Gallons per minute
17. Time interval from opening of furnace door to start of quench one Sec. Min.
18. Temperature of thickest section surface at end of quench cold °F
19. Temperature rise of thickest section surface after end of quench none °F
20. Method of cooling from tempering: Furnace        Air X Water
21. Other pertinent information: Austenitized for quench in an automatically controlled gas fired furnace.

\*Write number of thermocouples used in applicable spaces.

Authorized signature

*Raymond D. Disp*

RVG-0000003817

# NATIONAL FORGE COMPANY HOLLOW BORED FORGING SPECIALISTS

IRVINE, WARREN COUNTY, PENNSYLVANIA

Contract No.  
61001405110

To: The Babcock & Wilcox Company  
Boiler Division  
Barberton, Ohio 44203

CUSTOMERS ORDER NO. 329205  
N.F. ORDER NO.  
DATE

79-3847  
Sept. 18, 1968

ITEM SHIPPED HEAT NO.  
02-#1 ----- 9-5691

DESCRIPTION  
Outlet Nozzle Forging  
Dwg. 131825E  
Rev. 6  
Spec. ASTM-A-508-64  
Cl. 2

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING	HEAT NO.	C.	MN.	P.	S.	SI.	Ni.	CP.	MO.	VA.	Al.	Co.
(02) #1	9-5691	.26	.68	.009	.008	.25	.82	.36	.61	.00	.012	.01
Check		.26	.72	.008	.011	.26	.77	.36	.60	.00	.014	.01

D. H. Vacuum Steel

TEST	TENSILE STRENGTH LBS. PER SQ. IN.	YIELD STRENGTH @ 2% LBS. PER SQ. IN.	REDUCTION OF AREA %	ELONGATION %	FRACTURE
(02) #1					OUTLET NO2 B-6009-2 4860
X-a X-b				b,c	2/3 cup 1/2 cup
Heat Treat Procedure NFM-H-12-4 Rev. 2 3/15/68.					
Impact Procedure NFM-T-16-4 12/26/67.					
Ultrasonic Procedure NFM-T-17-4 12/26/67.					
Magnetic Particle NFM-T-20-4 Rev. 1 2/16/68.					
All tests Stress Relieved @ 1100c-1150cF for 30 hrs.					
Furnace cooled to below 600cF.					

Page. 1

State of Pennsylvania } ss:  
Warren County

Before me, a Notary Public in and for above County, personally appeared  
Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and  
says that the above Report is a True and Correct copy of tests shown on our Laboratory Records.

Subscribed and Sworn to  
this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_

My Commission expires \_\_\_\_\_

3224120

RVG.0000003617

**NATIONAL FORGE COMPANY**  
**HOLLOW BORED FORGING**  
**SPECIALISTS**

IRVINE, WARREN COUNTY, PENNSYLVANIA

To The Babcock & Wilcox Company  
 Boiler Division  
 Barberton, Ohio 44203

CUSTOMERS ORDER NO.  
 N.F. ORDER NO.  
 DATE

Contract No.  
 61001405110  
 329203  
 79-3847  
 Sept. 18, 1968

ITEM	SHIPPED	HEAT NO.	DESCRIPTION
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02-#1 Continued

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING	HEAT NO.	C.	MM.	P.	S.	BL.	NL.	CR.	NO.	VA.
		Temp.	#	% Ductile	Lateral Expansion					

b,c

AA  
 AB  
 AC  
 BA  
 BB  
 BC



State of Pennsylvania }  
 Warren County } SS:

Page. 2

Before me, a Notary Public in and for above County, personally appeared E. K. Oviatt, Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and says that the above Report is True and Correct to the best of His knowledge and belief.

Subscribed and Sworn to  
 this 18th day of Sept. 19 68

My Commission expires

*E. K. Oviatt*  
 E. K. Oviatt,  
 Test Engineer.

