WOLF CREEK
NUCLEAR OPERATING CORPORATION

John A. Bailey
Vice President
Engineering & Technical Services

September 13, 1988

ET 88-0121

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Subject: Docket No. 50-482: Response to NRC Bulletin 88-05

Gentlemen:

The purpose of this letter is to transmit Wolf Creek Nuclear Operating Corporation's (WCNOC) response to NRC Bulletin 88-05, "Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey". The response also addresses actions requested in Supplement 1 and 2. The attachment to this letter provides the results of WCNOC's record review, testing, and analysis of flanges supplied by the companies which were required by the bulletin and its supplements.

In accordance with Bulletin 88-05, Supplement 2, WCNOC has suspended actions required by Bulletin 88-05 and Supplement 1 and is submitting a report of actions taken prior to the suspension. If you have any questions concerning this matter, please contact me or Mr. O. L. Maynard of my staff.

Very truly yours,

John A Bailey

John A. Bailey
Vice President
Engineering & Technical Services

JAB/jad

Attachment

cc: B. L. Bartlett (NRC), w/a
D. D. Chamberlain (NRC), w/a
R. D. Martin (NRC), w/a
P. W. O'Connor (NRC), w/a (2)

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STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

John A. Bailey, of lawful age, being first duly sworn upon oath says that he is Vice-President Engineering and Technical Services of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the content thereof; that he has executed that same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By John A Bailey
John A. Bailey
Vice-President Engineering and
Technical Services

SUBSCRIBED and sworn to before me this 13 day of September, 1988.

Marline Heackman
Notary Public

Expiration Date August 4, 1990

MARLINE HEACKMAN NOTARY PUBLIC STATE OF KANSAS

RESPONSE TO NRC BULLETIN 88-05

I. Introduction

On May 6, 1988, the Nuclear Regulatory Commiasion (NRC) issued NRC Bulletin 88-05, "Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey, and West Jersey Manufacturing Company at Williamstown, New Jersey". This bulletin was addressed to all holders of operating licenses or construction permits for Nuclear Power Reactors to request certain information regarding materials supplied by Piping Supplies, Inc. (PSI) and West Jersey Manufacturing Company (WJM). The NRC had obtained copies of certified material test reports (CMTR's) for material supplied by PSI and WJM that contained false information about material supplied to the nuclear industry. The NRC concluded that there were generic safety implications at facilities that either have received direct shipment of materials furnished by PSI or WJM or received piping subassemblies and other components from holders of ASME Certificates of Authorization or other subcontractors which incorporated materials supplied by PSI or WJM.

To address the actions requested in the bulletin, two actions were initiated by Wolf Creek Nuclear Operating Corporation (WCNOC). The first action was to establish a task force to complete the actions commensurate with the reporting requirements specified in the bulletin. The task force activities were divided into the following five phases:

I. Procurement Document Review
II. Installation Documentation Review
III. In-Plant Testing/Inspection
IV. Engineering Evaluation and Justification for Continued Operation
V. Reporting

The second action initiated by WCNOC was to participate in an industry approach to help accomplish the actions requested by Bulletin 88-05. The purpose of this industry approach was to accumulate and share data regarding suspect materials, obtain records from vendors who may have used materials from the suppliers in question and to test material using a statistical sample to determine acceptability for service and provide licensing arguments. The generic industry efforts were coordinated by the Nuclear Management and Resources Council (NUMARC). NUMARC served as the primary interface with the NRC for the industry, coordinated the generic engineering aspects and arguments for justifying continued operation and served as the information dispatcher for the industry.

On June 15, 1988, the NRC issued NRC Bulletin 88-05, Supplement 1. The purpose of the supplement was to 1) provide additional information concerning materials supplied by PSI and WJM, 2) reduce the scope of the requested materials review to only flanges and fittings, and 3) delineate actions licensees were requested to take once they identify material that did not comply with the material specifications.

On August 3, 1988, the NRC issued NRC Bulletin 88-05, Supplement 2. In the supplement, the NRC identified an affiliated company, Chews Landing Metal Manufacturers Incorporated (CLM) which may have manufactured suspect materials. Also in Supplement 2, based on the reported measurement and analytical results as of that date, the NRC temporarily suspended the field measurements, testing, records review, and the preparation of JCO's until further notice. During the temporary suspension, the NRC is reviewing the measurement and test data and results of analysis performed and determine the extent to which further actions are appropriate.

