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January 7, 2025

VIA HAND DELIVERY

Department of Natural Resources and Environmental Control
Office of the Secretary
Attn: Assistant to the Environmental Appeals Board
89 Kings Highway
Dover, DE 19901

Re: Statement of Appeal of Notice of Administrative Penalty Assessment and Secretary's Order, Order No. 2024-A-0053 dated December 16, 2024

Dear Honorable Members of the Environmental Appeals Board:

On behalf of DCO Energy for the facility, Energy Center Dover, LLC ("Respondent"), pursuant to 7 Del. C. § 6008, enclosed is a Statement of Appeal for DNREC's December 16, 2024 Order No. 2024-A-0053 and a check payable to the Environmental Appeals Board in the amount of $50.00.

Thank you.

Sincerely,

Amanda L. Rauer

Enclosures

cc: Valerie S. Edge, Esquire (Deputy Attorney General)

BEFORE THE ENVIRONMENTAL APPEALS BOARD
FOR THE STATE OF DELAWARE

IN THE MATTER OF	)	EAB No. 2025- ____
	)	
SECRETARY'S ORDER NO. 2024-A-0053	)	

STATEMENT OF APPEAL OF SECRETARY'S ORDER NO. 2024-A-0053

Pursuant to 7 Del. C. § 6008(a) and 7 Del. C. § 105, DCO Energy ("DCO") on behalf of Energy Center Dover, LLC ("Facility", and collectively, with DCO, "Respondent") submits the instant written statement of appeal of the Order No. 2024-A-0053 (the "Order") issued by the Secretary of the Delaware Department of Natural Resources and Environmental Control ("DNREC"), dated December 16, 2024 and received by Respondent on or about December 19, 2024. A copy of the Order is attached hereto as Exhibit A.

Respondent's interests have been substantially affected by the Order and the reasons for this appeal are discussed more fully below.

I. Background

DCO is the current operator of the Facility,[1] which is located at 1280 W. North Street in Dover, Delaware. DCO has been operating the Facility since 2019. The Facility serves as a critical wholesale generator that supports the PA-NJ-Maryland ("PJM")[2] Interconnection. As is well-known, "PJM Interconnection's most important priority is to keep the lights on for 65 million customers in 13 states and the District of Columbia." https://www.pjm.com/-/media/DotCom/about-pjm/newsroom/fact-sheets/pjms-emergency-procedures-and-messages.ashx One part of PJM's method of "keeping the lights on" is to ensure "resource adequacy." *See* Statement of Aftab Khan on Behalf of PJM Interconnection, LLC, *Resource Adequacy and Expected Load Growth*, FERC Docket No. AD24-10-000 (Oct. 16, 2024), *available at* https://www.pjm.com/-/media/DotCom/library/reports-notices/testimony/2024/20241016-statement-of-aftab-khan-for-the-ferc-2024-reliability-technical-conference.pdf/.

Respondent is proud to be a part of PJM and actively participates in "keeping the lights on" for all members of the PJM community, including the citizens of Delaware. The Facility helps to ensure reliable and stable electric markets in the region and also provides critical power to two major industrial manufacturing facilities in Dover. As a combined heat and power producer, in 2022 the Facility was one of only six facilities in Delaware where fuel was used for electrical generation and thermal generation. Combined heat and power is "an efficient and clean approach to generating on-site electric power and useful thermal energy from a single fuel source." U.S. Dep't of Energy, Fact Sheet on Combined Heat and Power, *available at* https://www.energy.gov/eere/amo/articles/state-chp-delaware-fact-sheet-2017.

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[1] The Facility is owned by Cartier Energy since 2022.

[2] PJM is a regional transmission organization that coordinates and ensures the reliable movement of wholesale electricity in all or parts of 13 states and Washington, D.C.; this service area includes the Delmarva peninsula.

The Facility was issued a Notice of Administrative Penalty Assessment and Secretary's Order alleging two violations of the Facility's Title V Permit (Title V Permit: AOM-001/00127 (Renewal 4)(Revision 1), issued February 1, 2020 and Title V Permit: AOM-001/00127 (Renewal 4)(Revision 2), issued November 2, 2022). See Exhibit A. The Order stems from a Full Compliance Evaluation ("FCE") for Permit Number AQM 001/00127(Renewal 4) (Revision 1) that occurred at the Facility on August 18, 2022.

On October 10, 2022, DNREC notified the Facility of the results of the FCE. DNREC determined that there was an exceedance of NOx[3] emissions of 0.8 tons above the permitted allotted amount during the rolling 12-month period ending in July 2022 under Permit AQM-001/00127 (Renewal 4) (Revision 1).[4] The letter also identified deviations of Permit AQM-001/00127 (Renewal 4) (Revision 1) for which DNREC required additional information from the Facility. A copy of the October 10, 2022 Letter is attached as Exhibit B.

Following the FCE visit and prior to the October 10, 2022 letter from DNREC, DCO took immediate corrective actions to remedy any exceedances of the permit. DCO also notified DNREC on September 2, 2022 that it had an additional exceedance of the permit for NOx emissions for the rolling 12-month period ending in August 2022.

In a letter dated September 9, 2022, DCO provided DNREC a list of corrective action steps that it undertook to mitigate emissions including: (1) removing the emission unit from the day ahead and real time market; (2) placing the emission unit[5] in emergency status in the PJM market; (3) implementing real time monitoring of the emission unit that included an alarm for the rolling 12-month period NOx tonnage; and (4) not returning the emission unit to service until the rolling 12-month NOx emissions could operate within the permit ton limit. Additionally, Respondent, as a responsible energy generator, investigated the possible causes for the exceedances of NOx and found that there were several contributing factors such as increased demand from the emission unit, a prolonged hot summer season, high natural gas prices, and other generator retirements from the PJM market that led to increased usage. A copy of the September 9, 2022 Letter is attached as Exhibit C.

DNREC acknowledged in its October 10, 2022 Letter (Exhibit B) that no further corrective actions were needed for the emission unit. On October 17, 2022, DCO also provided DNREC additional information requested from the October 10, 2022 letter. A copy of the October 17, 2022 Letter is attached as Exhibit D.

On July 26, 2023, DCO confirmed with DNREC that the Facility's emission unit dropped below 15.0 tons after October 11, 2022 and that the emission unit was restored to market availability, along with additional monitoring in place to prevent exceeding the rolling 12-month total ton limit.

DCO made responsible efforts to immediately mitigate and take corrective action steps for permit emission exceedances; however, despite these cooperative efforts, on August 14, 2023, DNREC issued a Notice of Violation of Permit AQM 001/00127(Renewal 4) (Revision 1). A copy of the August 14, 2023 Notice of Violation is attached as Exhibit E. DCO timely responded to the action items set forth in the August 14, 2023 Notice of Violation.

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[3] NOx refers to nitrogen oxides.
[4] The permit for Emission Unit CT-2 allows for 15 tons of NOx during the rolling twelve-month period.
[5] Emission unit refers to emission unit CT-2.

The second alleged violation is under Permit: AOM-001/00127 (Renewal 4)(Revision 2), stemming from the Facility's notification of DNREC of a CO_2e[6] exceedance of its permit limit for the rolling 12-month average for the months of August and September 2023. The Facility spoke directly with regulators via a Zoom® call on October 27, 2023 to discuss the exceedance, steps to be taken to come into compliance, and the reasons for the exceedance.

On November 10, 2023, DCO provided DNREC a follow-up to the October 27, 2023 Zoom® call addressing the reason for the CO_2e exceedance and the immediate steps and corrective action measures undertaken to come into compliance. A copy of the November 10, 2023 Letter is attached as Exhibit F. The Facility worked diligently to bring the unit back into compliance. However, on June 21, 2024, DNREC issued a Notice of Violation for Permit: AOM-001/00127 (Renewal 4)(Revision 2) for CO_2e exceedances. A copy of the June 21, 2024 Notice of Violation is attached as Exhibit G. DCO responded on July 18, 2024 to the Notice of Violation outlining the status of all the measures taken to ensure compliance of the unit. A copy of the July 18, 2024 Letter is attached as Exhibit H.

Upon notice of these permit exceedances, DCO took swift and proactive action to bring the units into compliance. Throughout this process, DCO consistently collaborated and maintained a strong cooperative relationship with DNREC.

