

# REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8003210430 DOC.DATE: 80/03/19 NOTARIZED: YES DOCKET.#  
 FACIL:50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251  
 AUTH.NAME AUTHOR AFFILIATION  
 UHRIG,R.E. Florida Power & Light Co.  
 RECIP.NAME RECIPIENT AFFILIATION  
 EISENHUT,D.G. Division of Operating Reactors

SUBJECT: Forwards response to NRC 800225 request for info re disc  
 integrity in Westinghouse 1800 rpm low pressure nuclear  
 turbine. Certain Westinghouse identified info withheld  
 (ref 10CFR2.790). Westinghouse withholding application encl.

DISTRIBUTION CODE: PA019 COPIES RECEIVED: LTR 3 ENCL 3 SIZE: 11  
 TITLE: Proprietary Info after Issuance of License

NOTES: \_\_\_\_\_

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	14 ENGR BR	1	1	15 REAC SFTY BR	1	1
	16 PLANT SYS BR	1	1	17 EEB	1	1
	18 EFFL TRT SYS	1	1	NRC PDR	1	0
	OELD	1	0	STS GROUP LEADR	1	0
EXTERNAL:	19 ACRS	16	16	LPDR	1	0
	NSIC	1	0	SMITH,H. W/AFF	1	0

CHANGE: L E  
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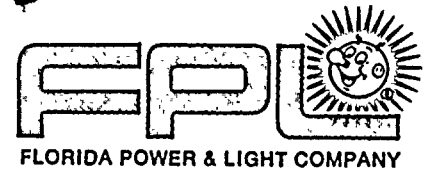
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March 19, 1980  
L-80-91

Office of Nuclear Reactor Regulation  
Attention: Mr. Darrell G. Eisenhut, Acting Director  
Division of Operating Reactors  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Mr. Eisenhut:

Re: Turkey Point Unit 4  
Docket No. 50-251  
Turbine Rotors

Florida Power & Light Company (FP&L) has reviewed your letter dated February 25, 1980 requesting, in accordance with 10 CFR 50.54(f), information relative to disc integrity in Westinghouse 1800 RPM low pressure nuclear turbines. Specifically, your request attached a set of six site-specific questions and a second set of eight generic questions. Your letter also urged that the generic questions be addressed through an owners group. As requested, responses to the generic questions were coordinated through a task force, of which FP&L is a member, which is chaired by Mr. Wayne Stiede of Commonwealth Edison. It is our understanding that Westinghouse will submit responses to the generic questions directly to your office and that you are in agreement with this method of submittal.

As a result of discussions at an industry Task Force meeting in Tampa, Florida on March 12-13, 1980, we understand that a site-specific information submittal date of March 19, 1980 is acceptable to the NRC. Such information is provided in Attachment 3. Based on that information, we have determined that continued operation of the Turkey Point Unit 4 turbine is justified until such time that an inspection can be performed on the LP rotor discs. An outage is planned for the March-April, 1980 time period, and an inspection will be performed during that outage.

Please note that our response contains information considered to be proprietary by the Westinghouse Electric Corporation. In conformance with 10 CFR 2.790, as amended, we are also forwarding an APPLICATION FOR WITHHOLDING INFORMATION FROM PUBLIC DISCLOSURE (Attachment 1) and an Affidavit (Attachment 2). The affidavit sets forth the basis on which the proprietary information contained in Attachment 3 may be withheld from public disclosure by the Commission.

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Office of Nuclear Reactor Regulation  
Page 2

Correspondence with respect to the affidavit or application for withholding should reference AW-80-19 and should be addressed to Mr. R. Williamson, Manager, Customer Order Engineering, Westinghouse Electric Corporation, Steam Turbine Divisions Lester Branch Box 9175, Philadelphia, Pa. 19113.

Very truly yours,

*for E. F. Adonato*  
Robert E. Uhrig  
Vice President  
Advanced Systems & Technology

REU/DKJ/cph

Attachments (3)

cc: Mr. J. P. O'Reilly, Region II (w/o attachments)  
Harold Reis, Esquire (w/o attachments)



Attachment 1

Application for Withholding Proprietary  
Information from Public Disclosure



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March 14, 1980

Darrell G. Eisenhut  
Division of Operating Reactors  
Office of Nuclear Reactor Regulation  
US Nuclear Regulatory Commission  
Washington DC 20555

APPLICATION FOR WITHHOLDING PROPRIETARY  
INFORMATION FROM PUBLIC DISCLOSURE

Subject: Turkey Point #3 and 4 Docket #50-250, 50-251, St. Lucie 50-335  
Information in Response to NRC Request for Information of  
February 25, 1980, Relative to Low Pressure Turbine Disc  
Integrity.

Reference: Appendix A letter from R. E. Uhrig to Eisenhut, dated 3/19/80

Dear Mr. Eisenhut:

This application for withholding is submitted by Westinghouse Electric Corporation ("Westinghouse") pursuant to the provisions of paragraph (b)(1) of Section 2.790 of the Commission's regulations. Withholding from public disclosure is requested with respect to the subject information which is further identified in the affidavit accompanying this application.

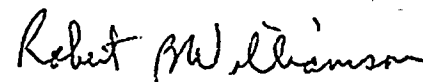
The undersigned has reviewed the information sought to be withheld and is authorized to apply for its withholding on behalf of Westinghouse, STG-TOD.

The affidavit accompanying this application sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse and which is further identified in the affidavit be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should be addressed to the undersigned.

Very truly yours,

  
R. Williamson, Manager  
Customer Order Engineering  
Westinghouse Electric Corporation

Attachment 2

Affidavit in Support of Application for  
Withholding Proprietary Information  
from Public Disclosure



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AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA  
COUNTY OF DELAWARE:

Before me, the undersigned authority, personally appeared Robert Williamson, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

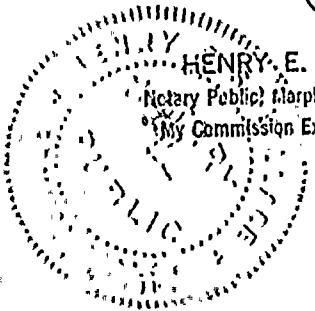
Robert Williamson

Robert Williamson, Manager  
Customer Order Engineering

Sworn to and subscribed before me  
this 15 day of May 1980

Henry E. Squillace

HENRY E. SQUILLACE  
Notary Public, Marple Twp., Delaware Co.  
My Commission Expires Oct. 18, 1980



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- (1) I am Manager, Customer Order Engineering in the Steam Turbine Generator Technical Operations Division of Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing, and am authorized to apply for its withholding on behalf of the Westinghouse Power Generation Divisions.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Power Generation Divisions in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
  - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
  - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.



Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

- (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.
- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
- (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
- (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
- (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
- (f) It contains patentable ideas, for which patent protection may be desirable.
- (g) It is not the property of Westinghouse, but must be treated as proprietary by Westinghouse according to agreements with the owner.





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- (h) Public disclosure of this information would allow unfair and untruthful judgments on the performance and reliability of Westinghouse equipment components and improper comparison with similar components made by competitors.

There are sound policy reasons behind the Westinghouse system which include the following:

- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
- (b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.
- (c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.
- (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.
- (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition in those countries.

- (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.790, it is to be received in confidence by the Commission.
- (iv) The information is not available in public sources to the best of our knowledge and belief.
- (v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in Appendix A to letter from R. E. Uhrig to Eisenhut, dated March 19, 1980 concerning information in response to NRC request for information of February 25, 1980, relative to low pressure turbine disc integrity.

The information enables Westinghouse to:

- (a) Develop test inputs and procedures to satisfactorily verify the design of Westinghouse supplied equipment.
- (b) Assist its customers to obtain licenses.

Further, the information has substantial commercial value as follows.

- (a) Westinghouse can sell the use of this information to customers.
- (b) Westinghouse uses the information to verify the design of equipment which is sold to customers.



(c) Westinghouse can sell services based upon the experience gained and the test equipment and methods developed.

Public disclosure of this information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to design, manufacture, verify, and sell electrical equipment for commercial turbine-generators without commensurate expenses. Also, public disclosure of the information would enable others having the same or similar equipment to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the equipment described in part by the information is the result of many years of development by Westinghouse and the expenditure of a considerable sum of money.

This could only be duplicated by a competitor if he were to invest similar sums of money and provided he had the appropriate talent available and could somehow obtain the requisite experience.

Further the deponent sayeth not.



DOCKET NO. 50-251

DATE: 80/03/26

NOTE TO NRC AND/OR LOCAL PUBLIC DOCUMENT ROOMS

The following item submitted with letter dated 80/03/19  
from Florida Power & Light Co is being withheld from public  
disclosure in accordance with Section 2.790.

