VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

8005090268

April 29, 1980

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

Serial No. 378
NO/CEN:baw
Docket Nos: 50-280
50-281

Dear Mr. Eisenhut:

SURRY 1 AND 2 TURBINE DISC INTEGRITY

Your letter of February 25, 1980, requested information about disc integrity in operating Westinghouse nuclear turbines. In particular, your letter included a list of "Site Specific General Questions" and another of "Generic Questions."

This letter will respond to the Site Specific General Questions for Vepco's Surry Power Station, Units 1 and 2. Responses to the Generic Questions, on the other hand, have been coordinated through a task force whose representation includes all owners of Westinghouse nuclear low-pressure turbines and which is chaired by Mr. Wayne Stiede of Commonwealth Edison. The consensus responses to the Generic Questions are contained in a letter of March 14, 1980, to you from Westinghouse's J. M. Schmerling, which is provided as Attachment 5.

Accompanying this letter are the following documents:

Attachment 1 - Westinghouse's "Application for Withholding Proprietary Information for Public Disclosure"

Attachment 2 - Affidavit of Robert Williamson in support of Westinghouse's Application for Withholding

Attachment 3 - Vepco's Responses to Site Specific General Questions for Surry No. 1

Appendix A - Westinghouse Proprietary Information referenced in Attachment 3.

Twenty four (24) pages of Westinghouse supplied computer printouts.

Two (2) tables of calculated crack sizes

Appendix B - Surry #1 nondestructive test reports

A001
S/10
PROP ENCL TO:
FILES
W ROSS
ENG BR
BC (3)
NT ACRS (16)
OTHERS RECEIVE LTR & NP

Appendix C - Nonproprietary version of Appendix A with proprietary information deleted

Attachment 4 - Vepco's Responses to Site Specific Questions for Surry No. 2

Appendix A - Westinghouse proprietary information referenced in Attachment 4

Twenty four (24) pages of Westinghouse supplied computer printouts

Two (2) tables of calculated crack sizes

Appendix B - Nonproprietary version of Appendix A with proprietary information deleted

Attachment 5 - Westinghouse Consensus Responses to Generic Questions

The site specific responses contain proprietary information of the Westinghouse Electric Corporation. In conformance with the requirements of 10 CFR 2.790 of the Commission's regulations, we are enclosing Attachment 1, an application for withholding for public disclosure, and Attachment 2, an affidavit. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission. Correspondence concerning the affidavid or application for withholding should reference AW-80-11 and be addressed to Mr. R. Williamson, Manager, Customer Order Engineering, Westinghouse Electric Corporation, Steam Turbine Divisions, Lester Branch, Box 9175, Philadelphia, PA 19113, with a copy to Vepco.

Please let us know if you require additional information. We shall do our best to cooperate.

Very truly yours,

J. H. Ferguson
Executive Vice President
Power

Attachments:

As indicated

COMMONWEALTH OF VIRGINIA)
) S.S.
CITY OF RICHMOND)

Before me, a Notary Public, in and for the City and Commonwealth aforesaid, today personally appeared J. H. Ferguson, who being duly sworn, made oath and said (1) that he is the Executive Vice President-Power of the Virginia Electric and Power Company, (2) that he is duly authorized to execute and file the accompanying information in behalf of that Company, (3) that to the extent the information is within the knowledge of Vepco employees and officers it is true and correct to the best of his knowledge and belief, and (4) that the remainder of the information has been supplied by the Westinghouse Electric Corporation.

Given under my hand and notarial seal this 29th day of April, 1980.

My commission expires: January 20, 1981.

Robert M. Neil
Notary Public

50-280

NRC 2/25/80 site specific general questions re disc integrity of Westinghouse nuclear turbines. (nonproprietary version)

Received wth ltr dtd 4/29/80

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DOCKET NO. 50-280/281

DATE: 5-13-80

NOTE TO NRC AND/OR LOCAL PUBLIC DOCUMENT ROOMS

The following item submitted with letter dated 4-29-80

from VEPCO is being withheld from public disclosure in accordance with Section 2.790.

PROPRIETARY INFORMATION

INFO ON disc. Integrity of Westinghouse NUCLEAR TURBINES

Don Landon

016

Distribution Service's Branch

Attachment 1

AW-80-11

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: North Anna #1 Docket #50-338
Information in Response to NRC Request for Information of February 25, 1980, Relative to Low Pressure Turbine Disc Integrity.

Reference: Appendix A letter from C. M. Stallings 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

Ref: AW-80-11

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, Manager
Customer Order Engineering

Sworn to and subscribed before me
this.....day of.....19.....

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

(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.

(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 C. M. Stallings 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.

Attachment 3

SURRY 1

Vepco's Responses to
SITE SPECIFIC GENERAL QUESTIONS
on Turbine Disc Integrity
Surry Power Station, Unit 1

I. Provide the following information for each LP turbine:

I.A. Turbine type

The Virginia Electric and Power Company Surry No. 1 unit has one tandem compound four flow, three casing, condensing, 1800 rpm turbine using 44-inch last-row blades in each low-pressure element. The low-pressure element is designated a Building Block 81.

I.B. Number of hours of operation for each LP turbine at time of last turbine inspection or if not inspected, postulated to inspection

The number of hours of operation from beginning of operation until February 19, 1980, when the current outage began, is 38,915.

I.C. Number of turbine trips and overspeeds

There have been eighty (80) turbine trips. There

have been seven (7) overspeeds, all of them intentional for the purpose of verifying the overspeed setpoint.

I.D. For each disc:

I.D.1. Type of material including material specifications

The material is Ni-Cr-Mo-V steel similar to ASTM-A-471. The minimum yield strength specified for each disc is given in Section B[1] of Appendix A to this Attachment 3.

I.D.2. Tensile properties data

Tensile properties data of tests taken from the disc hub and rim material are given in Sections B and C, respectively, of Appendix A to this Attachment 3.

I.D.3. Toughness properties data including Fracture Appearance Transition Temperature and upper energy and temperature

Toughness properties for the disc hub and rim are given in Sections B and C, respectively, of Appendix A to this Attachment 3. The upper shelf energy is not presented in this Attachment 3 when it is the same as the room temperature energy.

1/Note that the first 24 pages of Appendix A consist of Westinghouse computer print-outs, each with separate sections A through G. (For example, Section A is "Unit Identification.") It is to those sections we refer when we cite, for example, Section B of Appendix A to Attachment 3.

I.D.4. Keyway temperatures

The keyway temperatures are presented in Section G of Appendix A to this Attachment 3. The temperatures given are the calculated temperatures two inches from the exhaust face of the disc at the bore during full-load operation with all moisture separator reheaters in service.

I.D.5. Calculated keyway crack size for turbine time specified in "B" above

The calculated maximum keyway crack size is designated item G-3, in keeping with the notation suggested by Westinghouse, and is found in Appendix A to this Attachment 3. G-3 is calculated by multiplying the number of hours of operation (see I.B above) by the crack growth rate da/dt. The crack growth rate is calculated as described in the response to I.D.8 below.

I.D.6 Critical crack size

The critical crack size at 1800 rpm and at design (120%) overspeed is given in Section F of Appendix A to this Attachment 3.

I.D.7. Ratio of calculated crack to critical crack sizes

The ratio of calculated crack size to critical crack size, $a/a_{cr}(eff)$, is designated G-4 and given in Appendix A to this Attachment 3. This number is calculated simply by dividing item G-3 by item F-2.

I.D.8. Crack growth rate

The crack growth rate is given as G-2' in Appendix A to this Attachment 3. These crack growth rates are the maximum expected rates based on known cracks to date.

Westinghouse has changed the basis for determining these rates to use the NRC "gray book" operating hours. The NRC value for the crack growth rate is given as item G-2 on the computer print-outs (first 24 pages of Appendix A to this Attachment 3). Because Westinghouse's crack growth rates over the relevant range are consistently larger than the NRC values, however, the G-2 numbers from the print-outs have been multiplied by a factor, provided in Appendix A, to yield the more conservative G-2' figures, which are also given in Appendix A.

Westinghouse's opinion is that the crack growth rate of disc numbers 1 and 6 for Surry 1 should be assumed to be zero because these discs operate dry under normal conditions. However, to be conservative (and consistent with the calculations for the other discs), Vepco has calculated a crack size for disc numbers 1 and 6, using the same methods as for the other discs.

I.D.9. Calculated bore and keyway stress at operating speed and design overspeed

The bore tangential stresses at 1800 rpm and at design overspeed are given in Section E of Appendix A to this

Attachment 3. The values presented include the stresses due to shrink fit and centrifugal force loads only. Additional analysis to include thermal stresses and pressure stresses are being made but are not yet available.

Westinghouse has not provided the keyway stresses, because Westinghouse's analysis assumes that the keyway is part of the crack, and so the only significant stress is the bore stress.

I.D.10. Calculated K_{IC} data

The fracture toughness, K_{IC}, of each disc is calculated from the Charpy v-notch and tensile data. The values, presented in Sections B and C of Appendix A to this Attachment 3, are calculated at the upper shelf temperature or room temperature, whichever gives the lower result.

I.D.11. Minimum yield strength specified for each disc

The values for minimum yield strength are presented in Section B of Appendix A to this Attachment 3.

II. Provide details of the results of any completed inservice inspection of LP turbine rotors, including areas examined since issuance of an operating license. For each indication detected, provided details of the location of the crack, its orientation, and size.

Surry Unit 1 was put into service[2] in 1972, and the LP

2/Initial criticality July 1, 1972; first commercial operation July 7, 1972; full thermal output December 22, 1972.

turbines were recently inspected (February 27 - March 10, 1980). A Westinghouse field inspection team ultrasonically inspected the LP rotors (#1 LP 13A3291, #2 LP 13A3292) for disc cracks. The inspection method used was ultrasonic inspection of discs 1 through 6, both ends on each rotor, and an ultrasonic 360° scan on the outlet and inlet side of each disc. The inspection results for both rotors showed no indications of disc cracks. In addition, pertinent non-destructive test reports that were done in May 1978 and March 1980 are provided as Appendix B to Attachment 3.

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.

See the enclosed report on "Surry #1 Secondary System Chemistry."

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.

Both LP rotors were recently inspected by a Westinghouse field inspection team, and the ultrasonic inspection report stated that there was no indication of disc cracking. Vepco's approach to ensure that unacceptable cracking does not occur in the future is based on calculations of the ratio $a/a_{cr}(eff)$ for the worst-case disc in order to be sure that this ratio remains

less than unity. A calculation to determine the number of hours that the worst-case disc (disc no. 1, generator end, LP 2) could operate before a/a_{cr}(eff) became unity, using the values of a_{cr}(eff) and da/dt from Appendix A to this Attachment 3, yields a result of 19,836 hours.

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.

The plant was recently inspected and all turbine discs were found to be free of cracks.

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. In the event that such studies have not been made, consideration should be given to scheduling such an action.

An analysis of the turbine missile risk for Surry 1 has been done and provided to the Staff. The analysis can be found in the Final Safety Analysis Report, Supplemental Volume 2, S14.9 dated 10-15-70.

Surry 1 Secondary System Chemistry

Secondary system chemistry data for Surry Power Station from 1973 through 1979 was reviewed.

Operating specifications, as supplied by Westinghouse Electric Corporation, are shown in Tables I through IV. Prior to January 1975, this unit was operated with a coordinated phosphate treatment for corrosion inhibition control of the secondary side. The sodium/phosphate molar ratio, as per Westinghouse's criteria, varied from 2.0 to 2.6, 2.2 to 2.6 and 2.4 to 2.6. All Volatile Treatment was thereafter initiated using ammonium hydroxide, cyclohexylamine or morpholine for pH control. This unit has experienced condenser inleakage. Condenser cooling water is brackish.

A synopsis of the chemistry review follows.

Surry Unit No. 1

1973

- Utilized coordinated phosphate treatment control.
- Table I denotes specifications.
- Main steam average pH was 9.00$\pm$ 0.2 with the maximum being 10.02. Total average conductivity was 3.8 $\pm$ 0.5 mmhos.

- Condenser sodium was not routinely analyzed.

- Condenser inleakage was experienced approximately 50% of the operating time.

1974

- Utilized coordinated phosphate treatment control.

- Table I denotes specifications.

- Main Steam average pH was 9.00 ± 0.2 with the maximum being 10.20. Total average conductivity was 4.0 ± 1.0 mmhos.

- Condenser sodium was 0-10 ppb, 50%; 10-100 ppb, 45%; and greater than 100 ppb, 5% of the time.

- Condenser inleakage occurred approximately 75% of the operating time.

1975

- Utilized all volatile treatment control using ammonia and hydrazine.

- Tables II and III denote specifications.

- Main steam average pH was 8.80 ± 0.2 with the maximum being 9.60. Total average conductivity was 5.0 mmhos.

- Condenser sodium was 0-10 ppb, 50%; 10-100 ppb, 45%; and greater than 100ppb, 5% of the time.

- Blowdown chemistry specifications were maintained approximately 25% of the time.

- Condenser inleakage occurred approximately 80% of the operating time.

1976

- Utilized all volatile treatment control using cyclohexylamine and hydrazine.

- Tables II and III denote specifications.

- Main steam average pH was 9.5 ± 0.2 with the maximum being 10.20. Total average conductivity was 10.0 mmhos.

- Condenser sodium was 0-10 ppb, 50%; 10-100 ppb, 49%; and greater than 100 ppb, 1% of the time.

- Blowdown chemistry specifications were maintained approxiately 25% of the time.

- Condenser inleakage occurred approximately 80% of the operating time.

1977

- Utilized all volatile treatement control using morpholine and hydrazine.

- Tables II and III denote specifications.

- Main steam average pH was 9.1 ± 0.2 with the maximum being 10.10. Total average conductivity was 5.0 mmhos.

- Condenser sodium was 0-10 ppb, 65%, 10-100 ppm; 34%; and greater than 100 ppb, 1% of the time.

- Blowdown chemistry specifications were maintained approximately 30% of the time.

- Condenser inleakage occurred approximately 75% of the operating time.

1978

- Utilized all volatile treatment control using morpholine and hydrazine.

- Tables II, III and IV denote specifications.

- Main steam average pH was 8.9 ± 0.2 with the maximum being 9.60. Total average conductivity was 4.0 mmhos.

- Condenser sodium was 0-10 ppb, 75%; 10-100 ppb, 24%; and greater than 100 ppb, 1% of the time.

- Blowdown chemistry specifications were maintained approximately 40% of the time.

- Condenser inleakage occurred approximately 60% of the operating time.

1979

- Utilized all volatile treatment control using morpholine and hydrazine.

- Tables II, III and IV denote specifications.

January 2, 1979 - March 15, 1979

- Main steam average pH was 9.0. Total average conductivity was 3.0 mmhos.

- Condensate sodium was 0-10 ppb, 98%; and 10-100 ppb, 2% of the time.

- Blowdown chemistry specifications were maintained 80-85% of the time.

- Condenser inleakage occurred approximately 10% of the operating time.

October 24, 1979 - December 19, 1979

- Main steam average pH was 9.0. Total average conductivity was 3.0 mmhos.

- Condensate sodium was 0-10 ppb, 85%; 10-100 ppb, 14%; and greater than 100 ppb, 1% of the time.

- Blowdown chemistry specifications were maintained approximately 75% of the time.

- Condenser inleakage occurred approximately 15% of the operating time.

1979 continued from previous page

- Unit off-line other than times listed above.

NOTE: The following condensate sodium values approximately equate to the indicated condenser inleakage rate on the average:

10ppb - 0.1 gpm
100ppb - 1.0 gpm

COORDINATED PHOSPHATE CONTROL

TABLE I

	POWER OPERATION	
	FEEDWATER	BLOWDOWN
pH at 25°C	8.9 - 9.2	8.5 - 10.6
Phosphate, ppm	NA	25-80
Blowdown Rate, gpm	NA	greater than 5 (continuous)
Free Hydroxide	NA	Zero
Dissolved Oxygen, ppm	less than 0.005	less than 0.005
Hydrazine, ppm	greater than 0.01 residual	NA
Chloride, ppm	NA	less than 75
TDS, ppm	NA	less than 125
Susp. Solids, ppm	NA	less than 5.0
Iron & Copper, ppm	less than 0.01	less than 5.0
Silica, ppm	NA	less than 5.0

ALL VOLATILE TREATMENT

TABLE II

	POWER OPERATION BLOWDOWN
pH at 25°C	8.5 - 9.0
Free Hydroxide as ppm $CaCO_3$	less than 0.15
Cation Cond., mmhos at 25°C	less than 2.0
Sodium, ppm	less than 0.10
Chloride, ppm	less than 0.15
Ammonia, ppm	less than 0.25
Diss. Oxygen, ppm	less than 0.005
Silica, ppm	less than 1.0
Suspended Solids, ppm	less than 1.0

TABLE III

LIMITING AVT SPECIFICATIONS FOR
POWER OPERATIONS - BRACKISH WATER SITES

BLOWDOWN

	Two Weeks	24 Hours	Immediate
pH at 25°C	*8.0 - 9.2[1]	NA	< 8.0 or > 9.4[1]
Cation Cond., mmhos at 25°C	> *2.0 but ≤ 120	NA	≥ 120
Free Hydroxide, ppm as $CaCO_3$	NA[2]	> 0.15 but < 1.0	≥ 1.0

*Instrumented Measurement Recommended.

N/A Not Applicable.

Comment: Operation beyond the normal AVT specifications is limited as indicated above. Corrective action including shutdown, if necessary, is recommended within the time periods as applicable.

1/An increase of 0.4 pH units to the normal control pH limit of 9.0 will result from a Free Hydroxide concentration of 1.0 ppm as $CaCO_3$. However, pH is not intended to be the Free Hydroxide determinant.

2/No relief for Free Hydroxide over and above the Normal Operating Control Limit is provided for periods in excess of 24 hours.

TABLE IV

Steam Generator Blowdown AVT Specification

Chemistry Parameter	Control	Expected
pH at 25°C	8.5 - 9.0[1]	8.5 - 9.0[1]
Free Hydroxide as ppm $CaCO_3$	0.15	< 0.15
Cation Cond., mmhos/cm at 25°C	2.0	< 2.0
Chloride, ppm	NA	< 0.15[2]
Sodium, ppm	NA	< 0.1
NH_3, ppm	NA	< 0.25
Dissolved Oxygen, ppb	NA	< 5
SiO_2, ppm	NA	< 1.0
Suspended Solids, ppm	NA	< 1.0
Blowdown Rate, gpm/Steam Generator	As requred to maintain control parameters.	

Continued operation with known chloride ingress even through blowdown permits observance of the normal specification is not recommended. The cause of the contamination should be corrected. Continuous monitoring of the blowdown is essential if chloride exposure is to be minimized.

1/To be maintained with morpholine at sea and brackish water sites.

2/Chloride ion concentration is limited by cation conductivity. Confirmatory analysis for chloride is required.

Response to OFF Normal Conditions (Continued from Table IV)

- Sea or brackish Water Plants

As stated above, field and laboratory data reveal that even low bulk water chloride concentrations can produce denting. Further, plant operating histories suggest the chloride effect may be cumulative.

885.80

LIQUID PENETRANT INSPECTION REPORT
NDT – PT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

STATION: 1	SYSTEM: 2	PROCEDURE: 3	DATE: 4
Surry #1	L.P. Turbine	NDT-PT-13.1	May 5, 1978

ITEM, COMPONENT INSPECTED: 5 — Staples where blades were removed "A" Rotor

MAINTENANCE REPORT NO: 6 — NA

MATERIAL: 7 — Alloy Steel

SURFACE CONDITION: 8 — Glass beaded, emery clothed & Clean

	MANUFACTURER 9	TYPE 10	BATCH NO. 11	TYPE OF PENETRANT: 12
CLEANER	NA	NA	NA	☑ WATER SOLUBLE
PENETRANT	Sherwin	HM-3	16E316H	☑ FLUORESCENT
EMULSIFIER	NA	NA	NA	☐ VISIBLE RED DYE
REMOVER	NA	water	NA	☐ SOLVENT REMOVABLE
DEVELOPER	Sherwin	D-100	P659	☐ POST EMULSIFIABLE

PENETRANT APPLICATION: 13	PENETRANT DWELL TIME: 14	TEMP: 15	EMULSIFIER DWELL TIME: 16
☐ DIPPING ☑ SPRAYING ☐ BRUSHING	15 MIN.	75 OF	NA MIN.

REMOVAL TECHNIQUE FOR EXCESS PENETRANT: 17	DRYING TIME: 18	TEMP: 19
☑ FLOWING WATER ☐ WIPED SOLVENT ☐ WIPED WATER ☐ DIP CLEANING	5 MIN.	75 OF

DEVELOPER APPLICATION: 20	DEVELOPING TIME: 21	TEMP: 22
☐ DIPPING ☑ SPRAYING ☐ BRUSHING	7 MIN.	75 OF

TEST PERFORMED BY: 23 — D. Spooner

LEVEL OF CERTIFICATION: 24 — II

AREA INSPECTED 25	SIZE AND LOCATION OF INDICATIONS 26	ACCEPT 27	REJECT 28
Two steeples in L-3 where MT indications previously reported	PT confirms MT indication		✓

DISPOSITION OF REJECTED INDICATIONS: 29

AUTHORIZED INSPECTOR: 30 — David L. Spooner

DATE: 31 — May 5, 1978

= 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- 12.1	May 4, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"A" Rotor (2nd Time)	NA

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	Sandblasted

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2000 AMPERE TURNS	☐ AC
☐ PROD ____ SPACING ____ AMPS	☐ DC
☑ CONTINUOUS	☑ HWDC
☐ CIRCULAR ____ AMPERES	
☐ RESIDUAL	☐ YOKE ____

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
O. Spooner, D. Fowler, T. Bowers, A. Hamel, D. DeKaney	II, I, A, I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-3 Gov. End	Blades 47, 168, 173 Crack in root entry side		✓
Row L-4 Gov. End	Blade 155 Crack in root entry side		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 4, 1978

885.79

VISUAL INSPECTION REPORT
NDT – VT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1	2	3	4
Surry #1	SYSTEM: L. P. Turbine	PROCEDURE: NDT-VT-15.1	DATE: May 4, 1978

ITEM, COMPONENT INSPECTED: 5	MAINTENANCE REPORT NO: 6
A Rotor	NA

VISUAL AIDS: Flashlight & mirror 7

PERFORMED BY: 8	LEVEL OF CERTIFICATION: 9
D. Spooner, A. Hamel, D. Dickens	II, II, II

INDICATIONS NOTED: ☐ YES ☒ NO 10

INDICATIONS

11 AREA INSPECTED	12 DESCRIPTION OF INDICATIONS (SIZE, TYPE, AND LOCATION)	13 ACCEPT	14 REJECT
Row L-3 Cov. End	NRI	✓	
Row L-4 Cov. End	NRI	✓	

DISPOSITION OF REJECTED INDICATIONS. 15

AUTHORIZED INSPECTOR: 16	DATE: 17
David L Spooner	May 4, 1978

(1)

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- 12.1	May 2, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"A" L.P. Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	Sandblasted & Clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2200 AMPERE TURNS *	☐ AC
☐ PROD ____ SPACING ____ AMPS	☐ DC
☑ CONTINUOUS	☐ CIRCULAR ____ AMPERES	☑ HWDC
☐ RESIDUAL	☐ YOKE ____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
Hamel, Dickens, Fowler, Gibson, Hall, Spooner	I, I, I, A, A, II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Blading rows Gen End L-7	NRI	✓	
L-8	NRI	✓	
Turb End L-7	NRI	✓	
L-8	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

* both rows done @ same time due to being so small and close together

EDITED MAY 02 1978 D.S.T.

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 2, 1978

(3)

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- 12.1	May 2, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"A" L.P. Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2000 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS	☐ CIRCULAR _____ AMPERES	☑ HWDC
☐ RESIDUAL	☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
Hamel, Dickens, Gibson, Fowler, Hall, Spooner	I, I, A, I, A, II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Blading Row GEN. End L-0	NRI	✓	
L-1	NRI	✓	
L-2	NRI	✓	
Turbine End L-0	NRI	✓	
L-1	NRI	✓	
L-2	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

NOTED MAY 02 1978 D.S.T.

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 2, 1978

PAGE 1 OF 1

(2)

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT – MT – 12.1	May 2, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"A" L.P. Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:
- ☑ COIL 1600 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
Hamel, Dickens, Gibson, Fowler, Hall, Spooner	I, I, A, I, A, II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Blading Rows Gen. End L-3	No indications other than those readily Visible. Row heavily damaged by debris		✓
L-4	No indications other than those readily Visible. Row Destroyed		✓
L-5	NRI	✓	
L-6	NRI	✓	
Turbine End L-3	NRI	✓	
L-4	NRI	✓	
L-5	NRI	✓	
L-6	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

Row L-3 To be investigated further and possibly replaced

Row L-4 To be replaced

NOTED MAY 02 1978 D.S.T.

22 AUTHORIZED INSPECTOR:	23 DATE:
Dennis L Spooner	May 2, 1978

885.79

VISUAL INSPECTION REPORT
NDT – VT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #	L.P. Turbine	NDT-VT-15.1	May 2, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"A" Rotor	NA

7 VISUAL AIDS: Flashlight & mirror

8 PERFORMED BY:	9 LEVEL OF CERTIFICATION:
D.L. Spooner	II

10 INDICATIONS NOTED: ☑ YES ☐ NO

INDICATIONS

11 AREA INSPECTED	12 DESCRIPTION OF INDICATIONS (SIZE, TYPE, AND LOCATION)	13 ACCEPT	14 REJECT
Where blade # 193	No indication of damage to		
Broke off Gen. End Row L-3	steeples	*	*
Where blade # 1 & 42,	No indications of damage to		
Broke off Gen. End Row L-4	steeples	*	*
Where blade # 107,	Pieces missing from steeples between		
144 & 145 broke off Gen End Row L-4	blade # 107 & 108 and between # 144 & 145		
	Crack in top of steeple between		
	blades # 145 & 146	*	*

15 DISPOSITION OF REJECTED INDICATIONS.

* Accept – Reject defered until blade roots are removed and (W) evaluation & recommendation are available.

16 AUTHORIZED INSPECTOR	17 DATE
David L. Spooner	May 2, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L. P. Turbine	NDT-MT-12.1	May 5, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Steeples where blades were removed "A" Rotor	N.A

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	glass beaded & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 800 AMPERE TURNS	☐ AC
☐ PROD ____ SPACING ____ AMPS	☐ DC
☑ CONTINUOUS ☐ CIRCULAR ____ AMPERES	☑ HWDC
☐ RESIDUAL ☐ YOKE ____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Fowler & T. Bogers	I, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeples L-3	Two steeples cracked bottom platform. One entirely interior the other coming out on the exit side approx. 1/16" The staples are not numbered but are well marked. These two indications are the same as previously reported.		✓
Steeples L-4	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
Daniel L. Spooner	May 5, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- As per (W)	May 5, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Steeples where blades were removed "A" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	gloss Bead Blasted & clean

9 TYPE OF PARTICLES: ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER:	12 TYPE:
magnaflux	20 A

13 MAGNETIZATION:
☐ COIL _____ AMPERE TURNS
☐ PROD _____ SPACING _____ AMPS
☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES
☐ RESIDUAL ☐ YOKE _____
X Special See Dwg on Back

14 CURRENT:
☐ AC
☐ DC
☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Spooner, T. Byers, D. Fowler, S. Zimmerman	II, A, I, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeples L-3	Two steeples cracked bottom section. One entirely interior the other coming out on the exit side approx. 1/16". The blades D.S. The steeples are not numbered but are well marked		✓
steeples L-4	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 5, 1978

MAGNETIC PARTICLE INSPECTION REPORT

NDT – MT – FORM 1

VIRGINIA ELECTRIC AND POWER COMPANY

- 885.82

STATION: 1	SYSTEM: 2	PROCEDURE: 3	DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 5, 1978

ITEM, COMPONENT INSPECTED: 5 — "A" Rotor blade roots removed from rotor

MAINTENANCE REPORT NO: 6 — NA

MATERIAL: 7 — Alloy Steel

SURFACE CONDITION: 8 — Sand blasted & clean

TYPE OF PARTICLES: 9 — ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

BATCH NO: 10

MANUFACTURER: 11 — Magnaflux

TYPE: 12 — 20A

MAGNETIZATION: 13
- ☐ COIL 800 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

CURRENT: 14
- ☐ AC
- ☐ DC
- ☑ HWDC

TEST PERFORMED BY: 15 — D. Dickens & A. Hamel

LEVEL OF CERTIFICATION: 16 — I, I

AREA INSPECTED 17	SIZE AND LOCATION OF INDICATIONS 18	ACCEPT 19	REJECT 20
Row L-3	NRI	✓	
Row L-4	Blades 40 and 147 Crack in root		✓

DISPOSITION OF REJECTED INDICATIONS: 21

AUTHORIZED INSPECTOR: 22 — David L. Lam

DATE: 23 — [illegible]

≠ 885.80

LIQUID PENETRANT INSPECTION REPORT
NDT – PT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Sherwin	Turbine	NDT – PT – 13.1	May 6 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
#4 Rotor	SI-8042009

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	Sand Blasted As Welded.

	9 MANUFACTURER	10 TYPE	11 BATCH NO.
CLEANER	WATER	–	–
PENETRANT	Sherwin	HM-3	16E316H
EMULSIFIER	N/A	N/A	N/A
REMOVER	WATER	–	–
DEVELOPER	Sherwin	D 100	P.659

12 TYPE OF PENETRANT:
- [X] WATER SOLUBLE
- [X] FLUORESCENT
- [ ] VISIBLE RED DYE
- [ ] SOLVENT REMOVABLE
- [ ] POST EMULSIFIABLE

13 PENETRANT APPLICATION:	14 PENETRANT DWELL TIME:	15 TEMP:	16 EMULSIFIER DWELL TIME:
[ ] DIPPING [X] SPRAYING [ ] BRUSHING	20 MIN.	70 OF	N/A MIN.