II. Basis for Appeal

A. Respondent's Interests have been Substantially Affected

The Order substantially affects the Respondent's interests. The Order has assessed the Facility with an administrative penalty of $76,520.00 plus costs of $8,111.65 for a total amount of $84,631.65. Further, the Secretary failed to incorporate Respondent's good faith efforts, cooperation and swift corrective action into consideration when issuing its penalty. The Order also does not provide for an opportunity for a jury trial contrary to the 7th Amendment of the U.S. Constitution and the Delaware Constitution.

B. The Secretary's Order is Improper.

For the reasons set forth herein, Respondent asserts that the Order is improper, in that the Order violates fundamental rights, is arbitrary and capricious, fails to comply with statutory requirements and constitutes the Secretary's abuse of discretion in issuing the Order.

C. The Reasons the Secretary's Order is Improper.

1. A civil penalty cannot be imposed by an administrative agency because the Seventh Amendment right to a jury trial applies to any common law claims that are legal in nature. To determine whether a claim is legal in nature, a court will consider whether the cause of action resembles a common law cause of action and whether the remedy is the kind of remedy traditionally obtained in a court of law. Civil monetary penalties were a prototypical common law remedy because their purpose was to punish and deter, not restore the status quo. *SEC v. Jarkesy*, 144 S. Ct. 2117 (2024). Here the Secretary's assessment of civil penalties is contrary to the U.S. Supreme Court's pronouncement in *Jarkesy*. The notices of violation must be dismissed.

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[6] CO2e refers to carbon dioxide equivalent emissions.

2. The penalty assessed against the Facility fails to adequately account for a number of factors including the nature and circumstances that led to the violation, the lack of prior history of violations, the lack of culpability, as well as other mitigating circumstances such as good faith efforts to correct and remedy the units and cooperation from Respondent.

As was explained to DNREC, during the period of the exceedance for NOx emissions the Facility encountered a number of circumstances that weighed on its need for continued operation including unseasonably hot temperatures during the summer months, high natural gas prices, and other capacity retirements in the market that made the Facility a critical resource to assist in providing a stable energy market to PJM and a reliable generator for the Delaware community. Following the determination of the NOx exceedances, the Facility immediately took corrective action steps such as taking the emission unit offline and not returning the emission unit to operation until under the 12-month rolling limit, creating and instituting internal protocols to monitor NOx on an hourly basis to better predict run times for emissions, the Faciliy has since applied for an environmental variance with PJM.

Likewise following the determination of exceedances of CO_2e requirements, the Facility took swift action to communicate directly with DNREC informing them that the only way for the unit to come into compliance was for the unit to continue to run and that the run time was controlled by the Facility's customers and PJM requests. The Facility kept DNREC informed about the CO_2e results by providing periodic updates.

The Order points to the Facility's prior history of violations and cites to violations that it admits have no relation to the current violations and that occurred over 15 years previous. Notably, all violations occurred before the current owner and current operator had any roles at the Facility and are entirely irrelevant to the present alleged violations.

The Order states that the violations were willful or negligent. It offers no evidence of negligence. Nor is it willful non-compliance when the regulated entity is complying with the mandate of reliability in which it operates.

3. The violations assert Respondent is responsible for certain costs. However, in order to collect such costs the Secretary is required to provide a detailed billing, which he has not done, contrary to 7 Del. C. § 6005(c)(1). The claimed expenses cannot be collected.

4. Delaware's statute of limitations is 3 years. 10 Del. C. § 8106 ("no action based on a statute"). The violations assert non-compliance based on operations prior to December 16, 2021. Accordingly, all of the alleged violations based on NOx exceedances based on rolling 12-month averages that include emissions prior to December 16, 2021 are untimely.

III. Requested Relief and Estimated Witnesses and Time for a Hearing

Respondent wishes to resolve this matter and invites DNREC to discuss the Order in hopes of reaching a satisfactory resolution before the matter is heard before the Environmental Appeals Board. In the event a settlement is not reached, Respondent estimates that it will present four witnesses at the public hearing and that the public hearing will take approximately two days.

Respondent further reserves the right to amend the number of witnesses and to assert additional grounds for this appeal. Respondent also reserves its right to request discovery from DNREC.

DATED: January 5, 2025

Respectfully submitted,

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EXHIBIT A

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL
RICHARDSON & ROBBINS BUILDING
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

OFFICE OF THE
SECRETARY

PHONE
(302) 739-9000

NOTICE OF ADMINISTRATIVE PENALTY ASSESSMENT AND SECRETARY'S ORDER

Pursuant to 7 *Del. C.* § 6005

Order No. 2024-A-0053

SERVED VIA CERTIFIED MAIL
RETURN RECEIPT

Issued To:
Energy Center Dover, LLC
Attn: Ernst Just
Plant Manager
1280 W. North Street
Dover, DE, 19904

Registered Agent:
Corporation Service Company
251 Little Falls Drive
Wilmington, DE, 19808

This Assessment and Secretary's Order serves to notify Energy Center Dover, LLC ("Respondent") that the Secretary of the Department of Natural Resources and Environmental Control ("Department") has found Respondent in violation of its permit. Accordingly, the Department is issuing this Notice of Administrative Penalty Assessment and Secretary's Order pursuant to 7 *Del. C.* §6005(b)(3).

BACKGROUND

Respondent operates a facility located at 1280 W. North Street in Dover, Delaware ("facility") where, as a co-generation facility, it supplies steam to certain manufacturing facilities in Dover. In addition, it supplies electricity to the grid via the Pennsylvania-New Jersey-

Maryland ("PJM") Interconnection, the regional transmission organization that centrally dispatches generation and coordinates the movement of wholesale electricity in all or part of 13 states, including the entire Delmarva peninsula. Because Respondent's operations have the potential to emit ("PTE") certain criteria pollutants, such as nitrogen oxides ("NO_X"), at levels in excess of the major source thresholds for Kent County, Delaware, Respondent was and has been subject to 7 DE Admin. Code 1130, also known as the Title V State Operating Permit Program. Respondent's operations have been governed by a Title V Permit since 1999.

In 2000, Respondent added two 50 megawatt electric ("MWe") simple cycle combustion turbines, CT-1 and CT-2, to its operations. In 2011, Respondent applied for proposed changes to its facility, including converting one of the simple cycle combustion turbines, CT-1, to a combined cycle 64 MWe combustion turbine fired only on natural gas (hereafter referred to as "Emission Unit CT-1/C-2"). Emission Unit CT-2 remained a 50 MWe simple cycle combustion turbine that primarily operates on natural gas but can also use low sulfur distillate fuel oil as an emergency/back-up option. The 2011 changes resulted in the applicability of EPA's Prevention of Significant Deterioration ("PSD") Regulation pursuant to 7 DE Admin. Code 1125 "Requirements for Preconstruction Review" because of the PTE quantity of CO_2 equivalent emissions ("CO_2e"), which is considered to represent a greenhouse gas. As part of that applicability, Respondent conducted a Best Available Control Technology ("BACT") analysis. The result of the BACT analysis was the inclusion of a permit limit for CO_2e emissions, of 1,085 lb CO_2e/MWh, on a rolling 12-month average, for Emission Unit CT-1/C-2. This limit was based on operation of Emission Unit CT-1/C-2 at an average load of 80% of the maximum continuous rating which corresponded to a gross plant heat rate, based on a higher heating value of 9,115 Btu/kWh. The permit condition includes a formula that adjusts the CO_2e emission limit for thermal energy exports (i.e. steam exports) by applying the ratio of gross electric generation to equivalent gross energy production. It provides another formula for how the facility shall calculate the CO_2e emissions based on the total heat input for the period, emission factor for natural gas combustion, total electric generation for the period, the steam exported during the period and the conversion factor for steam Mlb to MWh steam. Respondent monitors the emissions NO_X using continuous emissions monitors ("CEMs").