PROPRIETARY INFORMATION

Info re disc integrity in low  
pressure nuclear turbine  
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Sharon Hunt  
M/S-016

Distribution Service's Branch

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RESPONSE TO NRC REQUEST FOR INFORMATION  
RELATED TO TURBINE DISCS  
SITE-SPECIFIC GENERAL QUESTIONS

I. LP Turbine design and operating data:

A. Turbine type:

The Florida Power & Light Company, Turkey Point #4 unit consists of one tandem compound four flow, three casings, condensing, 1800 RPM turbine utilizing 44 in. last row blades in each low pressure element. The low pressure element is designated as a Building Block 81.

B. Hours of operation for each LP Turbine:

Both LP rotors installed in the Unit 4 turbine operated a total of 42,633.1 hours as of midnight, March 16, 1980. Based on current Westinghouse inspection criteria, an inspection of the Unit 4 LP rotors would be indicated based on the 5-year operating criterion rather than the postulated crack size criterion. Unit 4 will not



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THE  
FEDERAL  
BUREAU OF  
INVESTIGATION  
OF THE  
DEPARTMENT OF JUSTICE  
WASHINGTON, D. C.  
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MEMORANDUM FOR THE DIRECTOR

SUBJECT: [Illegible]

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achieve 5 years of operation on the LP rotors until mid-1981. However, in recognition of current NRC concerns as well as the potential commercial penalties associated with a disc failure, FPL will inspect the LP rotors at the next scheduled outage of sufficient duration. This outage is currently scheduled to commence on March 24, 1980.

C. Number of turbine trips and overspeeds:

Based on the limited review predicated by the required response time, our records indicate that Unit 4 has undergone 3 overspeed trips and a maximum of 75 turbine trips from power operation. The 3 overspeed trips were the result of required testing, and the 75 turbine trips reported are based on records of reactor trips. As reactor trips at low power levels will not necessarily involve a turbine trip, this number (75) is also subject to revision. We will continue our review of existing records and advise you of any changes to this response resulting from this review.

D. Information pertaining to each disc:

1. Type of material including material specifications:

The material specified is Ni-Cr-Mo-V alloy steel similar to that specified as ASTM A-471. The material properties for each disc are included in sections A, B, and C of Appendix A (attached).

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2. Tensile properties data:

Tensile properties data determined from testing of hub and rim material are also included in Sections B and C of Appendix A.

3. Toughness properties data including Fracture Appearance  
Transition Temperature and Upper Energy and Temperature:

These properties are also included in Sections B and C of Appendix A. Note that Upper Shelf Energy is not listed when the value is identical to the Room Temperature Energy.

4. Keyway temperatures:

Keyway temperatures are listed in Section G of the Appendix A data for each disc. This is the calculated temperature two inches from the exhaust face of the disc at the bore during full load operation with all moisture separator reheaters functioning. Note that this value, as the major input into the calculation of crack growth rate, is only valid for calculational purposes for those discs which in normal operation run "wet". Westinghouse data indicates that no bore or keyway cracking has occurred in discs that run "dry".

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5. Calculated keyway crack size for turbine operating time in I.B. above:

See item I.D.4. The calculated crack size is a function of the estimated maximum crack growth rate, based on empirical data, and the equipment operating hours. This value, based on current NRC criteria, is given in Section G of Appendix A. Recent Westinghouse research and analyses have yielded conclusions that differ significantly from those values based on current NRC criteria. A summation of results pursuant to these conclusions, which also address items I.D.6, 7, and 8, is appended (Appendix B). Our response is based, where applicable, on these conclusions.

6. Critical crack size:

See item I.D.5. above.

7. Ratio of calculated crack to critical crack size:

See item I.D.5. above.

8. Crack growth rate:

See items I.D.4. and I.D.5. above.

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very long letter, and it contains a great deal of information about the state of the country at that time. It is a very important document, and it is one of the most interesting documents in the collection.

2. The second part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very long letter, and it contains a great deal of information about the state of the country at that time. It is a very important document, and it is one of the most interesting documents in the collection.

3. The third part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very long letter, and it contains a great deal of information about the state of the country at that time. It is a very important document, and it is one of the most interesting documents in the collection.

4. The fourth part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very long letter, and it contains a great deal of information about the state of the country at that time. It is a very important document, and it is one of the most interesting documents in the collection.

5. The fifth part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very long letter, and it contains a great deal of information about the state of the country at that time. It is a very important document, and it is one of the most interesting documents in the collection.

THE PRESIDENT OF THE UNITED STATES

TO THE CONGRESS

January 3, 1862

My dear Sir,



9. Calculated bore and keyway stress at operating design overspeed:

The bore tangential stresses at design speed and design overspeed are presented in Section E of Appendix A. The values presented include the stresses due to shrink fitting and centrifugal force loads only. Additional analyses to include thermal stresses and pressure stresses are being performed but are presently not available. Keyway stresses vary from zero to a high fraction of yield strength.

10. Calculated  $K_{1C}$  data:

The fracture toughness,  $K_{1C}$ , of each disc is calculated from the Charpy V-notch and tensile data. These values, presented in Sections B.11. and C.9. of Appendix A are calculated at either the Upper Shelf Temperature or room temperature, whichever yields the lower result.

11. Minimum yield strength specified for each disc:

The minimum yield strength for each disc is presented in Section B.1 of Appendix A.

1. The first part of the report is a summary of the work done during the year.

2. The second part is a detailed account of the experiments carried out.

3. The third part is a discussion of the results obtained.

4. The fourth part is a conclusion of the work.

5. The fifth part is a list of references.

6. The sixth part is a list of symbols.

7. The seventh part is a list of abbreviations.

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12. The twelfth part is a list of errata.

13. The thirteenth part is a list of acknowledgments.

14. The fourteenth part is a list of dedications.

15. The fifteenth part is a list of prefaces.

16. The sixteenth part is a list of contents.

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19. The nineteenth part is a list of symbols.

20. The twentieth part is a list of abbreviations.

II. Results of completed inservice inspections:

Relative to the disc bore and keyway areas of the Unit 4 LP rotors, only visual inspections have been performed. No significant abnormalities have been noted.

III. Provide the nominal water chemistry conditions for each LP turbine and describe any condenser inleakages or other significant changes in secondary water chemistry to this point in its operating life. Discuss the occurrence of cracks in any given turbine as related to history of secondary water chemistry in the unit:

Unit 4 does not have the capability to perform chemical analyses at the LP turbine. However, FP&L, in conjunction with Westinghouse, is conducting testing on both Turkey Point Units 3 and 4 to determine several parameters (pH, conductivity, and others) of the steam entering the LP turbines. We can provide, at your request, the results of this testing when the results become available. Nominal water chemistry philosophy and a record of condenser inleakages are, however, included in our response as Appendix C. We have been unable to identify to date any correlation between turbine disc cracking of any type and secondary chemistry. In point of fact recent industry research indicates that disc cracking may be independent of secondary water chemistry, that is cracking may occur even in a pure steam environment.

[illegible]

1. The first step in the process of the investigation is the identification of the problem. This is done by the investigator who is responsible for the study. The investigator must first identify the problem that is being studied. This is done by the investigator who is responsible for the study. The investigator must first identify the problem that is being studied.

[illegible]

- IV. If your plant has not been inspected, describe your proposed schedule and approach to ensure that turbine cracking does not exist in your turbine:

It is presently impossible to ensure that cracking does not exist in the Unit 4 LP rotor discs as cracking has been empirically proven to exist in some operating LP rotor discs. However, if cracking does exist, analyses show (see items I.D.4. and I.D.5.) that the maximum expected crack size will be significantly smaller than the critical crack size at the time of the inspection as delineated in Section I.B. See also Appendix B.

- V. If your plant has been inspected and plans to return or has returned to power with cracks, provide your proposed schedule for the next turbine inspection and the basis for this inspection schedule:

This question is not applicable to Turkey Point Unit 4.

- VI. Indicate whether an analysis and evaluation regarding turbine missiles have been performed for your plant and provided to the staff. If such an analysis and evaluation has been performed and reported, please provide appropriate references to the available documentation:

This information is included as Appendix D.

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY  
1954

REPORT OF THE  
COMMISSIONER OF THE  
BUREAU OF CHEMISTRY  
AND  
MINERALOGY  
OF THE  
UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF CHEMISTRY  
WASHINGTON, D. C.

ANNUAL REPORT  
FOR THE YEAR  
1954

BY  
J. H. HARRIS

CHIEF OF BUREAU  
BUREAU OF CHEMISTRY  
AND  
MINERALOGY  
DEPARTMENT OF THE INTERIOR  
WASHINGTON, D. C.