II. Description of WCNOC Actions

A) Phase I - Procurement Document Review

The objective of the Phase I activity was to accomplish three actions. The first action was to review purchasing order receiving records to identify the receipt of WJM/PSI/CLM material. This activity included a review of procurement documentation for both the construction and operational phase of Wolf Creek. The review included identification of material heat numbers, material description, material certification records. The second action was to prepare a checklist package for each record reviewed and process a copy to the Phase II team. The third action was to generate a data base to identify WJM/PSI/CLM material received. Prior to work initiation, procedures were prepared and training was provided to the Phase I team.

The procurement document review was subdivided into six categories due to the different procurement processes. Each category required different methods of review. The six categories are as follows:

1) Daniel International Corporation (DIC) Bulk Material
2) Piping Subassemblies
3) Components
4) Kansas Gas & Electric (KG&E)/WCNOC Bulk Materials
5) Westinghouse Instrumentation Installation
6) ANSI B.31.1 Piping Subassemblies

The Phase I procurement document review was completed for 5 of 6 categories. Category (3) was to be performed by the Phase II team and was not completed. The results of the Phase I activities are provided in Table 1 in the appendix to this report.

B) Phase II - Installation Documentation Review

Phase II encompassed the review of installation documentation to determine the installed physical location of identified material. Piping and equipment installation records were included in the review for 33 ASME Systems, 3 ANSI B31.1 critical systems, and non-category 1 seismic extensions to Category 1 seismic piping systems

of the 33 ASME systems. The review was subdivided into three categories. The categories were:

1) Bulk Ordered Material
2) Vendor Fabricated Spool Material
3) Component Supplier Material

Prior to work initiation, procedures were prepared for Phase II activities and training was provided to the Phase II team. The document reviews for the Bulk Ordered Material and the Vendor Fabricated Spool material were completed prior to the suspension of Bulletin 88-05 activities. The results of these reviews are included in Table 1 in the appendix to this report. In addition to the completed Phase II reviews, the document review for component supplier material was initiated. Of the estimated 2000 Receiving Inspection Report (RIR) packages, 207 packages were reviewed with no suspect material identified.

C) Phase III - In-Plant Testing/Inspection

The objective of Phase III was to implement the inspection actions required by the bulletin. This included development of: 1) Work packages for performance of scaffold erection, insulation removal and testing, 2) computer based test tracking system and 3) test procedures. Training was provided to the Phase III team and the personnel involved with the hardness testing were certified prior to work initiation. A member of the Phase III team attended the workshop conducted by EPRI in Charlotte, North Carolina. Hardness testing was conducted utilizing an Equotip Hardness Tester and the guidelines provided by NUMARC.

Hardness testing began on July 25, 1988 utilizing inspection teams consisting of WCNOC inspection personnel and test personnel from MQS, Inc. A total of 114 examinations were performed. The readings of the Equotip Tester were converted to hardness values and compared to the material specification. A total of 100 of the tests fell within the allowable hardness range. There were 10 items under the allowable hardness value and 4 items were above the allowable hardness values. With the release of Supplement 2 to NRC Bulletin 88-05, all field testing activities were suspended on August 4, 1988. The results of the field testing is provided in Table 2 in the appendix to this report.

D) Phase IV - Justification For Continued Operation

For the purpose of justifying the continued operation of Wolf Creek Generating Station, JCO's have been developed and implemented for Bulletin 88-05. The first is an "Immediate" JCO which is qualitative and provides interim justification for PSI, WJM, and CLM

material installed in WCGS except for those items which do not pass the hardness test. This JCO has already been prepared by Nuclear Plant Engineering and approved by the Plant Safety Review Committee (PSRC).

For those items which did not pass the hardness test, a "quantitative" JCO was prepared to provide the acceptable basis for continued operation. A total of fourteen items did not pass the hardness test and JCO's have been completed for each of these items.

E) Phase V - Reporting

This report meets the requirements of NRC Bulletin 88-05. The background documentation for the actions taken by WCNOC in response to Bulletin 88-05 will be maintained on file at WCGS.

III. Response to Bulletin 88-05, Supplement 2 Reporting Requirements

For holders of full power operating licenses, Bulletin 88-05, Supplement 2, temporarily suspended the reporting requirements in Bulletin 88-05 and Supplement 1 with the following exception:

Holders of full power operating licenses are required to report the results of the records review, testing, and analysis performed as of the date of this supplement in accordance with the 120 day reporting requirement specified in paragraph 1 of Bulletin 88-05.