17 REMOVAL TECHNIQUE FOR EXCESS PENETRANT:	18 DRYING TIME:	19 TEMP:
[X] FLOWING WATER [ ] WIPED SOLVENT [ ] WIPED WATER [ ] DIP CLEANING	7 MIN.	70 OF

20 DEVELOPER APPLICATION:	21 DEVELOPING TIME:	22 TEMP:
[ ] DIPPING [X] SPRAYING [ ] BRUSHING	10 MIN.	70 OF

23 TEST PERFORMED BY:	24 LEVEL OF CERTIFICATION:
Fowler Zimmerman, Bowers Friel	I - A - II

25 AREA INSPECTED	26 SIZE AND LOCATION OF INDICATIONS	27 ACCEPT	28 REJECT
L-1 Row Under	Linears in Welds 76, 77		X
Shroud Welds	83, 153, 157, 160, 155, 167		X
L-4 Row Under	Weld on #4 & 24 Linears		X
Shroud Weld.			
L-3	No Reportable Indications	✓	
L-1 Gen End	No Reportable Indications	✓	

29 DISPOSITION OF REJECTED INDICATIONS:

30 AUTHORIZED INSPECTOR:	31 DATE:
[signature]	May 7 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 8, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Steeples L-4 Row Gen. End "A" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	glass bead blasted & clean

9 TYPE OF PARTICLES: ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:
- ☑ COIL 1500 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Spooner, S. Zimmerman	II, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple 107-108	Cracked Top land Convex side approx. 1¼" long		✓
Steeple 144-145	NRI.	✓	
Steeple 145-146	Cracked across face exit side and down concave and convex sides approx. 5/8" at top land		✓

21 DISPOSITION OF REJECTED INDICATIONS:

Note these Steeples were previously reported as damaged on Visual report. Steeple 144-145 is damaged as reported in that report, no MT indications

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 8, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 10, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Steeples where blades were removed "A" Rotor	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	glass bead Blasted & clean

9 TYPE OF PARTICLES: ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER:	12 TYPE:
magnaflux	2DA

13 MAGNETIZATION:
- ☑ COIL 1200 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☐ CIRCULAR _____ AMPERES
- ☐ YOKE _____
- ☑ CONTINUOUS
- ☐ RESIDUAL

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Spooner	II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-3 Gen. End	In investigating the two cracked steeples previously reported Two more were seen adjacent to Blade 13 and 15 in L-2 Row. The entire area where blades had not been put back in was checked and no additional cracks were found. Awaiting removal of Blades to re-check rest of steeples		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 10, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

STATION: 1	SYSTEM: 2	PROCEDURE: 3	DATE: 4
SURRY	L.P. TURBINE	NDT-MT- 12.1	May 11, 1978

ITEM, COMPONENT INSPECTED: 5 — "A" ROTOR

MAINTENANCE REPORT NO: 6

MATERIAL: 7 — Alloy steel

SURFACE CONDITION: 8 — Sandblasted & Clean

TYPE OF PARTICLES: 9 — ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

BATCH NO: 10

MANUFACTURER: 11 — Magnaflux

TYPE: 12 — 20A

MAGNETIZATION: 13
- ☑ COIL 1000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

CURRENT: 14
- ☐ AC
- ☐ DC
- ☑ HWDC

TEST PERFORMED BY: 15 — Dickens

LEVEL OF CERTIFICATION: 16 — I

AREA INSPECTED 17	SIZE AND LOCATION OF INDICATIONS 18	ACCEPT 19	REJECT 20
Row L-4 Gov. End "A" ROTOR	BLADE # 155 ck 7/8" long in top root extending thru side		✓

DISPOSITION OF REJECTED INDICATIONS: 21

AUTHORIZED INSPECTOR: 22 — Merril L. Sooner MT LEVEL II

DATE: 23 — May 11, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT – MT – 12.1	May 11, 1978

5 ITEM, COMPONENT INSPECTED: Steeples where blades were removed "A" Rotor

6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: alloy steel

8 SURFACE CONDITION: Glass bead blasted & clean

9 TYPE OF PARTICLES: ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER: magna flux

12 TYPE: 20A

13 MAGNETIZATION:
- ☑ COIL 2000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY: D. Spooner, D. Fowler, D. Dickens, A. Hamel, T. Gibson

16 LEVEL OF CERTIFICATION: II, I, I, I, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-4 Gen. End	NRI	✓	
Row L-4 Gen. End	This is the 2nd MT of this row no further indications than those previously reported		✓
Row L-3 Gen. End	The following steeples are PLATFORMS cracked, the blade No.'s are the corresponding blade in Row L-2 4, 10, 12, 14, 19 154, 155 – This is the second M.T. of this Row.		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR: David L. Spooner

23 DATE: May 11, 1978

885.79

VISUAL INSPECTION REPORT
NDT – VT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1	2	3	4
Surry #1	SYSTEM: L.P. Turbine	PROCEDURE: NDT-VT-15.1	DATE: May 13, 1978

ITEM, COMPONENT INSPECTED: 5 — Steeples where blades were removed "A" rotor

MAINTENANCE REPORT NO: 6 — NA

VISUAL AIDS: 7 — Flashlight, mirror, 6" scale

PERFORMED BY: 8 — D. Spooner

LEVEL OF CERTIFICATION: 9 — II

INDICATIONS NOTED: 10 — ☑ YES ☐ NO

INDICATIONS

11 AREA INSPECTED	12 DESCRIPTION OF INDICATIONS (SIZE, TYPE, AND LOCATION)	13 ACCEPT	14 REJECT
Row L-3 Gen. End.	Steeple across from blade #11 L-2 row has ground area on top of bottom serration. 3/16" from Ext end on Concave side. Area is 3/4" long by 3/16" wide by approx. 1/8" deep. see attached sketch		✓

DISPOSITION OF REJECTED INDICATIONS. 15

AUTHORIZED INSPECTOR: 16 — David L. Spooner

DATE: 17 — May 13, 1978

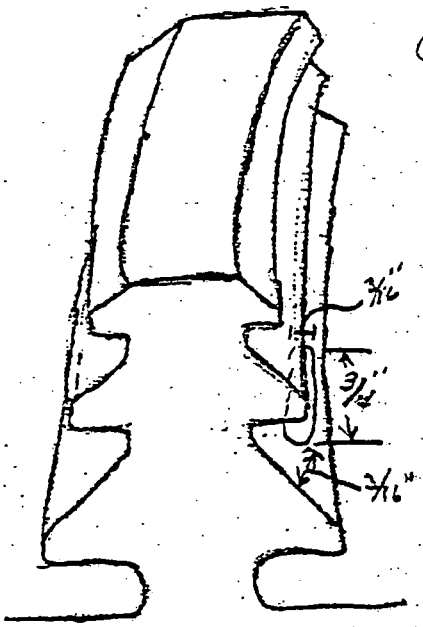
STEEPLE DISTRESS SUMMARY

RUN | SIN END | STEEPLE

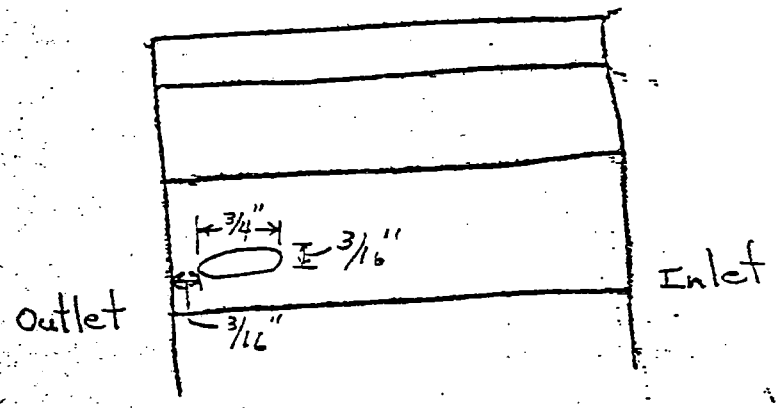
S.O. | UNIT | DATE

Draw in indication (and/or) what we have explored, metal removed. We need the length, width, depth.

across from blade #11 L-2 row

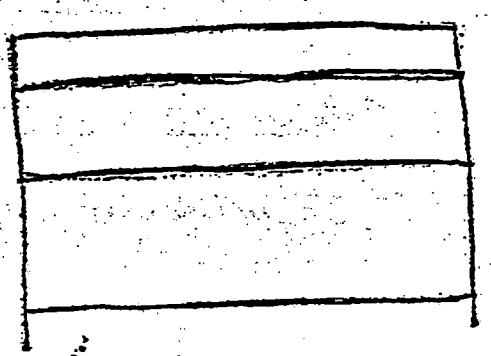


OUTLET SIDE

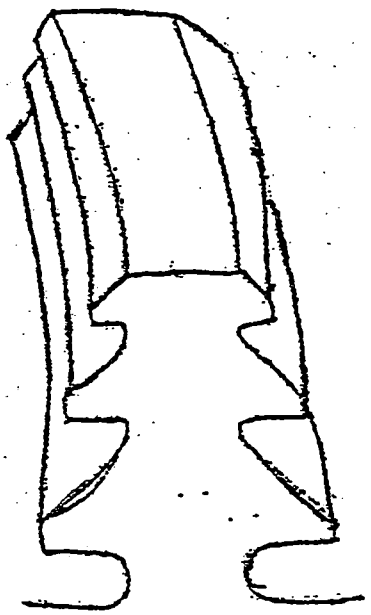


~~CONCAVE SIDE~~

Ground area on top of bottom serration approx. 1/8" deep



CONVEX SIDE



INLET SIDE

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- 12.4	May 16, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Steeples where blades were removed "A" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	glass bead blasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL _____ AMPERE TURNS ☐ PROD _____ SPACING _____ AMPS ☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES ☐ RESIDUAL ☑ YOKE Parker Probe	☐ AC ☐ DC ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Fowler & D. Spooner	I & II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
L-3 Conv. End	Steeples 48-49, 49-50, 170-171 have crack indications on the concave side. Steeple 169-170, 171-172, 172-173, 173-174 have pitting lined up that could be masking a crack. Steeple 48-49 also has some smeared metal from blade removal		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 16, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	Turbine	NDT – MT – 12.1	19 MAY 1978

5 ITEM, COMPONENT INSPECTED: Unit #1 "A" Rotor Governor End L-3 Stage Steeples

6 MAINTENANCE REPORT NO: 5180/200909

7 MATERIAL: Metal Alloy

8 SURFACE CONDITION: Clean / Glass bead blasted

9 TYPE OF PARTICLES: ☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT

10 BATCH NO: N/A

11 MANUFACTURER: MAGNAFLUX

12 TYPE: 20-A

13 MAGNETIZATION:
- ☒ COIL 2000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☐ CIRCULAR _____ AMPERES
- ☐ YOKE _____
- ☒ CONTINUOUS
- ☐ RESIDUAL

14 CURRENT:
- ☐ AC
- ☐ DC
- ☒ HWDC

15 TEST PERFORMED BY: Herman P. Hamel / Lloyd T. Gibson / Thomas Bowers

16 LEVEL OF CERTIFICATION: I / A / A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple # 165	INDICATION IN CONVEX AREA BACK LAND 5/16"		X
Steeple # 173	INDICATION IN CONCAVE AREA NEAR RADIUS 1/2"		X
Steeple # 181	1/8" INDICATION ON FACE OF STEEPLE INLET SIDE		X
Steeple # 140	FAINT (2) INDICATION IN CONCAVE AREA NEAR RADIUS 1"		X
Steeple # 209	INDICATION IN CONCAVE AREA NEAR RADIUS 5/16"		X
Steeple # 116	FAINT INDICATION IN CONCAVE AREA NEAR RADIUS		X
Steeple # 105	INDICATION IN CONCAVE AREA NEAR RADIUS 3/4"		X
Steeple # 102	INDICATION IN CONCAVE AREA NEAR RADIUS 1 1/2"		X
Steeple # 101	INDICATION IN CONCAVE AREA NEAR RADIUS 1/2"		X
Steeple # 100	INDICATION IN CONCAVE AREA NEAR RADIUS 2"		X
Steeple # 99	INDICATION IN CONCAVE AREA ADA NEAR RADIUS 3/4"		X
Steeple # 91	INDICATION IN CONCAVE AREA NEAR RADIUS 1/2"		X
Steeple # 90	INDICATION IN CONCAVE AREA NEAR RADIUS 1 1/2"		X

21 DISPOSITION OF REJECTED INDICATIONS:

Continued on page 2

22 AUTHORIZED INSPECTOR: David L. Spooner MT Level II

23 DATE: May 19, 1978

885.83

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	Turbine	NDT – MT – 12.1	19 MAY 1978

5 ITEM, COMPONENT INSPECTED: Unit #1 "A" Rotor Governor End L-3 Stage Steeples

6 MAINTENANCE REPORT NO: 51804 200909

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
Steeple #87	Indication in concave area near Radius 2"		X
Steeple #79	Faint indication in concave area near Radius 2"		X
Steeple #77	Indication in concave area near Radius 1½"		X
Steeple #69	Faint indication in concave area near Radius ½"		X
Steeple #68	Faint indication in concave area near Radius ½"		X
Steeple #67	Faint indication in concave area near Radius ¼"		X
Steeple #64	Faint indication in concave area near Radius 1"		X
Steeple #61	Faint indication in concave area near Radius 1½"		X
Steeple #49	Faint indication in concave area near Radius 1"		X
Steeple #48	Faint indication in concave area near Radius ½"		X
Steeple #47	Faint indication in concave area near Radius 1½"		X
Steeple #44	Faint indication in concave area near Radius ½"		X
Steeple #43	Faint indication in concave area near Radius 1"		X
Steeple #42	Faint indication in concave area near Radius ½"		X
Steeple #35	Faint indication in concave area near Radius ½"		X
Steeple #18	Faint indication in concave area near Radius ¼"		X
Steeple #230	Faint indication in concave area near Radius ½"		X

DISPOSITION OF REJECTED INDICATIONS:

AUTHORIZED INSPECTOR: David L. Spooner MT Level II — 12 DATE: 13 May 19, 1978

ATTACH TO "LIQUID PENETRANT INSPECTION REPORT"

NDT COPY

LIQUID PENETRANT INSPECTION REPORT
NDT – PT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE: NDT-PT-	4 DATE:
SURRY	TURBINE	13.1	22 May 1978

5 ITEM, COMPONENT INSPECTED: UNIT #1 "B" ROTOR L-4 STAGE GOVERNOR END

6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: Metal Alloy

8 SURFACE CONDITION: Clean

	9 MANUFACTURER	10 TYPE	11 BATCH NO.
CLEANER	SHERWIN	DR 60	4J 712H
PENETRANT	SHERWIN	DP-51	47K629H
EMULSIFIER	N/A	N/A	N/A
REMOVER	SHERWIN	DR-60	4J 712H
DEVELOPER	SHERWIN	D-100	616281H

12 TYPE OF PENETRANT:
- ☐ WATER SOLUBLE
- ☐ FLUORESCENT
- ☒ VISIBLE RED DYE
- ☒ SOLVENT REMOVABLE
- ☐ POST EMULSIFIABLE

13 PENETRANT APPLICATION: ☐ DIPPING ☒ SPRAYING ☐ BRUSHING

14 PENETRANT DWELL TIME: 7 MIN.

15 TEMP: 75° OF

16 EMULSIFIER DWELL TIME: N/A MIN.

17 REMOVAL TECHNIQUE FOR EXCESS PENETRANT: ☐ FLOWING WATER ☒ WIPED SOLVENT ☐ WIPED WATER ☐ DIP CLEANING

18 DRYING TIME: 7 MIN.

19 TEMP: 75° OF

20 DEVELOPER APPLICATION: ☐ DIPPING ☒ SPRAYING ☐ BRUSHING

21 DEVELOPING TIME: 15 MIN.

22 TEMP: 75° OF

23 TEST PERFORMED BY: ARMAND P. HAMEL / DAVID DICKENS

24 LEVEL OF CERTIFICATION: II / II

25 AREA INSPECTED	26 SIZE AND LOCATION OF INDICATIONS	27 ACCEPT	28 REJECT
Area inside Hub behind seal land on Steeple #179	2 – 1/32" Rounded indications 1/4" APART which appear to be POROSITY IN THE Metal		X

29 DISPOSITION OF REJECTED INDICATIONS:
These indications appear to be directly behind A crack that was found in the Disk and ground .200 deep, the crack is still there.

AUTHORIZED INSPECTOR: Armand P. Hamel

30

31 DATE: 22 May 1978

ORIGINAL TO DON TAYLOR

885.79

VISUAL INSPECTION REPORT
NDT – VT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1	2	3	4
Surry #1	SYSTEM: L.P. Turbine	PROCEDURE: NDT-VT-15.1	DATE: May 3, 1978

ITEM, COMPONENT INSPECTED: "B" Rotor — 5

MAINTENANCE REPORT NO: NA — 6

VISUAL AIDS: Flashlight & mirror — 7

PERFORMED BY: D. Spooner, D. Fowler, A. Hamel, D. Ockers — 8

LEVEL OF CERTIFICATION: II, II, II, II — 9

INDICATIONS NOTED: ☑ YES ☐ NO — 10

INDICATIONS

11 AREA INSPECTED	12 DESCRIPTION OF INDICATIONS (SIZE, TYPE, AND LOCATION)	13 ACCEPT	14 REJECT
Row L-3 Gov. End	Blades #145, 62, 63, 39 & 74 & 143 have cracks in undershroud weld		✓
	Staples between Blades 168-169, 15-16, 57-58, & 58-59 have visual indication of cracks. Unable to get any indication with mag particle. Indications judged to be erosion & pitting	✓	

DISPOSITION OF REJECTED INDICATIONS. — 15

AUTHORIZED INSPECTOR: David L. Spooner — 16

DATE: May 3, 1978 — 17

= 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 3, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	N/A

7 MATERIAL:	8 SURFACE CONDITION:
alloy Steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:
- ☑ COIL 2000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Spooner, D. Fowler, D. Dickens, A. Hamel	II, I, I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Blading Row L-3 Gov. End	Blade 180 crack in root exit side. Blade 35, 71 & 142 crack in root entry side		✓
	Roton Disc. below blades 67-68 had an indication appearing to be magnetic writing. However De-mag and emery cloth would not remove indication. Should be investigated further when blades are removed.		

21 DISPOSITION OF REJECTED INDICATIONS:

INDICATION ID ROTON DISC WAS GROUND OUT LIGHTLY – RE-INSPECTED M.T. AND U.T. INDICATION WAS REMOVED.

J.P Mongeau
5-4-78

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 3, 1978

886.83

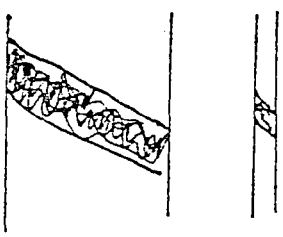
MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT – MT – 2.1	3-16-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #2 ROTOR L-4 GENERATOR END	5100220414

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
BLADE END SHROUD # 207	LINEAR ON SHROUD WELD BETWEEN		
# 208	BLADE NO. # 207 & # 208		✓

11 DISPOSITION OF REJECTED INDICATIONS:



ACCEPT per P.T. REPORT 3-18-80 JM

AUTHORIZED INSPECTOR: 12 William Frey II

13 DATE: 3-16-80

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

* 885.82

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT – MT – 12.1	3-18-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #2 ROTOR L-4 GENERATOR EXC	S100221041 4

7 MATERIAL:	8 SURFACE CONDITION:
ALLOY CARBON STEEL	GROUND & CLEAN

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	5G002

11 MANUFACTURER:	12 TYPE:
MAGNAFLUX	20 A

13 MAGNETIZATION:		14 CURRENT:
	☑ COIL 2400 AMPERE TURNS	
	☐ PROD _____ SPACING _____ AMPS	
☑ CONTINUOUS	☐ CIRCULAR _____ AMPERES	☐ AC
☐ RESIDUAL	☐ YOKE _____	☐ DC
		☑ ~~HWDC~~

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
T. GIBSON / W. FONG	A / II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
DISC RIM BY BLADE #104	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

Removed indication per (W) Direction.

22 AUTHORIZED INSPECTOR:	23 DATE:
William Fong II	3-18-80

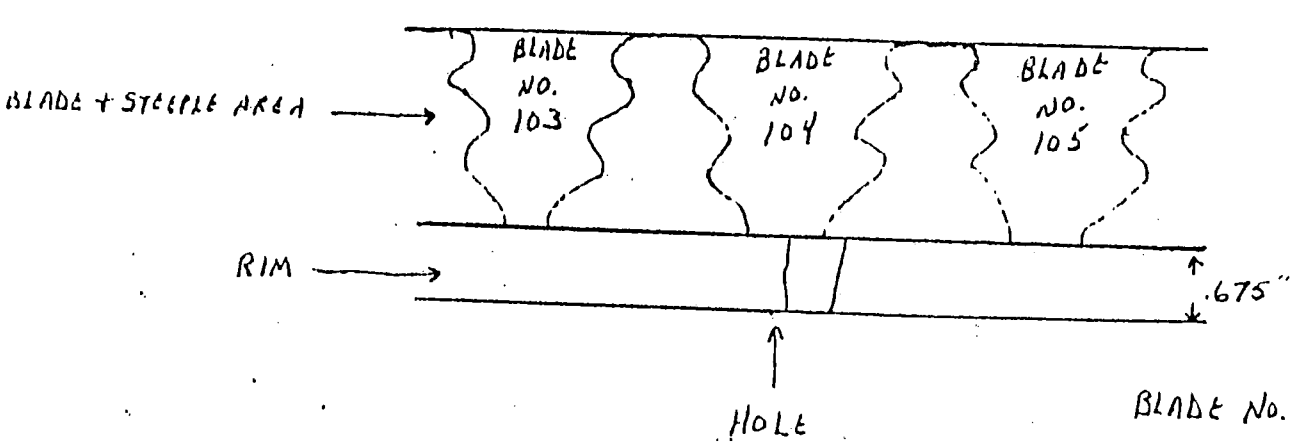
SURRY POWER STATION

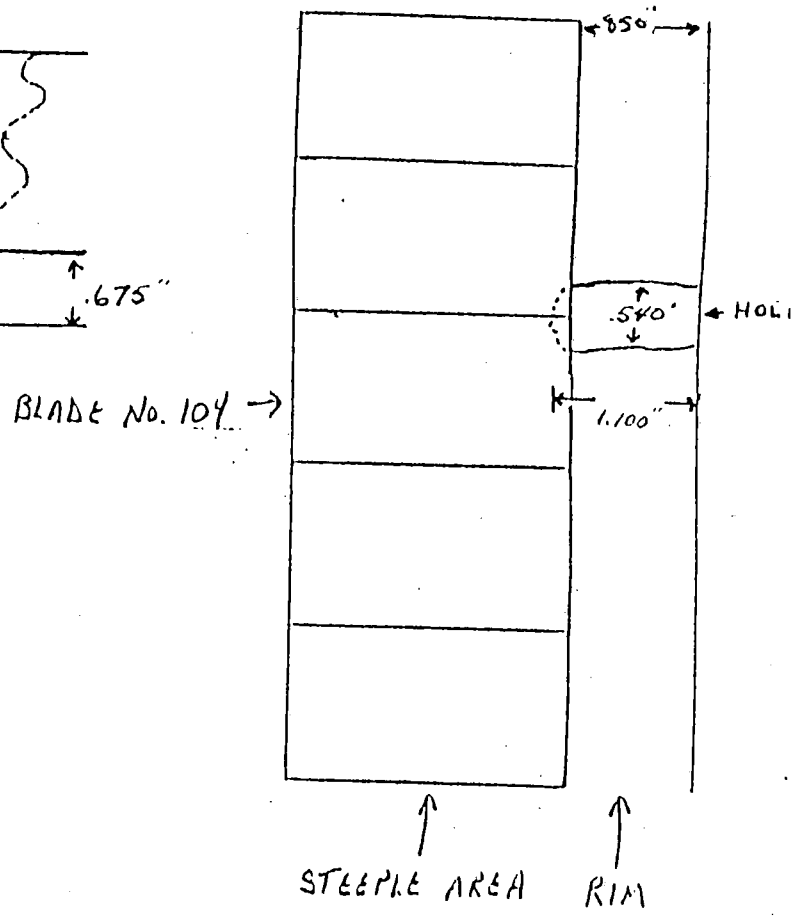
ROTOR NO. 3

ROW NO. 1-4

DATE: 3-18-

GEN. END





≈ 895.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT – MT – 12.1	3-16-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #2 ROTOR L-4 GENERATOR END	S1002210414

7 MATERIAL:	8 SURFACE CONDITION:
ALLOY CARBON STEEL	BLAST CLEAN

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	5G002

11 MANUFACTURER:	12 TYPE:
MAGNAFLUX	20 A

13 MAGNETIZATION:
- ☑ COIL 2400 - 3600 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
G. HERRERA / T. GIBSON / P. COLBY / W. FONG	I / A / II / II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
DISC AREA	NRI	✓	
DISC RIM	TWO LINEAR INDICATION .200", .400" ON		
	RIM BY BLADE NO. 104. SEE DRAWING		✓
	NO. 1		

21 DISPOSITION OF REJECTED INDICATIONS:

4 INDICATIONS REMOVED BY GRINDING IN (4) DIRECTIONS SEE M.T. REPORT 3-18-80. JPM

22 AUTHORIZED INSPECTOR:	23 DATE:
William Fong II	3-16-80

UNIT NO. 1

SURRY POWER STATION

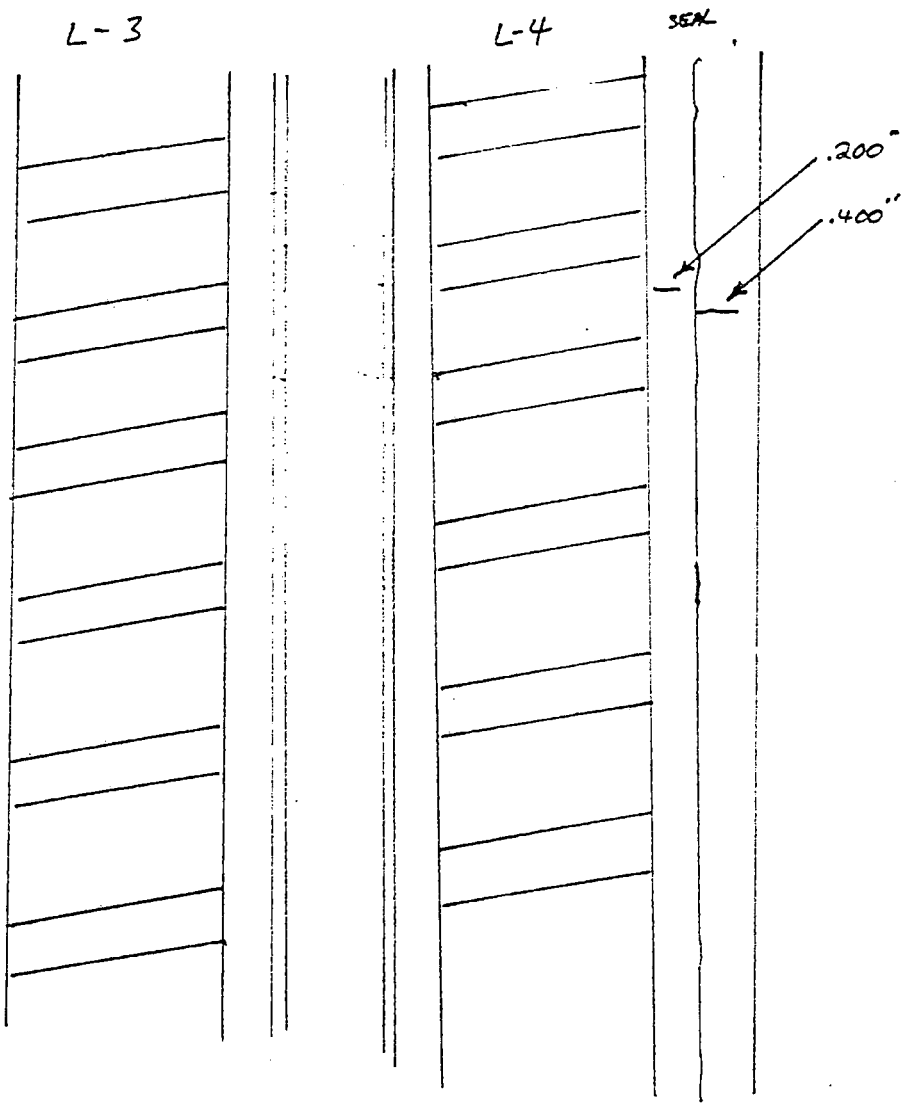
ROTOR NO. 2

ROW NO. L4

STEEPLE NO. 104

DRAWING NO. 1

DATE 3-16-80



L-4 GENERATOR END

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

≈ 885.82

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	LP TURBINE	NDT – MT – 12.1	3-15-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #2 ROTOR L-4 GOUERNOR END	S10022/0414

7 MATERIAL:	8 SURFACE CONDITION:
ALLOY CARBON STEEL	GLASS BEAD BLAST CLEAN

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	5G002

11 MANUFACTURER:	12 TYPE:
MAGNAFLUX	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2400-3600 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS	☑ HWDC
☐ CIRCULAR _____ AMPERES	
☐ RESIDUAL	
☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
T. GIBSON / J. DALTON / W. FONG	A / A / II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
* STEEPLE # 194	INLET ROTOR STEEPLE FACE HAS 3/8"		
	LINEAR INDICATION SEE DRAWING #1		✓
DISC AREA	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

* DEFERRED TO (3) yr

22 AUTHORIZED INSPECTOR:	23 DATE:
William Fong II	3-15-80

UNIT NO. 1

SURRY POWER STATION

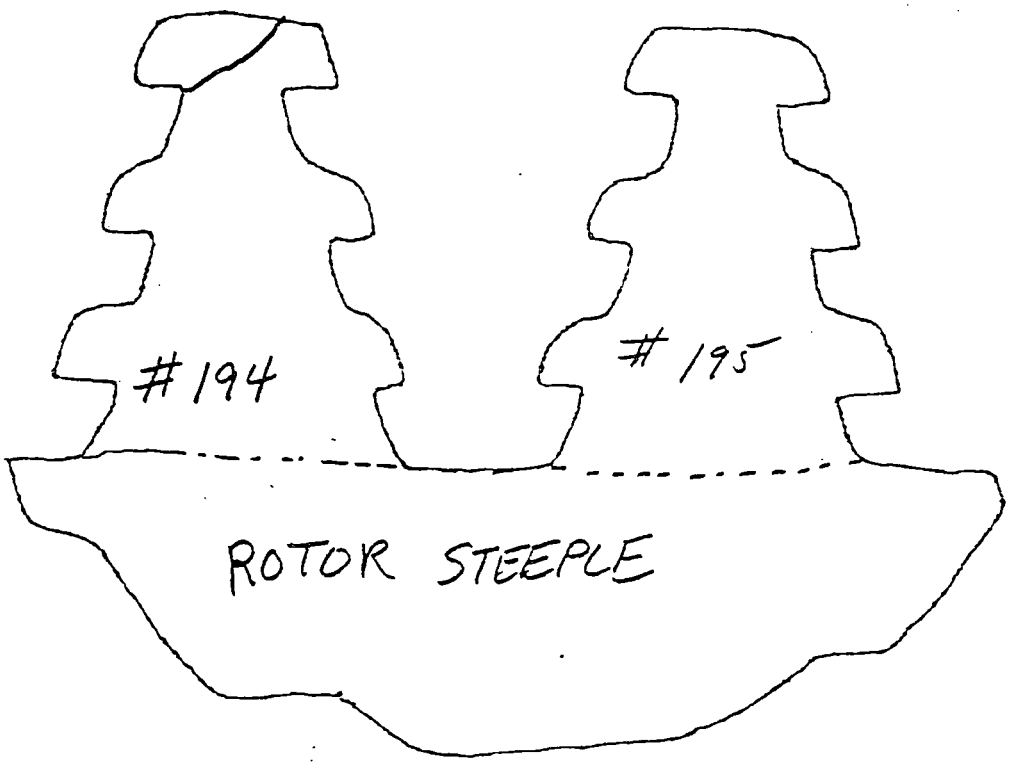
ROTOR NO. 2

ROW NO. L-4

STEEPLE NO. 194

DRAWING NO. 1

DATE 3-15-80



ID # : DO81102501

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP#
5. LOCATION GOV
6. DISC#
7. TEST NO. TD29568

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

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

[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 .010 b,c,e

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

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

3. Max. expected Keyway Crack size (in) [ ] b,c,e

4. Ratio A/A - CR - OS

Appendix C to Attachment 3

ID # : D081102501

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 2
7. TEST NO. TD35160

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD
(MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

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

3. Max. expected Keyway Crack size (in) - [ ]b,c,e

4. Ratio A/A - CR - OS

ID # : D08110250I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 3
7. TEST NO. TD35164

B. MATERIAL PROPERTIES (HUB)
1. TYPE VT
(MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

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

G-2' = [ ] b,c,e

3. Max. expected Keyway Crack size (in) - [ ] b,c,e

4. Ratio A/A - CR - OS

ID # : D08110250I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 4
7. TEST NO. TD23458

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD
(MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI•SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI•SQRT(IN.))

[ ] b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

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

G-2' = [ ] b,c,e

3. Max. expected Keyway Crack size (in) - [ ] b,c,e

4. Ratio A/A - CR - OS

ID # : D08110250I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 5
7. TEST NO. TD23437

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e VS
(MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e
4. RATIO A/A - CR - OS

ID # : 0081102501

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 6
7. TEST NO. TD5869

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD
(MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))
[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))
[ ] b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

NI	AS	SB	SN	AL	CU	S
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : DD8110250Z

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP#
5. LOCATION GEN
6. DISC#
7. TEST NO. TD26058

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD
(MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

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

[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

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA

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

3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e

4. RATIO A/A - CR - OS

ID # : D08110250Z

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 2
7. TEST NO. TD29573

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

NI	AS	SB	SN	AL	CU	S
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1600	(KSI)
2. 2160 (120%)	(KSI) [ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.) [ ] b,c,e,

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : D0811025O2

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 3
7. TEST NO. TD35363

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e VT
(MIN. Y.S. (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ]b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e

NI	AS	SB	SN	AL	CU	S
[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ]b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e
4. RATIO A/A - CR - OS

ID # : D08110250Z

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 4
7. TEST NO. TD23454

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

NI	AS	SB	SN	AL	CU	S
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)

[ ] b,c,e

G-2' = [ ] b,c,e

3. MAX EXPECTED KEYWAY CRACK SIZE (IN)

[ ] b,c,e

4. RATIO A/A - DR - OS

ID # : D081102502

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 5
7. TEST NO. TD23432

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD
(MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))
[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
[ ]b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))
[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e
4. RATIO A/A - CR - OS

ID # : D0811025O2

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 6
7. TEST NO. TD5870

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TC
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

b,c,e

[ ]b,c,e

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

[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

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1600	(KSI)	[ ]b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e
4. RATIO A/A - CR - OS

ID # : 0081102503

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 1
7. TEST NO. TD29566

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD
(MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))
[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))
[ ] b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

NI	AS	SB	SN	AL	CU	S
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

E. BORE STRESS

	SPEED (RPM)	STRESS	
1.	1600	(KSI)	[ ] b,c,e
2.	2160 (120%)	(KSI)	

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : D08110250 3

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 2
7. TEST NO. TD35158

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2 = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e
4. RATIO A/A - CR - OS

ID # : D081102503

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 3
7. TEST NO. TD35162

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI)) VT
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

b,c,e [ ] b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : 0081102503

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 4
7. TEST NO. TD23451

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ] b,c,e (KSI)) TD
2. SUPPLIER: HIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)

b,c,e

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

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	
[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	

E. BORE STRESS

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

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : 0081102503

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 5
7. TEST NO. TD23441

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI) [ ]b,c,e
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI) [ ]b,c,e
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e

NI	AS	SB	SN	AL	CU	S
[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ]b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e
4. RATIO A/A - CR - OS

ID # : D08110250З

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 6
7. TEST NO. TD18613

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

NI	AS	SB	SN	AL	CU	S
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : D08110250H

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 1
7. TEST NO. TD35153

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ] b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

NI	AS	SB	SN	AL	CU	S
[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e

E. BORE STRESS

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

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : D0811025O4

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	81
2. UNIT	SURRY #1
3. CUSTOMER:	VEPCO
4. LP#	2
5. LOCATION	GEN
6. DISC#	2
7. TEST NO.	TD35159

B. MATERIAL PROPERTIES (HUB)

1. TYPE [ ] b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	[
4. U.T.S. (KSI)	
5. ELONGATION	
6. R.A.	
7. FATT (DEG.F)	
8. R.T. IMPACT(FT.LB.)	
9. U.S. IMPACT TEMP. (DEG.F)	
10. U.S. IMPACT ENG. (FT.LB.)	
11. U.S. KIC (KSI*SQRT(IN.))	] b,c,e

C. MATERIAL PROPERTIES (RIM)

b,c,e

1. Y.S. (KSI)	[
2. U.T.S. (KSI)	
3. ELONGATION	
4. R.A.	
5. FATT (DEG.F)	
6. R.T. IMPACT(FT.LB.)	-
7. U.S. IMPACT TEMP. (DEG.F)	
8. U.S. IMPACT ENG. (FT.LB.)	
9. U.S. KIC (KSI*SQRT(IN.))	] b,c,e

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		
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		

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	[ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)	G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)	[ ] b,c,e
4. RATIO A/A - CR - OS	

ID # : D081102504

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 3
7. TEST NO. TD35163

B. MATERIAL PROPERTIES (HUB)

1. TYPE [ ] b,c,e VT
(MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [.009] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS [ ]

ID # : D08110250⁴

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 4
7. TEST NO. TD35371

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

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

[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

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

ID # : D0811025O4

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 5
7. TEST NO. TD23433

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

SPEED (RPH)	STRESS	
1: 1800	(KSI)	[ ]b,c,e
2: 2160 (120%)	(KSI)	

F. CRACK DATA

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

G. SERVICE DATA

1: OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2: ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e

3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]b,c,e

4. RATIO A/A - CR - OS

ID # ; D081102504

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #1
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 6
7. TEST NO. TD24062

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ] b,c,e TD
(MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

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

[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

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ] b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ] b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ] b,c,e
4. RATIO A/A - CR - OS

Attachment 4

SURRY 2

Vepco's Responses to
SITE SPECIFIC GENERAL QUESTIONS
on Turbine Disc Integrity
Surry Power Station, Unit 2

I. Provide the following information for each LP turbine:

I.A. Turbine type

The Virginia Electric and Power Company Surry No. 2 unit has one tandem compound four flow, three casing, condensing, 1800 rpm turbine using 44-inch last-row blades in each low-pressure element. The low-pressure element is designated a Building Block 81.

I.B. Number of hours of operation for each LP turbine at time of last turbine inspection or if not inspected, postulated to inspection

The number of hours of operation from beginning of operation until February 24, 1979, when the current outage began, is 33,996.

I.C. Number of turbine trips and overspeeds

There have been fifty (50) turbine trips. There has been one (1) overspeed, which was intentional for the purpose of verifying the overspeed setpoint.

I.D. For each disc:

I.D.1. Type of material including material specifications

The material is Ni-Cr-Mo-V steel similar to ASTM-A-471. The minimum yield strength specified for each disc is given in Section B[1] of Appendix A to this Attachment 4.

I.D.2. Tensile properties data

Tensile properties data of tests taken from the disc hub and rim material are given in Sections B and C, respectively, of Appendix A to this Attachment 4.