1955

APPENDIX A





# WESTINGHOUSE PROPRIETARY

ID # : DOR1102801

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE (MIN. Y.S. [110.0] bce TD (KSI))			1. Y.S. (KSI)	127,500	bce
2. UNIT	TURKEY PT. #4		2. SUPPLIER: MIDVALE HEPPENSTALL bce			2. U.T.S. (KSI)	141,500	
3. CUSTOMER:	FLORIDA P&L		3. Y.S. (KSI)	126,000		3. ELONGATION	20.2	
4. LP#	1		4. U.T.S. (KSI)	141,000		4. R.A.	68.2	
5. LOCATION	GOV		5. ELONGATION	19.6		5. FATT (DEG.F)	120.0	
6. DISCH	1		6. R.A.	63.3		6. R.T. IMPACT (FT.LB.)	96.0	
7. TEST NO.	TD44543		7. FATT (DEG.F)	120.0		7. U.S. IMPACT TEMP. (DEG.F)	0.0	
			8. R.T. IMPACT (FT.LB.)	84.0		8. U.S. IMPACT ENG. (FT.LB.)	96.0	
			9. U.S. IMPACT TEMP. (DEG.F)	75.0		9. U.S. KIC (KSI*SQRT(IN.))	.00	
			10. U.S. IMPACT ENG. (FT.LB.)	84.0				
			11. U.S. KIC (KSI*SQRT(IN.))	221.25				

## D. CHEMISTRY

C [0.28] bce MN [0.28] bce SI [0.01] bce P [0.007] bce CR [1.60] bce MO [0.38] bce V [0.12] bce  
 NI [3.51] bce AS [ ] bce SB [ ] bce SN [0.018] bce AL [ ] bce CU [ ] bce S [0.008] bce

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [62,700] bce  
 2. 2160 (120%) (KSI) [71,000]

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [4.04] bce  
 2. A=CR=OS (OVERSPEED) (IN.) [3.07]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [388] bce  
 2. ESTIMATED MAX DA/DY (IN/HR) [0.828-004]



# WESTINGHOUSE PROPRIETARY

ID # : D081102801

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 1  
5. LOCATION GOV  
6. DISCH 2  
7. TEST NO. TD35380

### B. MATERIAL PROPERTIES (HUB)

1. TYPE TD  
(MIN. Y.S. [110.0] bce (KSI))  
2. SUPPLIER: MIDVALE HEPENSTALL  
3. Y.S. (KSI) 122,000  
4. U.T.S. (KSI) 134,000  
5. ELONGATION 21.0  
6. R.A. 62.1  
7. FATT (DEG.F) -110.0  
8. R.T. IMPACT (FT.LB.) 78.5  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 78.5  
11. U.S. KIC 210.15  
(KSI\*SQRT(IN.))

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 124,000 bce  
2. U.T.S. (KSI) 133,500  
3. ELONGATION 21.6  
4. R.A. 67.3  
5. FATT (DEG.F) -110.0  
6. R.T. IMPACT (FT.LB.) 88.0  
7. U.S. IMPACT TEMP. (DEG.F) 75.0  
8. U.S. IMPACT ENG. (FT.LB.) 88.0  
9. U.S. KIC .00  
(KSI\*SQRT(IN.))

### D. CHEMISTRY

C [0.26] bce MN [0.29] bce SI [0.02] bce P [0.007] bce CR [1.74] bce MO [0.44] bce V [0.13] bce  
NI [3.59] bce AS [ ] bce SB [0.0014] bce SN [0.018] bce AL [ ] bce CU [ ] bce S [0.008] bce

### E. BORE STRESS

SPEED (RPM) STRESS

1: 1800 (120%) (KSI) [61,500] bce  
2: 2180 (120%) (KSI) [69,800]

### F. CRACK DATA

1: A=CR=OP (1800 RPM) (IN.) [3.77] bce  
2: A=CR=OS (OVERSPEED) (IN.) [2.84]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [220-304] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [0.220-0.004]



# WESTINGHOUSE PROPRIETARY

ID # : D081102801

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE (MIN. Y.S. (KSI))	[120.0] bce	TE	1. Y.S. (KSI)	129,000	bce
2. UNIT	TURKEY PT. #4		2. SUPPLIER	MIDVALE HEPPENSTALL		2. U.T.S. (KSI)	143,000	
3. CUSTOMER	FLORIDA P&L		3. Y.S. (KSI)	125,500	bce	3. ELONGATION	22.0	
4. LP#	1		4. U.T.S. (KSI)	139,000		4. R.A.	68.5	
5. LOCATION	GOV		5. ELONGATION	19.0		5. FATT (DEG.F)	-120.0	
6. DISCH	3		6. R.A.	55.7		6. R.T. IMPACT (FT.LB.)	86.0	
7. TEST NO.	TD44491		7. FATT (DEG.F)	-120.0		7. U.S. IMPACT TEMP. (DEG.F)	86.0	
			8. R.T. IMPACT (FT.LB.)	86.0		8. U.S. IMPACT ENG. (FT.LB.)	26.0	
			9. U.S. IMPACT TEMP. (DEG.F)	75.0		9. U.S. KIC (KSI*SQRT(IN.))	.00	
			10. U.S. IMPACT ENG. (FT.LB.)	86.0				
			11. U.S. KIC (KSI*SQRT(IN.))	223.67				

## D. CHEMISTRY

C [0.27] bce    MN [0.25] bce    SI [0.01] bce    P [0.008] bce    CR [1.65] bce    MO [0.39] bce    V [0.12] bce  
 NI [3.45] bce    AS [0.0024] bce    SB [0.016] bce    AL [0.009] bce    CU [0.009] bce

## E. BORE STRESS

## F. CRACK DATA

SPEED (RPM)    STRESS  
 1. 1800 (KSI) [70,600] bce  
 2. 2160 (120%) (KSI) [81,600]

1. A=CR=OP (1800 RPM) (IN.) [3.18] bce  
 2. A=CR=OS (OVERSPEED) (IN.) [2.29]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [794-250] bce  
 2. ESTIMATED MAX DA/DT (IN/HR) [0.005]



# WESTINGHOUSE PROPRIETARY

ID # : 0081102801

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE	(MIN. Y.S. [110.0] (KSI))	TD	1. Y.S. (KSI)	125.000	bce
2. UNIT	TURKEY PT. #4		2. SUPPLIER:	MIDVALE HEPPENSTALL		2. U.T.S. (KSI)	138.000	
3. CUSTOMER:	FLORIDA P&L		3. Y.T.S. (KSI)			3. ELONGATION	21.4	
4. LP#	1		4. U.T.S. (KSI)			4. R.A.	67.7	
5. LOCATION	GOV		5. ELONGATION			5. FATT (DEG.F)	120.0	
6. DISC#	4		6. R.A.			6. R.T. IMPACT (FT.LB.)	94.0	
7. TEST NO.	TD35375.		7. FATT (DEG.F)			7. U.S. IMPACT TEMP. (DEG.F)	0.0	
			8. R.T. IMPACT (FT.LB.)			8. U.S. IMPACT ENG. (FT.LB.)	94.0	
			9. U.S. IMPACT TEMP. (DEG.F)			9. U.S. KIC (KSI*SQRT(IN.))	.00	
			10. U.S. IMPACT ENG. (FT.LB.)					
			11. U.S. KIC (KSI*SQRT(IN.))					

## D. CHEMISTRY

$C_{.26}$  bce  $MN_{.28}$  bce  $SI_{.01}$  bce  $P_{.008}$  bce  $CR_{.65}$  bce  $MO_{.33}$  bce  $V_{.10}$  bce  
 $NI_{3.58}$  bce  $AS_{-}$  bce  $SB_{.0015}$  bce  $SN_{-}$  bce  $AL_{-}$  bce  $CU_{-}$  bce  $S_{.009}$  bce

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [61,300] bce  
 2. 2160 (120%) (KSI) [71,400]

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [3.86] bce.  
 2. A=CR=OS (OVERSPEED) (IN.) [2.74]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [205] bce  
 2. ESTIMATED MAX DA/DT (IN/HR) [299-005]





# WESTINGHOUSE PROPRIETARY

ID # : 0081102801

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE (MIN. Y.S. (KSI))	[120.0]	TE (KSI)	1. Y.S. (KSI)	[136.500]	b,c,e
2. UNIT	TURKEY PT. #4		2. SUPPLIER	MIDVALE HEPPENSTALL		2. U.T.S. (KSI)	[151.000]	
3. CUSTOMER	FLORIDA P&L		3. Y.S. (KSI)			3. ELONGATION	21.0	
4. LP#	1		4. U.T.S. (KSI)			4. R.A.	66.6	
5. LOCATION	GOV		5. ELONGATION			5. FATT (DEG.F)	-120.0	
6. DISC#	5		6. R.A.			6. R.T. IMPACT (FT.LB.)	76.5	
7. TEST NO.	TD44556		7. FATT (DEG.F)			7. U.S. IMPACT TEMP. (DEG.F)	0.0	
			8. R.T. IMPACT (FT.LB.)			8. U.S. IMPACT ENG. (FT.LB.)	76.5	
			9. U.S. IMPACT TEMP. (DEG.F)			9. U.S. KIC (KSI*SQRT(IN.))	1.00	
			10. U.S. IMPACT ENG. (FT.LB.)					
			11. U.S. KIC (KSI*SQRT(IN.))					

