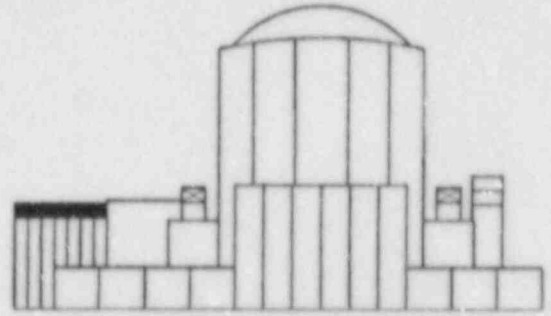




MIDDLE SOUTH
UTILITIES SYSTEM



WATERFORD SES - UNIT 3

NUCLEAR OPERATIONS



LEADING THE WAY
TO EXCELLENCE



Safety — Efficiency
Generation

Louisiana Power & Light Company

Response to

US-NRC Bulletin 88-05

September 9, 1988

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Actions Completed By Louisiana Power & Light Company

In Response to

US-NRC Bulletin 88-05

**(Non-conforming Materials Supplied by Piping Supplies, Inc. at
Folsom, New Jersey and West Jersey Manufacturing Company
at Williamstown, New Jersey)**

*Prepared by:
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Introduction

INTRODUCTION

NRC Bulletin 88-05 was issued to all holders of operating licenses or construction permits for nuclear reactors on May 6, 1988. This Bulletin addressed the possibility of materials supplied by Piping Supplies, Inc. (PSI) and West Jersey Manufacturing (WJM) being installed or stored for future use which may not have complied with design specification requirements. For materials installed, or intended for use in safety related applications, this Bulletin requested that licensees take action to either assure that the materials comply with the design specification requirements, are suitable for their intended service or are replaced. A written report discussing these activities was required within 120 days.

On June 15, 1988, NRC Bulletin 88-05, Supplement 1 was issued for the following purposes:

- To provide additional information concerning material supplied by PSI and WJM,
- Reduce the scope of materials in question to only flanges and fittings,
- Delineate field testing requirements, and
- Clarify what actions were required once the flanges and fittings were identified as not complying with the design specification requirements.

All other requirements of NRC Bulletin 88-05 remained in effect.

Supplement 2 of NRC Bulletin 88-05 was issued on August 3, 1988 to provide additional information concerning materials supplied by PSI and WJM and to temporarily suspend records review, field testing, and the preparation of justifications for continued operations (JCOs). The request that the licensee provide a written report within 120 days of the original bulletin remained in effect.

INTRODUCTION (Continued)

Upon receipt of the above mentioned Bulletin and its supplements, Louisiana Power & Light Company's Waterford 3 personnel began the tasks necessary to assure that its materials were in compliance with the bulletin requirements. Necessary tasks were conducted in the following areas:

- Records Search
- Test Equipment
- Test Personnel Training
- In-Warehouse Testing
- Field Testing
- Engineering Evaluations
- Quality Assurance

The following sections of this report describe these tasks and report their results as completed in regards to the reporting requirements of NRC Bulletin 88-05 and its supplements.

Records Search

RECORDS SEARCH

The purchase records at Waterford 3 were reviewed to determine whether any WJM or PSI supplied ASME Code or ASTM flanges or fittings were furnished to the nuclear facility.

A list of potential suppliers was developed by reviewing the following:

- Ebasco AVL's (Approved Vendors List)
- LP&L QSL's (Qualified Suppliers List)
- Ebasco Waterford 3 Index of Orders
- Ebasco Construction QA Records Vault Index of Suppliers
- List of suppliers generated as a result of keyword query of the Waterford 3 Tandem Computer System Databases

A list of purchase orders was generated from the potential suppliers. Hard copy and microfilm for these purchase orders were reviewed for certified material test reports (CMTRs) from WJM and PSI. It was determined through the records review process that WJM and PSI were not on the approved suppliers list nor did they supply flanges or fittings directly to Waterford 3. Only carbon steel flanges that were sub-supplied by WJM were identified through the records review process as being supplied to Waterford 3. No flanges or fittings from PSI were identified as being supplied to Waterford 3. Listed below are those suppliers which supplied WJM carbon steel flanges to Waterford 3:

- Dravo Corp.
- Dubose Steel, Inc.
- Gulfalloy Co.
- Guyon Alloys
- Tyler-Dawson Supply Co.