Paragraph 1 of the reporting requirements section of NRC Bulletin 88-05 states the following:

1. Provide a written report within 120 days of the date of receipt of this bulletin that either:

   a. States that no WJM- or PSI-supplied materials have been furnished for your facility for use in safety-related systems, if such is the case, or

   b. Provides the information requested in items 2a nd 3a above that indicates which materials have been found not to be in conformance with the applicable code requirements or procurement specifications, confirms completion of other actions requested in items 2b or c, 3b and 4, and provides a schedule for completing any remaining actions.

Since WCNOC does have PSI and WJM supplied material this section provides a response to each of the NRC actions requested.

Actions Requested

2. For ASME Code and ASTM materials furnished by PSI or WJM that are either not yet installed in safety-related systems at your facility or are installed in safety-related systems of plants under construction, the following actions are requested: (perform action a and either action b or c)

   a. Provide a list of WJM- and PSI-supplied materials that are found not to be in conformance with the applicable code requirements or procurement specifications and identify the applications in which these materials are used or will be used. Include the material specification, the nature of the component (e.g., pipe flange), size and pressure rating; also indicate the chain of purchase, and either...

WCNOC Response

PSI and WJM material which was not installed at WCGS has been segregated and placed "on hold" in the Quality Receiving Hold Areas. There are 58 PSI and 54 WJM flanges on hold. Since no testing has been performed on these items, none of these items have been shown not to be in conformance with the applicable code requirements or procurement specifications.

Actions Requested

   b. Take actions that provide assurance that all received materials comply with ASME Code Section III, ASTM, and applicable procurement specification requirements, or that demonstrate that such materials are suitable for the intended service. For example, this program should include specific verification that austenitic stainless steels have been received in a non-sensitized condition, or,

   c. Replace all questionable fittings and flanges with materials that have been manufactured in full compliance with ASME Code Section III, ASTM, and the applicable procurement specification requirements.

WCNOC Response

   b. At this time WCNOC does not intend to use the PSI and WJM items that are on hold.

   c. This item does not apply to materials which are on hold and not installed.

Action Requested

3. For ASME Code and ASTM materials furnished by WJM or PSI already installed in safety-related systems in operating plants, the following actions are requested:

   a. Provide a list of the WJM- and PSI-supplied materials that are found not to be in conformance with the applicable code requirements or procurement specifications and identify the applications in which the materials are used. Include the material specification, the nature of the component (e.g., pipe flange), size, and pressure rating; also indicate the chain of purchase.

WCNOC Response

Fourteen flanges were found outside of the hardness requirements of the Material specification during Equotip testing. A list of these flanges along with the requested information is included as Table 3 in the appendix to this report.

Action Requested

   b. Take actions requested in 2b or 2c above. However, an evaluation should be undertaken prior to replacing questionable material in accordance with 2c above that considers the occupational radiation exposure that would be received during the replacement process. This evaluation should be considered in developing the method and timing of material replacements.

WCNOC Response

This action requested either providing assurance that the material meets all requirements or replacing the questionable material. Since the NRC temporarily suspended actions being taken to show that these materials are not questionable, a final decision on what to do with the PSI/WJM/CLM material will be made after this issue is resolved.

Action Requested

   c. Document and maintain for inspection a basis for continued plant operation if the program requested in item 3b has not been completed within 120 days of the date of receipt of this bulletin.

WCNOC Response

JCO's as described in Section II of this report have been written for the fourteen flanges which did not pass the hardness test. These JCO's justify continued plant operation until final NRC resolution of this issue is achieved.

Action Requested

4. For any PSI- WJM-supplied materials having suspect CMTRs and used in systems that are not safety-related, take actions commensurate with the function to be performed.

WCNOC Response

There were 31 ANSI B31.1 non-safety and 9 special scope II/I flanges identified during the review prior to the NRC suspension. Based on industry data collected to date and the NRC's statement that it was appropriate to temporarily suspend the actions for the bulletin, WCNOC does not feel it necessary to take any further actions for PSI and WJM materials in non-safety-related systems at this time.