CORRECTED COPY

RVG-0000003617

National Forge Co. -79-3847-02-400-

ASSUMED TO BE 42-4

RE

19/21/73

Customer Babcock &amp; Wilcox Co.

Contract No. 610-014-05110

P.O. # 32920

NF 62-2 Rev. 2

Date March 15, 1963

Company performing heat treatment National Forge Co.

Name of part Outlet Nozzle

Purchaser Dwg. No. 131826E

Rev. Latest

Material composition and type ASTM-A-508-64 Class 7

2 mod.

ASTM-A-508-64

Specification ASME Code Case 1332-2

Approx. size of part as quenched, inches: Length 50 5/8 Width 14 1/2 Dia 4 1/2

Max. section thickness 10 7/8" Thickness at test point 10 7/8" wt. 18500 lbs.

Part forged individually yes

Multiple length no

Part quenched individually yes

Multiple length no

Forging operations: Prior to H.T. yes During H.T. After H.T.

Normalize temp. 1700 °F Austenitizing temp. 1570 °F Temper 1230 °F

Time at austenitizing for quench 12 Hrs. Max &amp; Min. Time at temper temp. 12 Hrs.

Temperature control austenitizing for quench: Thermocouples on parts no

Thermocouples not attached yes Recording chart used yes

Max. number of parts in furnace load for quench one

Rate of cooling during quench: From 1570 °F To cold °F In 1 hr 30 Minutes

Cooling medium: Water X or Oil: Still Agitated X Spray

Cooling medium temp. Normal Range 60 °F Min. 78 °F Max. Max. allowed 78 °F

Approx. quench tank liquid volume 2000 Cu. Ft. or Gallons

Approx. total flow rate if spray is used: Gallons per minute

Time interval from opening of furnace door to start of quench one Min.

Temperature of thickest section surface at end of quench cold °F

Temperature rise of thickest section surface after end of quench none °F

Method of cooling from tempering: Furnace Air X Water

Other pertinent information: Austenitized in an automatically

controlled gas fired furnace.

\*Write number of thermocouples used in applicable spaces.

Authorized signature

Raymond O. Culp  
9/8/69

RVG-0000003618

**NATIONAL FORGE COMPANY**  
**HOLLOW BORED FORGING**  
**SPECIALISTS**  
 IRVINE, WARREN COUNTY, PENNSYLVANIA

TO Babcock & Wilcox Co.  
 Boiler Div.  
 Barberton, Ohio 44203

Contract No. 61001405110  
 CUSTOMERS ORDER NO. 329208  
 N.F. ORDER NO. 79-3847  
 DATE Nov. 28, 1968

ITEM SHIPPED HEAT NO.  
 02-#2 ----- 9-5716

DESCRIPTION  
 Outlet Nozzle Forging  
 Dwg. 131826E  
 Rev. 6  
 Spec. ASTM-A-508-64  
 Cl. 2

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING	HEAT NO.	C.	MN.	P.	S.	SI.	NI.	CR.	MO.	VA.	AL.	Co.
(02) #2	9-5716	.25	.61	.006	.006	.26	.82	.28	.60	0.0	.017	.010
Check		.24	.63	.007	.007	.27	.82	.27	.60	0.0	.019	.009

D. H. Vacuum Steel

TEST	TENSILE STRENGTH LBS. PER SQ. IN.	Yield Str. @ .2% LBS. PER SQ. IN.	REDUCTION OF AREA %	ELONGATION %	FRACTURE	
(02)						
#2						
X-a	[	✓	✓	✓	b,c	B-6009-1
X-b					2/3 cup	4869
						Outlet Nozzle
					1/2 cup	

State of Pennsylvania ss:  
 Warren County.

Page 1.

Before me, a Notary Public in and for above County, personally appeared  
 Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and  
 says that the above Report is a True and Correct copy of tests shown on our Laboratory Records.