At the time of the violations addressed by this Order, Respondent was operating under Title V **Permit: AQM-001/00127 (Renewal 4)(Revision 1)**, issued February 1, 2020 ("Title V Permit (Ren. 4)(Rev. 1)"), and Title V **Permit: AQM-001/00127 (Renewal 4)(Revision 2)**, issued November 2, 2022 ("Title V Permit (Ren. 4)(Rev. 2)"), (collectively, "Title V Permit"). Respondent's Title V Permit includes a rolling 12-month NO_X emission limit of 15 tons for Emission Unit CT-2, based on the CEMs, as well as a rolling 12-month average limit for CO_2e of 1,085 pounds per gross megawatt hour ("MWh") for Emission Unit CT-1/C-2.

Violation #1

The Department conducted a federal fiscal year 2022 full compliance evaluation ("FFY22 FCE") at Respondent's facility on August 18, 2022, that included a review of records from January 2020 through August 2022. While reviewing these records, the Department discovered that for the rolling 12-month period ending July 31, 2022, Respondent's NO_X emissions were 15.8 tons, which was in excess of its permitted limit. In a September 2, 2022, email, Respondent submitted the initial report for this violation where it also indicated the violation had continued into the next rolling 12-month period ending August 31, 2022, with NO_X emissions of 17.1 tons.

In a letter dated September 9, 2022, received by the Department on September 30, 2022, Respondent provided the written report required by its permit which included additional details concerning the exceedances and corrective actions undertaken to prevent recurrence. Respondent stated in the letter that the hot weather experienced across the region during the summer, coupled with high natural gas prices and significant capacity retirements (removal of electrical power generating units from the electrical grid/market availability) in recent years, contributed to unforeseen volatility in wholesale electric markets. By virtue of its physical location and operating characteristics, Emission Unit CT-2 offered PJM a valuable resource with which to respond to these market demands. Respondent believed that the loss of, or limited access to, this resource would have placed an unnecessary burden on PJM's mission to provide reliable and cost-effective power to customers in the region. Respondent acknowledged that a monitoring plan, going beyond the monthly/quarterly review requirement of its Title V Permit,

could have allowed them to forewarn PJM that Emission Unit CT-2 may not be available for parts of July and/or August. Respondent stated that corrective actions taken in response to the exceedances included removing Emission Unit CT-2 from the "day ahead and real time market" and placing it in emergency status in the PJM market on September 2, 2022. Typically, Respondent receives the request to provide power the night before which provides ample time to start the turbines. Based on the operating records, Emission Unit CT-2 continued operation through September 1, 2022. An additional corrective action was updating the data acquisition and handling system to include real time monitoring, including an alarm for the rolling 12-month period NOx tonnage, on the operators' dashboard for both combustion turbines. The enhanced monitoring approach will provide Respondent with an hourly update to the 12-month rolling NOx calculation, thus providing the opportunity to better plan for future operation without risking an exceedance of the permit limit. Due to the Respondent's failure to provide a status update, the Department inquired about the compliance status in an email dated July 26, 2023. Respondent replied that same day stating that the Emission Unit CT-2 was restored to market availability, with the additional monitoring in place, on October 11, 2022, when the rolling 12-month NOx emissions fell below the 15-ton permit limit. Respondent further stated that Emission Unit CT-2 did not operate due to a PJM emergency between September 2, 2022, and October 10, 2022.

A Notice of Violation ("NOV") dated August 14, 2023, was issued to Respondent on August 17, 2023, for the violations of the rolling 12-month NOx emission limit for Emission Unit CT-2 for the periods ending July 31, 2022, and August 31, 2022. The NOV required Respondent submit a permit amendment request to the Department within 60 days of receipt of the NOV, to incorporate the enhanced NOx emissions monitoring plan into its Title V Permit for Emission Unit CT-2 as part of the monitoring requirements under Condition 3 - Table 1(b)(2)(vi). This was received in an August 24, 2023, letter, received by the Department on August 28, 2023. As the Title V Permit is due for renewal, the Department plans on addressing this amendment during the renewal process.

Violation #2

In an email dated October 19, 2023, Respondent emailed an electronic copy of a notification of exceedance it had faxed to the Department on October 18, 2023, regarding Emission Unit CT-1/C-2. The faxed report, dated October 11, 2023, stated that Emission Unit CT-1/C-2 exceeded the rolling 12-month average permit limit for CO_2e emissions for the periods ending August 31, 2023, and September 30, 2023. The total emissions on a rolling 12-month average were 1,008 lb CO_2e/MWh for the period ending August 31, 2023 (with a limit of 994.76 lb CO_2e/MWh) and 1,017 lb CO_2e/MWh for the period ending September 30, 2023, (with a limit of 997.07 lb CO_2e/MWh).

Pursuant to its Title V Permit, Respondent submitted the 3rd Quarter 2023 excess emission summary, dated October 24, 2023, on October 27, 2023, the same day the Department met with Respondent virtually to discuss the exceedances. During this meeting, Respondent indicated possible causes, including a decision to run the unit at a lower base load which allowed the unit to be more readily available to respond to grid conditions.

A detailed report on the CO_2e emissions exceedance, dated November 13, 2023, was received on November 15, 2023, where Respondent included several other possible causes for the exceedances such as, gas quality changes, including heating value; as yet to be identified parameters of the delivered pipeline natural gas; or engine degradation. Immediate steps taken were to increase the minimum base load offered resulting in improving the heat rate. A more efficient mode of operation for the unit was calculated to a heat rate of approximately 8,900 BTU/kWh, which was better than the previous calculation of 9,117 BTU/kWh. Respondent's calculations predicted an anticipated return to compliance by the end of December 2023. In addition, to address the other possible causes, a sample of the pipeline natural gas was collected and sent for analysis. The Respondent also stated that it would conduct an already scheduled inspection of the unit's engine for November 13 through November 28, 2023, which could determine if engine degradation was a factor. Lastly, Respondent committed to training operations staff on the importance of real-time monitoring of the unit's operating heat rate to ensure the unit is operated in the most efficient mode possible.

Despite a predicted return to compliance by the rolling 12-month period ending December 31, 2023, the return to compliance did not occur until the rolling 12-month period ending March 31, 2024. Due to the failure to return to compliance by the predicted date, the Respondent began actively updating the Department monthly on the status of the anticipated return to compliance with the rolling 12-month emission limit beginning in January 2024. Respondent informed the Department of its return to compliance on April 1, 2024.

A Notice of Violation ("NOV") dated June 21, 2024, was issued to Respondent on June 25, 2024, for the violations of the rolling 12-month CO_2e emission limit for Emission Unit CT-1/C-2 for the periods ending August 31, 2023, through February 29, 2024. It required that Respondent submit to the Department within 30 days of receipt of the NOV, the results of the natural gas quality analysis, the engine inspection report, and for any identified issues, the actions required to return the engine to compliant operation; as well as records documenting the training of operations staff.

In a letter dated July 18, 2024, received by the Department on July 24, 2024, Respondent submitted all the action items required by the NOV. The natural gas quality analysis and the engine inspection resulted in no identified issues that contributed to the exceedance. Respondent provided documentation that the required training had been conducted. Respondent determined that the root cause of the CO_2e emission exceedance was the change in Emission Unit CT-1/C-2 operations by lowering the base load levels. As a result, the unit's dispatch model was revised to prevent operation at lower base load levels. Additional monitoring measures taken by Respondent included monitoring of heat rate during unit operation and more frequent reviews of the CO_2e emissions.

FINDINGS OF FACT

1. Respondent operates a facility located at 1280 W. North Street in Dover, Delaware ("facility") where, as a co-generation facility, it supplies steam to certain

manufacturing facilities in Dover and supplies electricity to the grid via the PJM Interconnection.

2. Among the equipment at Respondent's facility is Emission Unit CT-1/C-2, a combined cycle 64 MWe combustion turbine and Emission Unit CT-2, a 50 Mwe simple cycle combustion turbine. Operation of the equipment at Respondent's facility results in the emission of pollutants, among them, NO_X and CO, that are monitored continuously via CEMS.

3. Equipment at Respondent's facility has the potential to emit NO_X in quantities that exceed the major source threshold for Kent County, Delaware and subjects Respondent to Delaware's Title V State Operating Permit Program. Respondent has operated under a Title V Permit since 1999.