I.D.3. Toughness properties data including Fracture Appearance Transition Temperature and upper energy and temperature

Toughness properties for the disc hub and rim are given in Sections B and C, respectively, of Appendix A to this Attachment 4. The upper shelf energy is not presented in this Attachment 4 when it is the same as the room temperature energy.

I.D.4. Keyway temperatures

The keyway temperatures are presented in Section G of Appendix A to this Attachment 4. The temperatures given are the calculated temperatures two inches from the exhaust

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1/Note that the first 24 pages of Appendix A consist of Westinghouse computer print-outs, each with separate sections A through G. (For example, Section A is "Unit Identification.") It is to those sections we refer when we cite, for example, Section B of Appendix A to Attachment 3.

face of the disc at the bore during full-load operation with all moisture separator reheaters in service.

I.D.5. Calculated keyway crack size for turbine specified in "B" above

The calculated maximum keyway crack size is designated item G-3, in keeping with the notation suggested by Westinghouse, and is found in Appendix A to this Attachment 4. G-3 is calculated by multiplying the number of hours of operation (see I.B above) by the crack growth rate da/dt. The crack growth rate is calculated as described in the response to I.D.8 below.

I.D.6 Critical crack size

The critical crack size at 1800 rpm and at design (120%) overspeed is given in Section F of Appendix A to this Attachment 4.

I.D.7. Ratio of calculated crack to critical crack sizes

The ratio of calculated crack size to critical crack size, $a/a_{cr}(eff)$, is designated G-4 and given in Appendix A to this Attachment 4. This number is calculated simply by dividing item G-3 by item F-2.

I.D.8. Crack growth rate

The crack growth rate is given as G-2' in Appendix A to this Attachment 4. These crack growth rates are the maximum expected rates based on known cracks to date.

Westinghouse has changed the basis for determining these rates to use the NRC "gray book" operating hours. The NRC value for the crack growth rate is given as item G-2 on the computer print-outs (first 24 pages of Appendix A to this Attachment 4). Because Westinghouse's crack growth rates over the relevant range are consistently larger than the NRC values, however, the G-2 numbers from the print-outs have been multiplied by a factor, provided in Appendix A, to yield the more conservative G-2' figures, which are also given in Appendix A.

Westinghouse's opinion is that the crack growth rate of disc numbers 1 and 6 for Surry 2 should be assumed to be zero because these discs operate dry under normal conditions. However, to be conservative (and consistent with the calculations for the other discs), Vepco has calculated a crack size for disc numbers 1 and 6, using the same methods as for the other discs.

I.D.9. Calculated bore and keyway stress at operating speed and design overspeed

The bore tangential stresses at 1800 rpm and at design overspeed are given in Section E of Appendix A to this Attachment 4. The values presented include the stresses due to shrink fit and centrifugal force loads only. Additional analysis to include thermal stresses and pressure stresses are being made but are not yet available.

Westinghouse has not provided the keyway stresses, because Westinghouse's analysis assumes that the keyway is part of the crack, and so the only significant stress is the bore stress.

I.D.10. Calculated K_{IC} data

The fracture toughness, K_{IC}, of each disc is calculated from the Charpy v-notch and tensile data. The values, presented in Section B and C of Appendix A to this Attachment 4, are calculated at the upper shelf temperature or room temperature, whichever gives the lower result.

I.D.11. Minimum yield strength specified for each disc

The values for minimum yield strength are presented in Section B of Appendix A to this Attachment 4.

II. Provide details of the results of any completed inservice inspection of LP turbine rotors, including areas examined since issuance of an operating license. For each indication detected, provided details of the location of the crack, its orientation, and size.

Surry Unit 2 was put into service[2] in 1973, and a Westinghouse inspection team ultrasonically inspected the Surry 2 LP rotors 13A3295 (LP1) and 13A3296 (LP2) at the Westinghouse Charlotte plant in September 1979. The inspection method used at that time was to inspect ultrasonically all keyways on discs

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2/Initial criticality March 7, 1973; first commercial operation March 11, 1973; full thermal output May 1, 1973.

1 and 2, both ends of each rotor, and to perform an ultrasonic 360° scan on the outlet side of each disc. The inlet scan was completed at the Surry Station in January 1980.

The inspection results for discs 1 and 2 are as follows:

# 1 LP -	Disc #1	Gov. End	No Indications
	Disc #1	Gen. End	No Indications
	Disc #2	Gov. End	No Indications
	Disc #2	Gen. End	.360" Deep Indication (Keyway #2)[3]
# 2 LP -			No Indications

Both rotors were unstacked (discs 3, 4, 5, and 6) at Charlotte in the summer and fall of 1979. During this time, new no. 3 discs were installed and nos. 4, 5 and 6 were restacked. Magnetic particle inspection of the unstacked discs, including the original no. 3 disc, which was scrapped, are as follows:

#1 LP -	Disc #3, 4, 5 & 6	Gov. End	No Indications
	Disc #3, 4, 5 & 6	Gen. End	No Indications
#2 LP -	Disc #4, 5 & 6	Gov. End	No Indications
	Disc #3, 4, 5 & 6	Gen. End	No Indications

3/The #1 LP, Disc #2, Generator End with .360" deep indication (Keyway #2) was repaired.

Disc #3 (scrapped)	Gen. End	.300" Deep Indication (Keyway 2)[4]

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.

See the enclosed report on "Surry #2 Secondary System Chemistry."

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.

Both LP rotors were recently inspected as explained in response to question II above. Vepco's approach to ensure that unacceptable cracking does not occur in the future is based on calculations of the ratio $a/a_{cr}(eff)$ for the worst-case disc in order to be sure that this ratio remains less than unity. A calculation to determine the number of hours that the worst-case disc (disc no. 1, governor end, LP 1) could operate before $a/a_{cr}(eff)$ became unity, using the values of $a_{cr}(eff)$ and da/dt from Appendix A to this Attachment 4, yields a result of 29,098 hours.

4/The #2 LP, Disc #3, Generator End with .300" deep indication (Keyway #3) was replaced.

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.

The plant was recently inspected and all defects were corrected.

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. In the event that such studies have not been made, consideration should be given to scheduling such an action.

An analysis of the turbine missile risk for Surry 2 has been done and provided to the Staff. The analysis can be found in the Final Safety Analysis Report, Supplemental Volume 2, S14.9 dated 10-15-70.

Westinghouse
Proprietary

Surry 2 Secondary System Chemistry

Secondary system chemistry data for Surry Power Station from 1974 through 1979 was reviewed.

Operating specifications, as supplied by Westinghouse Electric Corporation, are shown in Tables I through IV. Prior to January 1975, these units were operated with a coordinated phosphate treatment for corrosion inhibition control of the secondary side. The sodium/phosphate molar ratio, as per Westinghouse's criteria, varied from 2.0 to 2.6, 2.2 to 2.6 and 2.4 to 2.6. All Volatile Treatment was thereafter initiated using ammonium hydroxide, cyclohexylamine or morpholine for pH control. This unit has experienced condenser inleakage. Condenser cooling water is brackish.

A synopsis of the chemistry review follows.

Surry Unit No. 2

1974

- Utilized coordinated phosphate treatment control.
- Table I denotes specifications.
- Main steam average pH was 9.00 $\pm$ 0.2 with the maximum being 9.65. Total averge conductivity was 4.5 mmhos.

- Condensate sodium was 0-10 ppb, 47%; 10-100 ppb, 49%; and greater than 10 ppb, 3% of the time.

- Blowdown chemistry specifications were maintained approximately 80% of the time.

- Condenser inleakage occurred approximately 75% of the operating time.

1975

- Utilized all volatile treatment control using ammonium hydroxide and hydrazine.

- Tables II and III denote specifications.

- Main steam average pH was 8.90 $\pm$ 0.2 with the maximum being 9.80. Total average conductivity was 9.80 mmhos.

- Condensate sodium was 0-10 ppb, 60%; 10-100 ppb, 38%; and greater than 100 ppb, 2% of the time.

- Blowdown chemistry specifications were maintained approximately 25% of the time.

- Condenser inleakage occurred approximately 75% of the operating time.

1976

- Utilized all volatile treatment control using cyclohexylamine and hydrazine.

- Tables II and III denote specifications.

- Main steam average pH was 9.40 $\pm$ 0.2 with the maximum being 10.30. Total average conductivity was 12.0 mmhos.

- Condensate sodium was 0-10 ppb, 60%, 10-100 ppb, 35%; and greater than 100 ppb, 5% of the operating time.

- Steam generator chemistry specifications were maintained approximately 25% of the operating time.

- Condenser inleakage occurred approximately 75% of the operating time.

1977

- Utilized all volatile treatment control using morpholine and hydrazine.
- Tables II and III denote specifications.
- Main steam average pH was 9.0 ± 0.2 with the maximum being 10.3. Total average conductivity was 5.0 mmhos.
- Condensate sodium was 0-10 ppb, 62%; 10-100 ppb, 35%; and greater than 100 ppb 3% of the operating time.
- Steam generator chemistry specifications were maintained approximately 25% of the operating time.
- Condenser inleakage occurred approximately 75% of the operating time.

1978

- Utilized all volatile treatment control using morpholine and hydrazine.
- Tables II, III and IV denote specifications.
- Main steam average pH was 8.9 ± 0.2. Total average conductivity was 3.5 mmhos.
- Condensate sodium was 0-10 ppb, 80%; 10-100 ppb, 33%; and greater than 100 ppb, 2% of the operating time.
- Steam generator chemistry specifications were maintained approximately 40% of the operating time.
- Condenser inleakage occurred approximately 60% of the operating time.

1979

- Unit shutdown February 4, 1979, for the remainder the year for replacement of the steam generators.

NOTE: The following condensate sodium values approximately equate to the indicated condenser inleakage rate on an average:

10 ppb - 0.1 gpm

100 ppb - 1.0 gpm

COORDINATED PHOSPHATE CONTROL

TABLE I

	POWER OPERATION	
	FEEDWATER	BLOWDOWN
pH at 25°C	8.9 - 9.2	8.5 - 10.6
Phosphate, ppm	NA	25-80
Blowdown Rate, gpm	NA	greater than 5 (continuous)
Free Hydroxide	NA	Zero
Dissolved Oxygen, ppm	less than 0.005	less than 0.005
Hydrazine, ppm	greater than 0.01 residual	NA
Chloride, ppm	NA	less than 75
TDS, ppm	NA	less than 125
Susp. Solids, ppm	NA	less than 5.0
Iron & Copper, ppm	less than 0.01	less than 5.0
Silica, ppm	NA	less than 5.0

ALL VOLATILE TREATMENT

TABLE II

	POWER OPERATION BLOWDOWN
pH at 25°C	8.5 - 9.0
Free Hydroxide as ppm $CaCO_3$	less than 0.15
Cation Cond., mmhos at 25°C	less than 2.0
Sodium, ppm	less than 0.10
Chloride, ppm	less than 0.15
Ammonia, ppm	less than 0.25
Diss. Oxygen, ppm	less than 0.005
Silica, ppm	less than 1.0
Suspended Solids, ppm	less than 1.0

TABLE III

LIMITING AVT SPECIFICATIONS FOR
POWER OPERATIONS - BRACKISH WATER SITES

BLOWDOWN

	Two Weeks	24 Hours	Immediate
pH at 25°C	*8.0 - 9.2[1]	NA	< 8.0 or >9.4[1]
Cation Cond., mmhos at 25°C	>*2.0 but ≤120	NA	>120
Free Hydroxide, ppm as $CaCO_3$	NA[2]	>0.15 but <1.0	≥1.0

*Instrumented Measurement Recommended.

N/A Not Applicable.

Comment: Operation beyond the normal AVT specifications is limited as indicated above. Corrective action including shutdown, if necessary, is recommended within the time periods as applicable.

1/An increase of 0.4 pH units to the normal control pH limit of 9.0 will result from a Free Hydroxide concentration of 1.0 ppm as $CaCO_3$. However, pH is not intended to be the Free Hydroxide determinant.

2/No relief for Free Hydroxide over and above the Normal Operating Control Limit is provided for periods in excess of 24 hours.

TABLE IV

Steam Generator Blowdown AVT Specification

Chemistry Parameter	Control	Expected
pH at 25°C	8.5 - 9.0[1]	8.5 - 9.0[1]
Free Hydroxide as ppm $CaCO_3$	0.15	<0.15
Cation Cond., mmhos/cm at 25°C	2.0	<2.0
Chloride, ppm	NA	<0.15[2]
Sodium, ppm	NA	<0.1
NH_3, ppm	NA	<0.25
Dissolved Oxygen, ppb	NA	<5
SiO_2, ppm	NA	<1.0
Suspended Solids, ppm	NA	<1.0
Blowdown Rate, gpm/Steam Generator	As requred to maintain control parameters.	

Continued operation with known chloride ingress even through blowdown permits observance of the normal specification is not recommended. The cause of the contamination should be corrected. Continuous monitoring of the blowdown is essential if chloride exposure is to be minimized.

1/To be maintained with morpholine at sea and brackish water sites.

2/Chloride ion concentration is limited by cation conductivity. Confirmatory analysis for chloride is required.

Response to OFF Normal Conditions (Continued from Table IV)

- Sea or brackish Water Plants

As stated above, field and laboratory data reveal that even low bulk water chloride concentrations can produce denting. Further, plant operating histories suggest the chloride effect may be cumulative.

ID # : D08110260I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 1
7. TEST NO. TD55535

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD
(MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

[ ]b,c,e

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

D. CHEMISTRY

[C .23]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

[NI 3.52]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

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e G-2 [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS [ ]b,c,e

Appendix B
to Attachment 4

ID # : DD8110260I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK		81
2. UNIT	SURRY #2	
3. CUSTOMER:	VEPCO	
4. LP#		1
5. LOCATION		GOV
6. DISC#		2
7. TEST NO.	TD60028	

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ]^{b,c,e} (KSI))^{TD}
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI) [ ]^{b,c,e}
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI) [ ]^{b,c,e}
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

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}
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}

E. BORE STRESS

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

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.) [ ]^{b,c,e}
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]^{b,c,e}
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

G-2' = [ ]^{b,c,e}

ID # : D08110260I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 3
7. TEST NO. TD36431

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TE
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI) [ ]b,c,e
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI) [ ]b,c,e
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e

NI	AS	SB	SN	AL	CU	S
[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e	[ ]b,c,e

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ]b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

G-2' = [ ]b,c,e

ID # : DC8110260J

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 4
7. TEST NO. TD44534

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TE
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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
[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2140 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

"G-2" = [ ]b,c,e

ID # : D08110260I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP#
5. LOCATION GOV
6. DISC# 5
7. TEST NO. TD35353

B. MATERIAL PROPERTIES (HUB) [ ]b,c,e TD (MIN. Y.S. [ ]b,c,e (KSI))
1. TYPE
2. SUPPLIER; MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[ ]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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : DC8110260I

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GOV
6. DISC# 6
7. TEST NO. TD55531

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

*) G-2' = [ ]b,c,e

ID # : D0811026O2

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LB# 1
5. LOCATION GEN
6. DISC# 1
7. TEST NO. TD55536

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. L] (KSI))
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : P0811026D2

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 2
7. TEST NO. TD57959

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e TD (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI) [ ]b,c,e
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI) [ ]b,c,e
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

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

[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

E. BORE STRESS

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

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ]b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) G-2' = [ ]b,c,e
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

ID # : 0081102602

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LPP 1
5. LOCATION GEN
6. DISC# 3
7. TEST NO. TD60931

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TE
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : D08110260Z

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK B1
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 4
7. TEST NO. TD55595

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

G-2' = [ ]b,c,e

ID # : D08110260Z

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 5
7. TEST NO. TD55520

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[ ]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

E. BORE STRESS

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

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : D0811026O2

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 1
5. LOCATION GEN
6. DISC# 6
7. TEST NO. TD63045

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: BETHLEHEM STEEL

	[ ]b,c,e
3. Y.S. (KSI)	
4. U.T.S. (KSI)	
5. ELONGATION	
6. R.A.	
7. FATT (DEG.F)	
8. R.T. IMPACT(FT.LB.)	
9. U.S. IMPACT TEMP. (DEG.F)	
10. U.S. IMPACT ENG. (FT.LB.)	
11. U.S. KIC (KSI*SQRT(IN.))	

C. MATERIAL PROPERTIES (RIM)

	[ ]b,c,e
1. Y.S. (KSI)	
2. U.T.S. (KSI)	
3. ELONGATION	
4. R.A.	
5. FATT (DEG.F)	
6. R.T. IMPACT(FT.LB.)	
7. U.S. IMPACT TEMP. (DEG.F)	
8. U.S. IMPACT ENG. (FT.LB.)	
9. U.S. KIC (KSI*SQRT(IN.))	

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
[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	[ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)	
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)	
4. RATIO A/A-CR-OS	

G-2' = [ ]b,c,e

ID # : D0811026O3

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 1
7. TEST NO. TD55534

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ]b,c,e (KSI) TD
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

M=G-2' = [ ]b,c,e

ID # : D0811026O3

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK		81
2. UNIT	SURRY #2	
3. CUSTOMER:	VEPCO	
4. LP#		2
5. LOCATION		GOV
6. DISC#		2
7. TEST NO.	TD44514	

B. MATERIAL PROPERTIES (HUB)

1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR) [ ]
3. MAX EXPECTED KEYWAY CRACK SIZE (IN) [ ]
4. RATIO A/A-CR-OS

NOTE: G-2' = [ ]b,c,e

ID # : D08110260 3

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 3
7. TEST NO. TD11795

B. MATERIAL PROPERTIES (HUB)

1. TYPE
2. SUPPLIER: UNITED STATES STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

(MIN. Y.S. [ ]b,c,e (KSI)) TC

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : D08110260 3

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GOV
6. DISC# 4
7. TEST NO. TD35376

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]

G-2' = [ ]b,c,e

ID # : D08110260 3

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK — B1
2. UNIT — SURRY #2
3. CUSTOMER: — VEPCO
4. LP# — 2
5. LOCATION — GOV
6. DISC# — 5
7. TEST NO. — TD55517

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (1KSI)) TD
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

'G-2' = [ ]b,c,e

ID # : 0081102603

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK — B1
2. UNIT — SURRY #2
3. CUSTOMER: — VEPCO
4. LP# — 2
5. LOCATION — GOV
6. DISC# — 6
7. TEST NO. — TD44500

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

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

E. BORE STRESS

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

F. CRACK DATA

1: A-CR-OP (1800 RPM) (IN.)
2: A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : 0081102604

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 1
7. TEST NO. TD55533

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TD
2. SUPPLIER: BETHLEHEM STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1600	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : D081102604

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK B1
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 2
7. TEST NO. TD35386

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ]b,c,e (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

ID # : D[redacted]2604

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 3
7. TEST NO. TD44492 NEW REPLACEMENT DISC

B. MATERIAL PROPERTIES (HUB)

1. TYPE TC
   (MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: UNITED STATES STEEL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. (IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

D. CHEMISTRY

[ ]b,c,e 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 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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP, HUB (DEG.F) [ ]b,c,e
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE [ ]b,c,e
4. RATIO A/A-CR-OS

G-2' = [ ]b,c,e

ID # : D081102604

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 4
7. TEST NO. TD35377

B. MATERIAL PROPERTIES (HUB)

1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

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

F. CRACK DATA

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

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

* G-2' = [ ]b,c,e

ID # : D081102604

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK 81
2. UNIT SURRY #2
3. CUSTOMER: VEPCO
4. LP# 2
5. LOCATION GEN
6. DISC# 5
7. TEST NO. TD35359

B. MATERIAL PROPERTIES (HUB)
1. TYPE [ ]b,c,e TD (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]b,c,e

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

[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

E. BORE STRESS

	SPEED (RPM)	STRESS
1.	1800	(KSI)
2.	2160 (120%)	(KSI)

[ ]b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ]b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. MAX EXPECTED KEYWAY CRACK SIZE (IN)
4. RATIO A/A-CR-OS

[ ]b,c,e

G-2' = [ ]b,c,e

Attachment 5

Westinghouse Electric Corporation
Power Generation Group

Steam Turbine Division
Lester Branch Box 9175
Philadelphia, Pennsylvania 19113

March 14, 1980

Darrell G. Eisenhut, Acting Director
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Eisenhut,

Your letters of February 25, 1980, to licensees with operating Westinghouse steam turbines requested certain site specific and generic information relative to turbine disc integrity. You urged in your letter that the licensees address the generic questions and coordinate the responses through an owners' group.

Licensees with nuclear power plants and Westinghouse steam turbines have formed a Turbine Disc Integrity Task Force, with Mr. Wayne Stiede of Commonwealth Edison Company selected as Chairman. Westinghouse has been working with this Task Force to generate responses to your generic questions.

At a Task Force meeting on March 12 and 13, 1980, the utilities present prepared and approved consesus responses to each of your generic questions. The Task Force further directed Westinghouse Electric Corporation to transmit these responses directly to you. The purpose of this letter is to transmit that information to you.

It is our understanding that Mr. Wayne Stiede, Chairman of the Task Force, will also confirm to you by separate letter, the Task Force's decision to have Westinghouse transmit these responses direct to you. We also understand that each utility, in their specific response to your letter to that utility, will discuss the extent to which they agree with these consensus responses.

If you have any questions on these, please contact me.

Sincerely,

J. M. Schmerling per PSZ

J. M. Schmerling,
Disc Integrity Program Manager

cc: W. J. Ross, Operating Reactors Branch
USNRC, Washington DC 20555

Dupe of 8003210426 6pp.

GENERIC QUESTIONS - TO BE COMPLETED IN 20 DAYS

I. Describe what quality control and inspection procedures are used for the disc bore and keyways.

ANSWER:

Chemical analyses are made from each heat of steel. During manufacture mechanical tests are made from the disc bore region. These include tensile and Charpy v-notch impact tests. Each disc bore region is subject to ultrasonic and magnetic particle inspections. On later units, the disc keyways are inspected after machining, using liquid penetrant techniques.

For in-service inspection two ultrasonic techniques, namely the tangential aim and radial aim scans, have been developed to detect and determine the depth of disc keyway and bore cracks. The in-service ultrasonic inspection does not require unshrinking discs from the rotor.

The tangential aim scan is used to locate cracks. The technique requires sound energy to be coupled and directed tangentially towards the keyway from a precalculated position on the hub. This is accomplished by means of a compound angled plexigalass wedge. The wedge is machined to provide a contoured face which makes complete contact with the disc hub, while aiming the sound energy at the disc bore/keyway. Crack indications occuring in the vicinity of the keyway apex and at the bore will reflect the sound energy. The tangential aim scan is performed both in the clockwise and counterclockwise directions to permit locating crack indications with respect to the keyway apex.

A radial aim technique is used to confirm cracks located by the tangential aim scan. The technique is also used to determine the crack depth by comparing the time lapsed in obtaining a ultrasonic reflection from the crack with the time to obtain a reflection from the keyway or bore.

II. Provide details of the Westinghouse repair/replacement procedures for faulty discs.

ANSWER:

When cracks are found by an inservice inspection their severity is evaluated by means of an allowable life calculation. The allowable life is relatable to the time required for the crack to grow to critical size for fracture. Based upon the results of this calculation, the following actions may be taken:

A. If the affected disc has a calculated allowable life greater than zero a reinspection of the disc is recommended at approximately one-half of the allowable life.

B. If the affected disc has an allowable life less than or close to zero, one or more of the following may be employed:

1. The affected disc is removed by "machining", and is replaced with a collar and pressure drop baffle.

2. Upstream keyways may be drilled oversize to remove cracks after the downstream disc is removed.

3. The affected disc may be replaced . This requires unstacking and restacking several discs on the rotor.

III.A. What immediate and long term actions are being taken by Westinghouse to minimize future stress corrosion problems with turbine discs?

ANSWER:

The following short range actions are being taken:

1. Those discs which have been observed to be most susceptible to stress corrosion cracking are being redesigned. The new designs will achieve lower bore stresses and utilize lower yield strength material. These changes will increase the margin against stress corrosion cracking.

2. Designs that will eliminate spacers and bore keyways are being explored.

The following long range solutions are being examined:

1. Bore Heating - Ways and means to keep the disc keyways dry are being explored.

2. Sealing - Ways of sealing the hub and bore from the steam environment are being studied.

3. Coatings - Another method of sealing is to apply a protective coating. We are continuing to experiment with different coatings, but extensive work is still required to develop processes for their application and to demonstrate their benefits.

4. Partial Integral Rotors - Since one piece forgings cannot be procured at this time, we are exploring the possibilities of partial integral rotors where the first two or three discs are made a part of the shaft. Only the last few discs will have to be shrunk on.

5. Integral Rotors - A welded rotor design is being evaluated as a means to produce an integral rotor.

III.B. What actions are being recommended to utilities to minimize stress corrosion cracking?

ANSWER:

Westinghouse has developed recommended limits for steam purity. When these limits are exceeded corrective actions should be taken.

IV.A. Identify the impurities known to cause cracking in the low pressure turbines, and their sources.

ANSWER:

The main chemical species known to cause or contribute to stress corrosion of steam turbine materials in steam environments are:

Sodium hydroxide
Sodium chloride
Sodium sulfate
Oxygen

The sources of these impurities are under study.

IV.B. Discuss the relationship between steam generator chemistry and steam chemistry relative to the introduction of corrosive impurities into the turbine, including phosphate, AVT, and BWR chemistry.

ANSWER:

Analyses of material within LP disc cracks from PWR units shows the presence of Na, K, Ca, Si, Cl, OH, and C together with Fe, Co, V, Al and Ni ions.

In PWR units with recirculating steam generators, the total carry-over of non-volatile dissolved solids, such as NaOH and NaCl depends mainly on the mechanical carry-over. However, where ammonia is used for pH control such as with the all volatile water treatment, carry-over of anions may increase due to a formation of volatile ammonium salts.

In the PWR units with once-through steam generators, the high pressure turbine steam purity is similar to the feedwater purity. Most impurities entering the steam generator are carried directly into the turbine.

The published information on BWR systems indicates the concentration of oxygen in the steam is in the range of 10 to 30 ppm. With respect to other elements, however, it is likely that high steam purity standards will be maintained for control of radioactivity. To achieve this, BWR reactor water is generally double demineralized.

IV.C. Discuss the mechanism of deposition of these impurities that can lead to their concentration in certain areas of keyways and bores.

ANSWER:

The impurities from steam can get into shrunk-on disc bores and keyways in several possible ways:

1. After deposition in the steam path during operation, corrodents can wash into disc keyways during layup due to moisture condensation.

2. In the wet steam regions, the moisture can dry on hot metal surfaces.

3. As long as the disc retains its shrink fit we are not aware of any mechanism which can concentrate impurities on the bore.

V. What role does the refluxing action in the steam separation portion of the steam generator have on scrubbing corrosive impurities from the steam?

ANSWER:

Two modes of transport of corrosive impurities from the steam generator to the turbine are mechanical entrainment and volatility.

The non-volatile chemical species are transported by mechanical entrainment which is normally expected to be small.

The steam generator scrubbing equipment has minimum effectiveness in preventing the transport of volatile impurities, such as ammonium chloride, to the turbine. The concentration of volatile impurities in turbine steam is determined by their concentration in the steam generator bulk water and their specific volatility coefficient which differs with each species.

VI. To what extent can the buildup of corrosive impurities in the LP turbine be alleviated? What would be the effects of the following action:

A. Pumping moisture separator condensate to condenser?

ANSWER:

Pumping moisture separator condensate to the condenser would be beneficial in units with condensate polishing . In units without condensate polishing, there will be no effect.

B. Periodically moving (the) point of condensation to prevent locallized buildup of corrosive impurities.

ANSWER:

Conceptually, dilution of contaminants by increased levels of moisture and their subsequent transport to the condensate system could substantially reduce the buildup of impurities. However, the effectiveness of this technique and the means for successful control of the local environment of particular turbine parts must be developed and experimentally verified.

Several of the less volatile active corrodants, such as sodium chloride and sodium sulphate precipitate as concentrated liquid solutions in a region slightly above the equilibrium saturated vapor line of pure water. This region occurs initially within a given stage during normal operation and migrates toward the [illegible] exhaust as load reduces. Control of the zone can be affected by changes in inlet and moisture separator reheater (MSR) outlet temperature.

VII Describe fabrication and heat treatment sequence for discs, including thermal exposure during shrinking operation.

ANSWER:

The typical sequence for producing a disc forging includes the following operations, not all of which are necessarily applicable to any given disc.

A. Melting and casting of Ingot. Most discs manufactured since the early 1960's are made using basic electric furnace steel which is vacuum stream degassed or vacuum-carbon-deoxidized.

B. Forging The ingot is heated to forging temperature, block forged and cut into 2 to 4 pieces from which the individual disc forgings are made.

C. Preliminary Heat Treatment This step consists of austenitizing and tempering the forging to promote structure uniformity, grain refinement, and good machineability.

D. Preliminary Machining The forging is machined to the disc contour.

E. Preliminary Ultrasonic Inspection Typically the supplier makes a partial ultrasonic inspection of the forging to assure that the quality warrants continued manufacturing effort.

F. Heat Treatment for Properties The forging is austenitized and tempered at appropriate temperatures to achieve the desired mechanical properties. Cooling from the austenitizing treatment is achieved by water quenching. After tempering the forging is cooled in the furnace at a controlled rate.

G. Mechanical Properties Tensile properties are tested to determine if the required strength level has been achieved. Since about 1960, Charpy v-notch impact tests are made on each forging.

H. NDE Inspection The forgings are rough machined to the Westinghouse drawing requirements and an ultrasonic inspection of the flat surfaces of the hub, web, and rim of the disc is performed.

I. Stress Relief This treatment is required when a significant amount of metal is machined off of the forging after it has been heat treated for properties. The stress relief treatment is 50-100° F below the tempering temperature. Cooling is accomplished by a controlled furnace cool.

J. Mechanical Properties When a stress relief is used, the mechanical properties are tested after the stress relief treatment. (Reference Step G)

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-7 Rev 1	May 3, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:		14 CURRENT:
☑ CONTINUOUS	☑ COIL 2000 AMPERE TURNS	☐ AC
☐ RESIDUAL	☐ PROD ____ SPACING ____ AMPS	☐ DC
	☐ CIRCULAR ____ AMPERES	☑ HWDC
	☐ YOKE ____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Spooner, A. Homel, D. Dickens	II, I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Blading Row L-4 Gov. End	Blade 104-105 has crack in shroud, one crack in shroud between Blades 134, 166, 2, & 32 have cracks in the root on the exit side.		✓
	Blades 165 has crack in root entry side		✓
	Blade 121 is cracked from entry side to exit side in the root		✓
	Steeple between Blades 165-166 Cracked on entry side		✓

DISPOSITION OF REJECTED INDICATIONS: 21

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 3, 1978

885.79

VISUAL INSPECTION REPORT
NDT – VT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1	2	3	4
Surry # 1	SYSTEM: L.P. Turbine	PROCEDURE: NDT-VT-15.1	DATE: May 4, 1978

ITEM, COMPONENT INSPECTED: "B" Rotor (5)

MAINTENANCE REPORT NO: (6)

VISUAL AIDS: Flashlight & mirror (7)

PERFORMED BY: A. Hamel & D. Dickens (8)

LEVEL OF CERTIFICATION: II, II (9)

INDICATIONS NOTED: ☐ YES ☑ NO (10)

INDICATIONS

11 AREA INSPECTED	12 DESCRIPTION OF INDICATIONS (SIZE, TYPE, AND LOCATION)	13 ACCEPT	14 REJECT
Row L-3 Gen. End	NRI	✓	
Row L-4 Gen. End	NRI	✓	

DISPOSITION OF REJECTED INDICATIONS. (15)

16 AUTHORIZED INSPECTOR:	17 DATE:
David L. Groover Level II	May 4, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 4, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy Steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2000 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES	☑ HWDC
☐ RESIDUAL ☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
A. Hamel & D. Dickens	I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
L-3 Gen End	NRI	✓	
L-4 Gen End	Blade 66 cracked in root		
	entry side		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Groome Level II	May

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT – MT – 12.1	May 4 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy Steel	Sand Blasted & clean

9 TYPE OF PARTICLES: ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER:	12 TYPE:
Magna flux	20 A

13 MAGNETIZATION:
- ☑ COIL 2400 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☐ CIRCULAR _____ AMPERES
- ☐ YOKE _____
- ☑ CONTINUOUS
- ☐ RESIDUAL

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Spooner, D. Fowler, A. Hamel, D. Dickens	II, I, I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-0 Gen. End	NRI	✓	
Row L-1 Gen. End	NRI	✓	
Row L-0 Gen. End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 4, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L. P. Turbine	NDT – MT – 12.1	May 5, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2200 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES	☑ HWDC
☐ RESIDUAL ☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
A. Hamel, D. Dickens	I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-2 ~~Gen~~ ~~End~~ DS End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Groomes	May 5, 1978

895.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- 12.1	May 5, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:		14 CURRENT:
	☑ COIL 1600 AMPERE TURNS	☐ AC
	☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS	☐ CIRCULAR _____ AMPERES	☑ HWDC
☐ RESIDUAL	☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
A. Hamed, D. Dickens	I, I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-5 Gen. End	NRI	✓	
Row L-6 Gen. End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Groover	May 5, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 5, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	N/A

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2700 AMPERE TURNS *	☐ AC
☐ PROD ____ SPACING ____ AMPS	☐ DC
☑ CONTINUOUS	☑ HWDC
☐ RESIDUAL	
☐ CIRCULAR ____ AMPERES	
☐ YOKE ____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
A. Hamel, D. Duchens	II, II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-7 Gen End	NRI	✓	
Row L-8 Gen End	NRI	✓	
Row L-7 Gov End	NRI	✓	
Row L-8 Gov End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

* Rows L-7 & L-8 shot together due to limited space

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Groover	May 5, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT – MT – 2.1	May 6, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Alloy steel	Sandblasted & Clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
magnaflux	20 A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2400 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS	☐ CIRCULAR _____ AMPERES	☑ HWDC
☐ RESIDUAL	☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Fowler, S. Zimmerman, T. Bogan	I, A, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-1 Gen End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L Zimmerman	May 6, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

STATION: 1	SYSTEM: 2	PROCEDURE: 3	DATE: 4
Surry #1	L.P. Turbine	NDT-MT- 12.1	May 6, 1978

ITEM, COMPONENT INSPECTED: 5 — "B" Rotor

MAINTENANCE REPORT NO: 6 — N/A

MATERIAL: 7 — alloy steel

SURFACE CONDITION: 8 — Sandblasted & clean

TYPE OF PARTICLES: 9 — ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

BATCH NO: 10

MANUFACTURER: 11 — magnaflux

TYPE: 12 — 20A

MAGNETIZATION: 13
- ☑ COIL 2200 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☐ CIRCULAR _____ AMPERES
- ☐ YOKE _____
- ☑ CONTINUOUS
- ☐ RESIDUAL

CURRENT: 14
- ☐ AC
- ☐ DC
- ☑ HWDC

TEST PERFORMED BY: 15 — D. Fowler, S. Zimmerman, T. Boyers

LEVEL OF CERTIFICATION: 16 — I, A, A

AREA INSPECTED 17	SIZE AND LOCATION OF INDICATIONS 18	ACCEPT 19	REJECT 20
Row L-2 Gen End	NRI	✓	

DISPOSITION OF REJECTED INDICATIONS: 21

AUTHORIZED INSPECTOR: 22 — Daniel L. Groome

DATE: 23 — May 6, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry # 1	L.P. Turbine	NDT-MT-12.1	May 6, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy Steel	Sand Blasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 1600 AMPERE TURNS ☐ PROD _____ SPACING _____ AMPS ☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES ☐ RESIDUAL ☐ YOKE _____	☐ AC ☐ DC ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Fowler, S. Zimmerman, T. Bozeman	I, A, A.