Subscribed and Sworn to  
 this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_

My Commission expires \_\_\_\_\_

B-6009-1 4869



RVG-0000003618

NATIONAL FORGE COMPANY  
HOLLOW BORED FORGING  
SPECIALISTS

IRVINE, WARREN COUNTY, PENNSYLVANIA

Contract No.  
61001405110

32920E

79-3847

Nov. 28, 1968

To Babcock & Wilcox Co.  
Boiler Div.  
Barberton, Ohio 44203

CUSTOMERS ORDER NO.  
N.F. ORDER NO.  
DATE

ITEM	SHIPPED	HEAT NO.	DESCRIPTION
02-#2		Continued	

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING	HEAT NO.	C.	MM.	P.	S.	BL.	WL.	CR.	MO.	VD.
		1#		Temp.		% Ductile				Lateral Expansion

b,c

State of Pennsylvania } ss:  
Warren County

Page 2:

Before me, a Notary Public in and for above County, personally appeared E. K. Oviatt, Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and says that the above Report is True and Correct to the best of His knowledge and belief.

*E. K. Oviatt*

Subscribed and Sworn to  
this 28th day of Nov. 19 68

E. K. Oviatt,  
Test Engineer.

My Commission expires \_\_\_\_\_  
IRVINE, WARREN COUNTY, PENNA.

CORRECTED COPY

RVG-0000003618

National Forge Co. -79-3047-02-001

ASSUMED TO BE H2-H

RE

1/29/73

Manufacturer Babcock & Wilcox Co.

Part No. 610-014-05110

Po # 32920

Rev. 2

Date March 15, 1968

Company performing heat treatment National Forge Co.

Name of part Outlet Nozzle

Purchaser Dwg. No. 131826E

Rev. Latest

Material composition and type ASTM-A-508-64 Class 1

2 mod.

ASTM-A-508-64

ASME Code Case 1332-2

ASME Sect. II Article 3

Approx. size of part as quenched, inches: Length 50 5/8

Width

Dia 9 1/2

Max. section thickness 10.750"

Thickness at test protocol 10.750"

wt. 18500 lbs.

Part forged individually yes

Multiple length no

Part quenched individually yes

Multiple length no

Forging operations: Prior to H. T. yes

During H. T.

After H. T.

Normalize temp. 1700 °F

Austenitizing temp. 1570 °F

Temper 1230 °F

Time at austenitizing for quench 12 Hrs.

1 Max. & Min.

Time at temper temp. 12 Hrs.

\* Temperature control austenitizing for quench:

Thermocouples on parts no

Thermocouples not attached yes

Recording chart used yes

Max. number of parts in furnace load for quench one

Rate of cooling during quench: From 1570 °F To cold °F In 1 hr 30 Minutes

Cooling medium: Water X or Oil: Still Agitated X Spray

Cooling medium temp. Normal Range 60 °F Min. 78 °F Max. Max. allowed 78 °F

Approx. quench tank liquid volume 2000 Cu. Ft. or Gallons

Approx. total flow rate if spray is used: Gallons per minute

Time interval from opening of furnace door to start of quench one Sec. Min.

Temperature of thickest section surface at end of quench cold °F

Temperature rise of thickest section surface after end of quench none °F

Method of cooling from tempering: Furnace Air X Water

Other pertinent information: Austenitized in an automatically

controlled gas fired furnace.

\* Write number of thermocouples used in applicable spaces.