D. CHEMISTRY																				
C	[.28]	b,c,e	MN	[.27]	b,c,e	SI	[.02]	b,c,e	P	[.008]	b,c,e	CR	[1.69]	b,c,e	MO	[.52]	b,c,e	V	[.12]	b,c,e
Ni	[3.51]	b,c,e	AS	[.0018]	b,c,e	SB	[.0018]	b,c,e	SN	[.019]	b,c,e	AL	[.007]	b,c,e	CU	[.007]	b,c,e			

E. BORE STRESS			F. CRACK DATA		
SPEED (RPM)	STRESS		1. A=CR=OP (1800 RPM) (IN.)	[3.09]	b,c,e
1. 1800	[KSI]	[63.000]	2. A=CR=OS (OVERSPEED) (IN.)	[2.21]	
2. 2160 (120%)	[KSI]	[72.900]			

G. SERVICE DATA	
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	[164-180] b,c,e
2. ESTIMATED MAX DA/DI (IN/HR)	[.164-005]



# WESTINGHOUSE PROPRIETARY

ID # : D081102801

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LPH 1  
5. LOCATION GOV  
6. DISC# 6  
7. TEST NO. TD44501

### B. MATERIAL PROPERTIES (HUB)

1. TYPE bce TO  
(MIN. Y.S. [110.0] (KSI))  
2. SUPPLIER: MIDVALE HEPPENSTALL  
3. Y.S. (KSI) 132.500  
4. U.T.S. (KSI) 144.500  
5. ELONGATION 20.2  
6. R.A. 61.4  
7. FATT (DEG.F) -110.0  
8. R.T. IMPACT (FT.LB.) 67.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 67.0  
11. U.S. KIC 200.00  
(KSI\*SQRT(IN.))

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 130.000  
2. U.T.S. (KSI) 141.500  
3. ELONGATION 21.5  
4. R.A. 67.7  
5. FATT (DEG.F) -110.0  
6. R.T. IMPACT (FT.LB.) 74.5  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 74.5  
9. U.S. KIC .00  
(KSI\*SQRT(IN.))

### D. CHEMISTRY

C.26 bce MN.22 bce SI.01 bce P.008 bce CR.70 bce MO.37 bce V.14 bce  
NI.46 bce AS bce SB.0021 bce SN.018 bce AL bce CU bce S.008 bce

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [55.500] bce  
2. 2160 (120%) (KSI) [65.400]

### F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [4.23] bce  
2. A=CR=OS (OVERSPEED) (IN.) [2.94]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [191] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [.215-005]



VESTINGHOUSE PROPRIETARY

ID # : D081102802

# LP TURBINE DISC INFORMATION

## A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP#  
5. LOCATION GEN  
6. DISCH  
7. TEST NO. TD55538

## B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] bce TD  
2. SUPPLIER: BETHLEHEM STEEL  
3. Y.S. (KSI) 112,500 bce  
4. U.T.S. (KSI) 131,500  
5. ELONGATION 21.5  
6. R.A. 68.8  
7. FATT (DEG.F) -100.0  
8. R.T. IMPACT (FT.LB.) 112.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 112.0  
11. U.S. KIC (KSI\*SQRT(IN.)) 244.61

## C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 117,500 bce  
2. U.T.S. (KSI) 134,000  
3. ELONGATION 19.0  
4. R.A. 65.6  
5. FATT (DEG.F) -100.0  
6. R.T. IMPACT (FT.LB.) 114.0  
7. U.S. IMPACT TEMP. (DEG.F) 75.0  
8. U.S. IMPACT ENG. (FT.LB.) 114.0  
9. U.S. KIC (KSI\*SQRT(IN.)) 252.04

## D. CHEMISTRY

C [0.23] bce MN [0.30] bce SI [0.04] bce P [0.007] bce CR [1.79] bce MO [0.49] bce V [0.13] bce  
NI [3.56] bce AS [ ] bce SB [0.0009] bce SN [ ] bce AL [ ] bce CU [ ] bce S [0.010] bce

## E. BORE STRESS

SPEED (RPM) STRESS  
1. 1800 (KSI) [62,700] bce  
2. 2160 (120%) (KSI) [71,000]

## F. CRACK DATA

1. A=CR-OP (1800 RPM) (IN.) [5.03] bce  
2. A=CR-OS (OVERSPEED) (IN.) [3.84]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [388] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [0.828-004]



# WESTINGHOUSE PROPRIETARY

ID # : D081102802

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 1  
5. LOCATION GEN  
6. DISC# 2  
7. TEST NO. TD35388

### B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] (KSI)) bce TD  
2. SUPPLIER: MIDVALE HEPPENSTALL bce  
3. Y.S. (KSI) 127,000  
4. U.T.S. (KSI) 141,000  
5. ELONGATION 19.0  
6. R.A. 60.9  
7. FATT (DEG.F) -120.0  
8. R.T. IMPACT (FT.LB.) 69.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 69.0  
11. U.S. KIC (KSI\*SQRT(IN.)) 199.46

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 125,500  
2. U.T.S. (KSI) 139,000  
3. ELONGATION 20.4  
4. R.A. 62.1  
5. FATT (DEG.F) -120.0  
6. R.T. IMPACT (FT.LB.) 74.5  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 74.5  
9. U.S. KIC (KSI\*SQRT(IN.)) 100

### D. CHEMISTRY

C [0.24] bce MN [0.29] bce SI [0.01] bce P [0.009] bce CR [1.76] bce MO [0.40] bce V [0.12] bce  
NI [3.48] bce AS [ ] bce SB [0.0020] bce SN [0.017] bce AL [ ] bce CU [ ] bce S [0.011] bce

### E. BORE STRESS

SPEED (RPM) STRESS  
1. 1800 (KSI) [61,500] bce  
2. 2160 (120%) (KSI) [69,800]

### F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.) [3.36] bce  
2. A-CR-OS (OVERSPEED) (IN.) [2.52]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [304] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [0.220-004]





# WESTINGHOUSE PROPRIETARY

ID # : D081102802

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 1  
5. LOCATION GEN  
6. DISC# 3  
7. TEST NO. TD48100

### B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [120.0] (KSI)) TE  
2. SUPPLIER: MIDVALE HEPPENSTALL  
3. Y.S. (KSI) 127.000  
4. U.T.S. (KSI) 137.000  
5. ELONGATION 20.5  
6. R.A. 67.5  
7. FATT (DEG.F) 120.0  
8. R.T. IMPACT (FT.LB.) 88.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 88.0  
11. U.S. KIC (KSI\*SQRT(IN.)) 227.70

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 126.000  
2. U.T.S. (KSI) 139.000  
3. ELONGATION 20.2  
4. R.A. 69.5  
5. FATT (DEG.F) 120.0  
6. R.T. IMPACT (FT.LB.) 104.0  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 104.0  
9. U.S. KIC (KSI\*SQRT(IN.)) 0.00

### D. CHEMISTRY

C [0.26] b,c,e MN [0.28] b,c,e SI [0.02] b,c,e P [0.008] b,c,e CR [1.75] b,c,e MO [0.38] b,c,e V [0.13] b,c,e  
NI [3.55] b,c,e AS [ ] b,c,e SB [0.0021] b,c,e SN [0.017] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [0.006] b,c,e

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [70.600] b,c,e  
2. 2160 (120%) (KSI) [81.600]

### F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [3.31] b,c,e  
2. A=CR=OS (OVERSPEED) (IN.) [2.39]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [250] b,c,e  
2. ESTIMATED MAX DA/DT (IN/HR) [0.794-005]



WESTINGHOUSE PROPRIETARY

ID # : D081102802

# LP TURBINE DISC INFORMATION

## A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 1  
5. LOCATION GEN  
6. DISC# 4  
7. TEST NO. TD44520

## B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] bce) TD  
2. SUPPLIER: MIDVALE HEPPENSTALL bce  
3. Y.S. (KSI) 124,000  
4. U.T.S. (KSI) 135,000  
5. ELONGATION 22.5  
6. R.A. 68.2  
7. FATT (DEG.F) -120.0  
8. R.T. IMPACT (FT.LB.) 82.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 82.0  
11. U.S. KIC 216.79  
(KSI\*SQRT(IN.))