RECORDS SEARCH (Continued)

Due to the enormity of the pipe fabrication and NSSS contracts, Dravo (Piping Contractor) and Combustion Engineering (NSSS Supplier) were contracted to provide a listing of equipment/components on which materials from WJM or PSI were supplied. Combustion Engineering responded on July 13, 1988 that they found no evidence of either PSI or WJM as having supplied, either as prime vendor or sub-tier supplier, flanges or fittings to LP&L for Waterford 3. Dravo responded on June 30, 1988 that they did supply carbon steel flanges to Waterford 3 and they provided a list identifying these flanges.

Based on Purchase Records and communications with suppliers and sub-suppliers, it was determined that Waterford 3 received only carbon steel flanges manufactured by WJM.

To identify installed locations of these carbon steel flanges, a "flange package" was assembled and a search made of contractor (construction) safety installation packages. Installed locations were identified by searching the following:

- ROW's (Requisition on Warehouse)
- ROS's (Requisition on Stores)
- RTW's (Return to Warehouse)
- Ebasco Surplus Inventory Listing
- Current LP&L Inventory
- Nuclear Spare Parts Inventory System
- Transfer Requisitions
- Stations Modifications

Once the installed locations were identified, the "flange package" was processed by Engineering and Planning and Scheduling in preparation of field testing of the flanges.

**RECORDS SEARCH
(Continued)**

For WJM supplied flanges, procured under Ebasco purchase orders which did not have installation records, a search was conducted of the warehouse, service buildings, Skills Training Center, and Milan Auctioneer in Harvey, Louisiana which bought surplus material from LP&L. The results of this search indicated that those flanges were either used on non-safety related systems, discarded as scrap, or sold as surplus material to Milan Auctioneers.

Flanges supplied to Dravo by WJM which have not been located are believed to have been used on non-safety related pipe spools or were identified as surplus material and retained by Dravo.

Table 1 provides a summary of the records search for WJM carbon steel flanges at Waterford 3. Based on the records review process, the carbon steel flanges manufactured by WJM which are installed in safety related systems have been identified.

TABLE 1

Records Review Results

Flanges Identified As Scrap	13
Flanges Located In The Warehouse	138
Flanges Located Inside Containment (Inaccessible)	3
Flanges Identified For Field Testing	257
Flanges In Non-safety Systems	123
TOTAL FLANGES RECEIVED AT WATERFORD 3	<u>534</u>

Test Equipment

TEST EQUIPMENT

The test equipment used at Waterford 3 to perform the field testing on the WJM flanges was the EQUOTIP Hardness Tester. This unit was chosen for its ability to test metallic materials over a wide range of hardness. Additionally, the hardness testing could be performed directly on-site, in any position, and was especially suitable for applications in which static hardness testing was not feasible.

This unit was calibrated off site at the Stennis Space Center in Bay St. Louis, Mississippi prior to being used for field testing purposes. The accuracy of the unit was verified at the beginning of each shift by using the calibration block provided by the manufacturer.

Laboratory test results also demonstrated the reliability of the EQUOTIP Hardness Tester. By comparing results of the hardness readings using the EQUOTIP Hardness Tester with similar hardness readings using the Rockwell Hardness Tester in the laboratory for the same flanges, the accuracy of the EQUOTIP Hardness Tester was demonstrated.

Test Personnel Training

TEST PERSONNEL TRAINING

Training was conducted by the Quality Assurance Department on June 23, 1988 at Waterford 3 for the personnel who were designated to do the field testing of the WJM flanges. The Following items were discussed at the training session:

- Description of the EQUOTIP Hardness Tester and its Accessories
- Testing Procedure
- Preparation of the Test Sample
- Practical Demonstration of the Unit
- Documentation of the Results

Upon the completion of the training session, the personnel were fully capable of performing the field testing of the WJM flanges. An attendance record for the training session is kept on file in the Quality Assurance Department.

Additionally, a representative from the Quality Assurance Department attended a workshop on hardness testing conducted by EPRI in Charlotte, North Carolina. This workshop addressed these following areas:

- Performance Check and Operation of the EQUOTIP Hardness Tester
- Surface Preparation
- Magnetism Checking of the Metal
- Recording and Hardness Conversion of the Data Obtained

This information supplemented the above training of the personnel who were designated to do the field testing.