APPENDIX

DATA TABLES FOR

RESPONSE TO NRC BULLETIN 88-05

TABLE 1

PHASE I/II/III SUMMARY

PHASE I - PROCUREMENT DOCUMENT REVIEW

	RIR'S REVIEWED	NO. OF WJM/PSI/CL ITEMS RECEIVED
DIC BULK MATERIAL	33	346
PIPING SUBASSEMBLIES	491	323
KG&E/WCNOC BULK	563	86
W INSTRUMENTATION	2855	0
TOTAL	3942	755

PHASE II - INSTALLATION DOCUMENT REVIEW

ITEMS LOCATED BEFORE BULLETIN 88-05 SUSPENSION

TYPE OF ITEM	BULK MATERIAL	VENDOR FABRICATED SPOOLS	COMPONENTS
ASME	23	296	0
B31.1 CRITICAL	4	0	0
B31.1 NON-SAFETY	31	8	0
SPECIAL SCOPE II/I	9	0	0
B31.1 EXTENSION	0	3	0
TOTAL	67	307	0

PHASE III - IN-PLANT TESTING/INSPECTION

ITEMS GIVEN TO PHASE III FOR TESTING	NO. OF ITEMS TESTED TO DATE	NO. PASSING ALL TESTS	NO. NOT PASSING TESTS	NO. OF ITEMS INACCESSIBLE
322	114	100	14	0

TABLE 2

EQUOTIP HARDNESS TEST RESULTS

ACTIVITY NUMBER	SYSTEM	LINE NUMBER	FLANGE DESCRIPTION	MATERIAL SPECIFICATION	SIZE	PRESSURE RATING	HEAT NUMBER	HEAT CODE	HARDNESS VALUE
1[1]	BB	125 HBC-1"	RFWN ORIFICE[2]	SA 105	1"	300#	79158	B35	171
2	GP	005 HBB-1"	RFSW	SA 105	1"	150#	3226	CBB	125
3	GP	003 HBB-1"	RFSW	SA 105	1"	150#	3226	CBB	142
4	GP	005 HBB-1"	RF BLIND	SA 105	1"	150#	3226	CBB	167
5	GP	003 HBB-1"	RF BLIND	SA 105	1"	150#	3226	CBB	139
6	GP	005 HBB-1"	RF BLIND	SA 105	1"	150#	3226	CBB	124
7	GP	003 HBB-1"	RF BLIND	SA 105	1"	150#	3226	CBB	137
8	BM	029 DBB-2"	LT BLIND	SA 105	2"	1500#	31102	GDDN	153
10	BM	041 DBB-2"	LGSW	SA 105	2"	1500#	GDDB	GDDB	137
11	BM	041 DBB-2"	LT BLIND	SA 105	2"	1500#	31102	GDDN	126
12	AE	030 ABD-10"	LT BLIND	SA 105	10"	1500#	3197	CAO	156
13	AL	029 DBC-3"	RFWN ORIFICE	SA 105	3"	900#	03200	03200	140
14	AL	029 DBC-3"	RFWN ORIFICE	SA 105	3"	900#	03200	03200	152
15	AL	069 DBC-1"	LT BLIND	SA 105	1"	1500#	31103	GDDO	133
16	EF	139 HBC-30"	RFWN	SA 105	30"	150#	10707	10707	153
18	FC	048 HBC-4"	RFWN STD. BORE	SA 105	4"	150#	A66	A66	126
19	FC	048 HBC-4"	RF BLIND	SA 105	4"	150#	363666	363666	122
20	BB	191 HBC-4"	RFWN ORIFICE	SA 105	4"	300#	M140	N8	150
21	EG	140 HBC-4"	RFWN ORIFICE	SA 105	4"	300#	M140	N8	144
22	BB	191 HBC-4"	RFWN ORIFICE	SA 105	4"	300#	71	71	158
24	GF	081 HBC-3"	RFWN	SA 105	3"	150#	M3794	GDFU	159
26	KJ	002 HBC-26"	RFWN	SA 105	26"	150#	H3446	H3446	173
27	KJ	005 HBC-28"	RFWN	SA 105	28"	150#	LB1783	LB1783	164
28	KJ	005 HBC-28"	RFWN	SA 105	28"	150#	LB1783	LB1783	164
29	KJ	002 HBC-26"	RFWN	SA 105	26"	150#	H3446	H3446	153
30	KJ	006 HBC-28"	RFWN	SA 105	28"	150#	LB1783	LB1783	159
31	KJ	006 HBC-28"	RFWN	SA 105	28"	150#	LB1783	LB1783	164
32	KJ	007 HBC 42"	RFWN	SA 105	42"	150#	H3143	H3143	163
33	KJ	004 HBC-26"	RFWN	SA 105	26"	150#	H3446	H3446	184
34	KJ	001 HBC-26"	RFWN	SA 105	26"	150#	H3446	H3446	151
35	KJ	003 HBC-26"	RFWN	SA 105	26"	150#	H3446	H3446	179
36	KJ	001 HBC-26"	RFWN	SA 105	26"	150#	H3446	H3446	159
48	AL	008 HBC-8"	RFWN	SA 105	8"	300#	4304	4304	139
49	AL	008 HBC-10"	RFWN	SA 105	10"	150#	4569	4569	130
50	AL	008 HBC-10"	RFWN	SA 105	10"	150#	4569	4569	137
51	AL	004 HBC-6"	RFWN	SA 105	6"	300#	4732	4732	134
52	AL	004 HBC-8"	RFWN	SA 105	8"	150#	2887	3887	145
53	AL	004 HBC-8"	RFWN	SA 105	8"	150#	3887	3887	150
54	AL	005 HBC-6"	RFWN	SA 105	6"	300#	4732	4732	140
55	AL	005 HBC-8"	RFWN	SA 105	8"	150#	3887	3887	146
56	AL	003 HBC-8"	RFWN	SA 105	8"	150#	3887	3887	150
57	AL	003 HBC-12"	RFWN	SA 105	12"	150#	77A3W	T8	150
58	AL	008 HBC-8"	RFWN	SA 105	8"	150#		T4298	156
59	AL	006 HBC-6"	RFWN	SA 105	6"	150#	T6323	T6323	148
60	AL	007 HBC-6"	RFWN	SA 105	6"	150#	T6323	T6323	134
61	AL	009 HBC-8"	RFWN	SA 105	8"	150#		T4298	138
62	AL	051 HBC-12"	RFWN	SA 105	12"	150#	77A3W	T8	130
63	GL	085 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	201
64	GL	111 HBC-3"	RFWN	SA 105	3"	150#		J4E	183
65	EF	050 HBC-16"	RFWN ORIFICE	SA 105	16"	300#	T39280	T39280	237
66	GL	089 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	235
67	GL	099 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	180