## C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 122,000 bce  
2. U.T.S. (KSI) 134,000  
3. ELONGATION 22.0  
4. R.A. 70.1  
5. FATT (DEG.F) -120.0  
6. R.T. IMPACT (FT.LB.) 106.0  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 105.0  
9. U.S. KIC .00  
(KSI\*SQRT(IN.))

## D. CHEMISTRY

C [0.26] bce MN [0.28] bce SI [0.01] bce P [0.009] bce CR [0.72] bce MO [0.42] bce V [0.10] bce  
NI [3.54] bce AS [ ] bce SB [0.0019] bce SN [ ] bce AL [ ] bce CU [ ] bce S [0.008] bce

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 {KSI} [61,300] bce  
2. 2160 (120%) {KSI} [71,400] bce

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [4.06] bce  
2. A=CR=OS (OVERSPEED) (IN.) [2.89] bce

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [205] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [0.299-005] bce



# WESTINGHOUSE PROPRIETARY

ID # : 0081102802

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 1  
5. LOCATION GEN  
6. DISC# 5  
7. TEST NO. TD35357

### B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] (KSI)) TD  
2. SUPPLIER: MIDVALE HEPPENSTALL  
3. Y.S. (KSI) 119,500  
4. U.T.S. (KSI) 134,000  
5. ELONGATION 21.0  
6. R.A. 65.9  
7. FATT (DEG.F) -115.0  
8. R.T. IMPACT (FT.LB.) 88.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 88.0  
11. U.S. KIC (KSI.SQRT(IN.)) 221.38

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 120,500  
2. U.T.S. (KSI) 133,000  
3. ELONGATION 21.4  
4. R.A. 67.3  
5. FATT (DEG.F) -115.0  
6. R.T. IMPACT (FT.LB.) 107.5  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 107.5  
9. U.S. KIC (KSI.SQRT(IN.)) .00

### D. CHEMISTRY

C [0.27] bce MN [0.25] bce SI [0.01] bce P [0.007] bce CR [1.81] bce MO [0.43] bce V [0.07] bce  
NI [3.51] bce AS [0.0019] bce SB [0.0019] bce SN [0.0019] bce AL [0.0019] bce CU [0.0019] bce S [0.009] bce

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [63,000] bce  
2. 2160 (120%) (KSI) [72,900]

### F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.) [4.01] bce  
2. A-CR-OS (OVERSPEED) (IN.) [2.90]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [180] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [0.164-005]



# WESTINGHOUSE PROPRIETARY

ID # : D081102802

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE	TD		1. Y.S. (KSI)	110,500	bce
2. UNIT	TURKEY PT. #4		2. SUPPLIER	BETHLEHEM STEEL		2. U.T.S. (KSI)	130,000	
3. CUSTOMER	FLORIDA P&L		3. Y.S. (KSI)	112,000		3. ELONGATION	21.5	
4. LPH	1		4. U.T.S. (KSI)	128,000		4. R.A.	70.1	
5. LOCATION	GEN		5. ELONGATION	20.5		5. FATT (DEG.F)	125.0	
6. DISCH	6		6. R.A.	67.5		6. R.T. IMPACT (FT.LB.)	118.0	
7. TEST NO.	TD58932		7. FATT (DEG.F)	125.0		7. U.S. IMPACT TEMP. (DEG.F)	70.0	
			8. R.T. IMPACT (FT.LB.)	119.0		8. U.S. IMPACT ENG. (FT.LB.)	118.0	
			9. U.S. IMPACT TEMP. (DEG.F)	75.0		9. U.S. KIC (KSI*SQRT(IN.))	249.28	
			10. U.S. IMPACT ENG. (FT.LB.)	119.0				
			11. U.S. KIC (KSI*SQRT(IN.))	252.00				

## D. CHEMISTRY

C [0.22] bce MN [0.31] bce SI [0.06] bce P [0.008] bce CR [0.64] bce MO [0.50] bce V [0.10] bce  
 NI [3.57] bce AS [0] bce SB [0.0007] bce SN [0] bce AL [0] bce CU [0] bce S [0.008] bce

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [55,500] bce  
 2. 2160 (120%) (KSI) [65,400]

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [6.94] bce  
 2. A=CR=OS (OVERSPEED) (IN.) [4.89]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [191] bce  
 2. ESTIMATED MAX DA/DT (IN/HR) [0.215-005]





# VESTINGHOUSE PROPRIETARY

ID # : D081102803

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LPH 2  
5. LOCATION GOV  
6. DISCH 1  
7. TEST NO. TD20778

### B. MATERIAL PROPERTIES (HUB)

1. TYPE b,c,e VT  
(MIN. Y.S. [120.0] (KSI))  
2. SUPPLIER: MIDVALE HEPPENSTALL  
3. Y.S. (KSI) 127,500  
4. U.T.S. (KSI) 142,000  
5. ELONGATION 19.6  
6. R.A. 62.1  
7. FATT (DEG.F) -100.0  
8. R.T. IMPACT (FT.LB.) 60.5  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 60.5  
11. U.S. KIC 185.75  
(KSI\*SQRT(IN.))

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 109,500  
2. U.T.S. (KSI) 123,500  
3. ELONGATION 22.8  
4. R.A. 67.9  
5. FATT (DEG.F) -120.0  
6. R.T. IMPACT (FT.LB.) 105.5  
7. U.S. IMPACT TEMP. (DEG.F) 75.0  
8. U.S. IMPACT ENG. (FT.LB.) 105.5  
9. U.S. KIC 234.02  
(KSI\*SQRT(IN.))

### D. CHEMISTRY

C [0.25] b,c,e MN [0.29] b,c,e SI [0.27] b,c,e P [0.08] b,c,e CR [1.69] b,c,e MO [0.45] b,c,e V [0.13] b,c,e  
NI [3.50] b,c,e AS [0] b,c,e SB [0] b,c,e SN [0] b,c,e AL [0] b,c,e CU [0] b,c,e S [0.008] b,c,e

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [62,700] b,c,e  
2. 2160 (120%) (KSI) [71,000]

### F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [2.74] b,c,e  
2. A=CR=OS (OVERSPEED) (IN.) [2.05]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [388] b,c,e  
2. ESTIMATED MAX DA/DT (IN/HR) [0.828-004]



# WESTINGHOUSE PROPRIETARY

ID # : 0081102803

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION		B. MATERIAL PROPERTIES (HUB)		C. MATERIAL PROPERTIES (RIM)	
1. BUILDING BLOCK	81	1. TYPE	TD	1. Y.S. (KSI)	130,000
2. UNIT	TURKEY PT. #4	2. SUPPLIER	MIDVALE HEPPENSTALL	2. U.T.S. (KSI)	141,000
3. CUSTOMER	FLORIDA P&L	3. Y.S. (KSI)	128,500	3. ELONGATION	21.0
4. LPH	2	4. U.T.S. (KSI)	140,500	4. R.A.	66.8
5. LOCATION	GOV	5. ELONGATION	19.8	5. FATT (DEG.F)	105.0
6. DISC#	2	6. R.A.	63.1	6. R.T. IMPACT (FT.LB.)	92.0
7. TEST NO.	TD44513	7. FATT (DEG.F)	105.0	7. U.S. IMPACT TEMP. (DEG.F)	0.0
		8. R.T. IMPACT (FT.LB.)	74.5	8. U.S. IMPACT ENG. (FT.LB.)	92.0
		9. U.S. IMPACT TEMP. (DEG.F)	75.0	9. U.S. KIC (KSI*SQRT(IN.))	.00
		10. U.S. IMPACT ENG. (FT.LB.)	74.5		
		11. U.S. KIC (KSI*SQRT(IN.))	209.14		

## D. CHEMISTRY

C	b,c,e	MN	b,c,e	SI	b,c,e	P	b,c,e	CR	b,c,e	MO	b,c,e	V	b,c,e
[.27]		[.24]		[.01]		[.010]		[1.61]		[.39]		[.13]	
NI	b,c,e	AS	b,c,e	SB	b,c,e	SN	b,c,e	AL	b,c,e	CU	b,c,e	S	b,c,e
[3.45]		[.]		[.0019]		[.017]		[.]		[.]		[.008]	