4. Respondent made changes to its operations in 2011, the conversion of Unit CT-1/C-2 (combustion turbine) from a simple cycle to combined cycle operation. This resulted in CO_2e emissions, considered to represent a greenhouse gas, exceeding 75,000 tons per year thereby subjecting it to EPA's Prevention of Significant Deterioration ("PSD") Regulation pursuant to 7 DE Admin. Code 1125 "Requirements for Preconstruction Review". This required Respondent to conduct a Best Available Control Technology ("BACT") analysis.

5. The BACT analysis resulted in the inclusion of a rolling 12-month emission limit for CO_2e, including calculation methods, in its Title V Permit.

6. At the time of the violations addressed by this Order, Respondent was operating under Title V Permit: **AQM-001/00127 (Renewal 4)(Revision 1)**, issued February 1, 2020 and Title V **Permit: AQM-001/00127 (Renewal 4)(Revision 2)**, issued November 2, 2022, (collectively, "Title V Permit"), that included a rolling 12-month NO_X emission limit of 15 tons for Emission Unit CT-2, based on the CEMs as well as

a rolling 12-month average limit for CO_2e of 1,085 pounds per gross megawatt hour ("MWh") for Emission Unit CT-1/C-2.

7. The Department conducted a FFY22 FCE on August 18, 2022, and during the records review, discovered the rolling 12-month NO_X limit for Emission Unit CT-2 for the period of August 1, 2021, through July 31, 2022, was 15.8 tons, which was in excess of the Title V Permit limit.

8. In a September 2, 2022, email, Respondent made the initial reporting to the Department of this exceedance as well as an additional exceedance of the rolling 12-month NO_X limit for Emission Unit CT-2 for the period ending August 31, 2022.

9. Respondent submitted a required written report received by the Department on September 30, 2022, that provided additional details on the exceedances as well as the corrective actions it had taken in response to the violation. These included putting Emission Unit CT-2 in emergency only status in the PJM system as of September 2, 2022, and updating the data acquisition and handling system to include real time monitoring, including an alarm for the rolling 12-month period NO_X tonnage, on the operators' dashboard for both combustion turbines. The enhanced monitoring approach will provide the facility with an hourly update to the 12-month rolling NO_X calculation, thus providing the opportunity to better plan for future operation without risking an exceedance of the permit limit.

10. In a July 26, 2023, email, following the Department's inquiry on an updated compliance status, Respondent indicated that Emission Unit CT-2 was restored to available status on October 11, 2022, and stated that Emission Unit CT-2 did not operate while it was in emergency status from September 2, 2022, through October 10, 2022.

11. A Notice of Violation dated August 14, 2023, was issued to Respondent on August 17, 2023, for the violation of the rolling 12-month NO_X emission limit for Emission Unit CT-2 for the periods ending July 31, 2022, and August 31, 2022.

12. On October 19, 2023, Respondent notified the Department in an email, including a previously faxed notification as an attachment, that Emission Unit CT-1/C-2 had exceeded the rolling 12-month emission limit for CO_2e for the periods ending August 31, 2023, and September 30, 2023.

13. Respondent identified several possible causes for the exceedance, such as changes in natural gas quality; normal engine degradation with age; or a change in method of operation of the unit to make it more readily available to respond to grid conditions, by lowering the base load. Respondent planned to sample the natural gas and have it analyzed and continue with an already scheduled inspection of the engine. However, upon identifying the exceedance, Respondent did address one of those possible causes immediately by increasing the minimum base load when operating the unit which increased the heat rate and resulted in lowering CO_2e emissions.

14. Though Respondent's calculations predicted a return to compliance with the CO_2e emission limit by the rolling 12-month period ending December 31, 2023, the return to compliance didn't occur until the rolling 12-month period ending March 31, 2024.

15. A Notice of Violation dated June 21, 2024, was issued to Respondent on June 25, 2024, for the CO_2e emission exceedance violations and required action items including submitting the results of its investigation into the root cause of violation and providing documentation that staff had been trained on the proper operation of the unit.

16. In a letter dated July 18, 2024, and received by the Department on July 24, 2024, Respondent indicated that the results of its investigation into the exceedances identified the root cause as the change in operation of the unit. It provided

documentation of staff training and indicated that the unit dispatch model had been revised to prevent lowering of the load levels.

PERMIT REQUIREMENTS

1. In Condition 3 – Table 1(b)(2)(ii)(A) of Title V Permit (Ren. 4)(Rev. 1), it states:

   "NO_X emissions from Emission Unit CT-2 shall not exceed 15 tons in any rolling twelve (12) month period based on the CEMS."

2. In Condition 3 – Table 1(a)(1)(ii)(I)(1) of Title V Permit (Ren. 4)(Rev. 2), it states:

   "CO_2e emissions from the generating unit shall not exceed 1,085 pounds per gross megawatt hour (MWh) equivalent basis on a twelve (12) month rolling average."

CONCLUSION

Based on the above, the Department has concluded that Respondent committed the following violations:

1. Respondent is found to be in violation of the rolling 12-month NO_X emission limit of 15 tons for Emission Unit CT-2 set forth in Condition 3 – Table 1(b)(2)(ii)(A) of Title V Permit (Ren. 4)(Rev. 1) for the rolling 12-month periods ending July 31, 2022, and August 31, 2022.

2. Respondent is found to be in violation of the rolling 12-month CO_2e emission limit of Condition 3 – Table 1(a)(1)(ii)(I)(1) of Title V Permit (Ren. 4)(Rev. 2) for the seven rolling 12-month periods ending August 31, 2023, through February 29, 2024.

ASSESSMENT OF PENALTY

Pursuant to 7 *Del. C.* §6005(b)(3), the Secretary may impose an administrative penalty of not more than $10,000 for each day of violation detailed in this Order. In assessing the administrative penalty, 7 *Del. C.* §6005(b)(3) instructs the Secretary to consider the following

factors: (1) the nature, circumstances, extent, and gravity of the violation, or violations; (2) the ability of the violator to pay; (3) any prior history of such violations; (4) the degree of culpability; (5) the economic benefit or savings (if any) resulting from each violation; and (6) such other matters as justice may require. A brief discussion of these factors is set out below.

Having considered these factors, the Secretary is assessing an administrative penalty of $76,520.00 for the violations identified in this Assessment and Order.

1. **The Nature, Circumstances, Extent and Gravity of the Violation, or Violations:**
   The nature, circumstances, extent, and gravity of the violations are significant. Respondent violated an emission limit that emanated from a previously issued Secretary's Order No. 2002-A-0051, dated September 17, 2002. The Department determined that the emission limit was appropriate to resolve the alleged violations identified by the previous Order. Respondent is required to monitor NOx emissions on an hourly and daily period with the use of a certified CEMS. Respondent is required to calculate, record and monitor NOx emissions on a monthly and rolling 12-month period for compliance with the limit set forth in its Title V Permit. Had Respondent been actively monitoring this information, it would have both identified the potential for, and ultimately, the actual violation of the NOx emission limit, but it was the Department who identified the violation. The Respondent is a major source of NOx. Delaware continues to be in non-attainment for the ground level ozone National Ambient Air Quality Standard. Exceedances of the permitted NOx emission limit adversely impacts Delaware's continued efforts to attain the standard. For the CO_2e emission exceedances, a choice by Respondent to alter the operation of the unit to make it more readily available to grid demands resulted in inefficient operation of the unit and increased CO_2e emissions that took seven rolling 12-month periods to return to compliance.

2. **Respondent's Ability to Pay:**
   The record contains no information that the Respondent does not have the ability to pay the administrative penalty assessed.

3. **Prior History of Violations:**

   Prior to these violations, as stated above, Respondent was issued Secretary's Order No. 2002-A-0051, dated September 17, 2002, for operating two combustion gas turbines without an operating permit or a certified CEMS. In addition, a NOV was issued to Respondent on January 25, 2007, for initiating construction of a dry ash handling system without first obtaining a permit. The current violations associated with this order are not repeated or similar violations. The current violations occurred 15 years following the last violation. Due to Respondent's compliance history, no additional penalty for a history of violations was assessed.

4. **Degree of Culpability:**

   The degree of culpability is significant because though Respondent calculated and recorded the required monthly and rolling 12-month NO_X emissions per its Title V Permit requirements, it failed to monitor and identify when it exceeded the permitted limit. For the CO_2e emission exceedances, Respondent's decision to alter the operation of Emission Unit CT-1/C-2 in an attempt to make it more readily available for grid demands, resulted in the unit not being operated in its most efficient mode. The penalty assessed included a factor for the degree in which willfulness or negligence played a part in the violation. Thus, the Secretary considers the penalty amount assessed appropriate in the view of Respondent's culpability for these violations.