In-Warehouse Testing

IN-WAREHOUSE TESTING

A sample of the WJM flanges located in the warehouse was laboratory tested in response to NRC Bulletin 88-05. A representative sample from each heat number located in the warehouse was sent off-site to Partek Laboratories located in Houma, Louisiana. All testing was certified by Partek Laboratories and performed in accordance with applicable ASTM standard testing methods and procedures. Each flange was hardness tested in four (4) locations with a minimum of 3 readings per location. Laboratory testing also included selected chemical analysis for flanges with low hardness readings.

The laboratory test results for each flange were reported to the INPO Nuclear Network for dissemination to the industry. This was to alert utilities with similar heat numbers of possible non-conforming material. The material sent to the laboratory for testing was returned and is being retained for future use as may be required.

The laboratory tests for flanges previously tested in the warehouse also served as an indication to which flanges installed in the plant should be given a higher priority of testing. Any flange installed in the plant that had an identical heat number to flanges tested in the laboratory and whose results indicated a low hardness was promptly scheduled for testing. This provided Waterford 3 with the opportunity to test, on an expeditious basis, the flanges which were most likely to be non-conforming.

The remaining WJM flanges in the warehouse, and not yet tested, will be kept in storage. Waterford 3 has also taken the necessary steps to prevent any further installation of WJM flanges at its facility. Until further direction is given by the NRC, LP&L considers complete the testing of the subject flanges located in the warehouse.

Field Testing

FIELD TESTING

Hardness tests of the WJM flanges identified by records review as being installed at Waterford 3 were conducted at LP&L. The hardness tests were performed using the EQUOTIP Hardness Tester on accessible installed flanges to demonstrate the conformance of these to the design material specifications.

The testing procedure was developed by the Quality Assurance personnel and included the steps necessary to produce accurate readings. These steps included but were not limited to the following:

- Proper Surface Preparation
- Test Position Correction Factors
- High Temperature Correction Factors
- Appropriate Tolerance Range of the Readings

This procedure provided the means to perform hardness tests only and was not intended nor was it used to evaluate the hardness readings.

Hardness tests were completed on 217 of 257 flanges that were identified by records review prior to the suspension delineated in Supplement 2 of NRC Bulletin 88-05. The results of these tests have been reported to the INPO Nuclear Network for distribution to the industry. The hardness test results have been evaluated by Engineering and these evaluations are described in the following section, "Engineering Evaluations".

There remain forty (40) WJM flanges installed at Waterford 3 which have not been hardness tested. Until further direction is provided by the NRC, LP&L considers the field hardness testing effort complete.

Engineering Evaluations

ENGINEERING EVALUATIONS

The hardness test results of 217 WJM flanges were evaluated by Engineering for their acceptability. These flanges were installed per existing industrial standards and practices at the time of construction. The purpose of these evaluations was to determine if the material complied with the design specification requirements. Acceptability was determined by comparing the measured hardness of the flange with a hardness equivalent to a tensile strength of 66 KSI (acceptable Brinell Hardness of 137). There were 209 flanges evaluated as acceptable based on their hardness results.

A group of 8 WJM flanges whose hardness readings were found not to be in accordance with the above criteria were evaluated by Engineering. These flanges are summarized in Table 2. The NRC Operations Center was notified that the hardness readings did not meet the acceptable criteria. When appropriate, Justification for Continued Operations (JCOs) were completed. The JCOs provided the appropriate analysis justifying continued operation until comprehensive engineering evaluations were completed. The evaluations were completed to assure that the material was suitable for its intended design function. The evaluations consisted of comparing the allowable stresses of the flanges, determined by the hardness reading, and the calculated stresses based on the maximum operating loads of the flanges. The stresses based on the maximum operating loads were calculated utilizing the appropriate equations and information contained in or referenced by ASME B&PV Code Section III. The operating loads included the effects of the following:

- Dead Weight of the Piping
- Design Base Earthquake
- Internal Line Pressure
- Piping Configuration
- Piping Material
- Piping Size
- Piping Supports
- Thermal Loading
- Unsupported Lengths of Piping

ENGINEERING EVALUATIONS (Continued)

Since the allowable stresses determined by the hardness readings were greater than the stresses due to the operating loads, the 8 flanges in question were deemed acceptable for their intended use. Based on the engineering and 10CFR50.59 evaluations of these flanges, the appropriate licensing documents will be reviewed and updated as required.

Three flanges, located inside the high radiation and temperature portion of the containment building, were determined to be inaccessible during normal plant operation for hardness testing. JCO's were prepared for these flanges, and the NRC Operations Center was notified that they were inaccessible.