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-6 Gen End	NRF	✓	
Row L-5 Gen End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Broom	May 6, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 9, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Steeples where blades were removed "B" Rotor	WA

7 MATERIAL:	8 SURFACE CONDITION:
alloy steel	glass bead Blasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☐ COIL 2000 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS	☑ ~~HWDC~~
☐ CIRCULAR _____ AMPERES	
☐ RESIDUAL	☐ YOKE _____

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
A. Friel, D. Fowler, S. Zimmerman, T. Boyers	I, I, A, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-4 Gov. End	3 small cracks in the platform where blades 144 (3/16" long), 77 (1/8" long) and 195 (3/16" long) were removed		✓

DISPOSITION OF REJECTED INDICATIONS: 21

22 AUTHORIZED INSPECTOR:	23 DATE:
David L Spooner	May 9, 1978

¥ 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT- 12.1	May 9, 1978

5 ITEM, COMPONENT INSPECTED: Steeples when blades were Removed "B" Rotor

6 MAINTENANCE REPORT NO: NA

7 MATERIAL: Alloy Steel

8 SURFACE CONDITION: Glass bead Blasted & Clean

9 TYPE OF PARTICLES: ☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER: Magnaflux

12 TYPE: 20A

13 MAGNETIZATION:
- ☑ COIL 2000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY: A. Hamel, D. Dickens, A. Friel, S. Zimmerman, Boyers

16 LEVEL OF CERTIFICATION: I, I, I, A, A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
L-4 Row Gen. End.	Crack indication in platform where the following blades were		✓
	2, 4, 5, 6, 8, 10, 12, 26, 27, 33, 35, 42, 43, 44,		
	45, 49, 50, 51, 52, 53, 54, 55, 58, 59, 61, 63, 65		
	66, 67, 68, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 83		
	84, 86, 90, 91, 93, 94, 95, 99, 100, 105, 108, 109		
	110, 111, 112, 113, 114, 115, 118, 119, 120, 122, 123		
	126, 127, 133, 134, 138, 142, 143, 144, 145		
	146, 147, 148, 149, 150, 151, 152, 153, 154, 155		
	156, 157, 158, 159, 160, 161, 162, 163, 164, 165		
	166, 169, 171, 173, 175, 176, 177, 178, 179, 180, 181		
	182, 183, 184, 185, 186, 188, 190, 191, 192, 193, 194, 195		
	196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 209		

DISPOSITION OF REJECTED INDICATIONS: 210, 214, 217, 220, 221, 224, 225 — 21

Note: 28 of these indications were very light and could possibly be buffed out.

22 AUTHORIZED INSPECTOR: David L. Spooner MT Level II

23 DATE: May 9, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	L.P. TURBINE	NDT-MT- 12.1	May 11, 1978

5 ITEM, COMPONENT INSPECTED: "B" ROTOR

6 MAINTENANCE REPORT NO:

7 MATERIAL: Alloy STEEL

8 SURFACE CONDITION: SHNO BLASTED & CLEAN

9 TYPE OF PARTICLES:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO:

11 MANUFACTURER: MAGNAFLUX

12 TYPE: 20 A

13 MAGNETIZATION:
☐ COIL 1000 AMPERE TURNS
☐ PROD _____ SPACING _____ AMPS
☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES
☐ RESIDUAL ☐ YOKE _____

14 CURRENT:
☐ AC
☐ DC
☑ HWDC

15 TEST PERFORMED BY: Dickens

16 LEVEL OF CERTIFICATION: I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
ROW L-4 GOV END "B" ROTOR	BLADE #2 ck. ½" long in top of root extending to end of Root ⅛" ck in center of root on end of root		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR: Alvin L. Dickens MT LEVEL II

23 DATE: May 11, 1978

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	TURBINE	NDT – MT – 12.1	May 10, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit 1 2LP L-4 Gen End Blades	S1 804200 909

7 MATERIAL:	8 SURFACE CONDITION:
Alloy steel	Sand blasted + clean

9 TYPE OF PARTICLES:	10 BATCH NO:
[X] WET [ ] DRY [ ] VISIBLE [X] FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
Magnaflux	20A

13 MAGNETIZATION:		14 CURRENT:
[X] CONTINUOUS	[X] COIL 1600 AMPERE TURNS	[ ] AC
[ ] RESIDUAL	[ ] PROD ____ SPACING ____ AMPS	[ ] DC
	[ ] CIRCULAR ____ AMPERES	[X] HWDC
	[ ] YOKE ____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
Talower / Boozer	I & A

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Blade Roots of Removed Blades	#66 & #94 Cracked		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Boozer MT Level II	May 10, 1978

885.80 NDT

LIQUID PENETRANT INSPECTION REPORT
NDT – PT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT – PT – 13.1	May 10, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Undershroud welds "B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
3/s welds on Alloy Steel	Sandblasted & Clean

	9 MANUFACTURER	10 TYPE	11 BATCH NO.	12 TYPE OF PENETRANT:
CLEANER	NA	NA	NA	☑ WATER SOLUBLE
PENETRANT	Sherwin	HM-3	16E3/15H	☑ FLUORESCENT
EMULSIFIER	NA	NA	NA	☐ VISIBLE RED DYE
REMOVER	NA	Water	NA	☐ SOLVENT REMOVABLE
DEVELOPER	Sherwin	D-100	P659	☐ POST EMULSIFIABLE

13 PENETRANT APPLICATION:	14 PENETRANT DWELL TIME:	15 TEMP:	16 EMULSIFIER DWELL TIME:
☐ DIPPING ☑ SPRAYING ☐ BRUSHING	15 MIN.	75 OF	NA MIN.

17 REMOVAL TECHNIQUE FOR EXCESS PENETRANT:	18 DRYING TIME:	19 TEMP:
☑ FLOWING WATER ☐ WIPED SOLVENT ☐ WIPED WATER ☐ DIP CLEANING	30 MIN.	75 OF

20 DEVELOPER APPLICATION:	21 DEVELOPING TIME:	22 TEMP:
☐ DIPPING ☑ SPRAYING ☐ BRUSHING	7-30 MIN.	75 OF

23 TEST PERFORMED BY:	24 LEVEL OF CERTIFICATION:
D. Dickens, T. Gibson D. Fowler, A. Friel, S. Zimmerman, T. Boyens, A. Hamel	I, II, A, II, I, A

25 AREA INSPECTED	26 SIZE AND LOCATION OF INDICATIONS	27 ACCEPT	28 REJECT
Row L-1 Gov. End	weld on exit side of blades 3, 4, 6		✓
	7, 11, 13, 15, 16, 17, 46, 47, 49, 51, 152		
	156, 157, 158, 159, 160, 161, 163, 164		
	165, 166, 169, 170, 171, 172, 173, 175		
	176, 177, 178, 179 broke loose		
	from the shroud.		
Row L-3 Gov. End	NRI	✓	
Row L-3 Gen. End	NRI	✓	

DISPOSITION OF REJECTED INDICATIONS: 29

30 AUTHORIZED INSPECTOR:	31 DATE:
Continued on page 2	

885.81

LIQUID PENETRANT INSPECTION REPORT
NDT – PT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT – PT – 13.1	May 10, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Undershroud welds "B" Rotor	N/A

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
Row L-1 Gen. End	welds on exit side of blades		✓
	1, 2, 3, 4, 6, 7, 8, 13, 14, 18, 20		
	26, 27, 28, 35, 36, 48, 51, 52,		
	53, 54, 55, 56, 61, 63, 64, 67, 68		
	72, 76, 88, 91, 101, 102, 112, 116		
	117, 118, 119, 142, 144, 146, 148		
	152, 161, 164, 168, 173, 176, 178		
	179 broke loose from shroud		
	Blades 141 & 156 weld		
	Broke loose from blade		

11 DISPOSITION OF REJECTED INDICATIONS:

12 AUTHORIZED INSPECTOR:	13 DATE:
David L. Spoon PT Level II	May 10, 1978

ATTACH TO "LIQUID PENETRANT INSPECTION REPORT"

≈ 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry #1	L.P. Turbine	NDT-MT-12.1	May 6, 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
"B" Rotor	NA

7 MATERIAL:	8 SURFACE CONDITION:
alloy Steel	Sandblasted & clean

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	

11 MANUFACTURER:	12 TYPE:
magnaflux	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 1600 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☑ CONTINUOUS ☐ CIRCULAR _____ AMPERES	☑ ~~HWDC~~
☐ RESIDUAL ☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
D. Fowler, S. Zimmerman, T. Bozen	I, A, A.

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Row L-6 Gen End	NRI	✓	
Row L-5 Gen End	NRI	✓	

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Broom	May 6, 1978

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NDT

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT-12.1	15 May 1978

5 ITEM, COMPONENT INSPECTED: Unit #1 B Rotor Governor End Stubbs

6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: Metal Alloy

8 SURFACE CONDITION: Clean / Glass bead blasted

9 TYPE OF PARTICLES: [X] WET [ ] DRY [ ] VISIBLE [X] FLUORESCENT

10 BATCH NO: N/A

11 MANUFACTURER: MAGNAFLUX

12 TYPE: 20-A

13 MAGNETIZATION:
- [X] COIL 2000 AMPERE TURNS
- [ ] PROD _____ SPACING _____ AMPS
- [ ] CIRCULAR _____ AMPERES
- [ ] YOKE _____
- [X] CONTINUOUS
- [ ] RESIDUAL

14 CURRENT:
- [ ] AC
- [ ] DC
- [X] HWDC

15 TEST PERFORMED BY: Armand P. Hamel

16 LEVEL OF CERTIFICATION: I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple # 165	CRACK ON FACE at EXIT side which extends back into the back LAND APPROX. 5/16"		X

21 DISPOSITION OF REJECTED INDICATIONS:
Referred to Mark Rowe (W) engineer for Resolution
Armand Hamel

22 AUTHORIZED INSPECTOR: David L. Brown

23 DATE: May 15, 1978

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	TURBINE	NDT-MT- 12.1	17 MAY 1978

5 ITEM, COMPONENT INSPECTED: UNIT #1 "B" ROTOR GEN END L-4 STAGE STEEPLES

6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: METAL ALLOY

8 SURFACE CONDITION: CLEAN / GLASS BEAD BLASTED

9 TYPE OF PARTICLES: [X] WET [ ] DRY [ ] VISIBLE [ ] FLUORESCENT

10 BATCH NO: N/A

11 MANUFACTURER: MAGNAFLUX

12 TYPE: 20-A

13 MAGNETIZATION:
- [X] COIL 2000 AMPERE TURNS
- [ ] PROD _____ SPACING _____ AMPS
- [ ] CIRCULAR _____ AMPERES
- [ ] YOKE _____
- [X] CONTINUOUS
- [ ] RESIDUAL

14 CURRENT:
- [ ] AC
- [ ] DC
- [X] HWDC

15 TEST PERFORMED BY: DAVID L. SPOONER / DAVID FOWLER

16 LEVEL OF CERTIFICATION: II / I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
STEEPLE #85	PITTING IN LINE		X
STEEPLE #82	SMEARED METAL		X
STEEPLE #65	PITTING IN LINE		X
STEEPLE #185	CRACK IN STEEPLE NEAR RADIUS		X
STEEPLE #188	CRACK IN STEEPLE NEAR RADIUS		X
STEEPLE #191	CRACK IN STEEPLE NEAR RADIUS		X
STEEPLE #176	CRACK IN STEEPLE NEAR RADIUS		X
STEEPLE #179	CRACK IN DISC INLET SIDE		X
STEEPLE #102	SMEARED METAL		X

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR: David L. Spooner

23 DATE: May 17, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	Turbine	NDT-MT- 12.4	17 May 1978

5 ITEM, COMPONENT INSPECTED: Unit #1 "B" Rotor Gen End L-3 Stage Steeples
6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: Metal Alloy
8 SURFACE CONDITION: Clean / Glass bead blasted

9 TYPE OF PARTICLES:
☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT
10 BATCH NO: N/A

11 MANUFACTURER: MAGNAFLUX
12 TYPE: 20-A

13 MAGNETIZATION:
☐ COIL _____ AMPERE TURNS
☐ PROD _____ SPACING _____ AMPS
☒ CONTINUOUS
☐ CIRCULAR _____ AMPERES
☐ RESIDUAL
☒ YOKE Parker Probe

14 CURRENT:
☐ AC
☒ DC
☐ HWDC

15 TEST PERFORMED BY: David L. Spooner / David Fowler
16 LEVEL OF CERTIFICATION: II / I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple #72	CRACK ON INLET SIDE CONVEX SIDE		X

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR: David L. Spooner
23 DATE: May 17, 1978

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.4	17 MAY 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
UNIT #1 "B" ROTOR GENERAL L-3 Stage Steeples	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Metal Alloy	Clean / glass bead blasted

9 TYPE OF PARTICLES:	10 BATCH NO:
☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT	N/A

11 MANUFACTURER:	12 TYPE:
MAGNAFLUX	20-A

13 MAGNETIZATION:	14 CURRENT:
☐ COIL ____ AMPERE TURNS ☐ PROD ____ SPACING ____ AMPS ☒ CONTINUOUS ☐ CIRCULAR ____ AMPERES ☐ RESIDUAL ☒ YOKE PARKER PROBE	☐ AC ☒ DC ☐ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
David L. Spooner / David Fowler	II / I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple #182	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #183	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #185	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #138	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #140	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #143	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #73	CRACK IN STEEPLE NEAR RADIUS		X

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
Daniel L Spooner	May 17, 1978

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	Turbine	NDT-MT- 12.1	17 May 1978

5 ITEM, COMPONENT INSPECTED: Unit #1 "B" Rotor Gen end L-4 Stage Steeples
6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: Metal Alloy
8 SURFACE CONDITION: Clean / Glass bead blasted

9 TYPE OF PARTICLES: [X] WET [ ] DRY [ ] VISIBLE [X] FLUORESCENT
10 BATCH NO: N/A

11 MANUFACTURER: MAGNAFLUX
12 TYPE: 20-A

13 MAGNETIZATION: [X] COIL 2000 AMPERE TURNS; [ ] PROD ____ SPACING ____ AMPS; [ ] CIRCULAR ____ AMPERES; [ ] YOKE ____; [X] CONTINUOUS; [ ] RESIDUAL
14 CURRENT: [ ] AC; [ ] DC; [X] HWDC

15 TEST PERFORMED BY: David L. Spooner / David Fowler
16 LEVEL OF CERTIFICATION: II / I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple #66	CRACK in steeple near Radius		X
Steeple #65	CRACK in Steeple Near Radius		X
Steeple #62	CRACK in Steeple Near Radius		X
Steeple #57	CRACK in Steeple Near Radius		X
Steeple #54	CRACK in Steeple Near Radius		X
Steeple #53	CRACK in steeple near Radius		X
Steeple #51	CRACK in Steeple Near Radius		X
Steeple #48	CRACK in Steeple Near Radius		X
Steeple #47	CRACK in Steeple Near Radius		X
Steeple #46 (New)	CRACK in Steeple Near Radius		X
Steeple #45	CRACK in Steeple Near Radius		X
Steeple #44	CRACK in Steeple Near Radius		X
Steeple #42 (New)	CRACK in Steeple Near Radius		X

21 DISPOSITION OF REJECTED INDICATIONS: M7/9

22 AUTHORIZED INSPECTOR: Continued on page 2
23 DATE: 17 May 1978

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT – MT – 12.1	17 May 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit #1 "B" Rotor Gen end L-4 Stage Steeples	N/A

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
Steeple # 35	CRACK in steeple near radius		X
Steeple #33	CRACK in steeple near Radius		X
Steeple #31 (New)	CRACK in steeple near Radius		X
Steeple # 21 (New)	CRACK in steeple near Radius		X
Steeple #13 (New)	CRACK in steeple near Radius		X
Steeple #10	CRACK in steeple near Radius		X
Steeple #8	CRACK in steeple near Radius		X
Steeple #6	CRACK in steeple near Radius		X
Steeple #5	CRACK in steeple near Radius		X
Steeple #15	CRACK in steeple near Radius		X
Steeple #2	CRACK in steeple near Radius		X
Steeple #227	CRACK in steeple near Radius		X
Steeple #230	CRACK in steeple near Radius		X
Steeple #225 (New)	CRACK in steeple near Radius		X
Steeple #224	CRACK in steeple near Radius		X
Steeple #221	CRACK in steeple near Radius		X
Steeple #220	CRACK in steeple near Radius		X
Steeple #219	CRACK in steeple near Radius		X
Steeple #214	CRACK in steeple near Radius		X
Steeple #213	CRACK in steeple near Radius		X

11 DISPOSITION OF REJECTED INDICATIONS:

12 AUTHORIZED INSPECTOR:	13 DATE:
Continued on page 3	17 May 1978

ATTACH TO "LIQUID PENETRANT INSPECTION REPORT"

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	TURBINE	NDT – MT – 12.1	17 MAY 1978

5 ITEM, COMPONENT INSPECTED: Unit #1 "B" Rotor Gen end L-4 Stage Steeples

6 MAINTENANCE REPORT NO: N/A

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
Steeple #210 (New)	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #164 (New)	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #162	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #163	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #171	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #197	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #201	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #111	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #112	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #123 (Old+New)	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #154	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #70	CRACK IN Steeple NEAR RADIUS		X
Steeple #72	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #73	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #76 (New)	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #83 (New)	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #89	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #99	CRACK IN STEEPLE NEAR RADIUS		X
Steeple #105	CRACK IN STEEPLE NEAR RADIUS		X

DISPOSITION OF REJECTED INDICATIONS: 11

12 AUTHORIZED INSPECTOR: David L. Spoon

13 DATE: May 17, 1978

ATTACH TO "LIQUID PENETRANT INSPECTION REPORT"

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.1	May 2, 78

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit 1 "B" Rotor Gen. End L-3 Stage	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Metal alloy	Clean / Glass bead blasted

9 TYPE OF PARTICLES:	10 BATCH NO:
☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT	N/A

11 MANUFACTURER:	12 TYPE:
Magnaflux	20-A

13 MAGNETIZATION:	14 CURRENT:
☒ COIL 2000 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☒ CONTINUOUS ☐ CIRCULAR _____ AMPERES	☒ HWDC
☐ RESIDUAL ☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
David E Dickens / Armand P Hamel	I & I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Staple # 3	2 ind. on Concave side (outlet)		
Staple # 6	1 ind. on concave side		☒
Staple # 10	1 ind. on concave side		☒
Staple # 11	1 ind. on concave side		☒
Staple # 12	1 ind. on convex side 1/8" long		☒
Staple # 23	1 ind. on concave side 1/8" long		☒
Staple # 27	1 ind. on convex side 1/2" long (center)		☒
Staple # 35	1 ind. on concave (inlet 3/4" long		☒
Staple # 48	1 ind. on concave (inlet 1/2" long		☒
Staple # 57	1 ind. on concave (full length)		☒
Staple # 57	1 ind on convex side 1/2" center		☒
Staple # 59	(2) ind. 1/8" each on Concave (center)		☒
* Note: all these indications are in first land groove			☒

DISPOSITION OF REJECTED INDICATIONS: 21

22 AUTHORIZED INSPECTOR:	23 DATE:
Continued on page 2	

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.1	May 20, 78

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit 1 "B" Rotor Gen. End L-3 Stage	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Metal alloy	Clean / Glass bead blasted

9 TYPE OF PARTICLES: ☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT

10 BATCH NO: N/A

11 MANUFACTURER:	12 TYPE:
Magnaflux	20-A

13 MAGNETIZATION:
☒ COIL 2000 AMPERE TURNS
☐ PROD _____ SPACING _____ AMPS
☒ CONTINUOUS ☐ CIRCULAR _____ AMPERES
☐ RESIDUAL ☐ YOKE _____

14 CURRENT:
☐ AC
☐ DC
☒ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
David L. Dickens / Armand P. Hamel	I & II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple # 63	(1) 3/4" ind. on Concave side (center)		X
" # 63	(3) 1/8" ind on Convex side		X
" # 65	(1) 1/4" ind. on Convex inlet		X
" # 69	(1) 3/16" ind. on Convex side		X
" # 69	(1) 1/4" ind. on Concave side		X
" # 70	(1) 3/16" ind. on Convex side		X
" #72	(1) 1/8" ind. on Convex center		X
" #75	(1) 1/8" ind on Convex center		X
" # 78	(1) ind. on Convex outlet		X
" # 78	(1) 1/4" ind on Concave inlet		X
" # 79	(1) 3/4" ind on Concave outlet		X
" # 84	(1) 1/8" ind. on Convex side		X
* Note: All indications in land groove next to shaft.			

DISPOSITION OF REJECTED INDICATIONS: 21

22 AUTHORIZED INSPECTOR:	23 DATE:
Continued on page 3	

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.1	May 20, 78

5 ITEM, COMPONENT INSPECTED: Unit 1 "B" Rotor Gen. End L-3 Stage

6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: Metal alloy

8 SURFACE CONDITION: Clean / Glass bead blasted

9 TYPE OF PARTICLES: ☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT

10 BATCH NO: N/A

11 MANUFACTURER: Magnaflux

12 TYPE: 20-A

13 MAGNETIZATION:
- ☒ COIL 2000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☐ CIRCULAR _____ AMPERES
- ☐ YOKE _____
- ☒ CONTINUOUS
- ☐ RESIDUAL

14 CURRENT:
- ☐ AC
- ☐ DC
- ☒ HWDC

15 TEST PERFORMED BY: David L. Dickens / Armand P. Hamel

16 LEVEL OF CERTIFICATION: I & I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Stagpl. # 79	(1) ind. on convex outlet		X
" 86	(1) ind. on concave outlet		X
" 88	(1) 1/8" ind. on concave outlet.		X
" 89	(1) 1¼" ind. on concave outlet.		X
" 90	(1) ind. on concave side		X
" 95	(1) ind. on concave side		X
" 96	(1) ind. on convex side.		X
" 95	(1) ind on convex side		X
" 102	(1) 3/4" ind. on convex side		X
" 104	(2) 3/8" & (1) ½" ind. on concave side		X
" 105	(1) ind. on convex side		X
" 106	(1) ind. on concave & convex side		X
" 99	(1) ind. on convex side		X

21 DISPOSITION OF REJECTED INDICATIONS:

* Note: All indications are in land groove near shaft.

22 AUTHORIZED INSPECTOR:

23 DATE:

Continued on page 4

P 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.1	May 20, 78

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit 1 "B" Rotor Gen. End L-3 Stage	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Metal alloy	Clean / Glass bead blasted

9 TYPE OF PARTICLES:	10 BATCH NO:
☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT	N/A

11 MANUFACTURER:	12 TYPE:
Magnaflux	20-A

13 MAGNETIZATION:	14 CURRENT:
☒ COIL 2000 AMPERE TURNS	
☐ PROD _____ SPACING _____ AMPS	☐ AC
☒ CONTINUOUS	☐ DC
☐ CIRCULAR _____ AMPERES	☒ HWDC
☐ RESIDUAL	
☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
David L. Debord / Armand P. Hamel	I & I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple # 110	(1) ind. on concave side		X
" 114	(1) ind. on convex center		X
" 115	(1) ind. on convex side		X
" 121	(1) ind. on concave side.		X
" 125	(1) ind. on concave side.		X
" 126	(1) ind. on concave & convex		X
" 127	(1) 1/8" ind. on convex side		X
" 129	(1) ind. on concave side.		X
" 133	(1) ind. on convex side		X
" 135	(1) ind. on convex side		X
" 139	(1) ind. on convex side		X
" 139	(1) ind. on concave side		X
*Note - all indications are in land groove Aeon shaft			

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
Continued on page 5	

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT – MT – 12.1	May 20, 78

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit 1 "B" Rotor Gen. End L-3 Stage	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Metal Alloy	Clean / Glass bead blasted

9 TYPE OF PARTICLES: ☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT

10 BATCH NO: N/A

11 MANUFACTURER:	12 TYPE:
Magnaflux.	20 – A

13 MAGNETIZATION:
- ☒ COIL 2000 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☐ CIRCULAR _____ AMPERES
- ☐ YOKE _____
- ☒ CONTINUOUS
- ☐ RESIDUAL

14 CURRENT:
- ☐ AC
- ☐ DC
- ☒ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple # 145	(1) ind. on Convex side		X
" # 150	(1) ind. on Convex side		X
" 154	(1) ind. on Convex side		X
" 155	(1) ind on Concave & Convex side		X
" 157	(1) ind. on Concave side		X
" 159	(1) ind on Concave side		X
" 161	(1) ind. on Concave side		X
" 163	(1) ind. on Convex & Concave side		X
" 167	(1) ½" ind. on Convex (Center)		X
" 167	(1) ind. on Concave (Center)		X
" 173	(1) ind. 1" long on Convex Inlet		X
" 174	(1) ind. ½" long on Convex (Center)		X
* Note: All indications are in bond groove Near shaft.			

DISPOSITION OF REJECTED INDICATIONS: 21

22 AUTHORIZED INSPECTOR:	23 DATE:
Continued on page 6	

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MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.1	May 20, 78

5 ITEM, COMPONENT INSPECTED: Unit 1 "B" Rotor Gen. End L-3 Stage
6 MAINTENANCE REPORT NO: N/A

7 MATERIAL: Metal alloy
8 SURFACE CONDITION: Clean / Glass bead blasted

9 TYPE OF PARTICLES: ☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT
10 BATCH NO: N/A

11 MANUFACTURER: Magnaflux
12 TYPE: 20-A

13 MAGNETIZATION:
☒ COIL 2000 AMPERE TURNS
☐ PROD _____ SPACING _____ AMPS
☐ CONTINUOUS
☐ CIRCULAR _____ AMPERES
☐ RESIDUAL
☐ YOKE _____

14 CURRENT:
☐ AC
☐ DC
☒ HWDC

15 TEST PERFORMED BY: David L. Dickens / Armand P. Hamel
16 LEVEL OF CERTIFICATION: I & II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Steeple # 177	(1) ind. 1½" long on Convex outlet		☒
" 179	(1) ind - full length of concave side		☒
" 181	(1) ind. ⅛" on convex center.		☒
" 182	(1) ind. on concave outlet.		☒
" 184	(1) ind. on concave side.		☒
" 185	(1) ind. on concave side.		☒
" 187	(1) ind. on concave side.		☒
" 190	(1) ind. on concave side.		☒
" 191	(1) ind on concave side		☒
" 196	(1) ind. on concave & convex		☒
" 199	(1) ind on concave & convex side		☒
" 201	(1) ind. on concave side		☒
* Note: All indications all in land groove from shaft			

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:
23 DATE:

Continued on page 7

F 885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
Surry	Turbine	NDT-MT- 12.1	May 20, 78

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit 1 "B" Rotor - Gen. End L-3 Stage	N/A

7 MATERIAL:	8 SURFACE CONDITION:
Metal alloy	Clean / Glass bead blasted

9 TYPE OF PARTICLES:	10 BATCH NO:
☒ WET ☐ DRY ☐ VISIBLE ☒ FLUORESCENT	N/A

11 MANUFACTURER:	12 TYPE:
Magnaflux	20-A

13 MAGNETIZATION:	14 CURRENT:
☒ COIL 2000 AMPERE TURNS	☐ AC
☐ PROD _____ SPACING _____ AMPS	☐ DC
☒ CONTINUOUS ☐ CIRCULAR _____ AMPERES	☒ HWDC
☐ RESIDUAL ☐ YOKE _____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
David L. Dobson / Armand P. Hamel	I & I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
Staple # 205	(1) ind. 1/8" long on Convex Inlet		X
209	(1) ind. on concave side		X
217	(1) 1/8" ind. on Concave Outlet		X
218	(1) 1/8" ind. on Concave Outlet		X
216	(1) 2" ind. on Concave (Center)		X
220	(1) ind. on Concave Outlet		X
225	(1) 1 1/4" ind. on Convex Inlet		X
225	(1) 1/4" ind. on Concave Outlet		X
226	(1) ind. on Concave Outlet		X
Staple # 192	(1) ind. 1/2" Convex Outlet - Top of staple chipped - ind. under this		X
*Note: All indications except 192, are in bandgroove upon shoft			

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
End of Report David L. Goosen MT Level II	May 20, 1978

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY	TURBINE	NDT-MT- 12.1	20 MAY 1978

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
Unit #1 "B" rotor GOV. END L-3 STAGE STEEPLES	5180420090 9

7 MATERIAL:	8 SURFACE CONDITION:
metal alloy	CLEAN / Glass bead blasted

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	N/A

11 MANUFACTURER:	12 TYPE:
Magnaflux	20 A

13 MAGNETIZATION:		14 CURRENT:
	☐ COIL 2000 AMPERE TURNS	
	☐ PROD _____ SPACING _____ AMPS	
☑ CONTINUOUS	☐ CIRCULAR _____ AMPERES	☐ AC
☐ RESIDUAL	☐ YOKE _____	☐ DC
		☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
Spooner & Fowler	II & I

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
STEEPLES # 80	indication - CONCAVE SIDE		✓
# 129	INDICATION - CONCAVE SIDE		✓
# 136	INDICATION - CONCAVE SIDE		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR:	23 DATE:
David L. Spooner	May 20, 1978

MAGNETIC PARTICLE INSPECTION REPORT
HOT-KIT-FORM 7
TENNESSEE ELECTRIC AND POWER COMPANY

1 STATION:	2 UNIT:	3 PROCEDURE:	4 DATE:
Sycamore	L-4 Turbine	HOT-KIT- 12-1	3-12-80

5 ITEM OR PART INSPECTED:	6 MAINTENANCE REPORT NO.
LP-1 Rotor L-4 Generator End Bearing	3/80220 MM

7 MATERIAL:	8 SURFACE CONDITION:
Alloy Casting 3120	Sandblasted / Clean / Smooth

9 TYPE OF PARTICLES:	10 BATCH NO.
☐ DRY ☐ WET ☐ VISIBLE ☑ FLUORESCENT	5K002

11 MANUFACTURER:	12 TYPE:
Magnaflux	2CA

13 MAGNETIZATION:	14 CURRENT:
☑ CONTINUOUS ☐ RESIDUAL ☑ COIL 1500 AMPERE TURNS ☐ PRODS ☐ CIRCULAR ☐ OTHER	☐ AC ☐ DC ☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
T. Woodard W. Ford	II II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
L-4 Turbine Rotor End			
Stub Shaft	Blade Root # 29 Inlet - Linear		X
	Blade Root # 32 Outlet - Linear		X
	Outlet Steeple Between # 9 x 4 1/2 - Linear		X
	Inlet Steeple Between # 30 x 5 - Linear		X
	Inlet Steeple Between # 31 x 3 1/2 - Linear		X
	Outlet Steeple Between # 31 x 4 1/2 - Linear		X
	Outlet Steeple Between # 127 x 12 1/2 - Linear		X
	Outlet Steeple Between # 143 x 14 1/2 - Linear		X
	Inlet Steeple Between # 150 x 14 1/2 - Linear		X
	Outlet Steeple Between # 154 x 15 1/2 - Linear		X
	Outlet Steeple Between # 154 x 14 1/2 - Linear		X
	Outlet Steeple Between # 157 x 11 1/2 - Linear		X

22 DISPOSITION OF REJECTED INDICATIONS:

Curtis Necessary

23 INSPECTED BY:	24 DATE:
	3-12-80

PAGE ___ OF ___

2

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

STATION:	SYSTEM:	PROCEDURE:	DATE:
Surry 1	LP Turbine	NDT – MT – 12.1	3-6-80

ITEM, COMPONENT INSPECTED:	MAINTENANCE REPORT NO:
LP #1 Rotor L-H Generator End Blading	S1 0022 10414

AREA INSPECTED	SIZE AND LOCATION OF INDICATIONS	ACCEPT	REJECT
L-H Blade Root Band			
Staples	Outlet Staple Between #182 & #183 – Linear		X
	Inlet Staple Between #212 & #213 – Linear		X
Rim Area	NRI	X	

DISPOSITION OF REJECTED INDICATIONS:

[signature]

AUTHORIZED INSPECTOR: [signature] DATE: 3-6-80

ATTACH TO "LIQUID PENETRANT INSPECTION REPORT" PAGE ___ OF ___

MAGNETIC PARTICLE INSPECTION REPORT

NDT – MT – FORM 1

VIRGINIA ELECTRIC AND POWER COMPANY

STATION: 1 Surry I	SYSTEM: 2 LP Turbine	PROCEDURE: 3 NDT-MT- 12.1	DATE: 4 3-8-80

ITEM, COMPONENT INSPECTED: 5 LP #2 [illegible] Rotor L-4 Row Governor End Blading	MAINTENANCE REPORT NO: 6 [illegible]
MATERIAL: 7 Alloy Carbon Steel	SURFACE CONDITION: 8 Sand Blasted / Clean / Smooth
TYPE OF PARTICLES: 9 ☐ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	BATCH NO: 10
MANUFACTURER: 11 Magna Flux	TYPE: 12 20A

MAGNETIZATION: 13

☑ CONTINUOUS
☐ RESIDUAL

☑ COIL [illegible] AMPERE TURNS
☐ PRODS ____ SPACING ____ AMPS
☐ CIRCULAR ____ AMPERES
☐ YOKE ____

CURRENT: 14
☐ AC
☐ DC
☑ HWDC

TEST PERFORMED BY: 15 T. Baumbach B. Fogg	LEVEL OF CERTIFICATION: 16 II / III

AREA INSPECTED 17	SIZE AND LOCATION OF INDICATIONS 18	ACCEPT 19	REJECT 20
L-4 Blade Roots and			
Steeples inlet & outlet	NRI	X	
Rim area	NRI	X	

DISPOSITION OF REJECTED INDICATIONS:

N/A

To: Curtis McLeskey
11th floor [illegible]