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800	[KSI]	[61.500]	b,c,e
2. 2160 (120%)	[KSI]	[69.800]	

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.)	[3.73]	b,c,e
2. A=CR=OS (OVERSPEED) (IN.)	[2.81]	

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	[304]	b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)	[.220-004]	



# VESTINGHOUSE PROPRIETARY

ID # : D081102803

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE	(MIN. Y.S. [120.0] (KSI))	TE	1. Y.S. (KSI)	123.000	b,c,e
2. UNIT	TURKEY PT. #4		2. SUPPLIER	MIDVALE HEPPENSTALL	b,c,e	2. U.T.S. (KSI)	134.500	
3. CUSTOMER:	FLORIDA P&L		3. Y.S. (KSI)	121.000		3. ELONGATION	21.4	
4. LP#	2		4. U.T.S. (KSI)	135.000		4. R.A.	69.1	
5. LOCATION	GOV		5. ELONGATION	20.4		5. FATT (DEG.F)	-110.0	
6. DISC#	3		6. R.A.	67.7		6. R.T. IMPACT (FT.LB.)	96.0	
7. TEST NO.	TD44489		7. FATT (DEG.F)	-110.0		7. U.S. IMPACT TEMP. (DEG.F)	0.0	
			8. R.T. IMPACT (FT.LB.)	92.0		8. U.S. IMPACT ENG. (FT.LB.)	96.0	
			9. U.S. IMPACT TEMP. (DEG.F)	75.0		9. U.S. KIC (KSI*SQRT(IN.))	.00	
			10. U.S. IMPACT ENG. (FT.LB.)	92.0				
			11. U.S. KIC (KSI*SQRT(IN.))	228.03				

## D. CHEMISTRY

C [0.27] b,c,e MN [0.25] b,c,e SI [0.01] b,c,e P [0.008] b,c,e CR [1.65] b,c,e MO [0.39] b,c,e V [0.12] b,c,e  
 NI [3.45] b,c,e AS [ ] b,c,e SB [0.0024] b,c,e SN [0.016] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [0.009] b,c,e

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [70.600] b,c,e  
 2. 2160 (120%) (KSI) [81.600]

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [3.33] b,c,e  
 2. A=CR=OS (OVERSPEED) (IN.) [2.39]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [250] b,c,e  
 2. ESTIMATED MAX DA/DT (IN/HR) [0.794-005]



# WESTINGHOUSE PROPRIETARY

ID # : 0081102803

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION		B. MATERIAL PROPERTIES (HUB)		C. MATERIAL PROPERTIES (RIM)	
1. BUILDING BLOCK	81	1. TYPE (MIN. Y.S. (KSI))	TD [110.0] b,c,e	1. Y.S. (KSI)	118.000 b,c,e
2. UNIT	TURKEY PT. #4	2. SUPPLIER	MIDVALE HEPPENSTALL b,c,e	2. U.T.S. (KSI)	131.500
3. CUSTOMER:	FLORIDA P&L	3. Y.T.S. (KSI)	117.000	3. ELONGATION	23.0
4. LP#	2	4. U.T.S. (KSI)	131.500	4. R.A.	69.7
5. LOCATION	GOV	5. ELONGATION	21.5	5. FATT (DEG.F)	85.0
6. DISC#	4	6. R.A.	65.0	6. R.T. IMPACT (FT.LB.)	70.5
7. TEST NO.	TD35379	7. FATT (DEG.F)	85.0	7. U.S. IMPACT TEMP. (DEG.F)	0.0
		8. R.T. IMPACT (FT.LB.)	72.5	8. U.S. IMPACT ENG. (FT.LB.)	70.5
		9. U.S. IMPACT TEMP. (DEG.F)	75.0	9. U.S. KIC (KSI*SQRT(IN.))	0.00
		10. U.S. IMPACT ENG. (FT.LB.)	72.5		
		11. U.S. KIC (KSI*SQRT(IN.))	197.46		

## D. CHEMISTRY

C [0.27] b,c,e    MN [0.31] b,c,e    SI [0.02] b,c,e    P [0.008] b,c,e    CR [1.71] b,c,e    MO [0.38] b,c,e    V [0.13] b,c,e  
 NI [3.51] b,c,e    AS [0] b,c,e    SB [0.0021] b,c,e    SN [0.018] b,c,e    AL [0] b,c,e    CU [0] b,c,e    S [0.006] b,c,e

## E. BORE STRESS

SPEED (RPM)    STRESS  
 1. 1800 (KSI) [41.300] b,c,e  
 2. 2160 (120%) (KSI) [71.400]

## F. CRACK DATA

1. A=CR-OP (1800 RPM) (IN.) [3.30] b,c,e  
 2. A=CR-OS (OVERSPEED) (IN.) [2.34]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [299-205] b,c,e  
 2. ESTIMATED MAX DA/DT (IN/HR) [0.005]





# WESTINGHOUSE PROPRIETARY

ID # : D081102803

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 2  
5. LOCATION GOV  
6. DISCH 5  
7. TEST NO. TD35245

### B. MATERIAL PROPERTIES (HUB)

1. TYPE b,c,e TD  
2. SUPPLIER: MIDVALE HEPPENSTALL  
3. Y.S. (KSI) 110,07  
4. U.T.S. (KSI) 117,000  
5. ELONGATION 136,500  
6. R.A. 19.0  
7. FATT (DEG.F) 60.1  
8. R.T. IMPACT (FT.LB.) -110.0  
9. U.S. IMPACT TEMP. (DEG.F) 82.0  
10. U.S. IMPACT ENG. (FT.LB.) 75.0  
11. U.S. KIC 82.0  
(KSI\*SQRT(IN.)) 211.06

### C. MATERIAL PROPERTIES (RIN)

1. Y.S. (KSI) 114,000  
2. U.T.S. (KSI) 130,000  
3. ELONGATION 22.7  
4. R.A. 69.7  
5. FATT (DEG.F) -110.0  
6. R.T. IMPACT (FT.LB.) 92.0  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 92.0  
9. U.S. KIC 0.00  
(KSI\*SQRT(IN.))

### D. CHEMISTRY

C [0.29] b,c,e MN [0.31] b,c,e SI [0.01] b,c,e P [0.007] b,c,e CR [1.91] b,c,e MO [0.34] b,c,e V [0.13] b,c,e  
NI [3.49] b,c,e AS [0.0014] b,c,e SN [0.0014] b,c,e AL [0.0014] b,c,e CU [0.008] b,c,e

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) 63,000 b,c,e  
2. 2160 (120%) (KSI) 72,900

### F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) 3.61 b,c,e  
2. A=CR=OS (OVERSPEED) (IN.) 2.60

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) 180 b,c,e  
2. ESTIMATED MAX DA/DT (IN/HR) 0.164-005



# WESTINGHOUSE PROPRIETARY

ID # : D081102803

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION		B. MATERIAL PROPERTIES (HUB)		C. MATERIAL PROPERTIES (RIM)	
1. BUILDING BLOCK	81	1. TYPE (MIN. Y.S. (KSI))	TD [110.0] b,c,e	1. Y.S. (KSI)	[22.500] b,c,e
2. UNIT	TURKEY PT. #4	2. SUPPLIER	MIDVALE HEPPENSTALL b,c,e	2. U.T.S. (KSI)	[32.000]
3. CUSTOMER	FLORIDA P&L	3. Y.S. (KSI)	[24.500]	3. ELONGATION	[21.6]
4. LP#	2	4. U.T.S. (KSI)	[136.500]	4. R.A.	[67.0]
5. LOCATION	GOV	5. ELONGATION	[20.2]	5. FATT (DEG.F)	[120.0]
6. DISCH	6	6. R.A.	[59.4]	6. R.T. IMPACT (FT.LB.)	[74.5]
7. TEST NO.	TD44498	7. FATT (DEG.F)	[120.0]	7. U.S. IMPACT TEMP. (DEG.F)	[0.0]
		8. R.T. IMPACT (FT.LB.)	[69.0]	8. U.S. IMPACT ENG. (FT.LB.)	[74.5]
		9. U.S. IMPACT TEMP. (DEG.F)	[75.0]	9. U.S. KIC (KSI*SQRT(IN.))	[.00]
		10. U.S. IMPACT ENG. (FT.LB.)	[69.0]		
		11. U.S. KIC (KSI*SQRT(IN.))	[197.68]		

## D. CHEMISTRY

C [0.25] b,c,e MN [0.26] b,c,e SI [0.01] b,c,e P [0.010] b,c,e CR [1.60] b,c,e MO [0.40] b,c,e V [0.13] b,c,e  
 NI [3.53] b,c,e AS [0] b,c,e SB [0] b,c,e SN [0.018] b,c,e AL [0] b,c,e CU [0] b,c,e S [0.010] b,c,e