LP&L has completed the required evaluations for the 217 WJM flanges that were hardness tested at Waterford 3. Based on the completed evaluations for the WJM Flanges, LP&L concludes that the material meets the original design requirements or has been demonstrated as suitable for its intended use. No further actions are required for these flanges at Waterford 3 in regards to NRC Bulletin 88-05 and its supplements.

TABLE 2

FLANGE EVALUATION SUMMARY

FLANGE	1	2	3	4	5	6	7	8
IDENTIFYING NUMBER	CHW 550	CAR 204A	CAR 204B	CAR 205	CAR 206B	MS 106B	MS 108B	MS 113B
CHAIN OF PURCHASE	TYLER-DAWSON	DRAVO	DRAVO	DRAVO	DRAVO	DRAVO	DRAVO	DRAVO
HEAT NUMBER	15318	P51762	P51762	P51762	P51762	G631889	G631889	G631889
SIZE (IN.)	4	4	4	4	4	8	8	8
SYSTEM	CHILLED WATER	CNMT. ATMOS. RELEASE	CNMT. ATMOS. RELEASE	CNMT. ATMOS. RELEASE	CNMT. ATMOS. RELEASE	MAIN STEAM	MAIN STEAM	MAIN STEAM
PRESSURE RATING (LBS.)	150	150	150	150	150	1500	1500	1500
DESIGN PRESS. (PSI)	120	VACUUM	VACUUM	VACUUM	VACUUM	1,085	1,085	1,085
DESIGN TEMP. (°F)	104	150	150	150	150	555	555	555
PROCUREMENT SPECIFICATION	ASTM SA-105	ASTM SA-105	ASTM SA-105	ASTM SA-105	ASTM SA-105	ASTM SA-105	ASTM SA-105	ASTM SA-105
AVERAGE HARDNESS TEST RESULTS (BRINELL)	127/131	121/123	126/134	132/132	130/130	126/127	134/134	120/129
CHEMICAL ANALYSIS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.28 C .051 S .004 P .20 Si .77 Mn
RESULTS OF ENGR. EVAL	ACCEPT AS IS	ACCEPT AS IS	ACCEPT AS IS	ACCEPT AS IS	ACCEPT AS IS	ACCEPT AS IS	ACCEPT AS IS	ACCEPT AS IS

Quality Assurance

QUALITY ASSURANCE

The Technical Group of the System Development/Administration section of the Quality Assurance Department performed functions in support of the efforts concerning the actions required to respond to NRC Bulletin 88-05 and its supplements. The functions were primarily metallurgical expertise and quality review.

The Technical Group developed the instructions and training plan for the testing, and also conducted training for the designated personnel who did the actual hardness testing. In addition, when a tested flange was found to have an average hardness reading either above or below the acceptable range, personnel from the Technical Group were summoned to witness the re-testing of the subject flange(s) to verify the accuracy and that proper testing procedures were followed.

Upon completion of the field testing, the Technical Group performed a quality review of the completed "flange package" to ensure the following:

- All average readings were correctly calculated,
- The proper flanges were tested,
- The required signatures were on the appropriate documents, and
- Any necessary dispositioning of the tests results was adequately documented.

The utilization of the Technical Group for the above mentioned activities assured LP&L that Waterford 3 had properly completed the tasks associated with NRC Bulletin 88-05 and its supplements.

Summary

SUMMARY

Louisiana Power & Light Company (LP&L) has completed tasks in the following areas to assure that the WJM flanges installed at Waterford 3 are in compliance with the requirements of NRC Bulletin 88-05:

- Records Search
- Test Equipment
- Test Personnel Training
- In-Warehouse Testing
- Field Testing
- Engineering Evaluations
- Quality Assurance

Each area listed above contained tasks which contributed to the evaluation process of the WJM flanges. The acceptable evaluations of the 217 WJM flanges that were hardness tested at Waterford 3 demonstrate their compliance with the requirements of NRC Bulletin 88-05.

The remaining temporarily suspended activities, i.e., testing, records search, review, and preparation of justification for continued operation (JCOs) have been discontinued at Waterford as stipulated in Supplement 2 of NRC Bulletin 88-05. The pertinent materials and records associated with the activities of this Bulletin and its supplements are being retained by LP&L until further direction is provided by the NRC regarding this issue. Based on the acceptable completed actions described earlier herein, with the exception of updating the licensing documents, as required, which is ongoing at this time, no further activities are required for these flanges at Waterford 3.