AUTHORIZED INSPECTOR: 22 [illegible]	DATE: [illegible]

PAGE 1 OF 1

V 8/5/82

MAGNETIC PARTICLE INSPECTION REPORT
MPT-RT-FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION	2 SYSTEM	3 PROCEDURE	4 DATE
Surry 1	LP TURBINE	MPT-RT-12.1	3-8-00

5 ITEM, COMPONENT INSPECTED	6 MAINTENANCE REPORT NO.
1-2 # 1 Rotor L-3 Generator End Blading	5100226411

7 MATERIAL	8 SURFACE CONDITION
Alloy Carbon Steel	Sand Blasted

9 TYPE OF PARTICLES	10 BATCH NO.
☐ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	56002

11 MANUFACTURER	12 TYPE
Magnaflux	2A

13 ILLUMINESCENCE: ☑ COIL 1500 AMPERE TURNS; ☐ PRODS ____ SPACING ____ AMPS; ☐ CIRCULAR ____ AMPERES; ☐ YOKE ____; ☑ CONTINUOUS; ☐ RESIDUAL

14 CURRENT: ☐ AC ☐ DC ☑ HWDC

15 TEST PERFORMED BY	16 LEVEL OF CERTIFICATION
T. BERNBACH W. FOYE	II / II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 RECORD	20 REJECT
L-3 BLADE ROOTS AND STEELES			-
	BLADE ROOT #1 INLET - LINEAR		X
	BLADE ROOT #4 INLET - LINEAR		X
	BLADE ROOT #165 INLET - LINEAR		X
	BLADE ROOT #180 INLET - LINEAR		X
	INLET STEELE BETWEEN #9 & #10 - LINEAR		X
	INLET STEELE BETWEEN #16 & #17 - LINEAR		X
	INLET STEELE BETWEEN #50 & #51 - LINEAR		X
	INLET STEELE BETWEEN #51 & #52 - LINEAR		X
	INLET STEELE BETWEEN #70 & #71 - LINEAR		X
	INLET STEELE BETWEEN #80 & #81 - LINEAR		X
	INLET STEELE BETWEEN #81 & #82 - LINEAR		X
	INLET STEELE BETWEEN #85 & #86 - LINEAR		X

21 DISPOSITION OF REJECTED INDICATIONS

Curtis Necessary

22 AUTHORIZED INSPECTION	23 DATE
[signature]	3-10-00

MAGNETIC PARTICLE INSPECTION REPORT
NDT-MT-FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

STATION:	SYSTEM:	PROCEDURE:	DATE:
Surry 1	LP Turbine	NDT-MT-12.1	3-5-80

ITEM, COMPONENT INSPECTED:	MAINTENANCE REPORT NO:
LP #1 Rotor L-3 Generator Blading	[illegible]

AREA INSPECTED	SIZE AND LOCATION OF INDICATIONS	ACCEPT	REJECT
L-3 Blade Roots and			
Steeples	Inlet Steeple between #117 & #118 - [illegible]		X
	Inlet Steeple between #130 & #131 - [illegible]		X
	Inlet Steeple between #142 & #143 - [illegible]		X
Rim Area	NRI	X	

DISPOSITION OF REJECTED INDICATIONS

Curtis [illegible]

AUTHORIZED INSPECTOR: [signature]

DATE: 3-5-80

MAGNETIC PARTICLE INSPECTION REPORT

NDT-MT-FORM 1

VIRGINIA ELECTRIC AND POWER COMPANY

STATION: 1	SYSTEM: 2	PROCEDURE: 3	DATE: 4
[illegible]	LP TURBINE	NDT-MT-[illegible]	[illegible]

ITEM, COMPONENT INSPECTED: 5	MAINTENANCE REPORT NO: 6
[illegible]	[illegible]

MATERIAL: 7	SURFACE CONDITION: 8
[illegible]	[illegible]

TYPE OF PARTICLES: 9	BATCH NO: 10
☐ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	[illegible]

MANUFACTURER: 11	TYPE: 12
[illegible]	[illegible]

MAGNETIZATION: 13		CURRENT: 14
☑ CONTINUOUS	☑ COIL [illegible] AMPERE TURNS	☐ AC
☐ RESIDUAL	☐ PROD ______ SPACING ______ AMPS	☐ DC
	☐ CIRCULAR ______ AMPERES	☑ HWDC
	☐ YOKE ______	

TEST PERFORMED BY: 15	LEVEL OF CERTIFICATION: 16
[illegible]	[illegible]

AREA INSPECTED 17	SIZE AND LOCATION OF INDICATIONS 18	ACCEPT 19	REJECT 20
[illegible]	[illegible]		
	[illegible] (in area of Broken Blade)		✓
RIM AREA	N.R.I.	✓	

DISPOSITION OF REJECTED INDICATIONS: 21

[illegible signature]

AUTHORIZED INSPECTOR: 22	DATE: 23
[illegible signature]	[illegible]

PAGE ___ OF ___

885.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT – MT – 12.1	3-14-80

5 ITEM, COMPONENT INSPECTED: [redacted] ROTOR [redacted] END

6 MAINTENANCE REPORT NO: S100221041 4

7 MATERIAL: ALLOY CARBON STEEL

8 SURFACE CONDITION: GLASS BEAD BLASTED

9 TYPE OF PARTICLES: ☐ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT

10 BATCH NO: 5G002

11 MANUFACTURER: MAGNAFLUX

12 TYPE: 20 A

13 MAGNETIZATION:
- ☐ COIL 2400 AMPERE TURNS
- ☐ PROD _____ SPACING _____ AMPS
- ☑ CONTINUOUS
- ☐ CIRCULAR _____ AMPERES
- ☐ RESIDUAL
- ☐ YOKE _____

NOTED MAR 1 [illegible] 1981 W.S.

14 CURRENT:
- ☐ AC
- ☐ DC
- ☑ HWDC

15 TEST PERFORMED BY: T. GIBSON / G. HERRERA / P. COLBY / W. FONG

16 LEVEL OF CERTIFICATION: A / I / II / III

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
STEEPLE # 2	3/16" LINEAR CONVEX SIDE SEE ATTACHED DRAWING # 43		✓
# 7	1/16" LINEAR CONCAVE SIDE SEE ATTACHED DRAWING # 45		✓
# 10	CONCAVE SIDE 5 LINEAR INDICATION 1/4" LINEAR SEE ATTACHED DRAWING # 42		✓
# 12	1/8" LINEAR CONVEX SIDE SEE ATTACHED DRAWING # 41		✓
# 14	CONVEX SIDE 4 LINEAR 1/4" & SMALLER SEE ATTACHED DRAWING # 39		✓
# 15	PREVIOUSLY GROUNDED CONCAVE SIDE SEE ATTACHED LINEAR 1/2 LENGTH OF STEERLE DRAWING # 38		✓
# 22	CONVEX SIDE & CONCAVE SIDE SEE ATTACHED 1/8" LINEAR & THREE 1/16" LINEAR DRAWING # 37 & # 40		✓
# 59	CONCAVE SIDE SEE ATTACHED 3 LINEAR 1/8", 1/16" & 1/16 DRAWING # 46		✓
# 61	CONCAVE SIDE 1/4" LINEAR SEE ATTACHED DRAWING # 36		✓
# 62	CONCAVE SIDE 1/8" & 1/4" LINEAR SEE ATTACHED DRAWING # 35		✓
# 64	CONVEX SIDE 1/2" LINEAR SEE ATTACHED DRAWING # 34		✓
# 85	CONCAVE SIDE 1/16" LINEAR SEE ATTACHED DRAWING # 30		✓
# 87	CONVEX SIDE TWO 1/8" LINEAR SEE ATTACHED DRAWING # 31		✓

21 DISPOSITION OF REJECTED INDICATIONS:

22 AUTHORIZED INSPECTOR: William Fong II

23 DATE: 3-14-80

885.83

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT – MT – 12.1	3-14-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
[redacted] ROTOR [redacted] END	5100 22104 1

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
STEEPLE # 99	CONVEX SIDE 1/8" LINEAR SEE DRAWING # 32		✓
# 124	CONCAVE SIDE 1/16" LINEAR SEE ATTACHED DRAWING # 29		✓
# 129	METAL AT TOP OF STEEPLES IS TORN AWAY AND FOLDED OUT. NRI SEE DRAWING # 28	★	★
# 130	METAL AT TOP OF STEEPLES IS TORN AWAY AND FOLDED OUT. NRI SEE DRAWING # 28	★	★
# 137	CONVEX SIDE 1/16" LINEAR SEE DRAWING # 25		✓
# 138	CONCAVE SIDE THREE 1/4" LINEAR SEE DRAWING # 24		✓
# 142	CONVEX SIDE 1/2" LINEAR SEE DRAWING # 27		✓
# 150	CONCAVE SIDE – LINEAR 1/2 LENGTH OF STEEPLE 3/16" LINEAR 6 INDICATIONS AT BASE SEE DRAWING # 22 & # 23		✓
# 151	CONCAVE SIDE 1", 3/4", & SMALL LINEAR SEE DRAWING # 21		✓
# 159	CONCAVE SIDE 3/16" LINEAR SEE DRAWING # 20		✓
# 160	CONCAVE SIDE PREVIOUSLY GROUNDED 3 LINEAR 1/2", 1/4" & 3/8" SEE DRAWING # 14		✓
# 161	CONCAVE & CONVEX SIDE 1/4", 1/16" & SMALLER INDICATIONS SEE DRAWINGS # 19 & # 26		✓
# 162	CONCAVE SIDE 3 LINEAR 1/4" & SMALLER SEE DRAWING # 18		✓
# 163	CONCAVE SIDE 1/4" LINEAR SEE DRAWING # 17		✓
# 164	CONCAVE SIDE 2 LINEAR 1/2" & 1/4" SEE DRAWING # 16		✓
# 165	CONCAVE SIDE 1/4" LINEAR SEE DRAWING # 15		✓
# 167	CONCAVE SIDE 1/4" & 3/4" LINEAR SEE DRAWING # 13		✓
# 168	CONCAVE SIDE PREVIOUSLY GROUND 3/16" LINEAR SEE DRAWING # 10		✓
# 174	CONCAVE SIDE 1/4" LINEAR SEE DRAWING # 9		✓
# 189	CONVEX SIDE & CONCAVE SIDE 3/16" LINEAR SEE DRAWING # 8 & # 7		✓

11 DISPOSITION OF REJECTED INDICATIONS:

★★ DEFERRED TO (W) ENGINEERING

12 AUTHORIZED INSPECTOR:	13 DATE:
William Tong II	3-14-80

ATTACH TO "LIQUID PENETRANT INSPECTION REPORT"

= 885.83

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1 (SUPPLEMENT)
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT – MT – 12. 1	3-14-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
[redacted] ROTOR [redacted] GENERATOR END	3100221041 4

7 AREA INSPECTED	8 SIZE AND LOCATION OF INDICATIONS	9 ACCEPT	10 REJECT
STEEPLE # 190	CONCAVE SIDE PREVIOUSLY GROUND 3/8" LINEAR SEE DRAWING # 6		✓
# 195	CONVEX SIDE 1/4" LINEAR SEE DRAWING # 5		✓
# 204	CONCAVE SIDE PREVIOUSLY GROUND 1 1/4" LINEAR SEE DRAWING # 2		✓
# 208	CONCAVE SIDE 1 1/4" LINEAR SEE DRAWING # 3		✓
# 209	CONCAVE SIDE 1/4" LINEAR SEE DRAWING # 4		✓
# 223	CONCAVE SIDE 1/4" – 1/8" LINEAR SEE DRAWING # 1		✓

11 DISPOSITION OF REJECTED INDICATIONS:

12 AUTHORIZED INSPECTOR:	13 DATE:
William Fry II	3-14-80

SURRY POWER STATION

ROTOR NO. 1

ROW NO. GEN L-3

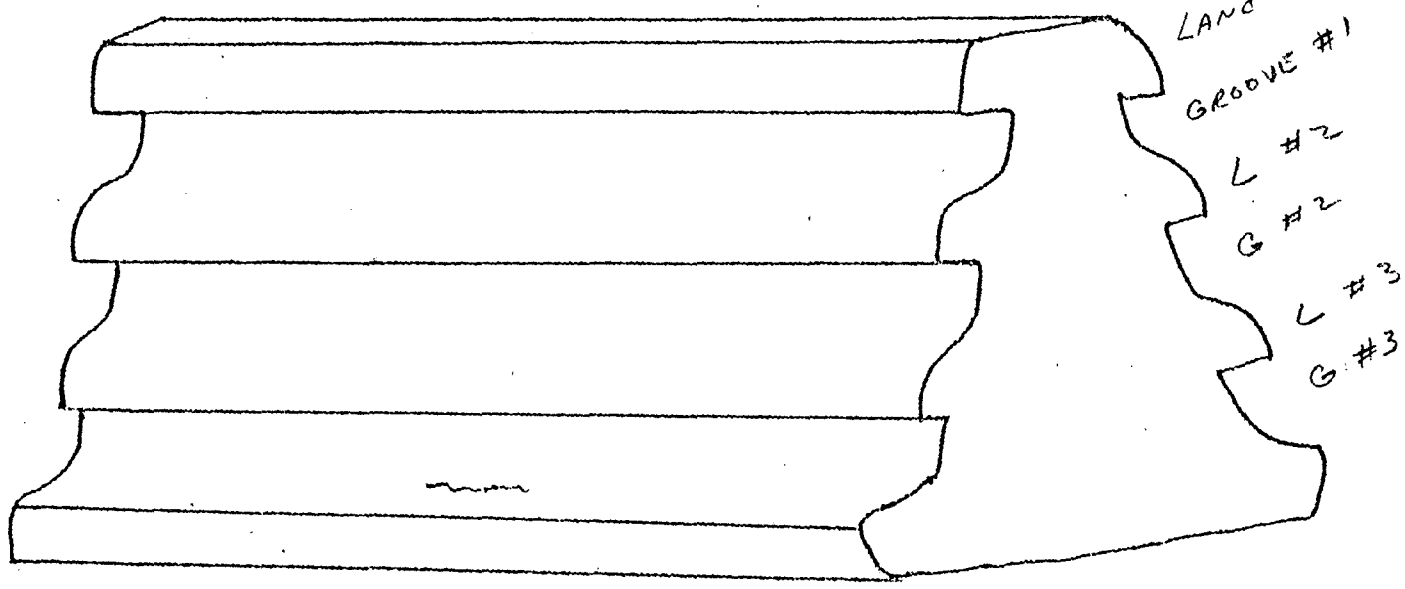
STEEPLE NO. 2

DRAWING NO. 43

DATE 14/MAR/8

High Cycle Fatigue Cracking

CONVEX SIDE



LINEAR INDICATIONS 3/16"

SURRY POWER STATION

ROTOR NO. 1

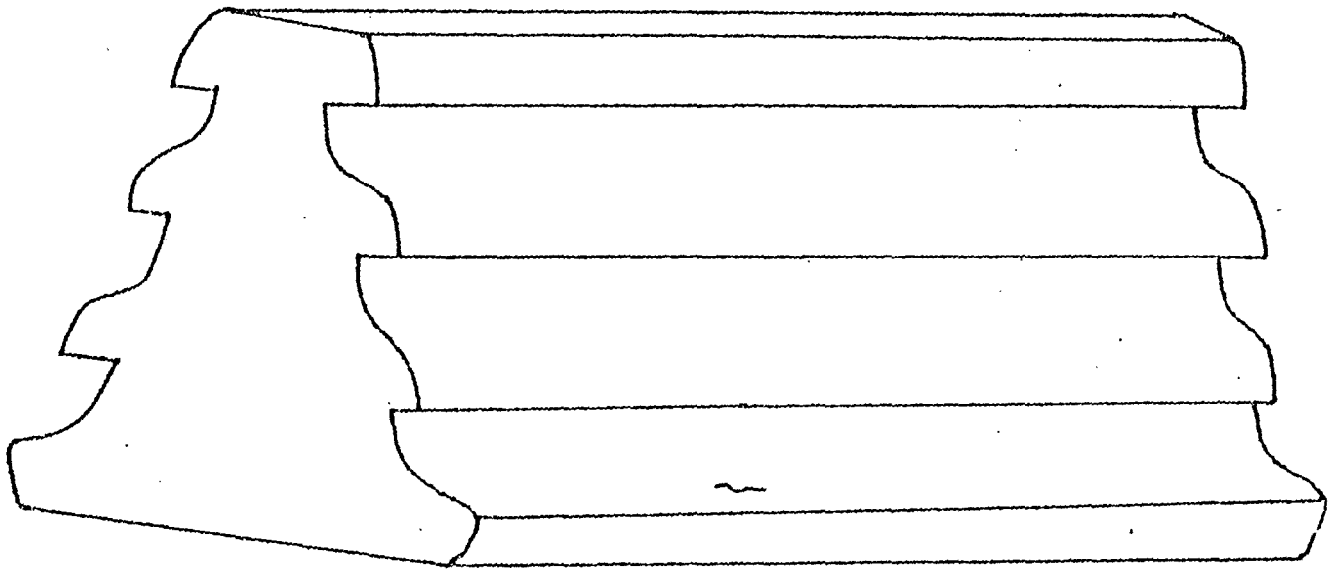
ROW NO. GEN 1-2

STEEPLE NO. 7

DRAWING NO. 45

DATE 14 MAR 82

CONCAVE SIDE



1/16" LINEAR INDICATION

SURRY POWER STATION

ROTOR NO. 1

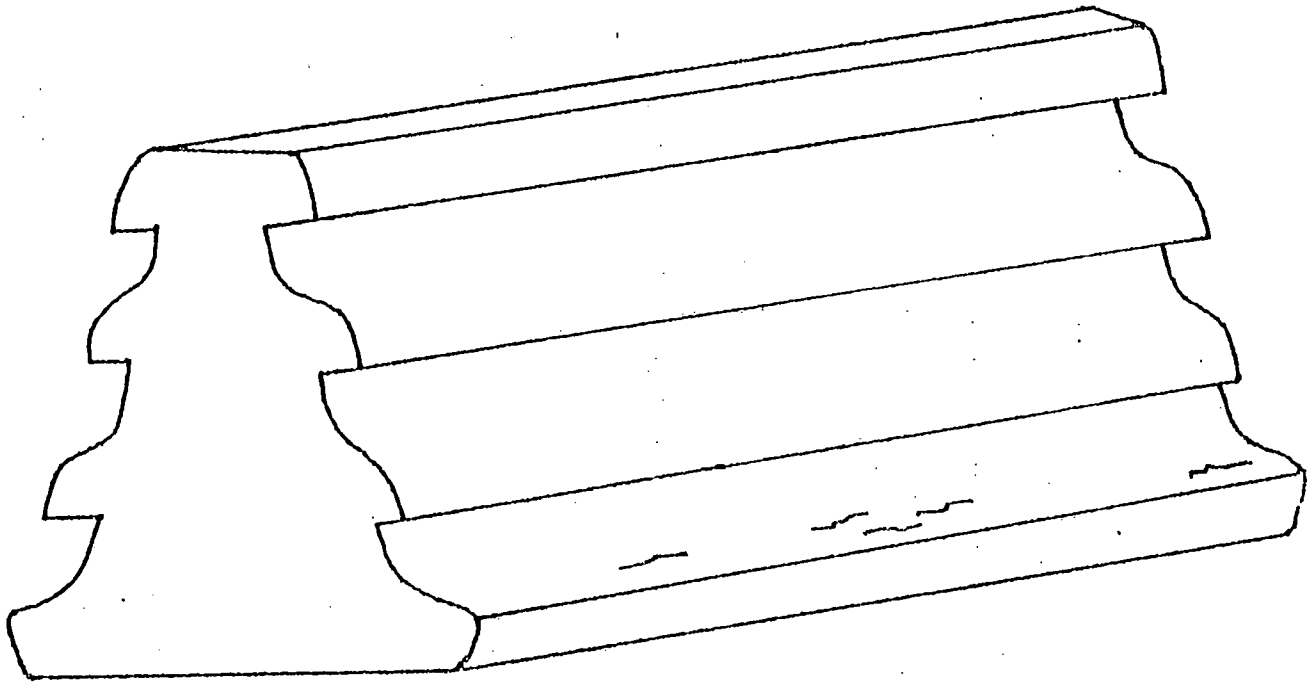
ROW NO. GEN. L-3

STEEPLE NO. 10

DRAWING NO. 42

DATE 14/MAR/80

CONCAVE SIDE



5 LINEAR INDICATIONS

1/4" + SMALLER

SURRY POWER STATION

ROTOR NO. 1

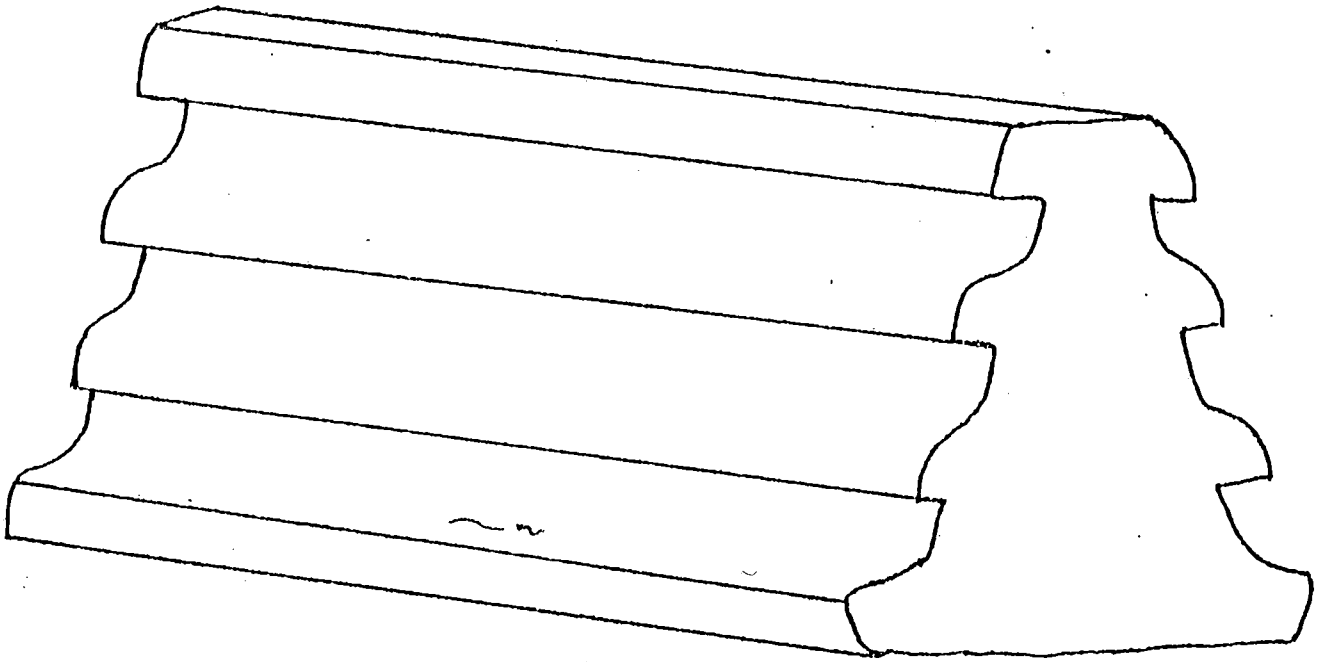
ROW NO. GOW L-3

STEEPLE NO. 12

DRAWING NO. 41

DATE 14 MAR 86

CONVEX SIDE



1/8" LINEAR INDICATION

SURRY POWER STATION

ROTOR NO. 1

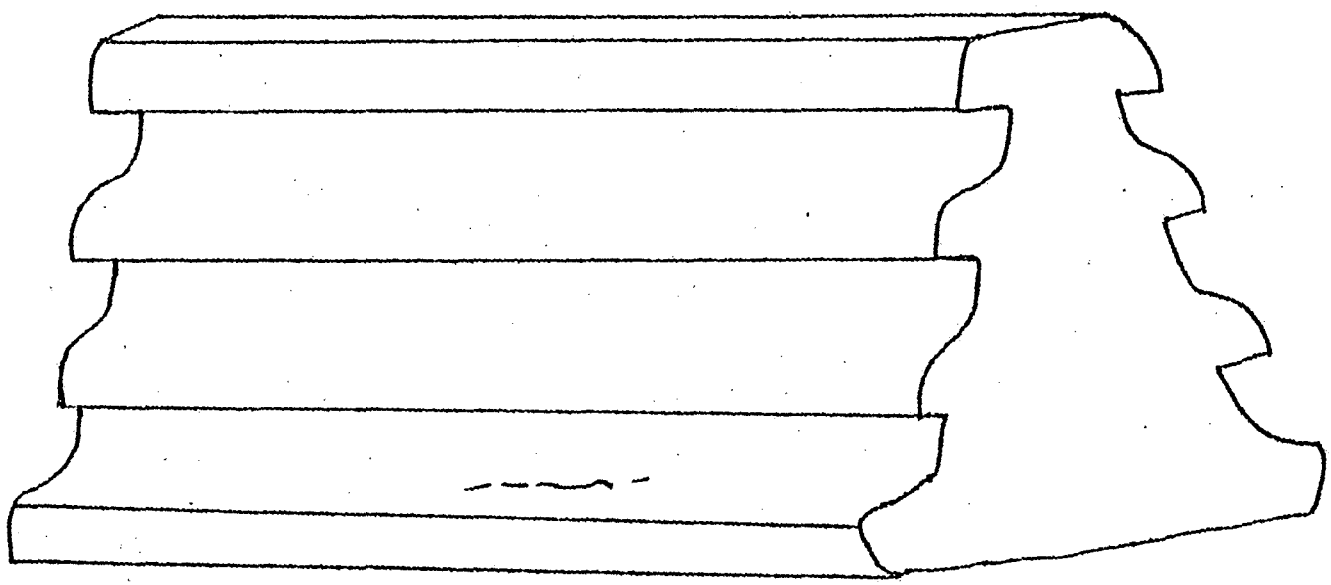
ROW NO. CON L-3

STEEPLE NO. 14

DRAWING NO. 39

DATE 14 MAR 85

CONVEX SIDE



4 LINEAR INDICATIONS
1/4" + SMALLER

SURRY POWER STATION

ROTOR NO. 1

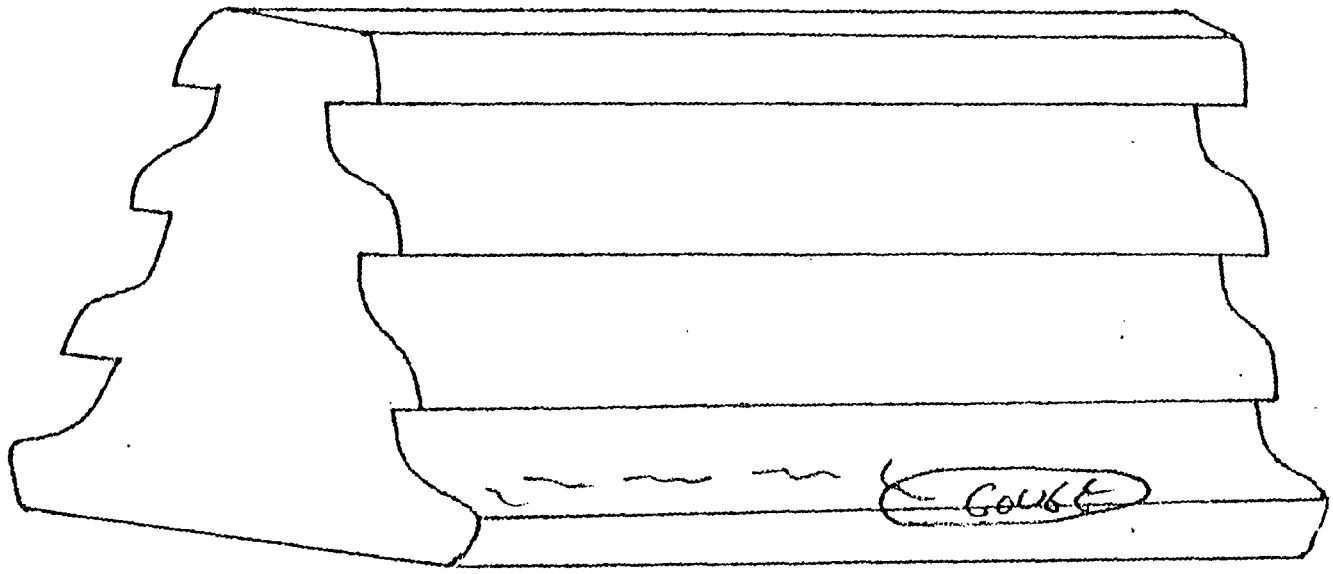
ROW NO. CW L-3

STEEPLE NO. 15

DRAWING NO. 38

DATE 14/MAR

CONCAVE SIDE



LINEAR INDICATIONS
1/2 LENGTH OF STEEPLE

SURRY POWER STATION

ROTOR NO. 1

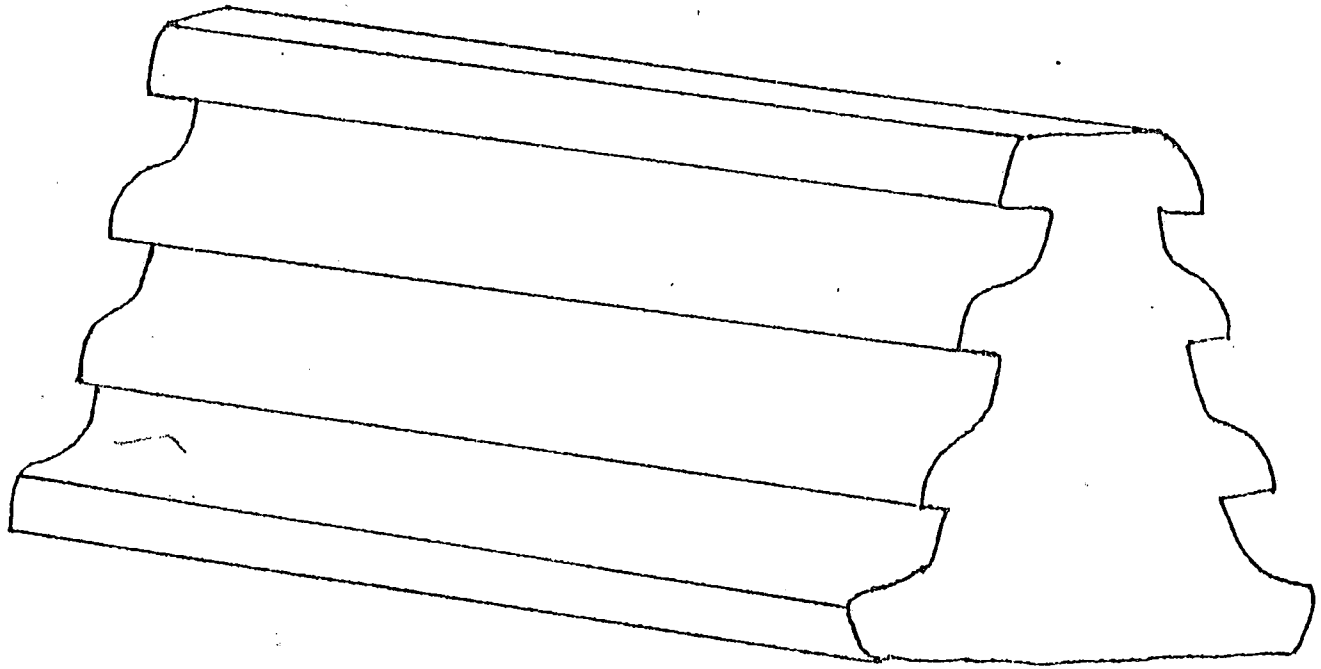
ROW NO. CON L-3

STEEPLE NO. 22

DRAWING NO. 40

DATE 14/May/80

Convex Side



1/8" long Linear indication

SURRY POWER STATION

ROTOR NO. 1

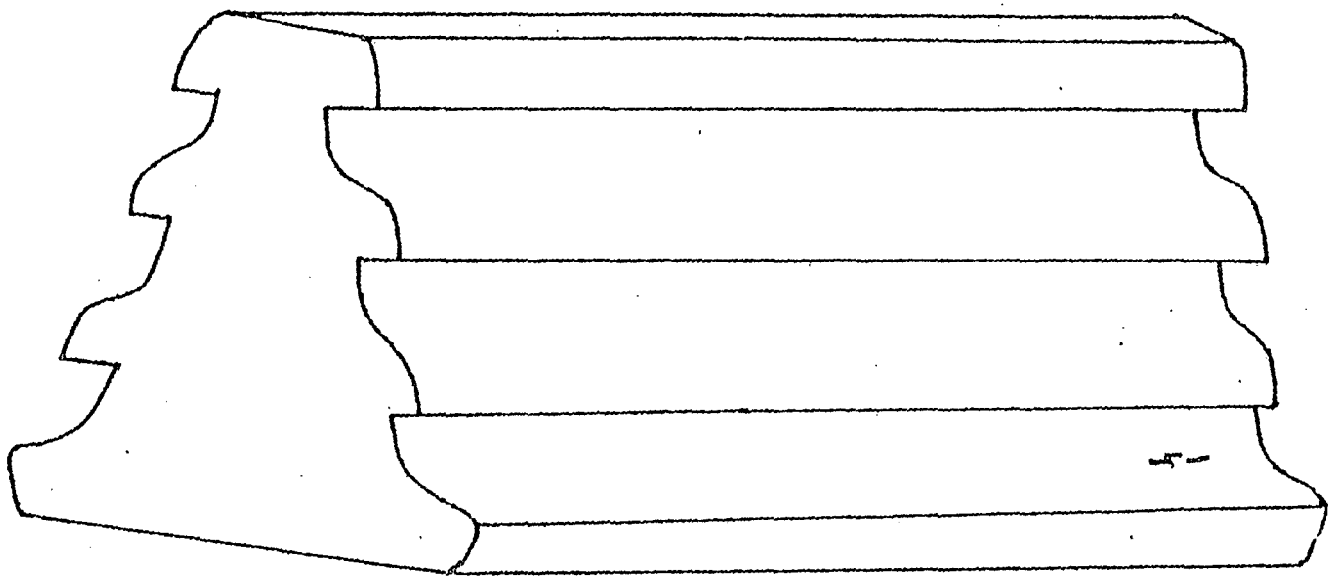
ROW NO. 6DW L-3

STEEPLE NO. 22

DRAWING NO. 37

DATE 4/8/81

Concave Side



Three 1/8" linear indications

SURRY POWER STATION

ROTOR NO. 1

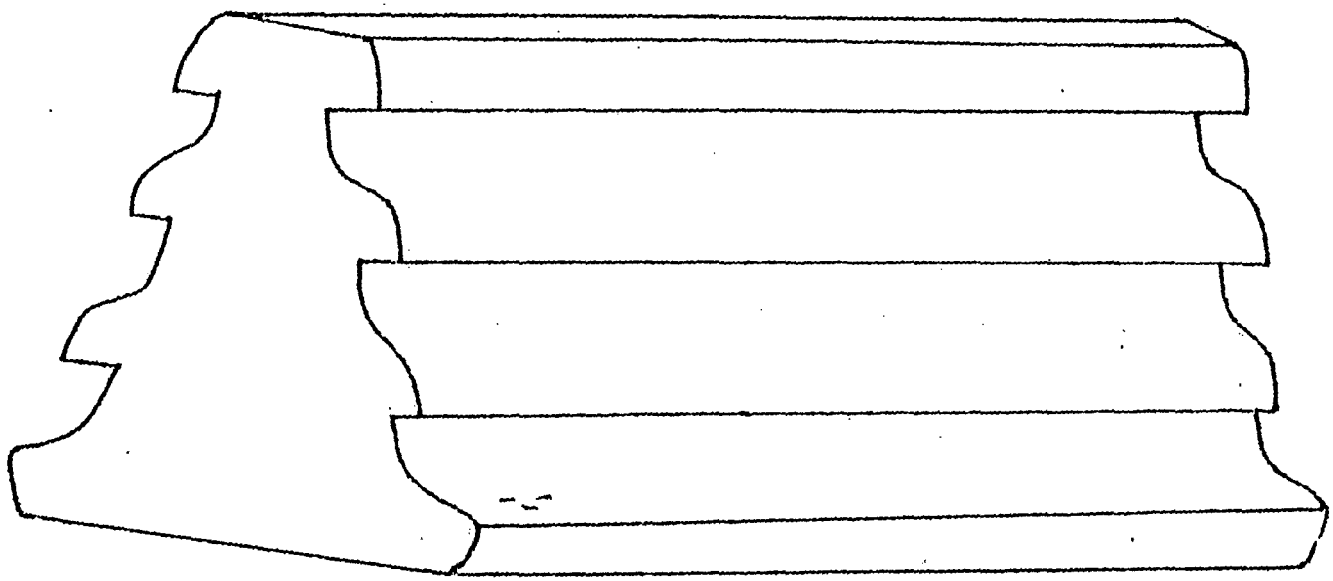
ROW NO. 6 SD.