5. **Economic Benefit or Savings Resulting from the Violation(s):**

   Respondent economically benefited from the operation of the Emission Unit CT-2 while in violation of the rolling 12-month NO_X emission limit. However, due to the complex nature of the energy market, the Department cannot accurately quantify the economic benefit realized by the facility. An economic benefit from the violation was not quantified and a corresponding factor was not included in the penalty assessment.

6. **Such Other Matters as Justice May Require:**
   Lastly, considering such other matters as justice may require, the Secretary has determined that the penalty assessed is proportional to the violations and calculated so as to deter Respondent and those similarly situated from engaging in future violations.

SECRETARY'S ORDER ASSESSING ADMINISTRATIVE PENALTY

Pursuant to 7 *Del. C.* §6005(b)(3), this is written notice to Respondent that on the basis of its findings, the Department is assessing Respondent an administrative penalty of $76,520.00 for the violations identified in this Secretary's Order.

Respondent shall submit a check to the payable to the "State of Delaware" in the amount of $76,520.00 within thirty (30) days of receipt of this Secretary's Order to: Leslie Reese, Department of Natural Resources and Environmental Control, Office of the Secretary, 89 Kings Highway, Dover, Delaware 19901.

PUBLIC HEARING AND APPEAL RIGHTS

This Secretary's Order affects Respondent's legal rights and is effective and final upon receipt by Respondent. Pursuant to 7 *Del. C.* §6008, any person whose interest is substantially affected by this action of the Secretary may appeal to the Environmental Appeals Board within 20 days of the receipt of the Secretary's Order. In the alternative, Respondent may, pursuant to 7 *Del. C.* §6005(b)(3), request a public hearing on the Secretary's Order, within 30 days of receipt of the Order. A public hearing pursuant to 7 *Del. C.* §6005(b)(3) would be conducted pursuant to 7 *Del. C.* §6006, and the Secretary's Order following the hearing would be subject to appeal, pursuant to 7 *Del. C.* §6008, by any person substantially affected.

Respondent is further advised that the above assessed administrative penalty shall be due and owing within 30 days of Respondent's receipt of this Assessment and Order. In the event of nonpayment of the administrative penalty assessed above, and after Respondent has exhausted all legal appeals, if any, a civil action may be brought by the Secretary in Superior Court for collection of the administrative penalty, including interest, attorneys' fees and costs, and the validity, amount and appropriateness of such administrative penalty and/or costs shall not be subject to review pursuant to 7 *Del. C.* §6005(b)(3).

To request a public hearing pursuant to 7 *Del. C.* §6005(b)(3), please submit your request, in writing, to:

Department of Natural Resources and Environmental Control
Office of the Secretary
89 Kings Highway
Dover, DE 19901
Phone: (302) 739-9000

To submit an appeal to the Environmental Appeals Board pursuant to 7 *Del. C.* §6008, you must file your written statement of appeal and submit a check, made payable to: "Environmental Appeals Board," for the $50.00 filing fee, to:

Department of Natural Resources and Environmental Control
Office of the Secretary
Attn: Assistant to the Environmental Appeals Board
89 Kings Highway
Dover, DE 19901
Phone: (302) 739-9000

For additional information on filing an appeal with the Environmental Appeals Board and what information you must include in your written statement of appeal, please refer to the Environmental Appeals Board Regulations, codified at 7 DE Admin. Code 105.

The Department, to the extent necessary, reserves the right to take additional enforcement actions regarding these and other violations by Respondent, including but not limited to one or

more of the following: an action under 7 *Del. C.* §6005(b)(1) seeking penalties for past violations, an action under 7 *Del. C.* §6005(b)(2) seeking penalties for continuing violations, an action in the Court of Chancery pursuant to 7 *Del. C.* §6005(b)(2) seeking a temporary restraining order or an injunction, and the imposition of civil penalties and recovery of the Department's costs and attorney's fees pursuant to 7 *Del. C.* §§6005(b)(3) & (c)(1). Nothing in this document shall be deemed to estop, or in any way preclude, any additional enforcement action for these and any other violations, including administrative and civil penalties for each day of violation, or an action for the recovery of Department costs expended in abating these violations.

COST RECOVERY

Pursuant to 7 *Del. C.* §6005(c), Respondent is liable for all expenses incurred by the Department in abating the violations detailed in this Secretary's Order. "Such expenses shall include, but not be limited to, the costs of investigation, legal fees and assistance, public hearings, materials, equipment, human resources, contractual assistance and appropriate salary and overtime pay for all state employees involved in the effort notwithstanding merit system laws, regulations or rules to the contrary." (7 *Del. C.* §6005(c)(1)).

Respondent is liable for $8,111.65 in costs, which costs the Department has incurred to date in abating the violations detailed in this Secretary's Order. The Department has attached to this Secretary's Order a detailed billing of expenses detailing these costs. Respondent shall remit a check payable to the "State of Delaware" in the amount of $8,111.65 within thirty (30) days of receipt of this Secretary's Order, to: Leslie Reese, Department of Natural Resources and Environmental Control, Office of the Secretary, 89 Kings Highway, Dover, Delaware 19901.

In the event that Respondent appeals this Secretary's Order pursuant to 7 *Del. C.* §6008 or requests a public hearing pursuant to 7 *Del. C.* §6005(b)(3), or in the event Respondent fails to comply with this Secretary's Order, the Department will rescind the detailed billing attached to this Secretary's Order. The Department will issue Respondent a new detailed billing and Cost

Recovery Order following exhaustion of Respondent's appeal rights that will include all additional recoverable costs incurred by the Department. Respondent is further advised that Respondent may challenge the Department's final detailed billing in accordance with 7 *Del. C.* §6005(c)(2).

PRE-PAYMENT

Respondent may prepay the administrative penalty of $76,520.00 and the Department's costs in the amount of $8,111.65, in the manner described in the attached "Waiver of Statutory Right to a Hearing." By doing so, Respondent waives its right to a hearing and the opportunity to appeal or contest this Secretary's Order and the Department's Cost Recovery.

If you have any questions, please contact, or have your attorney contact, Valerie S. Edge, Deputy Attorney General, at (302) 739-4636.

12/16/24
Date

Shawn M. Garvin, Secretary
Department of Natural Resources
and Environmental Control

cc: Valerie S. Edge, Deputy Attorney General
Angela Marconi, P.E., Director

2023-16dcm Energy Center Dover LLC Order.doc

WAIVER OF STATUTORY RIGHT TO A HEARING

Energy Center Dover, LLC hereby waives its right to a hearing and its opportunity to appeal or contest this Assessment and Order and agrees to the following:

1. **Energy Center Dover, LLC** will pay the administrative penalty in the amount of $76,520.00 by sending a check payable to the "State of Delaware" within 30 days of receipt of this Assessment and Order. The check shall be directed to Leslie Reese, Department of Natural Resources and Environmental Control, Office of the Secretary, 89 Kings Highway, Dover, Delaware 19901; and

2. **Energy Center Dover, LLC** will pay the Department's Costs in the amount of $8,111.65 by sending a check payable to the State of Delaware within 30 days of receipt of this Assessment and Order. The check shall be directed to Leslie Reese, Department of Natural Resources and Environmental Control, Office of the Secretary, 89 Kings Highway, Dover, Delaware 19901; and

Energy Center Dover, LLC

Date: _____ By: _____

Title: _____

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

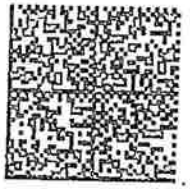
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

"Official Business, Penalty for Private Use $300.00

400111

CERTIFIED MAIL

7020 0640 0001 9493 9587



US POSTAGE PITNEY BOWES

ZIP 19901 $ 009.92⁰
02 4W
0000384055 DEC 18. 2024

Corporation Service Company
251 Little Falls Drive
Wilmington, DE 19808

EXHIBIT B

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF AIR QUALITY
STATE STREET COMMONS
100 W. WATER STREET, SUITE 6A
DOVER, DELAWARE 19904

ENGINEERING & COMPLIANCE

PHONE
(302) 739-9402

October 10, 2022

Energy Center Dover LLC
1280 W. North Street
Dover, DE 19904

ATTENTION: William Grow
Plant Manager

SUBJECT: August 18, 2022 Full Compliance Evaluation

Dear Mr. Grow:

The following violation of **Permit: AQM-001/00127 (Renewal 4) (Revision 1)** was identified during the compliance evaluation conducted at your facility on August 18, 2022:

1. Emission unit CT-2 was found to be in exceedance of the emission limitation under Condition 3 – Table 1(b)(2)(ii)(A) of **Permit: AQM-001/00127 (Renewal 4) (Revision 1)**. This condition states:

   "NOx emissions from Emission Unit CT-2 shall not exceed 15 tons in any rolling twelve (12) month period based on the CEMS."