Authorized signature

R. W. O'Leary  
9/8/69

196-276

# NATIONAL FORGE COMPANY

## HOLLOW BORED FORGING SPECIALISTS

IRVINE, WARREN COUNTY, PENNSYLVANIA

TO: The Babcock & Wilcox Company  
Barberton, Ohio

CUSTOMERS ORDER NO. 61001405110  
N.F. ORDER NO. 32920E  
DATE 79-3847  
March 16, 1970

ITEM	SHIPPED	HEAT NO.	DESCRIPTION									
01-#1	---	9-5414	Inlet Nozzle Forging Dwg. 94924C Rev. 5 Spec. ASTM-A-508-64 Cl. 2									
Corrected Copy												
MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE												
MARKING	HEAT NO.	C.	MM.	P.	S.	SL	NL	CR.	MO.	VA	AL.	Co.
(01) #1	9-5414	.26	.64	.012	.008	.20	.78	.34	.62	.00	.020	.010
	Chock	.24	.64	.010	.009	.23	.84	.35	.62	.00	.017	.010

TEST	TENSILE STRENGTH LBS. PER SQ. IN.	Yield Str. @ .25 LBS. PER SQ. IN.	REDUCTION OF AREA %	ELONGATION %	FRACTURE	
(01) #1						
X-1	[			] b,c	2/3 cup	B-6010-2 4869 Inlet Nozzle MK 12-2
X-2					7/8 cup	
Heat Treat Procedure NFM-H-42-4 Rev. 2 3/15/68. Impact Procedure NFM-T-16-4 12/26/67. Ultrasonic Procedure NFM-T-17-4 12/26/67. Magnetic Particle NFM-T-20-4 Rev. 1 2/16/68. All tests stress relieved @ 1100o-1150oF for 30 hrs. Furnace cooled to below 600oF.						

Page 1

Page 1

State of Pennsylvania }  
Warren County }

Before me, a Notary Public in and for above County, personally appeared  
Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and  
says that the above Report is a true and correct copy of tests shown on our Laboratory Records.

Subscribed and Sworn to  
this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_

My Commission expires \_\_\_\_\_

329.2012

**NATIONAL FORGE COMPANY**  
**HOLLOW BORED FORGING**  
**SPECIALISTS**

IRVINE, WARREN COUNTY, PENNSYLVANIA

Contract No.  
 61001105110

TO: The Babcock & Wilcox Company  
 Barberton, Ohio

CUSTOMERS ORDER NO. 32920E

N.F. ORDER NO.

79-3847

DATE

March 16, 1970

ITEM	SHIPPED	HEAT NO.	DESCRIPTION
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01-21 Continued

Corrected Copy

MADE FROM BASIC ELECTRIC FURNACE STEEL OF OUR OWN MANUFACTURE

MARKING	HEAT NO.	C.	MM.	P.	S.	SL.	NL.	CR.	MO.	VA.
		<u>Temp</u>	<u>1#</u>			<u>% Ductile</u>				<u>Lateral Expansion</u>

b,c

A  
 A  
 A  
 B  
 B  
 B  
 EX  
 BA  
 BB  
 BC  
  
 AG  
 AH  
 BD  
  
 AA  
 AB  
 AC  
  
 AD  
 AE  
 AF  
  
 BE  
 BF  
 BG

State of Pennsylvania }  
 Warren County } ss:

Page 2.

Before me, a Notary Public in and for above County, personally appeared N.D. Jefferson  
 Engineer of Tests of the National Forge Company, who being duly Sworn according to Law, deposes and  
 says that the above Report is True and Correct to the best of His knowledge and belief.