STEEPLE NO. 59

DRAWING NO. [illegible]

DATE 3-14-8[illegible]

COUPLING SIDE



3 IDENTICAL 1/8, 1/16 & 1/16"

SURRY POWER STATION

ROTOR NO. 1

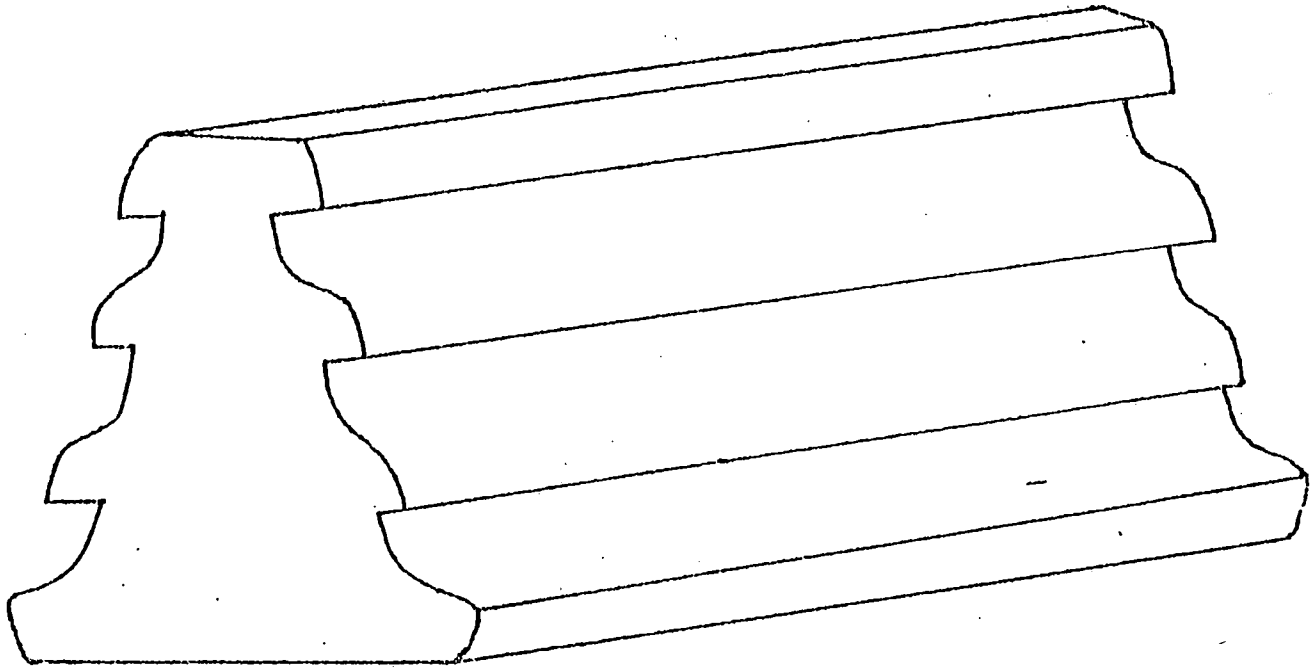
ROW NO. 2-3

STEEPLE NO. 61

DRAWING NO. 36

DATE 14/MAR/80

CONCAVE SIDE



1/16 LINEAR INDICATION

SURRY POWER STATION

ROTOR NO. 1

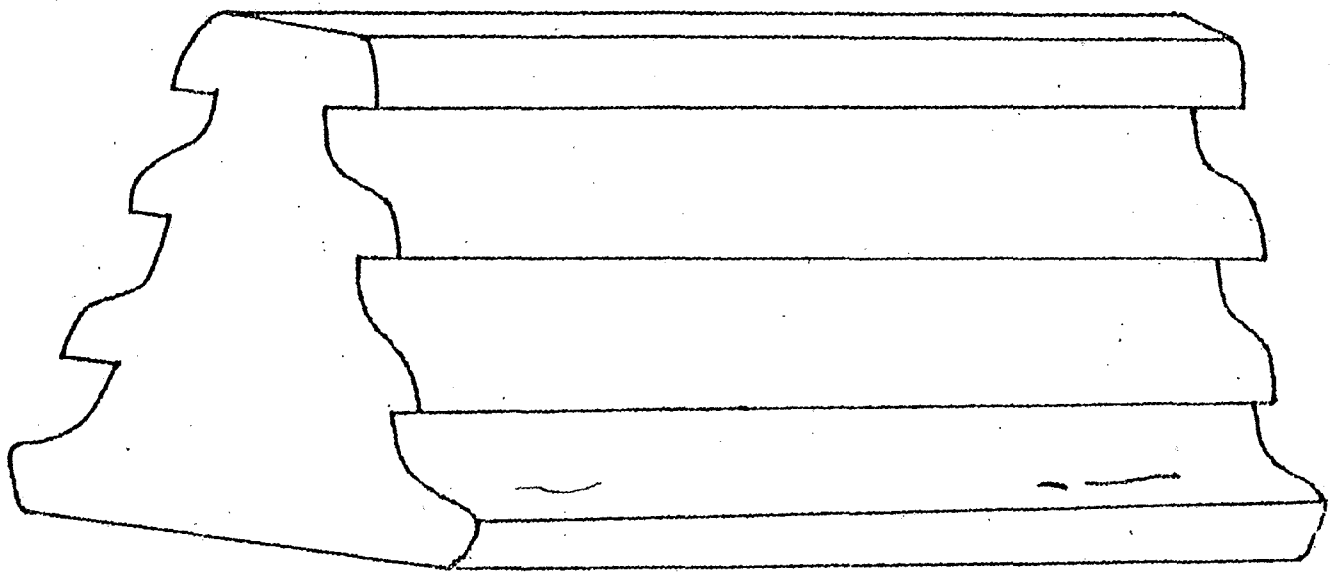
ROW NO. 6 of 23

STEEPLE NO. 62

DRAWING NO. 35

DATE 4/MAR/8

CONCAVE SIDE



1/4" LINEAR INDICATION

1/8" LINEAR INDICATION

SURRY POWER STATION

ROTOR NO. 1

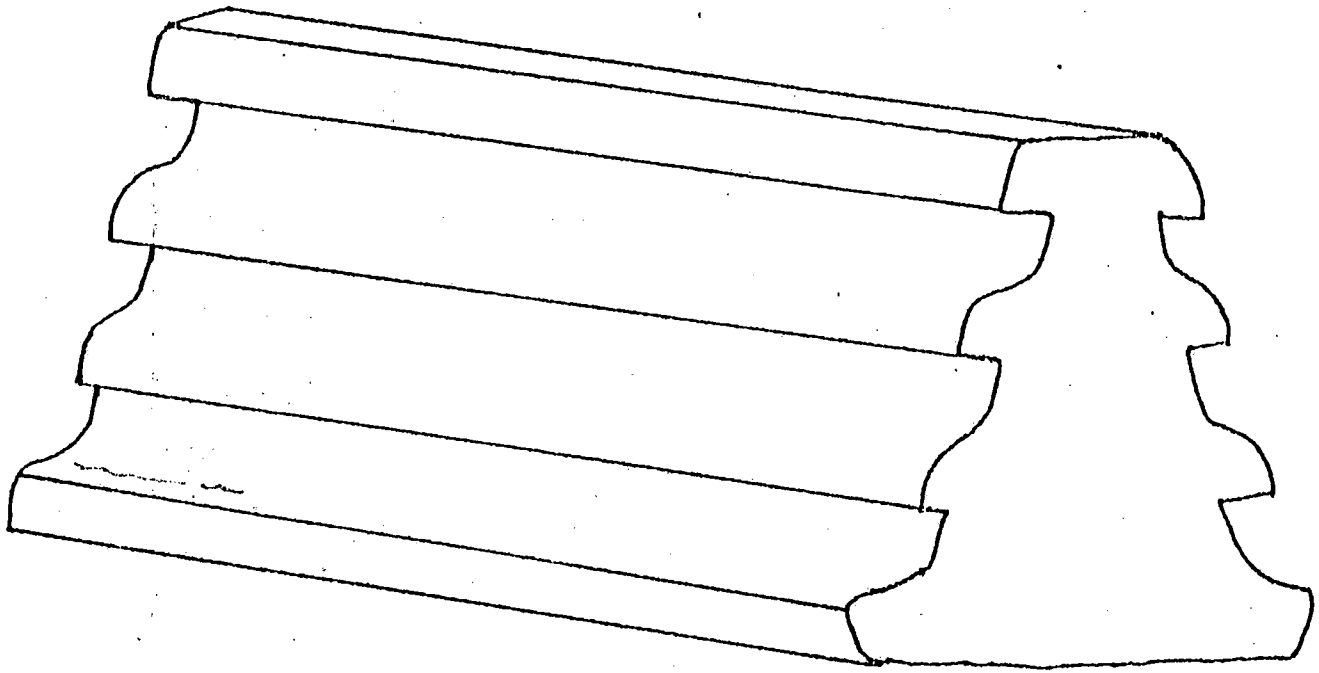
CONV. ROW NO. L-3

STEEPLE NO. 64

DRAWING NO. 34

DATE 1/8/MAR/6

CONVEX SIDE



1/2" LINEAR INDICATION

SURRY POWER STATION

ROTOR NO. 1

GEN.

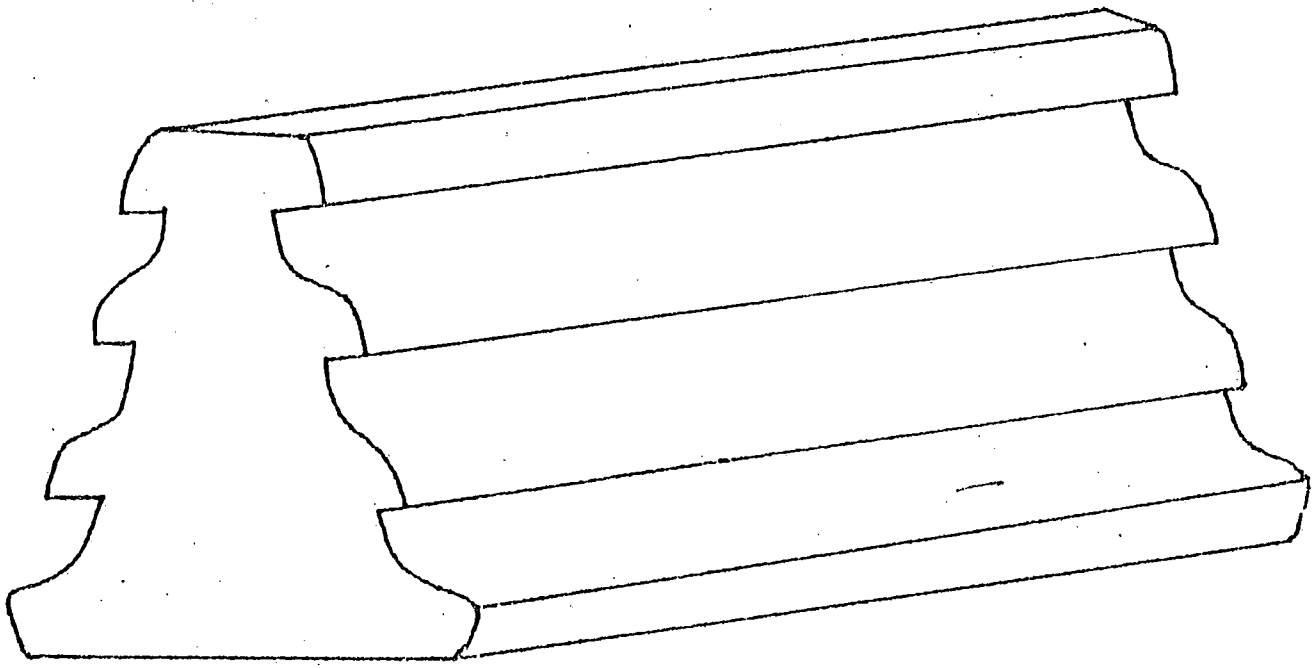
ROW NO. L-3

STEEPLE NO. 85

DRAWING NO. 30

DATE 13/Mar/80

Concave Side



1/16" Linear Indication

SURRY POWER STATION

ROTOR NO. 1

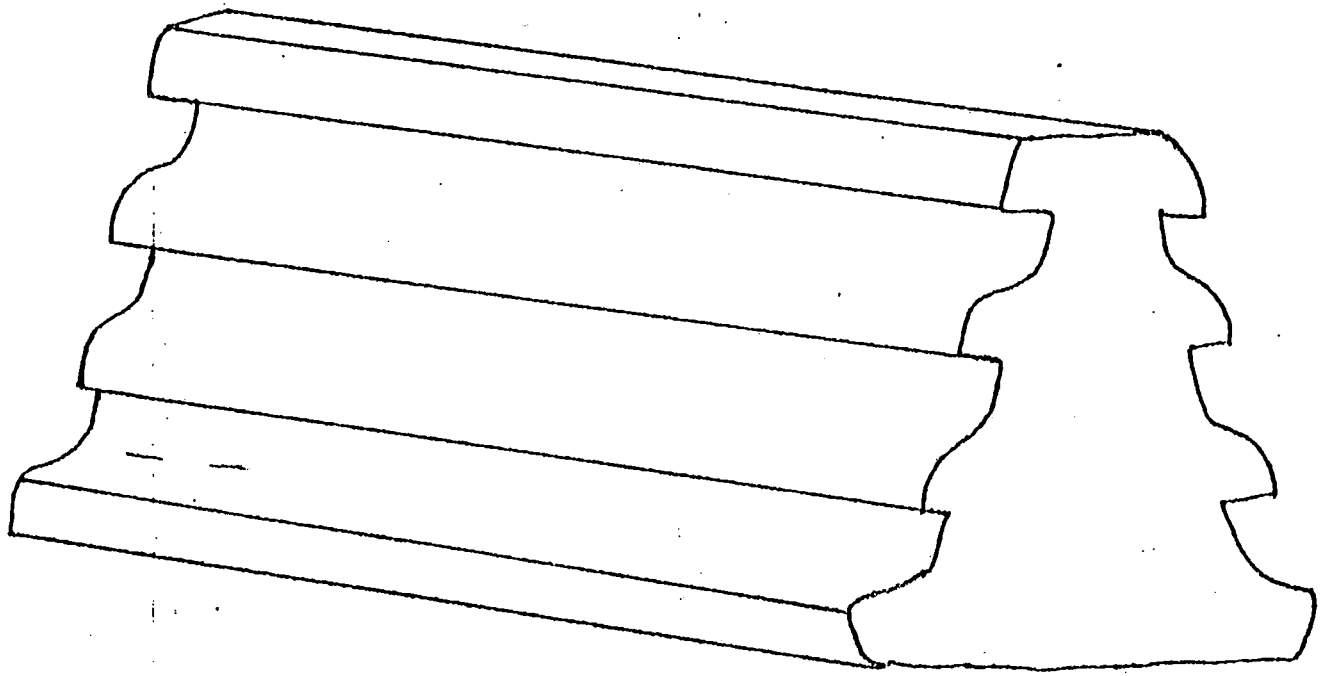
ROW NO. 60W L-3

STEEPLE NO. 87

DRAWING NO. 31

DATE 13/May/80

Convex Side



Two 1/16" Linear Indications

SURRY POWER STATION

ROTOR NO. 1 GEN.

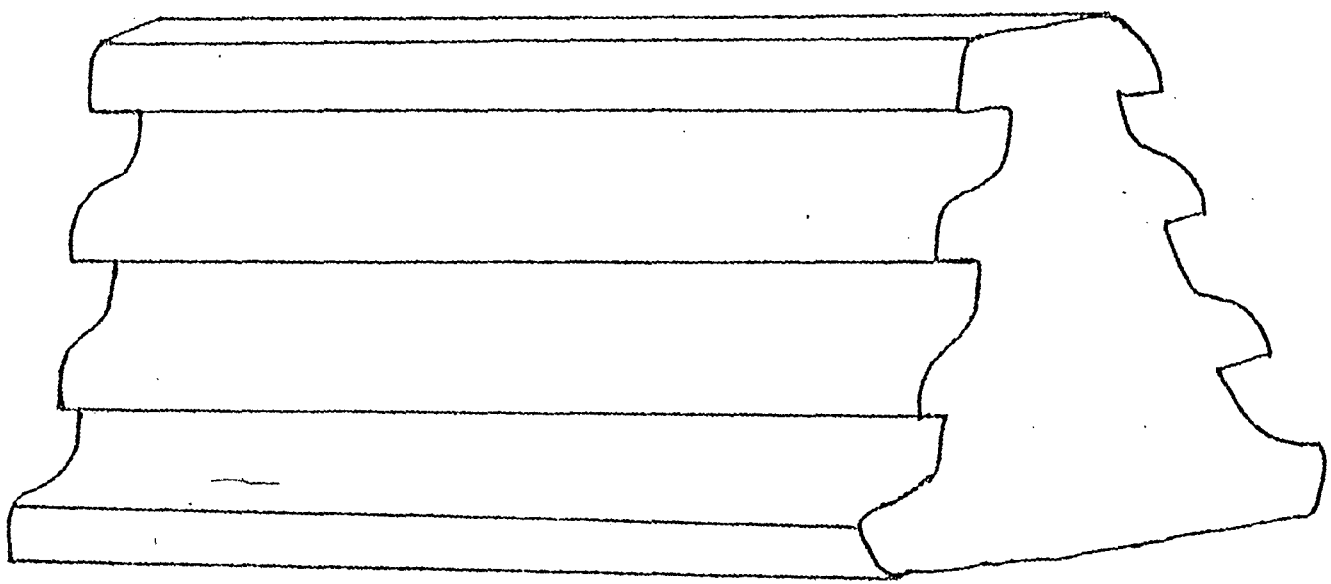
ROW NO. L-3

STEEPLE NO. 99

DRAWING NO. 32

DATE 13/[illegible]/80

Convex Side



One 1/8" Linear Indication

CONCAVE SIDE

SURRY POWER STATION

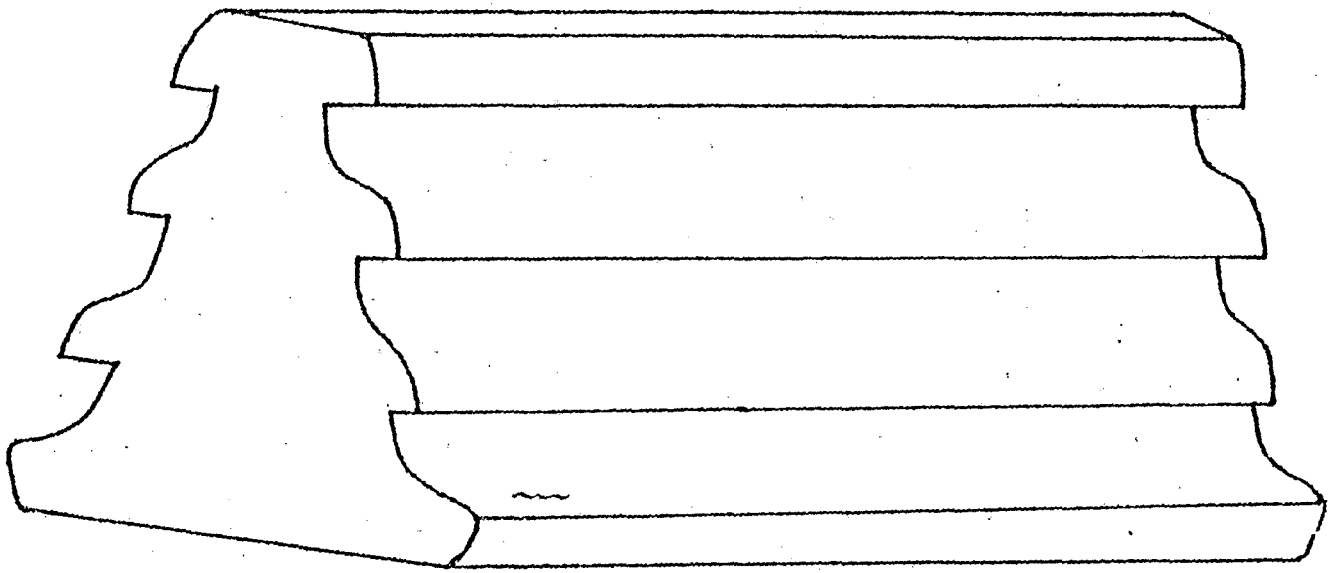
ROTOR NO. 1

ROW NO. L-2

STEEPLE NO. 124

DRAWING NO. 29

DATE 3/MAR/8



1/16" LINEAR INDICATION AT BASE

11 NO. 1

SURRY POWER STATION

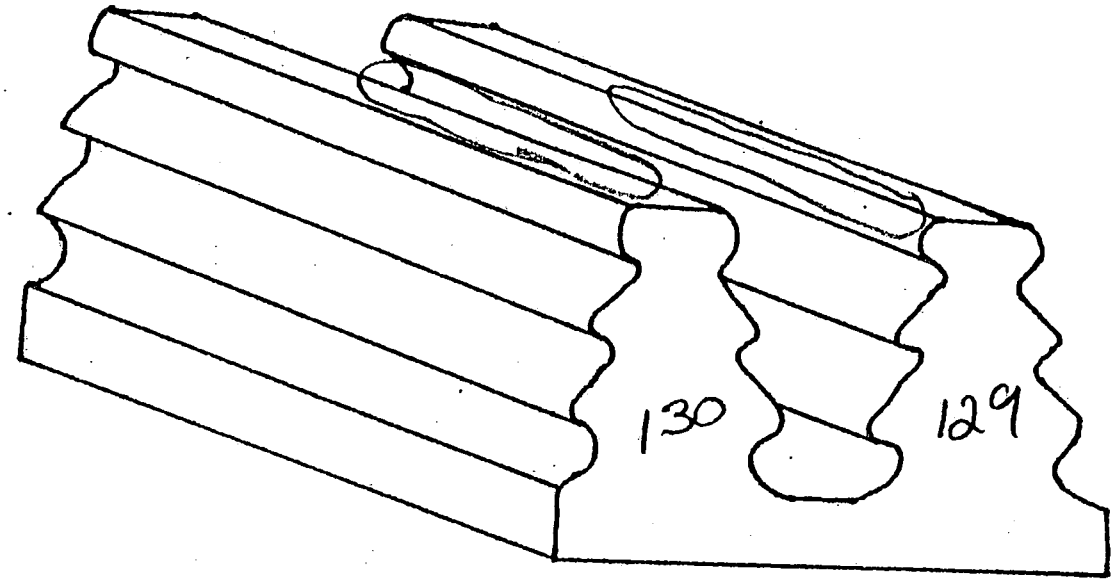
ROTOR NO. 1

GEN.
ROW NO. 2-3

STEEPLE NO. 130-129

DRAWING NO. 28

DATE 13/MAR/80

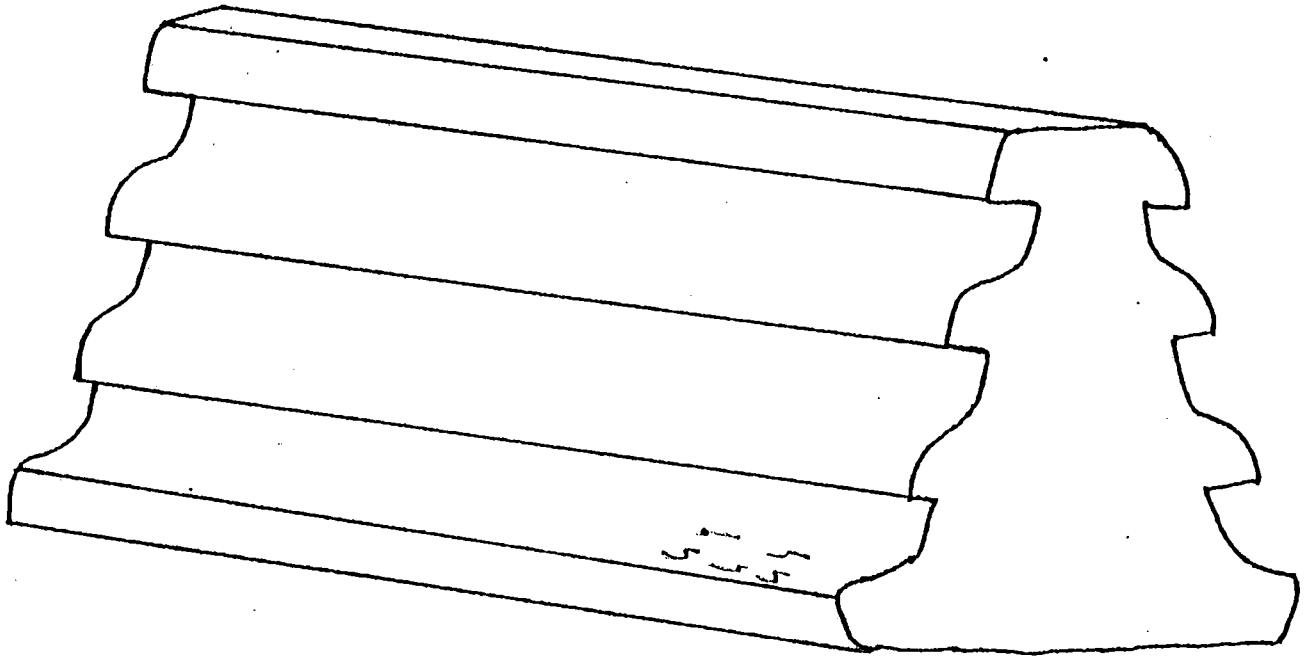


METAL AT TOP OF STEEPLES IS TORN AWAY AND FOLDED OUT

SURRY POWER STATION

ROTOR NO. 1
GEN
ROW NO. L-3
STEEPLE NO. 137
DRAWING NO. 25
DATE 13/MAR/80

CONVEX SIDE



1/16" LINEAR INDICATIONS IN BASE METAL UP TO BOTTOM GROOVE

SURRY POWER STATION

ROTOR NO. 1

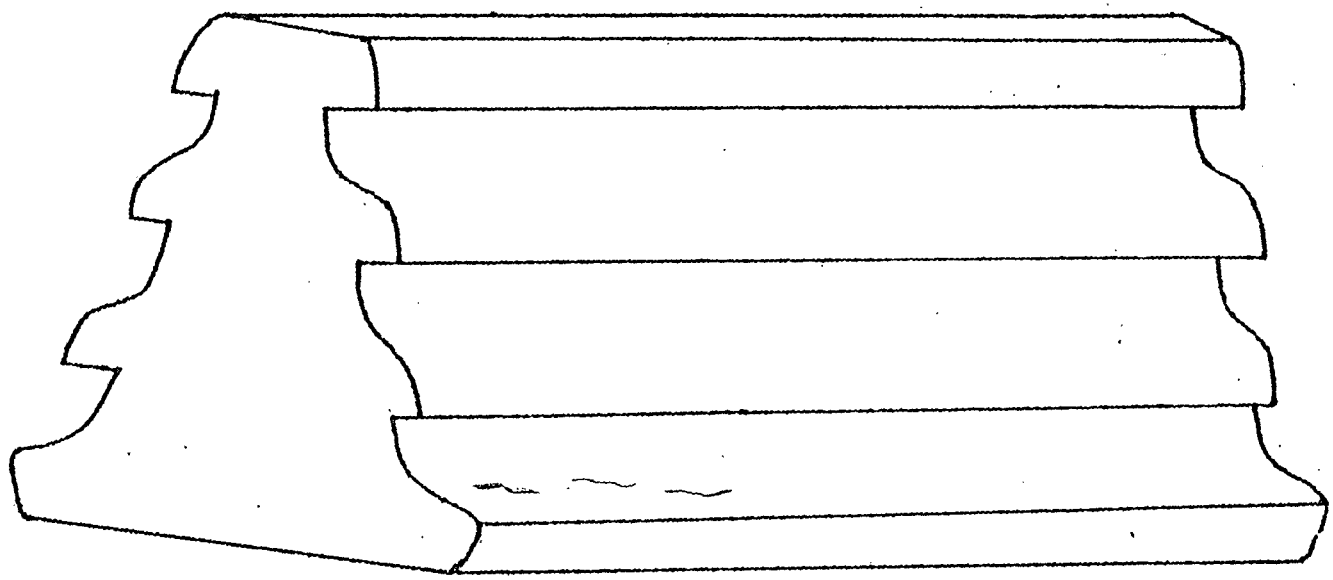
ROW NO. L-3

STEEPLE NO. 138

DRAWING NO. 24

DATE 13 MAR 8[illegible]

CONCAVE SIDE



3 LINEAR INDICATIONS 1/4"

SURRY POWER STATION

ROTOR NO. 1

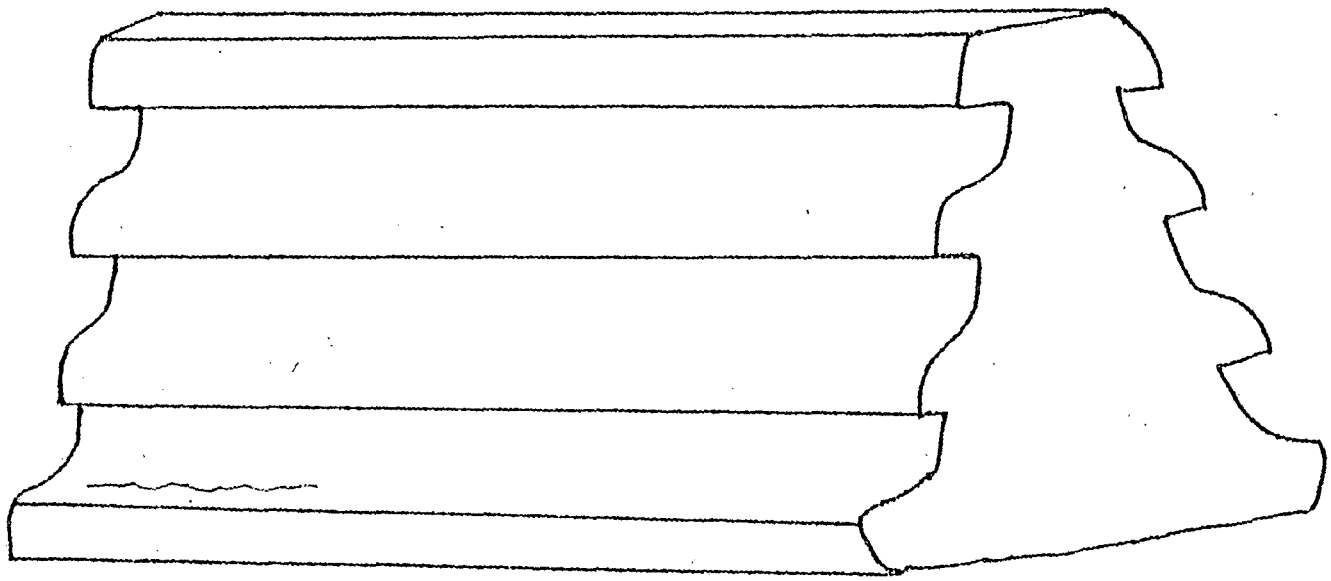
ROW NO. GEN L-3

STEEPLE NO. 142

DRAWING NO. 27

DATE 13/MAR/80

CONVEX SIDE



½" LINEAR INDICATION

SURRY POWER STATION

ROTOR NO. 1 GEN

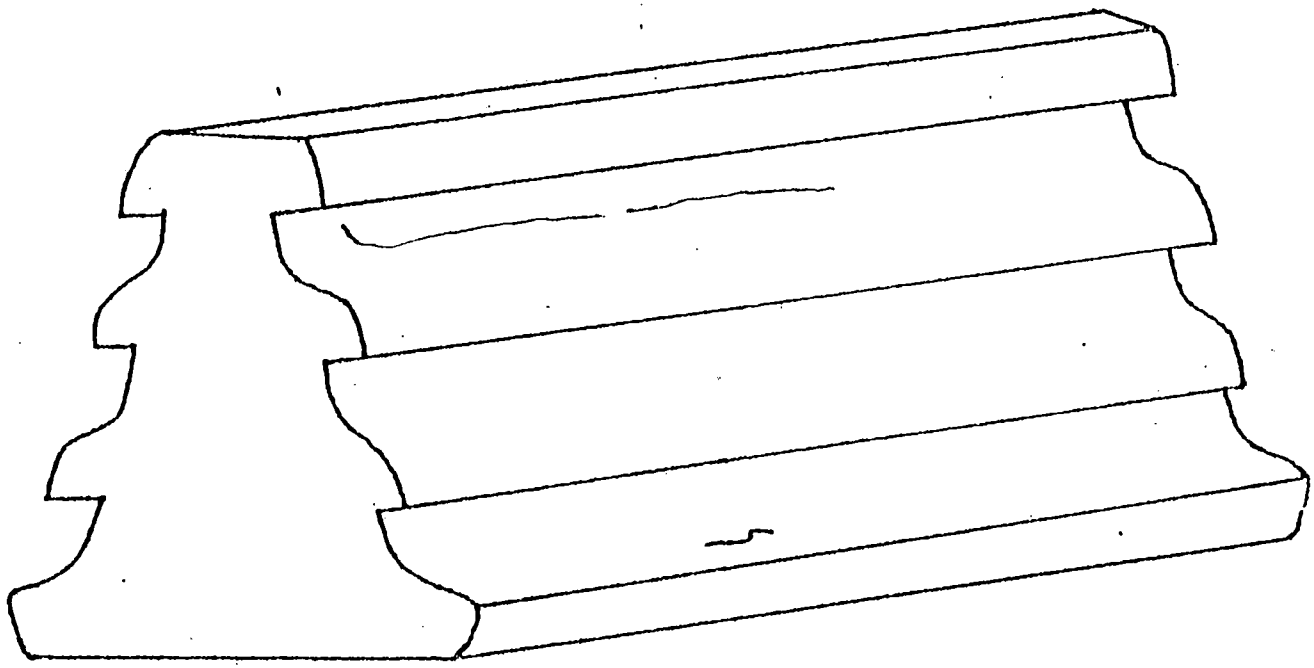
ROW NO. 2-3

STEEPLE NO. 150

DRAWING NO. 23

DATE 13/MAR/80

CONCAVE SIDE



3/16" LINEAR INDICATION

LINEAR INDICATIONS APPROX 1/4"

UNIT NO. 1

SURRY POWER STATION

ROTOR NO. 1

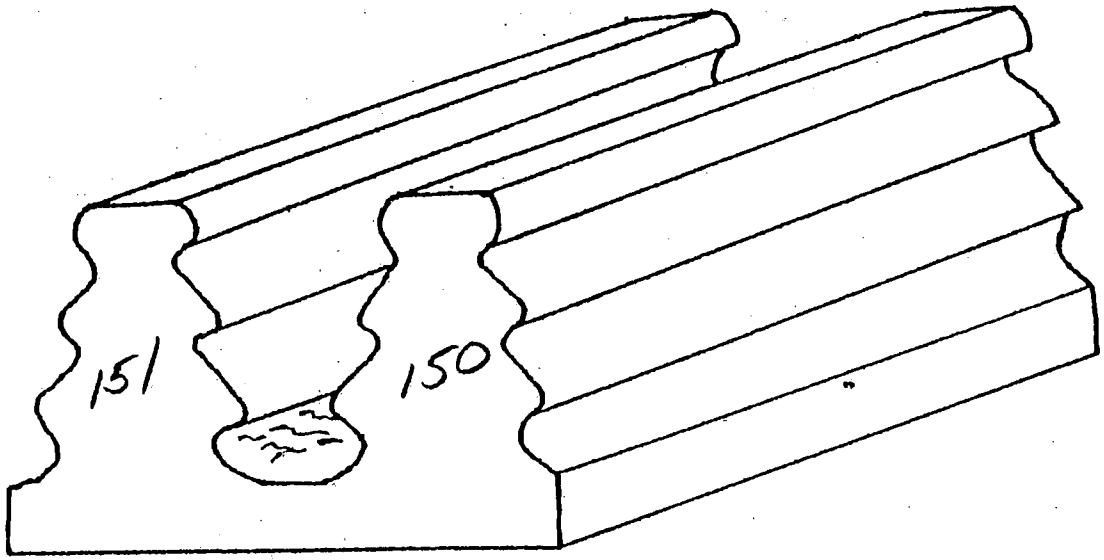
ROW NO. CON 2-3

STEEPLE NO. 151-150

DRAWING NO. 22

DATE 13/MAR/80

CONCAVE SIDE



LINEAR INDICATIONS ON BASE METAL BETWEEN STEEPLES.