   In the spreadsheet provided by your facility as part of the compliance evaluation, NOx emissions for unit CT-2 for the rolling twelve-month period ending in July 2022 were 15.8 tons. Additionally, in an email dated September 2, 2022, your facility submitted a report to the Department indicating an additional exceedance of NOx limits for the rolling twelve-month period ending August 2022. NOx emissions of 17.1 tons were reported for that period.

ACTION ITEMS:
In a letter dated September 9, 2022, received on September 30, 2022, your facility provided additional details concerning the exceedance and corrective actions being undertaken to prevent recurrence.

Corrective actions include:

- Removing Emission Unit CT-2 from the day ahead and real time market and placing it in an emergency status in the PJM market
- Updating the DAHS to include real time monitoring, including an alarm for the rolling 12-month period NOx tonnage, on the operators' dashboard for both combustion turbines
- Not returning Emission Unit CT-2 to service until the rolling 12-month NOx emissions are once again below the 15 TPY limit, except in the rare case of a PJM emergency.

No additional corrective actions are currently required.

The following deviations of **Permit: AQM-001/00127 (Renewal 4) (Revision 1)** were also identified:

1. During the start-up of Unit CT-1/C-2 on August 18, 2022, the SCR began operation at a temperature of 510.9°F as measured across the inlet face of the SCR Catalyst bank in deviation of Condition 3 – Table 1(a)(2)(iv)(B).

   Unit CT-1/C-2 SCR is required to begin operation at a minimum temperature of 600°F as measured across the inlet face of the SCR Catalyst bank. Your facility must monitor the temperature at which SCR operations begin to ensure it is at a minimum of 600°F.

2. On March 7, 2021, Emission Unit CT1/C-2 had a NOx emission exceedance for a 1-hour period following a startup of the unit and subsequent increase in load. The NOx concentration 1-hour average was 2.7 ppm, above the limit of 2.5 ppm in Condition 3- Table 1(a)(2)(ii)(B).

3. On October 26, 2021, Emission Unit CT-2 had a one-hour average concentration of 26.45 ppm corrected to 15% O_2 while firing on natural gas, above the limit of 25 ppm in Condition 3 – Table 1(b)(2)(i).

4. On July 28, 2022, Emission Unit CT-2 exceeded the NOx emission standard of 25 ppm in Condition 3 – Table 1(b)(2)(i) for a 2-hour period, with hourly averages of 28.19 ppm and 25.38 ppm corrected to 15% O_2 while firing on natural gas.

Based upon the information provided in letters dated March 9, 2021, October 27, 2021, and July 29, 2022, for deviations #2-4 respectively, no additional corrective actions are currently required.

REQUEST FOR ADDITIONAL INFORMATION:
In the submitted written reports dated October 27, 2021, and July 29, 2022, your facility claimed affirmative defense of equipment malfunction involved in the exceedances of emission unit CT-2. The reports stated that corrective actions related to the NOx exceedances from emission unit CT-2 involved performing a review of the affected instruments to determine cause of momentary failure and replacing the faulty engine sensor. The Department requests information detailing the steps taken to implement the proposed corrective actions, including dates which correspond to the replacement of the faulty engine sensor. Furthermore, as required by Condition 3 – Table 1(b)(1)(x)(A), your facility is required to submit a written report of excess emissions to the Department quarterly. These exceedances are to be reported as excess emissions.

The Department would like to discuss your request to keep Emission Unit C-4 in the Title V permit despite it having been removed from the site. We will reach out to schedule a meeting to discuss this issue.

The Department is currently investigating the violation listed above. Please be advised that a separate Notice of Violation (NOV) regarding the above violation may be issued to your facility when the investigation is completed.

Please contact Kevin Njoroge at (302) 739-9402 if you have any questions.

Sincerely,

Amy S. Mann, P.E.
Program Administrator
Engineering & Compliance Section

ASM:JGM:KMN
F:\EngAndCompliance\KMN\Energy Center Dover, LLC\kmn22076 Energy Center Dover LLC FCE Letter.doc

pc: Dover Title V File
Amy Mann, P.E.
Kevin Njoroge
Dawn Minor

EXHIBIT C

Energy Center Dover LLC
1280 West North Street
Dover, DE 19904

Phone: (302) 678-4666

September 9, 2022

Mr. Kevin Njoroge
DNREC/Division of Air Quality
100 W. Water St., Ste 6A
Dover, DE 19904

Subject: Report on the September 2, 2022, NOx Emissions Violation Concerning Unit CT2 (Unit 3/ KD2) at Energy Center Dover, LLC
Reference: Permit No. AQM-001/00127(Renewal 4)

Dear Mr. Njoroge,

In accordance with Condition 3(c)(2)(ii)(B)(2) of the above referenced permit, on September 2, 2022, Energy Center Dover (Dover) reported an exceedance of the annual NOx limitation specified under Condition 3-Table 1(b)(2)(ii)(A). This letter is a follow-up to that initial report providing additional details concerning the exceedance and corrective actions being undertaken to prevent recurrence.

Description of exceedance –
Condition 3-Table 1(b)(2)(vi)(A) of the operating permit requires Dover to monitor the "monthly and rolling twelve (12) month" NOx mass emissions. Condition 3-Table 1(b)(2)(x)(C) requires a quarterly report of NOx emissions. Historically, the quarterly reporting requirement has been the trigger for a review of actual NOx emissions against the permitted limit. On September 2, after completing data entries for the month of August, Dover operators observed possible exceedances for the months of July and August (as of August 1, the rolling 12-month NOx was 15.8 ton/yr; as of September 1, the rolling 12-month NOx was 17.1 ton/yr). [note: Condition 3-Table 1(b)(2)(ii)(A) states, "NOx emissions from Emission Unit CT-2 shall not exceed 15 tons in any rolling twelve (12) month period based on the CEMS".]

Further investigation of the cause of the exceedance suggests that substantial changes in the increasingly complex regional wholesale electric market managed by PJM (PJM Interconnection is the regional transmission operator (RTO) that centrally dispatches generation and coordinates the movement of wholesale electricity in all or part of 13 states, including the entire Delmarva peninsula) have led to an unanticipated increase in demand for the energy provided by CT-2. The hot weather experienced across the region during this summer, coupled with high natural gas prices and significant capacity retirements in recent years, contributed to unforeseen volatility in wholesale electric markets. By virtue of its physical location and operating characteristics, CT-2 offered PJM a valuable resource with which to respond to these market demands. Dover believes that the loss of, or limited access to, this resource would have placed an unnecessary burden on PJM's mission to provide reliable and cost-effective power to customers in the region. Dover

acknowledges that a monitoring plan going beyond the monthly/quarterly review requirement implied by the permit could have allowed us to forewarn PJM that CT-2 may not be available for parts of July and/or August.

Steps taken to mitigate emissions, and corrective actions –
In accordance with established Dover environmental procedures, upon recognition of the probable exceedance of the NOx limit, CT-2 was immediately taken out of the Day Ahead and Real Time market and placed in an Emergency status in the PJM market. Dover will continue tracking NOx emissions and will not return the unit to service until such time as the rolling 12-month NOx values are once again below the 15 ton/yr limit, except in the rare case of a PJM Emergency.