Subscribed and Sworn to  
 this 16 day of March 19 70

My Commission expires

*N.D. Jefferson*

Purchaser Babcock & Wilcox Co.  
Contract No. 610-014-05110

No. NEMH-42-4 Rev. 2  
Date March 15, 1968

1. Company performing heat treatment National Forge Co.
2. Name of part Inlet Nozzle Purchaser Dwg. No. 94924C Rev. 2 Modified ASTM-A-508-64
3. Material composition and type ASTM-A-508-64 Class Specification ASME Code Case 1332-2
4. Approx. size of part as quenched, inches: Length 543/8 Width ASME Sec. III Article 3  
Max. section thickness 13.375 Thickness at test prolong 13.375 wt. 25000 lbs.
5. Part forged individually YES Multiple length NO
6. Part quenched individually YES Multiple length NO
7. Forging operations: Prior to H.T. yes During H.T. NO After H.T. NO
8. Normalize temp. 1700 °F. Austenitizing temp. 1570 °F Tempered 230 °F
9. Time at austenitizing for quench 15 Hrs. (Max & Min) Time at temper temp. 15 Hrs.
10. Temperature control austenitizing for quench: Thermocouples on parts NO  
Thermocouples not attached YES Recording chart used Yes
11. Max. number of parts in furnace load for quench one
12. Rate of cooling during quench: From 1570 °F To cold °F In 1 hr / Minutes 45 min.
13. Cooling medium: Water X or Oil NO: Still NO Agitated X Spray NO
14. Cooling medium temp. Normal Range 70 °F Min. 90 °F Max. Max. allowed 90 °F
15. Approx. quench tank liquid volume 2000 Cu. Ft. or NO Gallons
16. Approx. total flow rate if spray is used: NO Gallons per minute
17. Time interval from opening of furnace door to start of quench one Sec. Min.
18. Temperature of thickest section surface at end of quench cold °F
19. Temperature rise of thickest section surface after end of quench none °F
20. Method of cooling from tempering: Furnace NO Air X Water NO
21. Other pertinent information: Austenitized for quench in an automatically controlled gas fired furnace.

\*Write number of thermocouples used in applicable spaces.

Authorized signature Raymond D. Disp

**ENCLOSURE 2**

**WESTINGHOUSE REPORT  
"POINT BEACH UNIT 1, CYCLE 29 – REACTOR VESSEL UPPER CLOSURE HEAD  
VOLUME BEST-ESTIMATE MEAN FLUID TEMPERATURE",  
WEP-05-168, REVISION 1, DATED JUNE 20, 2005  
(NON-PROPRIETARY)**

**(3 pages follow)**



Westinghouse Electric Company  
Nuclear Services  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230-0355  
USA

June 20 2005  
WEP-05-168, Rev. 1-NP

Mr. Rob Chapman  
Nuclear Management Company  
Point Beach Nuclear Plant  
6610 Nuclear Road  
Two Rivers, WI 54241

**Nuclear Management Company**  
**Point Beach Unit 1**  
**Point Beach Unit 1, Cycle 29 – Reactor Vessel Upper Closure Head Volume**  
**Best-Estimate Mean Fluid Temperature**

**References:**

1. Westinghouse Letter LTR-EMT-01-52, "Point Beach Units 1 and 2 – RSG/Fuel Upgrade Reactor Internals Engineering Report," April 2, 2001.
2. Westinghouse Letter LTR-EMT-02-258, "Point Beach Units 1 and 2 – Upper Head Mean Fluid Temperature for Flaw Handbook Calculation," September 16, 2002.
3. WCAP-14000-P, Rev. 2, "Structural Integrity Evaluation of Reactor Vessel Upper Head Penetrations to Support Continued Operation: Point Beach Units 1 and 2," September 2004.
4. Point Beach Nuclear Plant Letter NPL 2005-0084, Original Issue, "Transmittal Of Design Information Relating To Purchase Order P304307 Line Item 7 For Unit 1 Cycle 29 Reactor Vessel Upper Head Mean Fluid Temperature Analysis," May 2, 2005.
5. WCAP-16233-P, Rev. 0, "The Nuclear Design and Core Management of the Point Beach Unit 1 Nuclear Reactor, Cycle 29," March 2004.
6. Westinghouse Calculation Note CN-RCDA-05-53, Rev. 0, "Calculation of the Reactor Vessel Upper Closure Head Volume Best-Estimate Mean Fluid Temperature for Point Beach Unit 1 Cycle 29," May 17, 2005.
7. LTR-RCDA-05-379, Rev. 1
8. NMC Purchase Order No. P304307 Rev. 4, Line Item 7
9. Westinghouse Sales Order No. 34273

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Westinghouse Electric Company LLC  
P.O. Box 355  
Pittsburgh, PA 15230-0355

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All Rights Reserved

A BNFL Group company

Dear Mr. Chapman:

The following evaluation is being provided in response to the Reference 8 NMC purchase order.