TABLE 2

EQUOTIP HARDNESS TEST RESULTS

ACTIVITY NUMBER	SYSTEM	LINE NUMBER	FLANGE DESCRIPTION	MATERIAL SPECIFICATION	SIZE	PRESSURE RATING	HEAT NUMBER	HEAT CODE	HARDNESS VALUE
68	EF	066 HBC-14"	RFWN	SA 105	14"	150#	83779	JS	185
72	EF	066 HBC-14"	RFWN	SA 105	14"	150#	83779	JS	164
73	EF	076 HBC-24"	RFWN ORIFICE	SA 105	24"	300#	W5986	W5986	162
74	EF	076 HBC-24"	RFWN	SA 105	24"	150#		T85868	167
75	EF	050 HBC-16"	RFWN ORIFICE	SA 105	16"	300#	T39280		145
76	EG	203 HBC-24"	RFWN	SA 105	24"	150#		T85888	142
77	AL	028 DBC-8"	RFWN	SA 105	8"	900#	G52575	G52575	146
81	EF	080 HBC-24"	RFWN	SA 105	24"	150#		T85888	147
82	EF	070 HBC-10"	RFWN	SA 105	10"	150#		T4205	147
83	EF	071 HBC-14"	RFWN	SA 105	14"	150#	83779	JS	152
84	EF	071 HBC-14"	RFWN	SA 105	14"	150#	83779	JS	164
85	EF	071 HBC-14"	RFWN	SA 105	14"	150#	83779	JS	169
88	EF	205 HBC-24"	RFWN	SA 105	24"	150#		T85888	147
90	EF	091 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	184
92	EF	087 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	182
95	EF	113 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	186
96	EF	081 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	170
97	EF	081 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	173
98	EF	081 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	158
99	EF	081 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	151
100	EF	081 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	139
101	EF	082 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	152
102	EF	082 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	172
103	EF	082 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	154
104	EF	081 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	163
105	EF	020 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	184
106	EF	020 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	166
107	EF	138 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	164
108	EF	020 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7393	166
109	EF	020 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	160
110	EF	020 HBC-30"	RFWN ORIFICE	SA 105	30"	300#		W7493	164
111	EF	020 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	185
112	EF	020 HBC-30"	RFWN	SA 105	30"	300#		W7494	156
113	EF	010 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	165
114	EF	010 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	168
115	EF	010 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	173
116	EF	139 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	152
118	EF	138 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	168
119	EF	138 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	159
120	EF	136 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	178
121	EF	138 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	180
122	EF	138 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	176
123	EF	138 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	158
124	EF	011 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7393	146
125	EF	011 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	167
126	EF	011 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	167
127	EF	031 HBC-30"	RFWN ORIFICE	SA 105	30"	300#		W7494	141
128	EF	031 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	159
129	EF	031 HBC-30"	RFWN ORIFICE	SA 105	30"	300#	W7493	W7493	144
130	EF	031 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	159
131	EF	031 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	148
132	EF	031 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	165