In addition to the existing practice of monitoring and reporting NOx emissions, Dover has updated the DAHS to include real time monitoring, including an alarm for the rolling 12-month period NOx tonnage, on the operators dash board for both CT-1/CC and CT-2. This enhanced monitoring approach will provide Dover with an hourly update to the 12-month rolling NOx calculation, thus providing the opportunity to better plan for future operation without risking an exceedance of the permit limit.

If you have any further questions regarding this incident, or if you require any additional information, please contact me at (302) 678-4652 or (302) 465-0316.

I certify, based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate and complete.

William Grow
Plant Manager
Energy Center Dover LLC

cc: Greg MacDonald
Ernie Just
Erin Barry

EXHIBIT D

Energy Center Dover LLC
1280 West North Street
Dover, DE 19904

Phone: (302) 678-4666

October 17, 2022

Mr. Kevin Njoroge
DNREC/Division of Air Quality
100 W. Water Street, Suite 6A
Dover, DE 19904

Subject: Response to 2022 Full Compliance Evaluation, Letter Dated October 10, 2022
References: Permit No. AQM-001/00127(Renewal 4)(Revision 1)

Dear Mr. Njoroge,

The following information is being provided by Energy Center Dover LLC in response to your letter in which you presented the findings of your 2022 full compliance evaluation. For clarity, this response is organized to provide a summary of your finding, and response/corrective actions implemented for those items not previously addressed.

First observed deviation:

Summary of deviation. 1. During the start-up of Unit CT-1/C-2 on August 18, 2022, the SCR began operation at a temperature of 510.9°F as measured across the inlet face of the SCR Catalyst bank in deviation of Condition 3 – Table 1(a)(2)(iv)(B).
Unit CT-1/C-2 SCR is required to begin operation at a minimum temperature of 600°F as measured across the inlet face of the SCR Catalyst bank. Your facility must monitor the temperature at which SCR operations begin to ensure it is at a minimum of 600°F.

Corrective action required. Condition 3 – Table 1(a)(2)(iv)(B) states "At a minimum, the SCR shall begin operation at a temperature of 600°F as measured across the inlet face of the SCR Catalyst bank." It is the understanding of Energy Center Dover that this means the SCR should begin operation before 600°F, which adheres to the manufacturer recommended minimum operating temperature of 480°F. Normal operating temperature of the SCR inlet is approximately 550°F. See included excerpt from the manufacturers manual.

Request for additional information:

Written report dated October 27, 2021: Per the previously submitted letter, a failed sensor was determined to the be the root cause of the exceedance, specifically the Secondary Liquid Manifold Temperature. This sensor had previously caused trips of the unit in August 2021, however at that time, it appeared that the fault was a loose connection. The sensor was deemed to be operating correctly, and monitoring of the condition was established. No further incidents occurred until October 26, 2021. At this time, it was decided that the sensor required replacement. The sensor was replaced, and all other connections were inspected and found to

still be satisfactory. No further incidents have occurred since. Work documentation has been included.

Written report dated July 29, 2022: Per the previously submitted letter, a failed sensor was determined to the be the root cause of the exceedance, specifically the Primary Liquid Manifold Temperature. This sensor was replaced on July 29, and all associated wiring was inspected and determined to be satisfactory. Work documentation has been included.

NOTE: the Primary and Secondary Liquid Manifold Temperature Sensors work together to monitor the Liquid fuel manifold(s).

Quarterly Excess Emissions Report (Q4 2021): Per Condition 3 – Table 1(b)(1)(x)(B)2), "If the total duration of excess emissions for the reporting period is one percent (1%) or greater of the total operating time for the reporting period or the total CMS downtime for the reporting period is five percent (5%) or greater of the total operating time for the reporting period, the summary report form and the excess emission report shall both be submitted. If the duration of excess emissions or the CMS downtime is less than specified above, only the summary report form shall be submitted." For the 4th quarter of 2021 (period including October 27, 2021), the total downtime of the CEMS was 1% and the total excess emissions were only 0.4%. Thus, only the Summary report was submitted.

Quarterly Excess Emissions Report (Q3 2022): The reports for the 3rd quarter of 2022 (the period including July 29, 2022) are still being generated at the time of this letter. Both a Summary report and a report of excess emissions will be filed.

On behalf of Energy Center Dover LLC, I would like to thank you for the opportunity to respond to the findings of your compliance evaluation. If you have any questions regarding this response, or if you require any additional information, please contact me at (302) 678-4652 or (302) 465-0316, or Ernie Just at (302) 678-4353.

Sincerely,

William Grow

William Grow
Plant Manager
Energy Center Dover LLC

cc: Erin Barry – DCO Energy
Ernie Just – DCO Energy
Gregory MacDonald – DCO Energy

Work Order

WO-Incid#:	137,426	Open / History:	H
Incident Report Implementing Procedure, Click to download:	DCO-OPS-010, Plant Incident Reporting.pdf	WO Created Date:	08/25/2021
Equipment Tag #:	DVR-KD2-GT-301	Date Closed:	03/03/2022
Equipment Description:	KD2 GAS TURBINE	Request #:	19066
Facility:	DVR	1st Project #, If Applicable:	
Job #:	81-584	Related to WO #:	137428
Facility Manager / Designee:		Incident Report Status:	Closed
Requested By:	Ernie Just	WO Type:	Incident
Incident Category:	Turbine		
Incident Sub Category:	Controls		
Section 1 - Incident Description			
Incident Date & Time:	08/24/2021 06:28:00 PM		
Plant operating status at time of incident:	KD-2 was online per the Day Ahead schedule		
Brief Description (Lead/Planner Only):	KD-2 Trip - Secondary Liquid Fuel Manifold Temperature Alarm - Unit trip		
Detailed description of incident:	Secondary Liquid fuel manifold temperature alarm - signal failure. Unit Steps to Minimum Load. Not able to reset alarm. Unit Tripped. Notified Tenaska (power marketing desk).		
Alarm Description or Number:	Secondary Liquid fuel manifold temperature		
Incident Recovery Detail (Restart details)(Temporary and/or Permanent)(Identify Vendor or Contractor:	Unit successfully put into crank cycle to prevent 4 hour lock out. Once cranck cycle completed, all alarms were acknowledged and reset to obtain a "Ready to Start" condition. Notified Tenaska of recovery, PJM did not want the unit back online.		
Incident Recovery Date/Time, if App.:	08/25/2021 06:58:00 PM		
Section 2 - Incident Cause			
Incident Cause:	Equipment		
Summary of Incident Cause:	A clean and inspect of the primary & secondary liquid fuel manifold temperature sensor field wiring connection showed fowling/corrosion buildup on the secondary temperature sensor cannon plug connection. Contact cleaner & cotton swabs did not fully remove the fowling/corrosion buildup.		
Section 3 - Corrective Action			
Corrective Action (Specify Work Order No's):	Replace sensor (137428)		