In September 2002, the mean temperature of the primary coolant that occupies the reactor vessel upper closure head volume was estimated to be 598°F at 100% steady-state full-power operation for Point Beach Unit 1. This estimated temperature was developed for use in the Flaw Handbook and took into account the effects of a low-leakage core loading pattern with hafnium absorbers, the 1.7% mini power uprate, and the effect of utilizing the best-estimate flow.

The 598°F value was estimated as follows:

- 1) The mean fluid temperature of the reactor vessel upper closure head volume reported in Reference [1] was [ ] °F and was based on the following reactor coolant system (RCS) conditions.

Core power of 1650 MWt  
Core inlet temperature of 542.5°F  
Thermal design flow of 89,000 gpm/loop  
Pressure of 2250 psia

- 2) The effect of the low-leakage core loading pattern with hafnium absorbers is an increase to the mean fluid temperature of the reactor vessel upper closure head volume. It was estimated that this effect was approximately [ ] °F.
- 3) The effect of the 1.7% mini power uprate is an increase to the mean fluid temperature of the reactor vessel closure head volume. It was estimated that this effect is approximately [ ] °F.
- 4) The effect of the using the best-estimate flow instead of the thermal design flow is a decrease to the mean fluid temperature of the reactor vessel closure head volume. It was estimated that this effect is approximately [ ] °F.

As a result, the estimated mean fluid temperature of the reactor vessel upper closure head volume, transmitted by Reference [2], for use in the Flaw Handbook calculation (Reference [3]) for Point Beach Unit 1 was:

$$[ ]^{\circ}\text{F} + [ ]^{\circ}\text{F} + [ ]^{\circ}\text{F} - [ ]^{\circ}\text{F} = 598^{\circ}\text{F}$$

Recently, a request was received from the Nuclear Management Company (NMC) to estimate the mean fluid temperature of the reactor vessel upper closure head volume based on the actual operating conditions for Point Beach Unit 1, cycle 29. These actual operating conditions for Point Beach Unit 1 were provided in Reference [4] and are presented below. The effect of the average cycle 29 core power distributions was also included in the calculations for the cycle 29 specific estimated mean fluid temperature of the reactor vessel upper closure head volume. The cycle 29 core assemblywise power distributions were obtained from Reference [5].



Point Beach Unit 1 – Actual Operating Conditions (Reference [4])

Core thermal power	1540 MWt
RCS total flow	190,912 gpm
Vessel inlet temperature	541.61°F
RCS Pressure	2232.0 psig

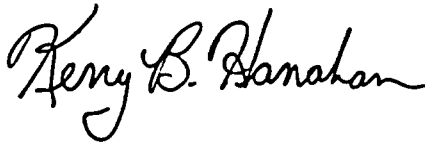
Removal of the part-length control rod drive mechanisms (CRDMs) with no upper guide tube flow restrictors installed.

Using the Point Beach Unit 1 actual operating conditions (shown above) and the cycle 29 core assemblywise power distributions, the best-estimate mean fluid temperature of the reactor vessel upper closure head volume averaged over the cycle was calculated to be 593.9°F. This value is not an estimated value like the 598°F temperature, but is calculated using the methodology developed by Westinghouse and verified through scale model testing and in-plant measurements. The Point Beach Unit 1 best-estimate mean fluid temperature of the reactor vessel upper closure head volume for cycle 29 is documented in Reference [6].

If you have any questions regarding the above please call Kevin Neubert at 412-374-6608 or the undersigned.

Very truly yours,

WESTINGHOUSE ELECTRIC COMPANY



Kerry B. Hanahan  
Customer Project Manager