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 [KSI] [55.500] b,c,e  
 2. 2160 (120%) [KSI] [65.400]

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [4.13] b,c,e  
 2. A=CR=OS (OVERSPEED) (IN.) [2.86]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [191] b,c,e  
 2. ESTIMATED MAX DA/DT (IN/HR) [0.215-005]



WESTINGHOUSE PROPRIETARY

ID # : 0081102804

# LP TURBINE DISC INFORMATION

## A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 2  
5. LOCATION GEN  
6. DISC# 1  
7. TEST NO. TD44544

## B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [10.0] (KSI)) TD  
2. SUPPLIER: MIDVALE HEPPENSTALL  
3. Y.S. (KSI) 118,500  
4. U.T.S. (KSI) 132,000  
5. ELONGATION 21.8  
6. R.A. 59.9  
7. FATT (DEG.F) -110.0  
8. R.T. IMPACT (FT.LB.) 96.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 96.0  
11. U.S. KIC (KSI\*SQRT(IN.)) 231.02

## C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 120,000  
2. U.T.S. (KSI) 134,500  
3. ELONGATION 20.4  
4. R.A. 68.2  
5. FATT (DEG.F) -110.0  
6. R.T. IMPACT (FT.LB.) 26.0  
7. U.S. IMPACT TEMP. (DEG.F) 6.0  
8. U.S. IMPACT ENG. (FT.LB.) 26.0  
9. U.S. KIC (KSI\*SQRT(IN.)) .00

## D. CHEMISTRY

[.26] b,c,e [MN .29] b,c,e [SI .02] b,c,e [P .007] b,c,e [CR 1.73] b,c,e [MO .37] b,c,e [V .13] b,c,e  
[NI 3.36] b,c,e [AS ] b,c,e [SB .0020] b,c,e [SN .017] b,c,e [AL ] b,c,e [CU ] b,c,e [S .008] b,c,e

## E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [62,700] b,c,e  
2. 2160 (120%) (KSI) [71,000]

## F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [4.44] b,c,e  
2. A=CR=OS (OVERSPEED) (IN.) [3.38]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) 388  
2. ESTIMATED MAX DA/DT (IN/HR) [828.004] b,c,e



# WESTINGHOUSE PROPRIETARY

ID # : 0081102804

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION		B. MATERIAL PROPERTIES (HUB)		C. MATERIAL PROPERTIES (RIM)	
1. BUILDING BLOCK	81	1. TYPE (MIN. Y.S. (KSI))	TD [110.0] bce	1. Y.S. (KSI)	117.000
2. UNIT	TURKEY PT. #4	2. SUPPLIER	MIDVALE HEPPENSTALL bce	2. U.T.S. (KSI)	131.000
3. CUSTOMER:	FLORIDA P&L	3. Y.S. (KSI)	124.000	3. ELONGATION	21.6
4. LPH	2	4. U.T.S. (KSI)	139.000	4. R.A.	66.6
5. LOCATION	GEN	5. ELONGATION	20.8	5. FATT (DEG.F)	120.0
6. DISC#	2	6. R.A.	61.8	6. R.T. IMPACT (FT.LB.)	82.0
7. TEST NO.	TD35387	7. FATT (DEG.F)	120.0	7. U.S. IMPACT TEMP. (DEG.F)	0.0
		8. R.T. IMPACT (FT.LB.)	70.5	8. U.S. IMPACT ENG. (FT.LB.)	82.0
		9. U.S. IMPACT TEMP. (DEG.F)	75.0	9. U.S. KIC (KSI.SQRT(IN.))	.00
		10. U.S. IMPACT ENG. (FT.LB.)	70.5		
		11. U.S. KIC (KSI.SQRT(IN.))	199.66		

## D. CHEMISTRY

C [0.24] bce    MN [0.29] bce    SI [0.01] bce    P [0.009] bce    CR [1.76] bce    MO [0.40] bce    V [0.12] bce  
 NI [3.48] bce    AS [ ] bce    SB [0.0070] bce    SN [0.017] bce    AL [ ] bce    CU [ ] bce    S [0.011] bce

## E. BORE STRESS

## F. CRACK DATA

SPEED (RPM)    STRESS  
 1. 1800 (KSI) [61.500] bce  
 2. 2160 (120%) (KSI) [69.800]

1. A-CR-OP (1800 RPM) (IN.) [3.36] bce  
 2. A-CR-OS (OVERSPEED) (IN.) [2.53]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [220-304] bce  
 2. ESTIMATED MAX DA/DT (IN/HR) [0.004]





WESTINGHOUSE PROPRIETARY

ID # : 0081102804

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE	TE		1. Y.S. (KSI)	122.000	bce
2. UNIT	TURKEY PT. #4		2. SUPPLIER	MIDVALE HEPPENSTALL	bce	2. U.T.S. (KSI)	136.000	
3. CUSTOMER	FLORIDA P&L		3. Y.S. (KSI)	125.000		3. ELONGATION	20.6	
4. LPH	2		4. U.T.S. (KSI)	139.000		4. R.A.	68.5	
5. LOCATION	GEN		5. ELONGATION	20.2		5. FATT (DEG.F)	120.0	
6. DISC#	3		6. R.A.	65.0		6. R.T. IMPACT (FT.LB.)	84.0	
7. TEST NO.	TD36429		7. FATT (DEG.F)	120.0		7. U.S. IMPACT TEMP. (DEG.F)	0.0	
			8. R.T. IMPACT (FT.LB.)	82.0		8. U.S. IMPACT ENG. (FT.LB.)	84.0	
			9. U.S. IMPACT TEMP. (DEG.F)	75.0		9. U.S. KIC (KSI.SQRT(IN.))	.00	
			10. U.S. IMPACT ENG. (FT.LB.)	82.0				
			11. U.S. KIC (KSI.SQRT(IN.))	217.59				

D. CHEMISTRY

C.26 bce MN.26 bce SI.01 bce P.009 bce CR.70 bce MO.39 bce V.13 bce  
NI.45 bce AS bce SB.0020 bce SN.017 bce AL bce CU bce S.006 bce

E. BORE STRESS

F. CRACK DATA

SPEED (RPM) STRESS  
1. 1800 (KSI) [70.600] bce  
2. 2160 (120%) (KSI) [81.600]  
1. A=CR=OP (1800 RPM) (IN.) [2.99] bce  
2. A=CR=OS (OVERSPEED) (IN.) [2.15]

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [250] bce  
2. ESTIMATED MAX DA/DT (IN/HR) [.794-005]



# WESTINGHOUSE PROPRIETARY

ID # : D081102804

## LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION			B. MATERIAL PROPERTIES (HUB)			C. MATERIAL PROPERTIES (RIM)		
1. BUILDING BLOCK	81		1. TYPE	TD		1. Y.S. (KSI)	123.000	b,c,e
2. UNIT	TURKEY PT. #4		2. SUPPLIER:	MIDVALE HEPPENSTALL		2. U.T.S. (KSI)	136.000	
3. CUSTOMER:	FLORIDA P&L		3. Y.S. (KSI)	122.000		3. ELONGATION	22.5	
4. LPH	2		4. U.T.S. (KSI)	137.000		4. R.A.	69.3	
5. LOCATION	GEN		5. ELONGATION	20.7		5. FATT (DEG.F)	40.0	
6. DISC#	4		6. R.A.	64.7		6. R.T. IMPACT (FT.LB.)	47.5	
7. TEST NO.	TD35378		7. FATT (DEG.F)	40.0		7. U.S. IMPACT TEMP. (DEG.F)	0.0	
			8. R.T. IMPACT (FT.LB.)	53.5		8. U.S. IMPACT ENG. (FT.LB.)	47.5	
			9. U.S. IMPACT TEMP. (DEG.F)	75.0		9. U.S. KIC (KSI*SQRT(IN.))	0.00	
			10. U.S. IMPACT ENG. (FT.LB.)	53.5				
			11. U.S. KIC (KSI*SQRT(IN.))	170.04				

## D. CHEMISTRY

C.27] b,c,e    MN.31] b,c,e    SI.02] b,c,e    P.008] b,c,e    CR.71] b,c,e    MO.38] b,c,e    V.13] b,c,e  
 NI.3.51] b,c,e    AS. b,c,e    SB.0021] b,c,e    SN.018] b,c,e    AL. b,c,e    CU. b,c,e    S.006] b,c,e

## E. BORE STRESS

## F. CRACK DATA

SPEED (RPM)    STRESS  
 1. 1800    {KSI}    [61.300] b,c,e  
 2. 2160 (120%)    {KSI}    [71.400]

1. A=CR=OP (1800 RPM) (IN.)    [2.35] b,c,e  
 2. A=CR=OS (OVERSPEED) (IN.)    [1.63]

## G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)    [205] b,c,e  
 2. ESTIMATED MAX DA/DT (IN/HR)    [2.99-005]



# WESTINGHOUSE PROPRIETARY

ID # : 0001102804

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 2  
5. LOCATION GEN  
6. DISCH 5  
7. TEST NO. TD58935

### B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] (KSI)) TO  
2. SUPPLIER: BETHLEHEM STEEL  
3. Y.S. (KSI) 118.500  
4. U.T.S. (KSI) 136.000  
5. ELONGATION 20.5  
6. R.A. 66.8  
7. FATT (DEG.F) -110.0  
8. R.T. IMPACT (FT.LB.) 108.0  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 108.0  
11. U.S. KIC 245.93 (KSI\*SQRT(IN.))