TABLE 2

EQUOTIP HARDNESS TEST RESULTS

ACTIVITY NUMBER	SYSTEM	LINE NUMBER	FLANGE DESCRIPTION	MATERIAL SPECIFICATION	SIZE	PRESSURE RATING	HEAT NUMBER	HEAT CODE	HARDNESS VALUE
133	EF	031 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	165
134	EF	031 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	159
141	EF	139 HBC-30"	RFWN	SA 105	30"	150#	W7493	W7493	150
143	EF	129 HBC-24"	RFWN ORIFICE	SA 105	24"	300#	W5986	W5986	164
145	EF	129 HBC-24"	RFWN	SA 105	24"	150#		T85888	141
147	EF	117 HBC-14"	RFWN	SA 105	14"	150#	83779	JS	192
150	EF	108 HBC-3"	RFWN	SA 105	3"	150#		J4E	186
151	EF	104 HBC-3"	RFWN	SA 105	3"	150#		J4E	202
153	EG	210 HBC-24"	RFWN	SA 105	24"	150#		T85888	43
155	EF	086 HBC-3"	RFWN	SA 105	3"	150#	J4E	J4E	183

[1] THE ACTIVITY NUMBER WAS USED AS A TRACKING MECHANISM AND THEREFORE A UNIQUE NUMBER WAS ASSIGNED TO EACH COMPONENT.

[2] FLANGE DESCRIPTIONS:

RFWN - RAISED FACE WELD NECK
RFSW - RAISED FACE SOCKET WELD
RF - RAISED FACE
LT - LARGE TONGUE
LGSW - LARGE GROOVE SOCKET WELD

TABLE 3

ITEMS OUTSIDE SPECIFIED RANGE (137-187 BHN) FOR HARDNESS TEST

COMPONENT	SYSTEM	SIZE/RATING	HEAT #	SPECIFICATION	BHN	CHAIN OF PURCHASE: WJM/PSI CLIENT	CHAIN OF PURCHASE: SUPPLIER TO WCNOC
BLIND FLANGE	GP	1" 150#	CBB	SA-105	124	GULFALLOY	GULFALLOY
BLIND FLANGE	GP	1" 150#	CBB	SA-105	125	GULFALLOY	GULFALLOY
WELD NECK FLANGE	FC	4" 150#	A-66	SA-105	126	DRAVO	DRAVO
BLIND FLANGE	FC	4" 150#	363666	SA-105	122	DRAVO	DRAVO
BLIND FLANGE	AL	1" 1500#	31103	SA-105	133	GULFALLOY	GULFALLOY
LARGE TONGUE BLIND FLANGE	BM	2" 1500#	31102	SA-105	126	GUYON	GUYON
RAISED FACE WELD NECK FLANGE	AL	10" 150#	4569	SA-105	130	PULLMAN	SOUTHWEST FAB.
RAISED FACE WELD NECK FLANGE	AL	6" 300#	4732	SA-105	134	PULLMAN	SOUTHWEST FAB.
WELD NECK FLANGE	AL	12" 150#	77A3W	SA-105	130	PULLMAN	PULLMAN
WELD NECK FLANGE	AL	6" 150#	T63223	SA-105	134	PULLMAN	PULLMAN
WELD NECK FLANGE	GL	3" 150#	J4E[1]	SA-105	201	PULLMAN	PULLMAN
WELD NECK FLANGE	GL	3" 150#	J4E[1]	SA-105	235	PULLMAN	PULLMAN
WELD NECK FLANGE	EF	3" 150#	J4E[1]	SA-105	202	PULLMAN	PULLMAN
WELD NECK FLANGE	EF	14" 150#	83779[2]	SA-105	192	PULLMAN	PULLMAN

[1] CHEMICAL TESTS WERE PERFORMED AND RESULTS INDICATE THE MATERIAL IS A LOW ALLOY STEEL (SIMILAR TO AISI 5140)

[2] CHEMICAL TESTS WERE PERFORMED AND RESULTS INDICATE THE MATERIAL IS A MILD CARBON STEEL (SIMILAR TO AISI 1020)