SURRY POWER STATION

ROTOR NO. 1

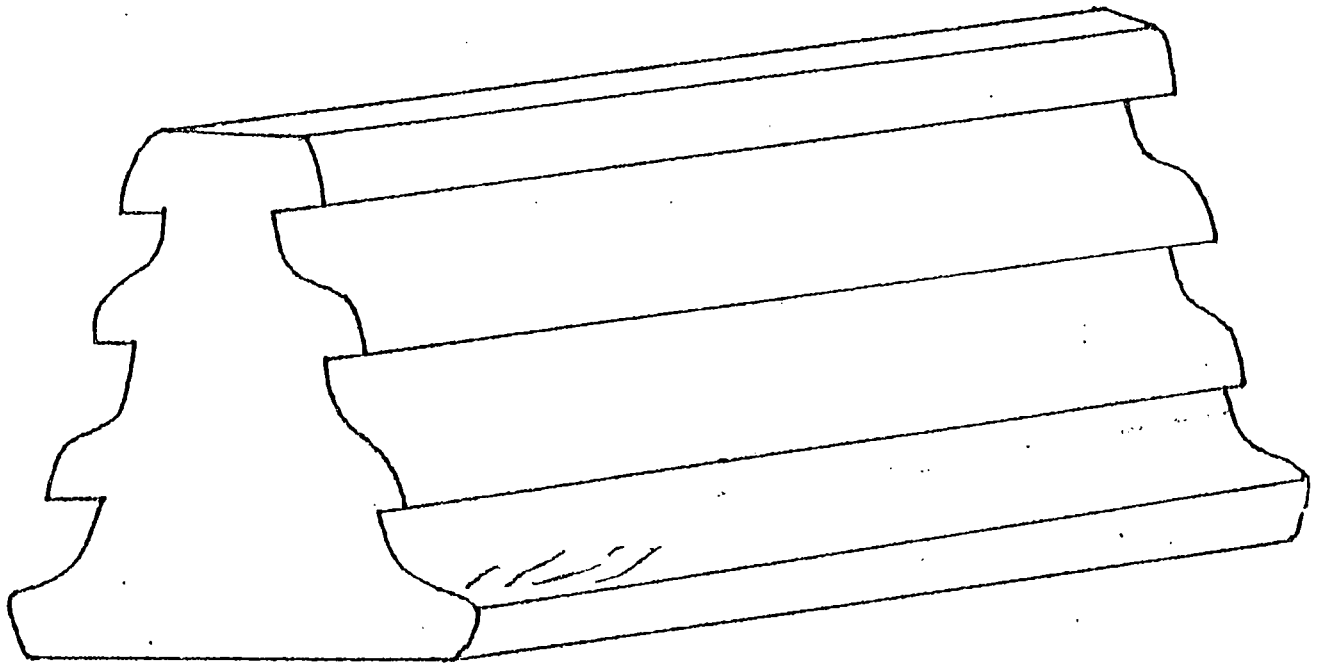
ROW NO. L-3 (CON)

STEEPLE NO. 151

DRAWING NO. 21

DATE 13/MAR/80

CONCAVE SIDE



LINEAR INDICATIONS

1", 3/4" ACCEPTED

SURRY POWER STATION

ROTOR NO. 1

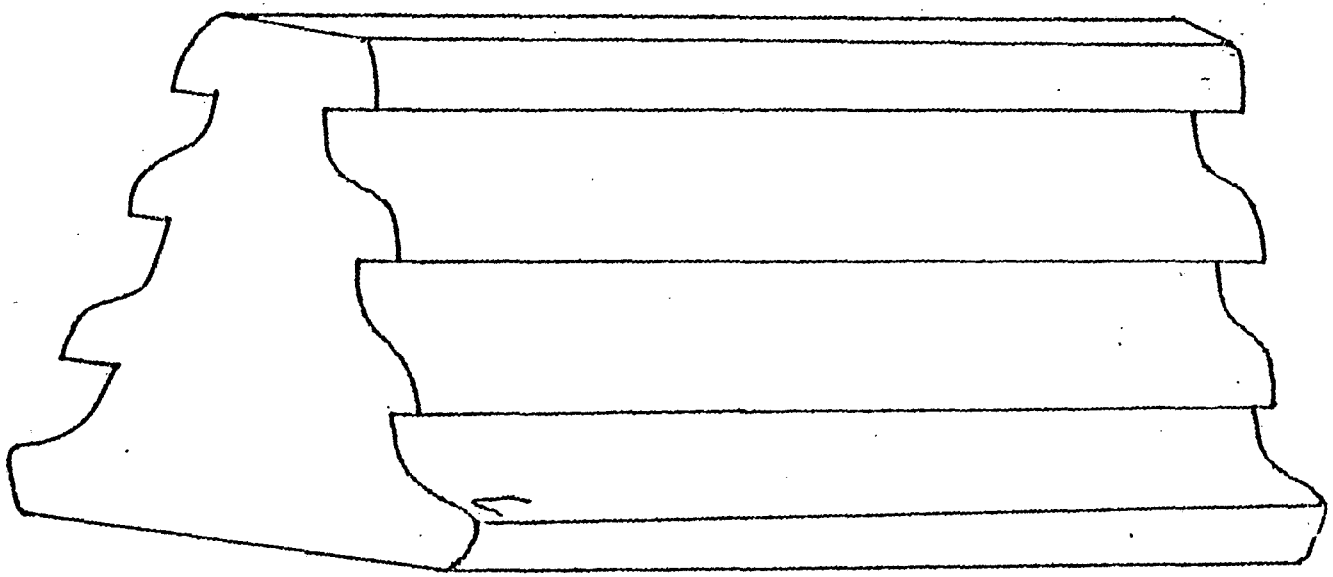
ROW NO. L-3

STEEPLE NO. 159

DRAWING NO. 20

DATE 13/MAR/81

CONCAVE SIDE



LINEAR INDICATION

3/16"

CONCAVE SIDE

SURRY POWER STATION

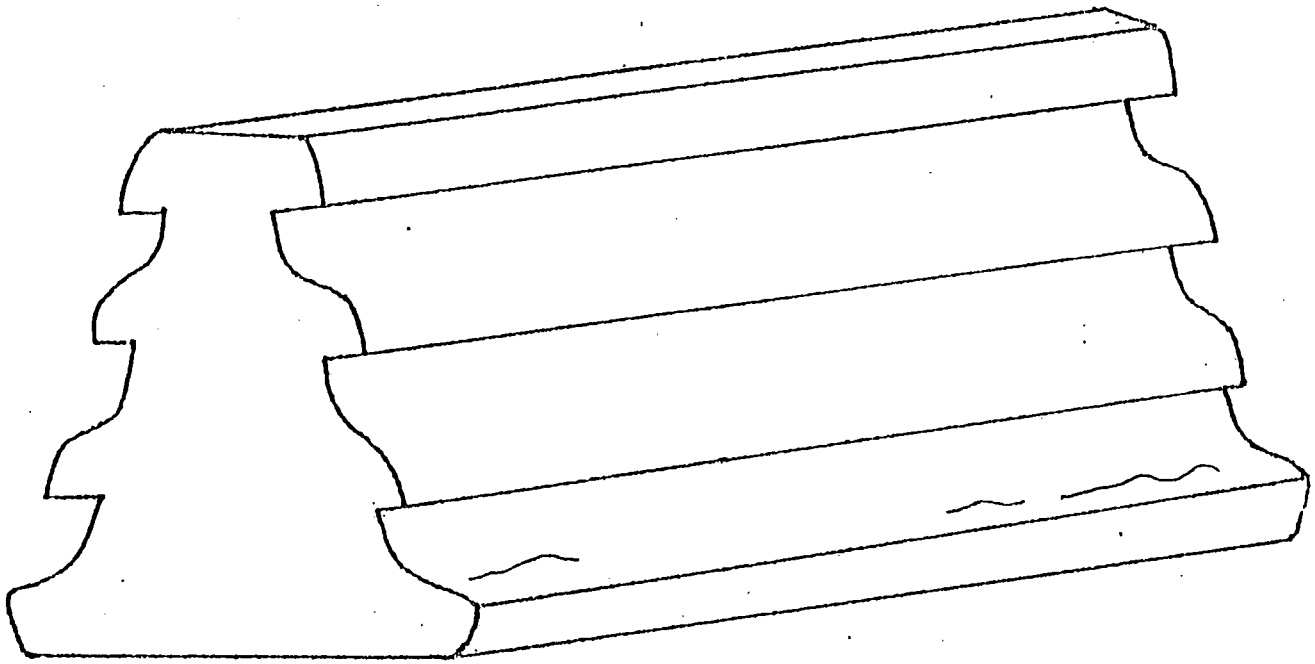
ROTOR NO. 1 GEN

ROW NO. L-3

STEEPLE NO. 1-0

DRAWING NO. 14

DATE 13/MAR/80



3 LINEAR INDICATIONS

1/2", 1/4", 3/8"

SURRY POWER STATION

ROTOR NO. 1

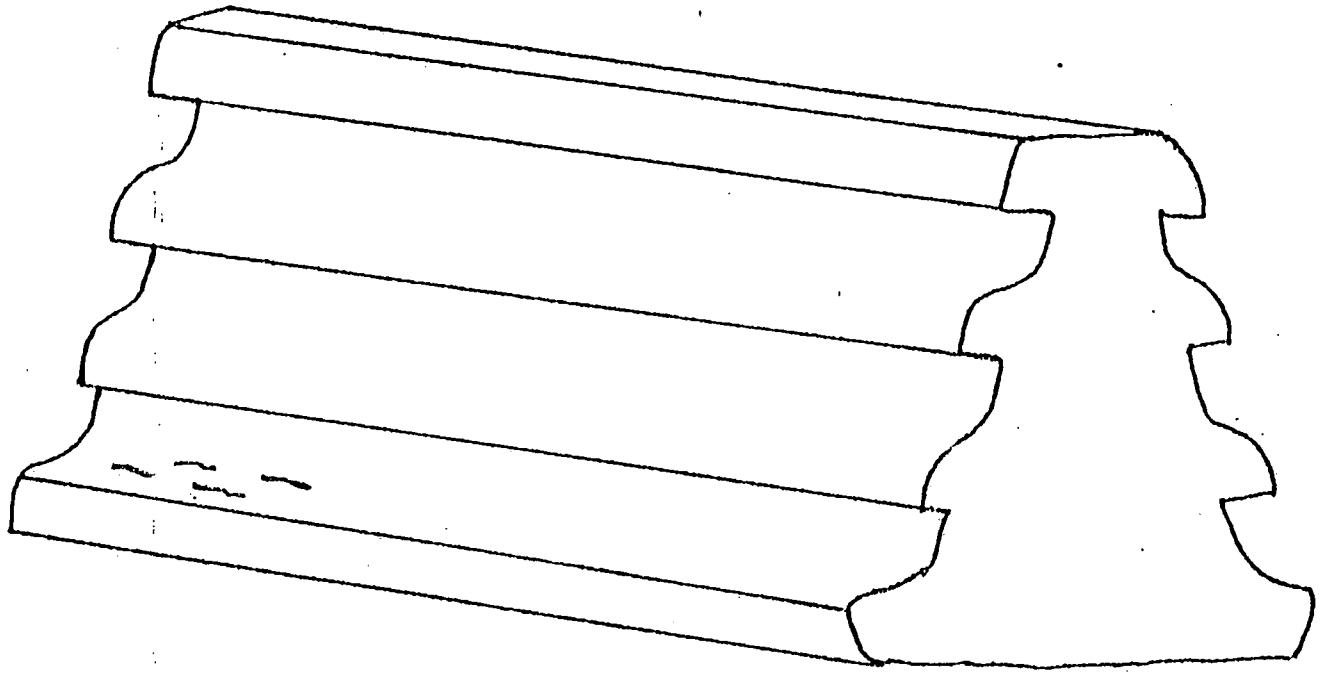
ROW NO. GEN L-3

STEEPLE NO. 161

DRAWING NO. 26

DATE 13/MAR 82

CONVEX SIDE



LINEAR INDICATIONS AT BASE METAL

1/16" & SMALLER

CONCAVE SIDE

SURRY POWER STATION

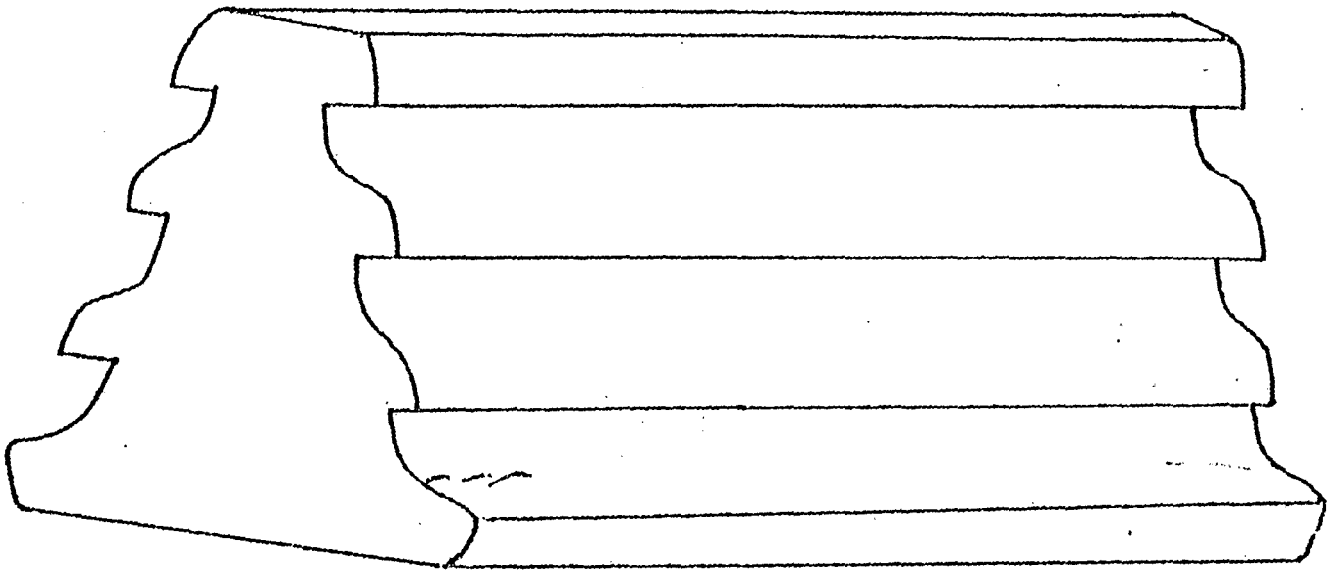
ROTOR NO. 1

ROW NO. LOW-3

STEEPLE NO. 161

DRAWING NO. 19

DATE 13/MAR/8

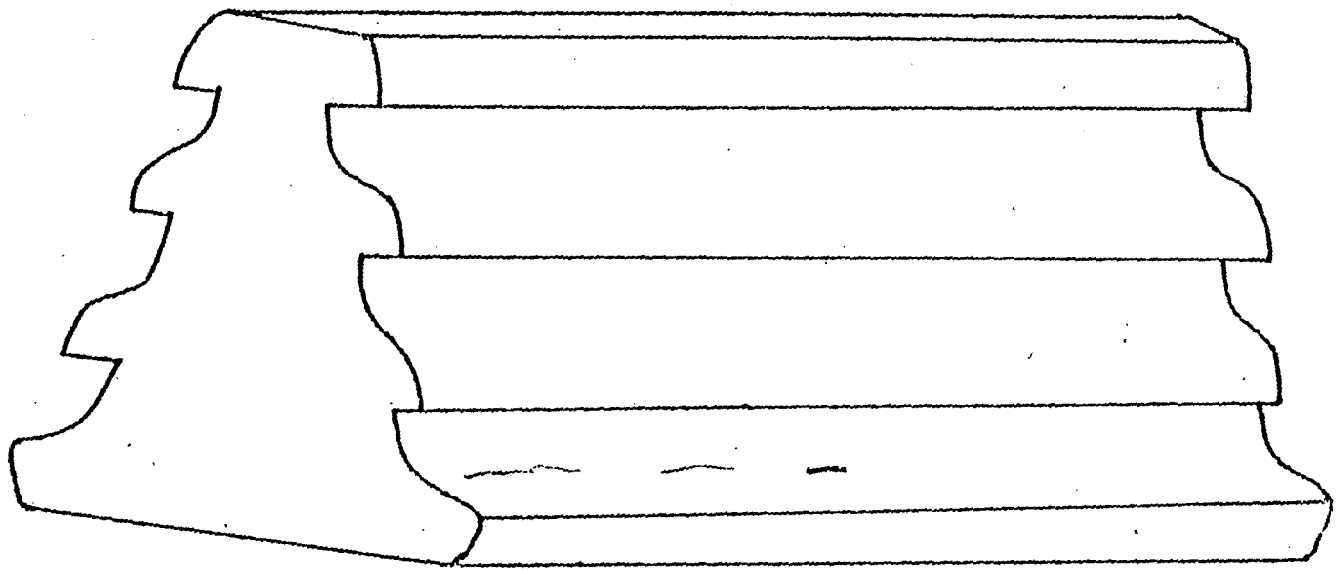


4 LINEAR INDICATIONS
1/4" + SMALLER

CONCAVE
SIDE

SURRY POWER STATION

ROTOR NO. 1
ROW NO. L-3
STEEPLE NO. 162
DRAWING NO. 18
DATE 13/MAR/80

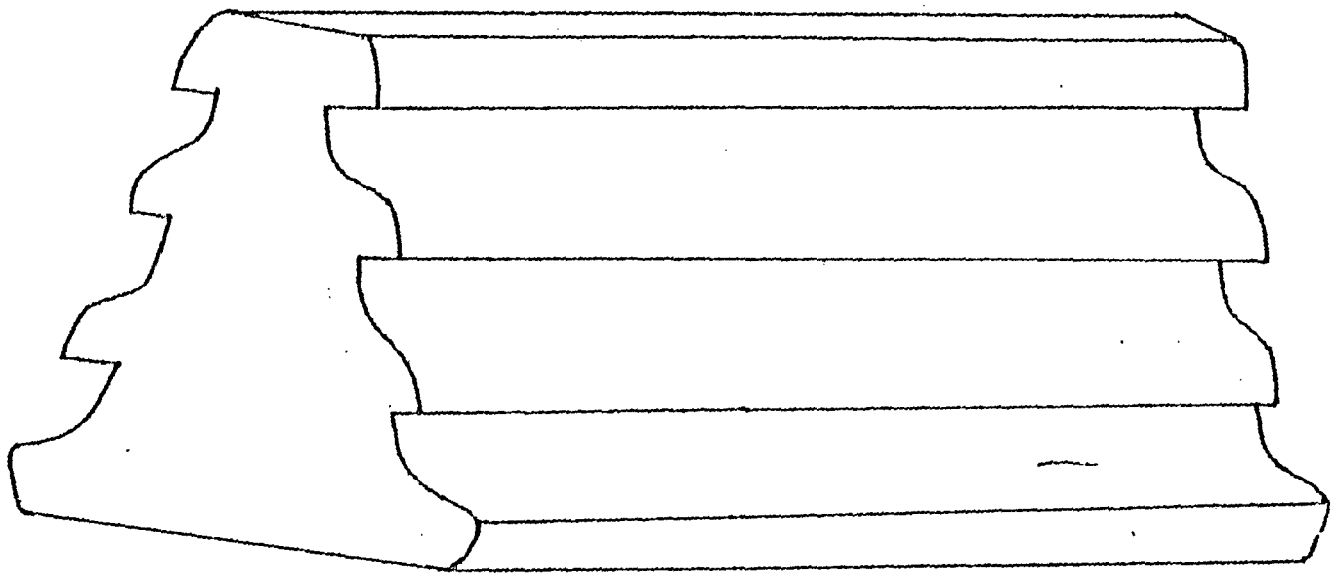


3 LINEAR INDICATIONS
1/4" + SMALLER

CONCAVE
SIDE

SURRY POWER STATION

ROTOR NO. 1
ROW NO. 2-3
STEEPLE NO. 16
DRAWING NO. 17
DATE 13/MAR/8

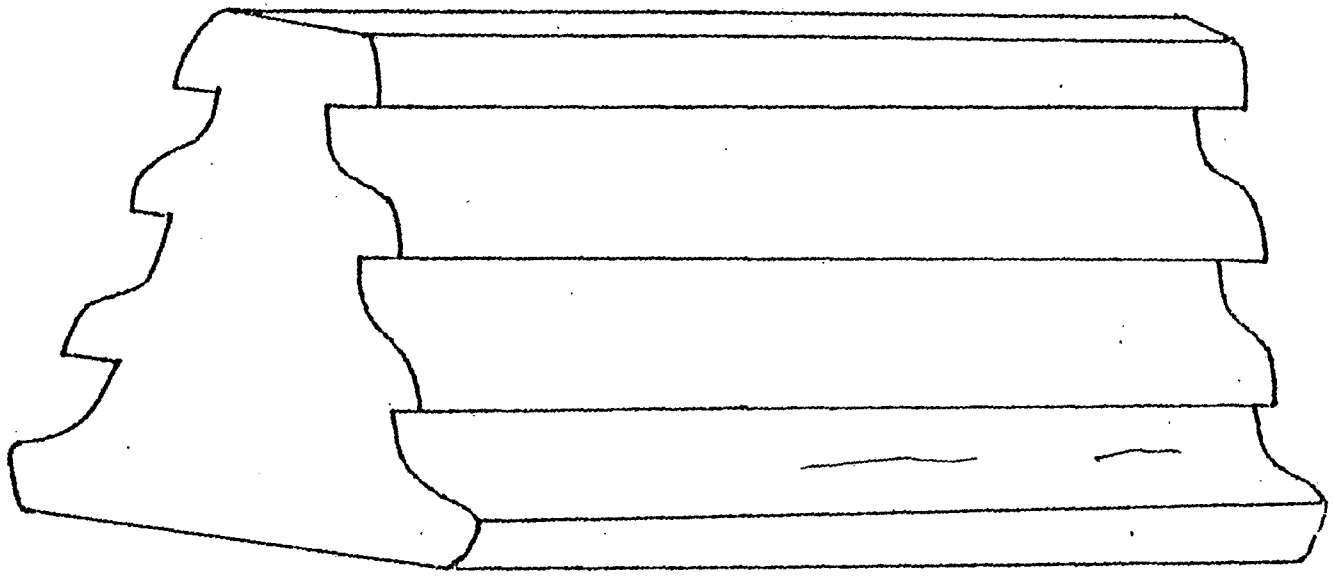


1/4" LINEAR INDICATION

CONCAVE
SIDE

SURRY POWER STATION

ROTOR NO. 1
ROW NO. Gen L-3
STEEPLE NO. 164
DRAWING NO. 16
DATE 13/MAR



2 LINEAR INDICATIONS
1/2" + 1/4"

SURRY POWER STATION

CONCAVE SIDE

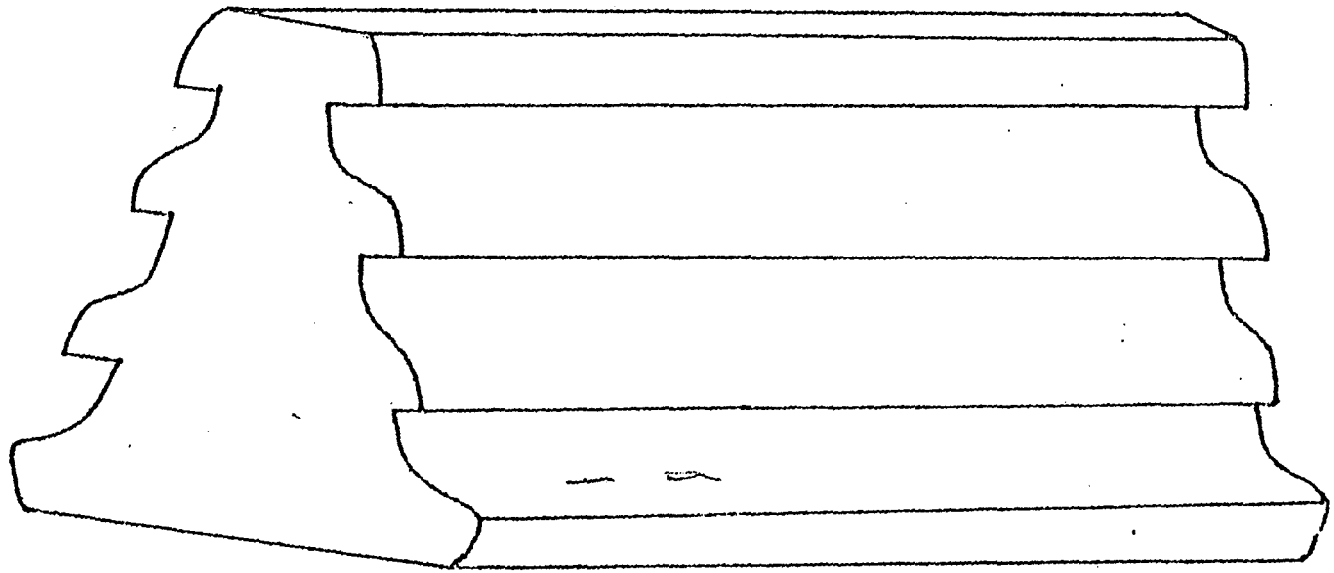
ROTOR NO. 1

ROW NO. L-3

STEEPLE NO. 165

DRAWING NO. 15

DATE 13/MAR/



1/4" LINEAR INDICATIONS

CONCAVE SIDE

SURRY POWER STATION

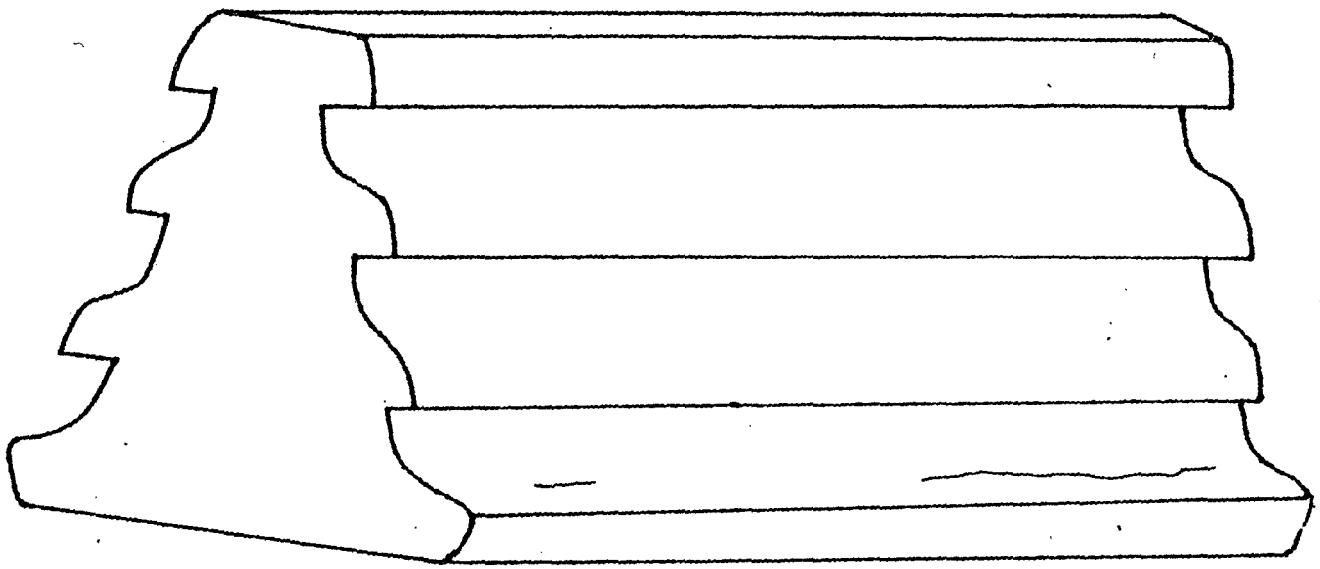
ROTOR NO. 1

ROW NO. L-3

STEEPLE NO. 167

DRAWING NO. 13

DATE 13/MAR



3/4" LINEAR INDICATION

1/4" " "

SURRY POWER STATION

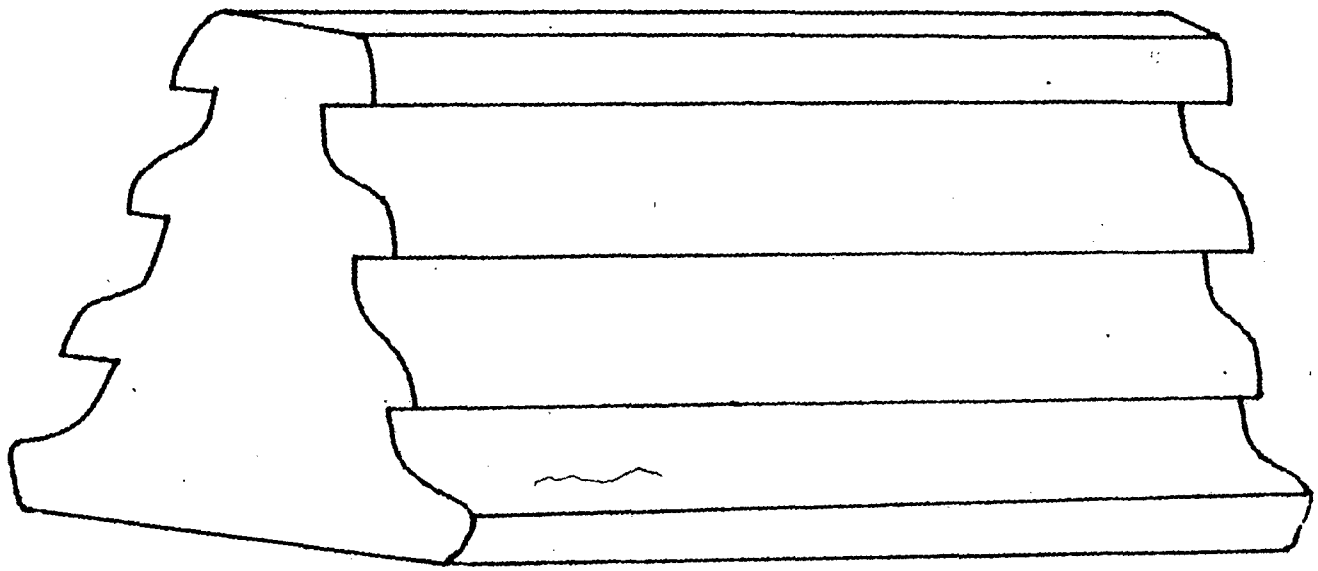
ROTOR NO. 1

ROW NO. 60J

STEEPLE NO. 168

DRAWING NO. 1

DATE



CONCAVE SIDE
3/16" LINEAR
INDICATION (GRIND)