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 113.000  
2. U.T.S. (KSI) 131.000  
3. ELONGATION 20.5  
4. R.A. 69.2  
5. FATT (DEG.F) -110.0  
6. R.T. IMPACT (FT.LB.) 102.0  
7. U.S. IMPACT TEMP. (DEG.F) 75.0  
8. U.S. IMPACT ENG. (FT.LB.) 102.0  
9. U.S. KIC 233.32 (KSI\*SQRT(IN.))

### D. CHEMISTRY

C [0.22] b,c,e MN [0.31] b,c,e SI [0.06] b,c,e P [0.008] b,c,e CR [1.64] b,c,e MO [0.50] b,c,e V [0.10] b,c,e  
NI [3.57] b,c,e AS [ ] b,c,e SB [0.0007] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [0.008] b,c,e

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [63.000] b,c,e  
2. 2160 (120%) (KSI) [72.900]

### F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [5.03] b,c,e  
2. A=CR=OS (OVERSPEED) (IN.) [3.66]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) 180 b,c,e  
2. ESTIMATED MAX DA/DT (IN/HR) [0.164\*005]



# WESTINGHOUSE PROPRIETARY

ID # : D081102804

## LP TURBINE DISC INFORMATION

### A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81  
2. UNIT TURKEY PT. #4  
3. CUSTOMER: FLORIDA P&L  
4. LP# 2  
5. LOCATION GEN  
6. DISCH 6  
7. TEST NO: TD44494

### B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] bce TD  
2. SUPPLIER: MIDVALE HEPPENSTALL bce  
3. Y.S. (KSI) 120,000  
4. U.T.S. (KSI) 135,000  
5. ELONGATION 21.7  
6. R.A. 67.5  
7. FATT (DEG.F) -110.0  
8. R.T. IMPACT (FT.LB.) 80.5  
9. U.S. IMPACT TEMP. (DEG.F) 75.0  
10. U.S. IMPACT ENG. (FT.LB.) 80.5  
11. U.S. KIC (KSI.SQRT(IN.)) 211.42

### C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) 121,000 bce  
2. U.T.S. (KSI) 135,500  
3. ELONGATION 22.7  
4. R.A. 69.7  
5. FATT (DEG.F) -110.0  
6. R.T. IMPACT (FT.LB.) 92.0  
7. U.S. IMPACT TEMP. (DEG.F) 0.0  
8. U.S. IMPACT ENG. (FT.LB.) 92.0  
9. U.S. KIC (KSI.SQRT(IN.)) 0.00

### D. CHEMISTRY

C [0.26] bce MN [0.25] bce SI [0.01] bce P [0.008] bce CR [1.70] bce MO [0.41] bce V [0.06] bce  
NI [3.45] bce AS [0.0020] bce SB [0.018] bce AL [0.009] bce CU [0.009] bce

### E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI) [55,500] bce  
2. 2160 (120%) (KSI) [65,400]

### F. CRACK DATA

1. A=CR=OP (1800 RPM) (IN.) [4.77] bce  
2. A=CR=OS (OVERSPEED) (IN.) [3.33]

### G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) 191 bce  
2. ESTIMATED MAX DA/DT (IN/HR) [0.215-005]





APPENDIX C



Turkey Point Unit 4 secondary water chemistry has undergone two major changes. Originally the secondary side was on phosphate treatment, with the sodium-to-phosphate molar ratio maintained between 1.0 and 2.5. This ratio was changed to 2.3 to 2.6 in December of 1973 in keeping with NSSS vendor secondary chemistry recommendations. Again on the recommendation of our NSSS vendor, secondary water chemistry was changed to the all-volatile treatment method (AVT) in November of 1974. Unit 4 has continued to operate with AVT secondary water chemistry since that time.

A summary of Unit 4 condenser inleakages follows:

10-09-73	05-30-78
	07-10-78
02-24-74	07-13-78
05-13-74	10-05-78
06-23-74	10-09-78
08-17-74	12-20-78
11-15-74	
	01-29-79
03-24-75	06-26-79
06-28-75	10-15-79
12-08-75	10-20-79
12-29-75	10-25-79
	11-21-79
06-17-76	12-25-79
09-06-76	
09-20-76	01-23-80
	02-01-80
11-30-77	02-23-80
12- 1-77	
12-26-77	
12-27-77	



APPENDIX D

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Turkey Point Units 3 and 4 received extensive AEC review on turbine missiles during the construction permit and operating license stages. Licensing submittals regarding turbine missiles began as early as 1966 and have included:

PSAR Supplement No. 3, September 8, 1966

PSAR Supplement No. 8, November 4, 1966

FSAR Revision No. 1, March 16, 1970

FSAR Revision No. 11, February 25, 1971

FSAR Revision No. 12, March 3, 1971

Turbine design analyses and missile protection criteria are provided in FSAR Section 14.1.13 and FSAR Appendix 5E respectively. AEC final position of acceptance on turbine missile design is provided at Section 4.8 in the Turkey Point Unit 3 and 4 Safety Evaluation Report, March 16, 1972.

STATE OF FLORIDA     )  
                              )  
COUNTY OF DADE     )     ss.

E. A. Adomat, being first duly sworn, deposes and says:

That he is Executive Vice President of Florida Power & Light Company, the licensee herein;

That he has executed the foregoing document; that the statements made in this said document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said

*E. A. Adomat*

E. A. Adomat

Subscribed and sworn to before me this

19th day of March, 1980

*Lris J. Marino*

NOTARY PUBLIC, in and for the County of Dade,  
State of Florida

My commission expires: NOTARY PUBLIC STATE OF FLORIDA at LARGE  
MY COMMISSION EXPIRES AUGUST 24, 1981  
BONDED THRU MAYNARD BONDING AGENCY





APPENDIX B

1950

# WESTINGHOUSE PROPRIETARY

## TURKEY POINT UNIT 4 REVISED WESTINGHOUSE DATA

ROTOR	DISC	da/dt	CALCULATED CRACK SIZE AT NEXT INSP	CRITICAL CRACK SIZE*	RATIO, A/A <sub>CR</sub>
LP1 GOV	1	RUNS DRY	—	—	—
	2	$.330 \times 10^{-4}$	1.413	2.84	.50
	3	$.119 \times 10^{-4}$	.510	2.29	.22
	4	$.449 \times 10^{-5}$	.192	2.74	.07
	5	$.246 \times 10^{-5}$	.105	2.21	.05
	6	RUNS DRY	—	—	—
LP1 GEN	1	RUNS DRY	—	—	—
	2	$.330 \times 10^{-4}$	1.413	2.52	.56
	3	$.119 \times 10^{-4}$	.510	2.39	.21
	4	$.449 \times 10^{-5}$	.192	2.89	.07
	5	$.246 \times 10^{-5}$	.105	2.90	.04
	6	RUNS DRY	—	—	—
LP2 GOV	1	RUNS DRY	—	—	—
	2	$.330 \times 10^{-4}$	1.413	2.81	.50
	3	$.119 \times 10^{-4}$	.510	2.39	.21
	4	$.449 \times 10^{-5}$	.192	2.34	.08
	5	$.246 \times 10^{-5}$	.105	2.60	.04
	6	RUNS DRY	—	—	—
LP2 GEN	1	RUNS DRY	—	—	—
	2	$.330 \times 10^{-4}$	1.413	2.53	.56
	3	$.119 \times 10^{-4}$	.510	2.15	.24
	4	$.449 \times 10^{-5}$	.192	1.63	.12
	5	$.246 \times 10^{-5}$	.105	3.66	.03
	6	RUNS DRY	—	—	—

\* AT DESIGN OVERSPEED

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