SURRY POWER STATION

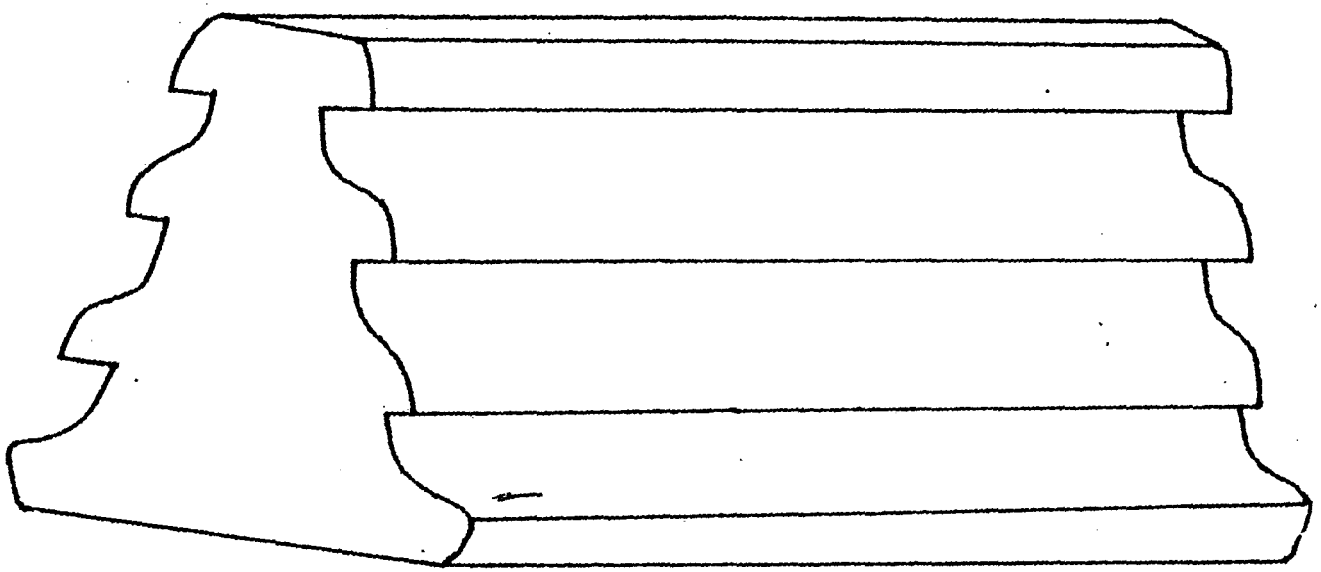
ROTOR NO. 1

ROW NO. 6 & 7

STEEPLE NO. 174

DRAWING NO. 9

DATE 3-17-80



COUPLING SIDE

¼" LEADING INDICATION

UNIT NO. 1

SURRY POWER STATION

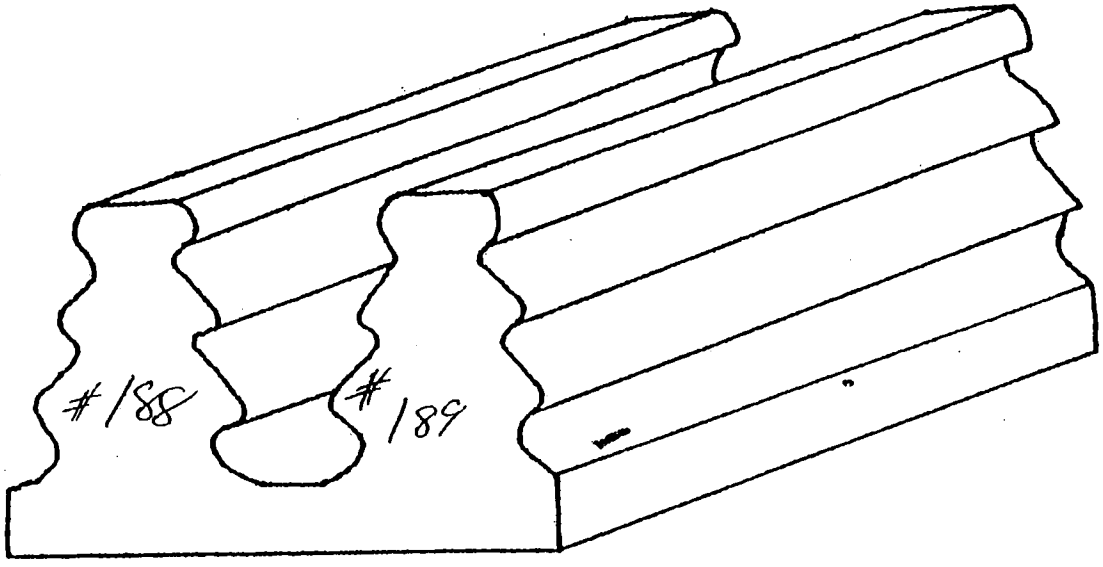
ROTOR NO. 1 CRW

ROW NO. 1-3

STEEPLE NO. 189

DRAWING NO. 8

DATE 3-13-80



CONVEX SIDE

3/16" LINEAR INDICATION

SURRY POWER STATION

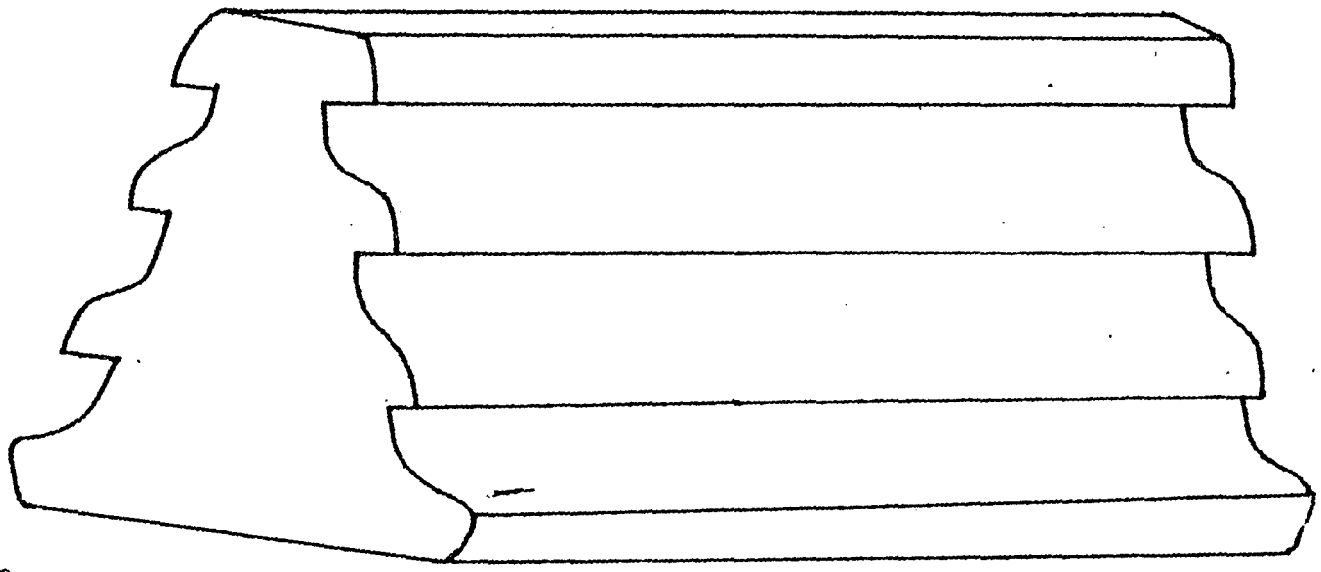
ROTOR NO. 1

ROW NO. ~~10~~ 6 ON

STEEPLE NO. 189

DRAWING NO. 7

DATE 3-13-80



CONCAVE SIDE
7/16" LINEAR INDICATION

SURRY POWER STATION

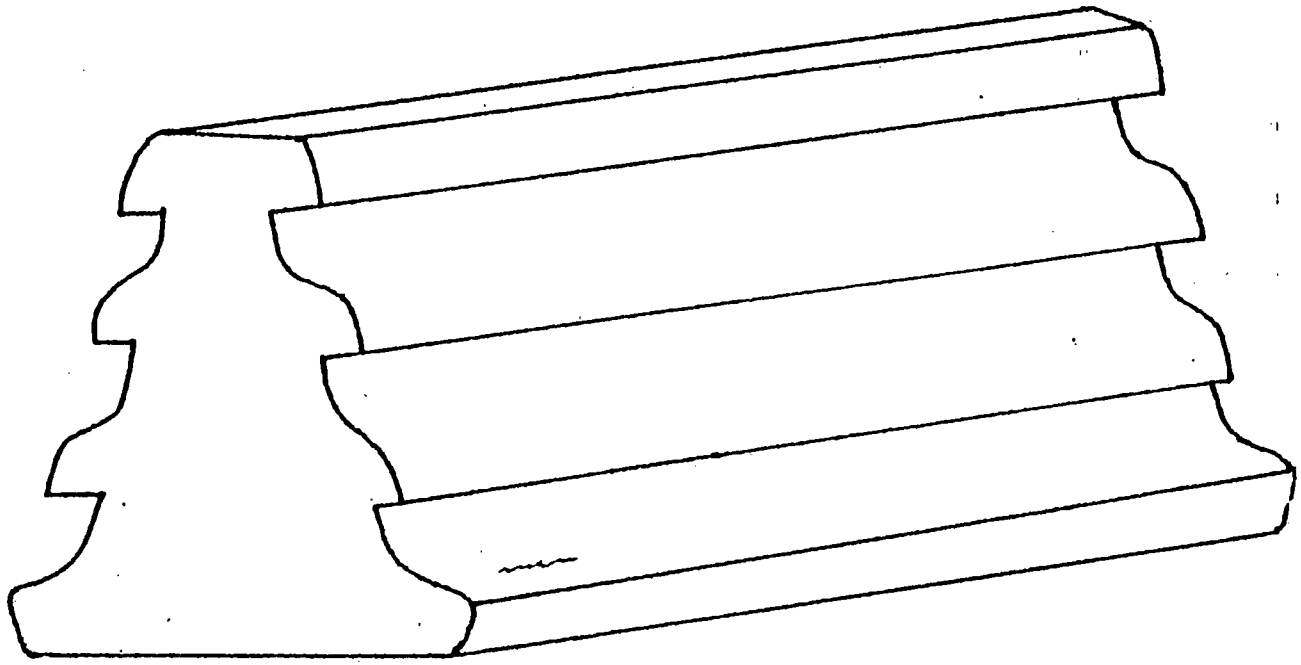
ROTOR NO. 1

ROW NO. 1-3

STEEPLE NO. 190

DRAWING NO. 6

DATE 5-18-80



CONCAVE SIDE

[illegible]

UNIT No. 1

SURRY POWER STATION

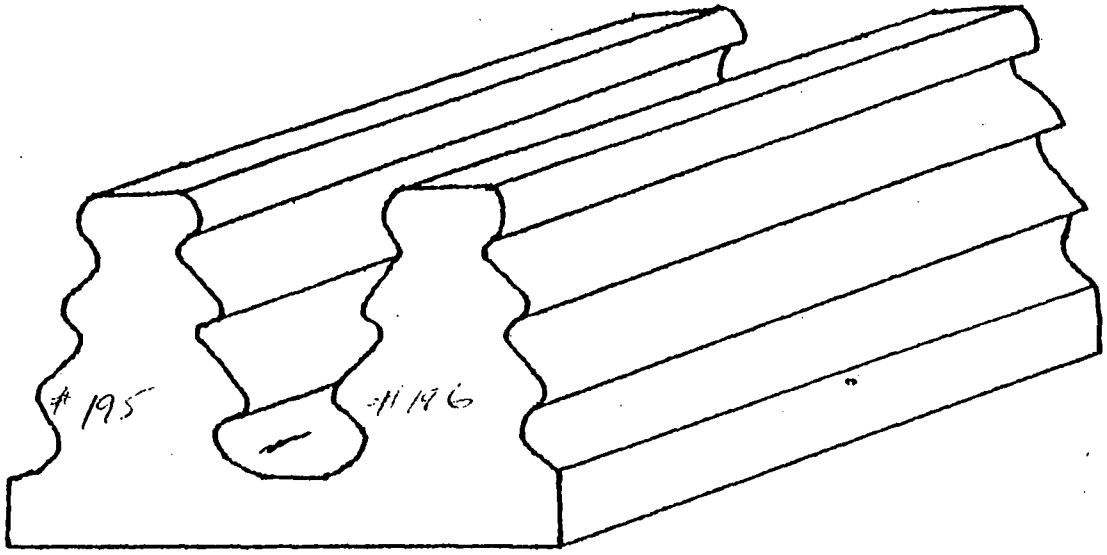
ROTOR NO. 1 (60)

ROW NO. L-3

STEEPLE NO. 195

DRAWING NO. #5

DATE 5-15-80



CONVEX SIDE

1/4" LOOKING INBOARD

UNIT No. 1

SURRY POWER STATION

ROTOR NO. 1

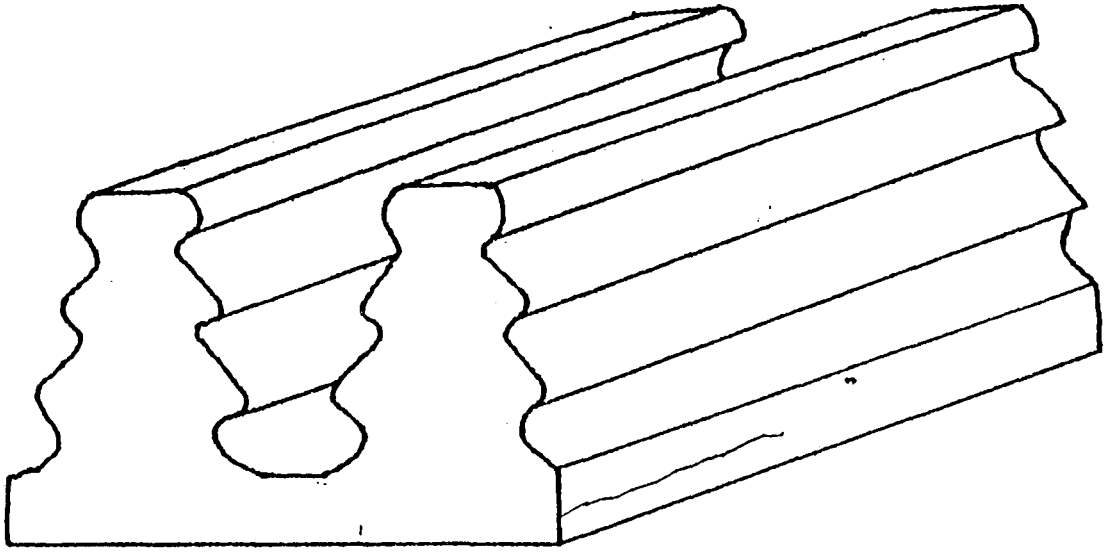
6eN

ROW NO. L-5

STEEPLE NO. 204

DRAWING NO. 2

DATE 3-13-80



CONCAVE SIDE

1/4" LINEAR INDICATION

UNIT NO. 1

SURRY POWER STATION

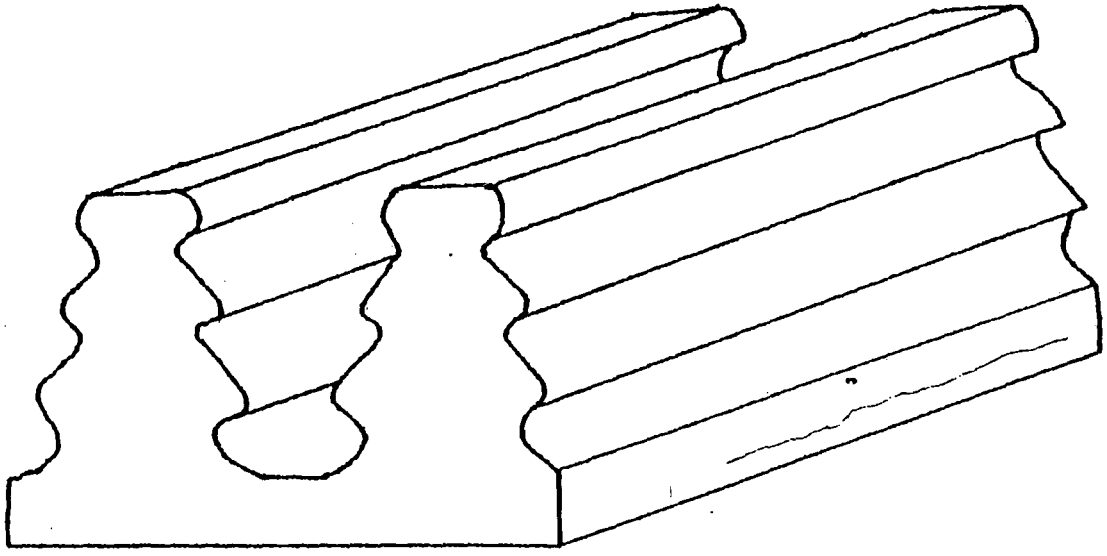
ROTOR NO. 6 aw

ROW NO.

STEEPLE NO.

DRAWING NO. 3

DATE



No Scale

No Space

UNIT NO. 1

SURRY POWER STATION

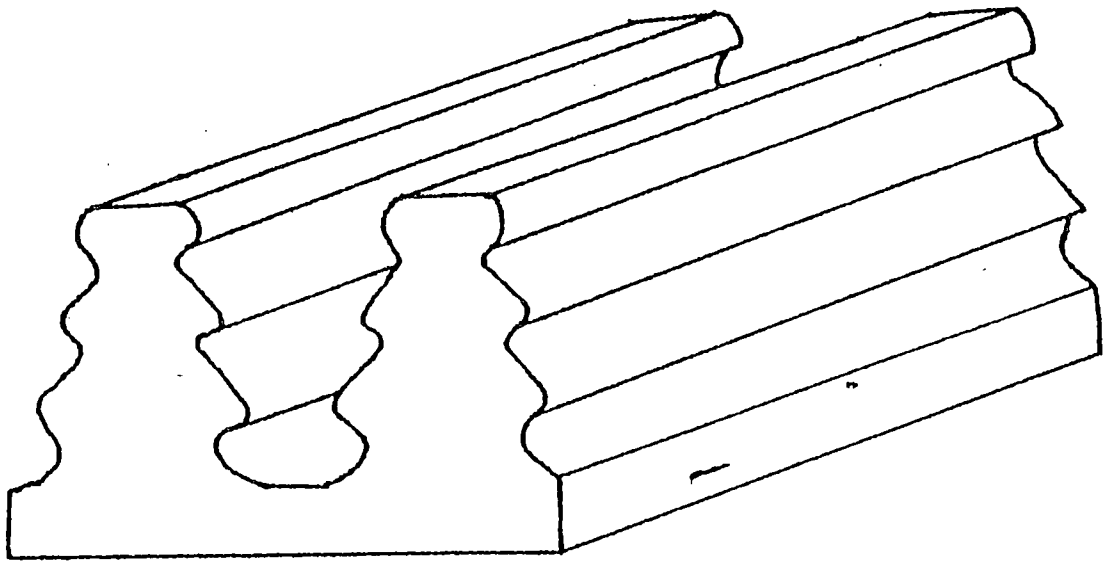
ROTOR NO. 1

ROW NO. GOW 2-9

STEEPLE NO. 207

DRAWING NO. 4

DATE 5/13/80



CONCAVE SIDE

1/4" LINEAR INCREASE

SURRY POWER STATION

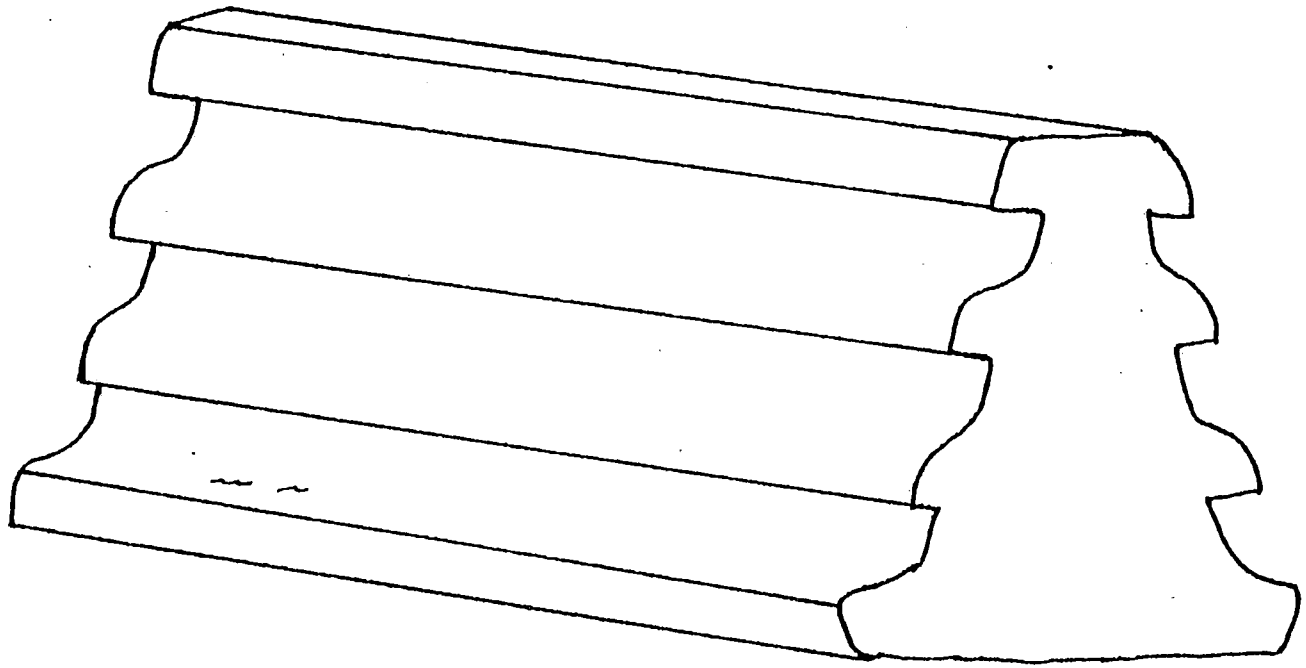
ROTOR NO. 1

ROW NO. C-3 (CON)

STEEPLE NO. 223

DRAWING NO. 1

DATE 3-13-8



Concave Side

2 Linear Indications

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	LP TURBINE	NDT – MT – 12.1	3-15-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #1 ROTOR L-4 GENERATOR END	S10022104I4

7 MATERIAL:	8 SURFACE CONDITION:
ALLOY STEEL (CARBON)	GLASS BEAD BLAST CLEAN

9 TYPE OF PARTICLES:	10 BATCH NO:
☑ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	5G002

11 MANUFACTURER:	12 TYPE:
MAGNAFLUX	20A

13 MAGNETIZATION:		14 CURRENT:
	☑ COIL 2200-3800 AMPERE TURNS	
	☐ PROD _____ SPACING _____ AMPS	☐ AC
☑ CONTINUOUS	☐ CIRCULAR _____ AMPERES	☐ DC
☐ RESIDUAL	☐ YOKE _____	☑ HWDC

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
T. GIBSON/G. HERRERA/P. COLBY/W. FONG	A/I/II/III

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
STEEPLE # 184	STEEPLE BROKEN ALL THE WAY THROUGH		
	SEE DRAWING #1		✓
#185	STEEPLE BROKEN, 3/4" SECTION MISSING		
	SEE DRAWING #2		✓
DISC AREA	NRI	✓	

DISPOSITION OF REJECTED INDICATIONS: 21

22 AUTHORIZED INSPECTOR:	23 DATE:
William Fong II	3-15-80

PAGE 1 OF 2

UNIT NO. 1

SURRY POWER STATION

ROTOR NO. 1

ROW NO. L-4

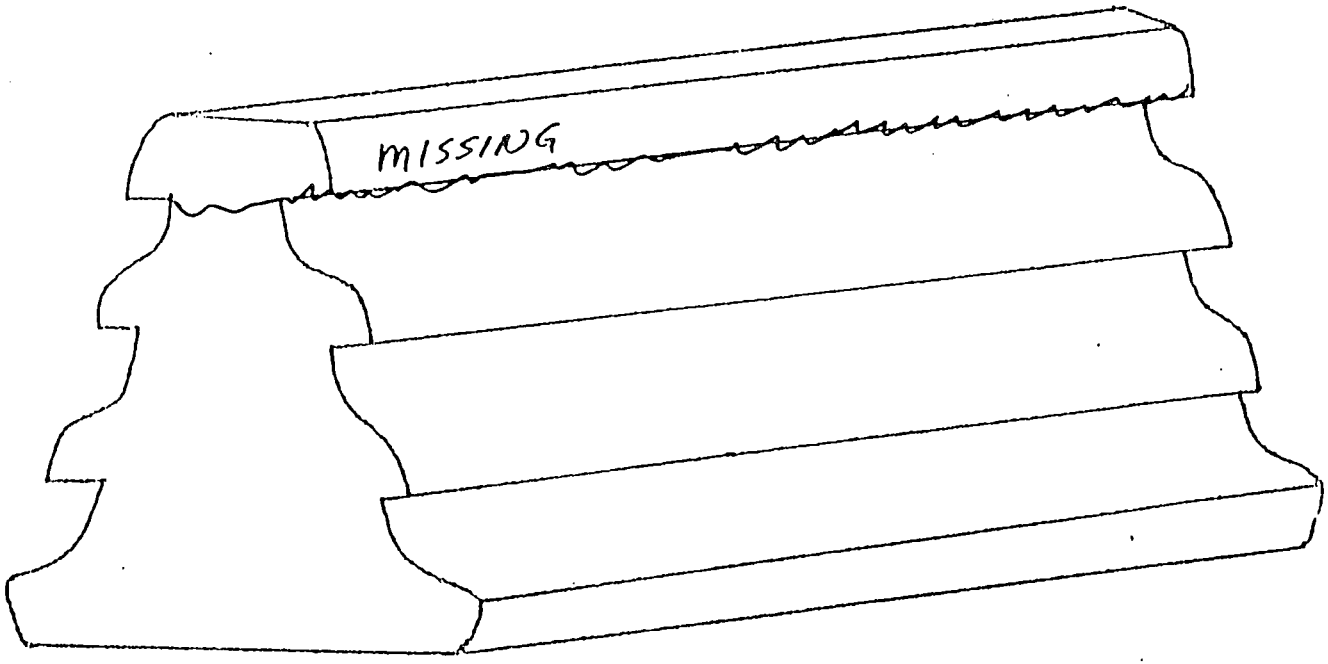
STEEPLE NO. 184

DRAWING NO. 1

DATE 3-14-80

ROTOR STEEPLE

GEN. END

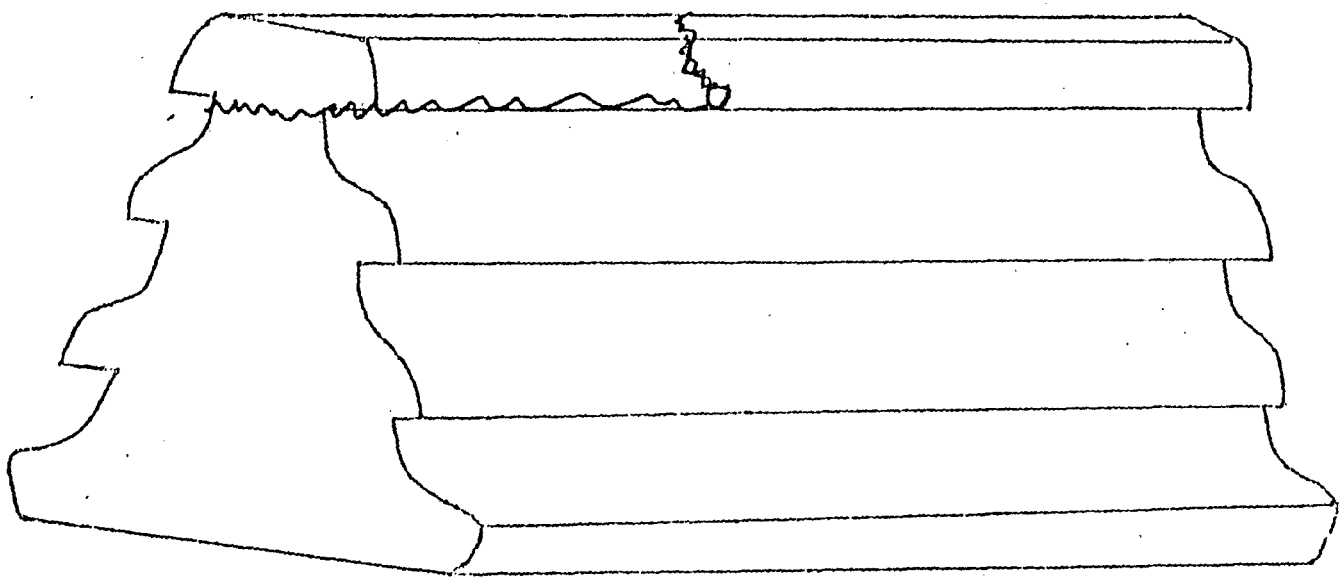


STEEPLE BROKEN ALL THE WAY THROUGH

UNIT No. 1
SURRY POWER STATION

ROTOR NO. 1
ROW NO. L-4
STEEPLE NO. 185
DRAWING NO. 2
DATE 3-14-80

ROTOR STEEPLE
GEN. END



3/4" SECTION OF STEEPLE MISSING

No. 885.80

LIQUID PENETRANT INSPECTION REPORT
NDT – PT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT-PT-13.1	3-18-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #2 ROTOR L-4 GENERATOR & GOVERNOR ENDS	S100 2210414

7 MATERIAL:	8 SURFACE CONDITION:
ALLOY CARBON STEEL	EMERY CLOTH – CLEAN

	9 MANUFACTURER	10 TYPE	11 BATCH NO.
CLEANER	SHERWIN	DR 60	4F915
PENETRANT	SHERWIN	DP 51	47C813H
EMULSIFIER	N/A	N/A	N/A
REMOVER	WATER	N/A	N/A
DEVELOPER	SHERWIN	D 100	60824C

12 TYPE OF PENETRANT:
- [x] WATER SOLUBLE
- [ ] FLUORESCENT
- [x] VISIBLE RED DYE
- [ ] SOLVENT REMOVABLE
- [ ] POST EMULSIFIABLE

13 PENETRANT APPLICATION:	14 PENETRANT DWELL TIME:	15 TEMP:	16 EMULSIFIER DWELL TIME:
[ ] DIPPING [x] SPRAYING [ ] BRUSHING	10 MIN.	60 °OF	N/A MIN.

17 REMOVAL TECHNIQUE FOR EXCESS PENETRANT:	18 DRYING TIME:	19 TEMP:
[x] FLOWING WATER [ ] WIPED SOLVENT [ ] WIPED WATER [ ] DIP CLEANING	10 MIN.	60 °OF

20 DEVELOPER APPLICATION:	21 DEVELOPING TIME:	22 TEMP:
[ ] DIPPING [x] SPRAYING [ ] BRUSHING	15 MIN.	60 °OF

23 TEST PERFORMED BY:	24 LEVEL OF CERTIFICATION:
G. HERRERA / P. COLBY / T. GIBSON / W. FONG	II / I / II

25 AREA INSPECTED	26 SIZE AND LOCATION OF INDICATIONS	27 ACCEPT	28 REJECT
WELD AREA ON SHROUD ON L-4 GENERATOR AND GOVERNOR END	NRI	✓	

29 DISPOSITION OF REJECTED INDICATIONS:

NOTE: PENETRANT INSPECTION WAS PERFORM AND DETERMINED MAGNETIC PARTICLE INDICATIONS TO BE NON-RELEVANT. MAGNETIC PARTICLES INDICATIONS WAS DUE TO DISSIMILAR MATERIAL.

30 AUTHORIZED INSPECTOR:	31 DATE:
William Fong Tc	3-18-80

PAGE 1 OF 1

= 895.82

MAGNETIC PARTICLE INSPECTION REPORT
NDT – MT – FORM 1
VIRGINIA ELECTRIC AND POWER COMPANY

1 STATION:	2 SYSTEM:	3 PROCEDURE:	4 DATE:
SURRY 1	TURBINE	NDT-MT-12.1	3-15-80

5 ITEM, COMPONENT INSPECTED:	6 MAINTENANCE REPORT NO:
LP #2 ROTOR L-4 GOVERNOR	S100221041 4

7 MATERIAL:	8 SURFACE CONDITION:
ALLOY CARBON STEEL	GLASS BEAD BLAST CLEAN

9 TYPE OF PARTICLES:	10 BATCH NO:
☐ WET ☐ DRY ☐ VISIBLE ☑ FLUORESCENT	5G002

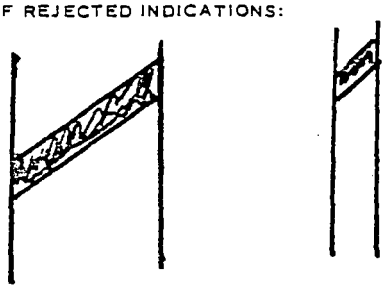
11 MANUFACTURER:	12 TYPE:
MAGNAFLUX	20A

13 MAGNETIZATION:	14 CURRENT:
☑ COIL 2400 AMPERE TURNS	☐ AC
☐ PROD ____ SPACING ____ AMPS	☐ DC
☑ CONTINUOUS	☑ HWDC
☐ CIRCULAR ____ AMPERES	
☐ RESIDUAL	
☐ YOKE ____	

15 TEST PERFORMED BY:	16 LEVEL OF CERTIFICATION:
T. GIBSON / J. DALTON / W. FONG	A / A / II

17 AREA INSPECTED	18 SIZE AND LOCATION OF INDICATIONS	19 ACCEPT	20 REJECT
BLADE END SHROUD #19	LINEAR ON WELD AREA BETWEEN		
#20	BLADE #19 & #20		✓
#51	LINEAR ON WELD AREA BETWEEN		
52	BLADE #51 & #52		✓
#85	LINEAR ON WELD AREA BETWEEN		
#86	BLADE #85 & #86		✓
#119	LINEAR ON WELD AREA BETWEEN		
#120	BLADE #119 & #120		✓
#151	LINEAR ON WELD AREA BETWEEN		
#152	BLADE #151 & #152		✓
#185	LINEAR ON WELD AREA BETWEEN		
#186	BLADE #185 & #186		✓

21 DISPOSITION OF REJECTED INDICATIONS:



P.T. ON SHROUD AREA IS ACCEPTABLE - see P.T. REPORT 3-18-80 JM

22 AUTHORIZED INSPECTOR:	23 DATE:
William Fong II	3-15-80