Work Order

		WO-Incid#:	137,428
Outage Required?:	Yes	Follow Up From WO#:	0
		Related to WO #:	
1st Project #, If Applicable:		WO Created Date:	08/25/2021
2nd Project #, If Applicable:		WO Created by:	ERNIEJUS99
WO Type:	CM	Open / History:	H
Importance:		Last Edited by User:	ERNIEJUS99
Priority Level:	3 **Planned PM/CM**	Scheduled Date:	08/25/2021
Equipment Tag #:	DVR-KD2-GT-301	Original PM Sch. Date:	08/25/2021
Equipment Description:	KD2 GAS TURBINE	Sch. Date Deviation Days:	0
Facility:	DVR	WO Job Status:	Closed
Facility Owner:	DCO Energy	Sub Job Status 1:	
Job #:	81-584	Sub Job Status 3:	
Equipment Type:	GASTURBINE	RIME Ranking Index:	10
Problem Type:	Instrumentation and Controls		
ADP Code:	000950 **New Brunswick**	Generated from a Request?	
Cost Code:	68-820 **CM-Gas Turbines**	Request #:	19067
Building:		Requested By:	Ernie Just
Brief Description (Lead/Planner Only):	Replace the Secondary Liquid Fuel Manifold Temperature Sensor	Add Date:	08/25/2021
Est. Total Man Hours:	4.00	AC Rov Maint Work:	
Work Description (Lead/Planner Only):	Replace sensor per GEK WP-1912	Ready for A.C. Rov. Maint Work:	☐
Task No. (If Applicable):			
WO Note:		Mechanic assigned (WO):	
Are these Required?		Mechanic ID:	
J.S.A./P.P.E. Required?:	Yes	Assign to a Group?:	DVR-I&C **DVR-I&C**
L.O.T.O. Required?:	Yes		
DCO LOTO Permit #, if App:		Comments Dropdown:	
Hot Work Permit Required?:	No	Work Order Comments:	
Confined Space Entry Permit Required?:	No	Work Order As Left Job Status:	Field Complete
QC Inspection Required?:	No	Lead Section:	
Operator Training Required?:	No	Lead:	
Lift/Rigging Plan Required?:	No	Lead, Has Everything been Reviewed After WO Completed?:	
Materials / Specialty Tools Required?:	Yes	Are there Comments in the WO that need to be review?:	
Materials/Tools		Facility Manager / Designee	
Materials / Specialty Tools Need to be Ordered?:		Facility Manager / Designee:	
Materials / Specialty Tools Ordered?:		Rigging, LOTO, and/or Permits Reviewed?:	
Materials/ Specialty Tools Received from Order?:		Facility Manager / Designee Comments (internal only):	
All Materials / Specialty Tools Staged On-Site?:	Yes	Date WO Completed:	09/09/2021
Are these Completed?		Date Closed:	09/09/2021
J.S.A/P.P.E. Process Completed?:	Yes	Closed by:	ERNIEJUS99
L.O.T.O. Process Completed?:	Yes	Create Follow Up WO:	☐
Hot Work Permit Process Completed?:	Yes	Notes for Follow up WO:	
Confined Space Entry Permit Process Completed?:	Yes		
QC Inspection Process Completed?:	Yes	Customer's CMMS No.:	
Operator Training Process Completed?:	Yes	Customer's Name, Room, and Phone #:	
Lift/Rigging Plan Process Completed?:	Yes		
Materials/Tools Process Completed?:	Yes		

Work Order Charges

	Tranid	Category	Comment	Wo	Contactid	Trandate	Unitcost	Qty. Used	Extcost	Start time	Stop time	***As Left Job Status (Mechanic)***
DVR												
	_64P0I2ZF2	DVR		137,428	CLAYHEND56	08/26/2021	0.00	0.02	0.00	08/26/2021 08:25:14 AM	08/26/2021 08:26:02 AM	Incomplete / In Progress
	_6530SBSV4	DVR	Since the last entry in August when the connections were tightened, we have not had any more alarms/trips associated with this problem. We will keep an eye on this issue, but no further entries are necessary for this work order.	137,428	CLAYHEND56	09/09/2021	0.00	0.04	0.00	09/09/2021 01:10:22 PM	09/09/2021 01:10:30 PM	Field Complete
Sub								**0.06**	**0.00**			
Total								**0.06**	**0.00**			

Recommended Materials/Tools

Required Qty.	Item No from Inventory	Item Description	Note	Item Location	Unique ID	Status
1.000	DVR-03988	SEAL-GE-TURB		DVR	_64O0RUOSY	
1.000	DVR-04945	SENSOR- TEMPERATURE- AIR		DVR	_64O0RW1NC	

L.O.T.O.

WO #	DCO LOTO Permit # (Required)	Attach Form Here (optional)
137428	515	

J.S.A./P.P.E.

Created Date	Brief Description	1 - Hazard Source	2 -Hazard Source	3 - Hazard Source	4 - Hazard Source
08/25/2021	Replace the Secondary Liquid Fuel Manifold Temperature Sensor	PRESSURIZED EQUIPMENT/PIPING	SLIP / FALLS		

Comment History

Work Comment Added By	Date/Time Added	Work Comments
CLAYHEND56	08/26/2021 08:25:59 AM	OPERATIONS reported that on the previous night, KD2 tripped on Secondary liquid fuel manifold temperature. They tried to reset the alarm before the unit tripped, but was unsuccessful. Went out to inspect the manifold and the Amphenol connections. Noted that the south Amphenol connector was only finger tight. Cleaned the connection and re-installed. Noted that after cleaning the connection surfaces, the south TE looked worse than north TE. Discussed with Ernie and we all agree at the next availability to replace the South TE. Parts are in stock. Noted that I was able to get a few turns more when I re-installed the connector. It is possible that the connector was not fully seated, causing intermittent contact and faults on KD2.
CLAYHEND56	09/09/2021 01:13:00 PM	Since the last entry in August when the connections were tightened, we have not had any more alarms/trips associated with this problem. We will keep an eye on this issue, but no further entries are necessary for this work order.

Work Order

		WO-Incid#:	164,640
Outage Required?:	No	Follow Up From WO#:	0
		Related to WO #:	
1st Project #, If Applicable:		WO Created Date:	07/29/2022
2nd Project #, If Applicable:		WO Created by:	ERNIEJUS99
WO Type:	CM	Open / History:	H
Importance:		Last Edited by User:	GREGMACD99
Priority Level:	3 **Planned PM/CM**	Scheduled Date:	07/29/2022
Equipment Tag #:	DVR-KD2-GT-301	Original PM Sch. Date:	07/29/2022
Equipment Description:	KD2 GAS TURBINE	Sch. Date Deviation Days:	0
Facility:	DVR	WO Job Status:	Closed
Facility Owner:	DCO Energy	Sub Job Status 1:	
Job #:	81-584	Sub Job Status 3:	
Equipment Type:	GASTURBINE	RIME Ranking Index:	10
Problem Type:	NONE		
ADP Code:	000950 **New Brunswick**	Generated from a Request?	
Cost Code:	68-822 **CM-Gas Turbines Unit 2**	Request #:	
Building:		Requested By:	
Brief Description (Lead/Planner Only):	Primary Liquid Manifold Temperature Alarm Event - Replace Sensor	Add Date:	07/29/2022
Est. Total Man Hours:	8.00	AC Rov Maint Work:	No
Work Description (Lead/Planner Only):		Ready for A.C. Rov. Maint Work:	☐
Task No. (If Applicable):			
WO Note:		Mechanic assigned (WO):	Clay Henderson
Are these Required?		Mechanic ID:	CLAYHEN960
J.S.A./P.P.E. Required?:	Yes	Assign to a Group?:	DVR-MAINT **DVR-MAINT**
L.O.T.O. Required?:	Yes		
DCO LOTO Permit #, if App:		Comments Dropdown:	
Hot Work Permit Required?:	No	Work Order Comments:	
Confined Space Entry Permit Required?:	No	Work Order As Left Job Status:	Field Complete
QC Inspection Required?:	No	Lead Section:	
Operator Training Required?:	No	Lead:	Ernie Just
Lift/Rigging Plan Required?:	No	Lead, Has Everything been Reviewed After WO Completed?:	
Materials / Specialty Tools Required?:	Yes	Are there Comments in the WO that need to be review?:	Yes
Materials/Tools		Facility Manager / Designee	
Materials / Specialty Tools Need to be Ordered?:		Facility Manager / Designee:	William Grow
Materials / Specialty Tools Ordered?:		Rigging, LOTO, and/or Permits Reviewed?:	
Materials/ Specialty Tools Received from Order?:		Facility Manager / Designee Comments (internal only):	
All Materials / Specialty Tools Staged On-Site?:	Yes	Date WO Completed:	08/02/2022
Are these Completed?		Date Closed:	08/12/2022
J.S.A/P.P.E. Process Completed?:	Yes	Closed by:	ERNIEJUS99
L.O.T.O. Process Completed?:	Yes	Create Follow Up WO:	☐
Hot Work Permit Process Completed?:	Yes	Notes for Follow up WO:	
Confined Space Entry Permit Process Completed?:	Yes		
QC Inspection Process Completed?:	Yes	Customer's CMMS No.:	
Operator Training Process Completed?:	Yes	Customer's Name, Room, and Phone #:	
Lift/Rigging Plan Process Completed?:	Yes		
Materials/Tools Process Completed?:	Yes		

Work Order Charges

	Tranid	Category	Comment	Wo	Contactid	Trandate	Unitcost	Qty-Used	Extcost	Start time	Stop time	***As Left Job Status (Mechanic)***
DVR												
	_6E40JB0R0	DVR		164,640	CLAYHEN960 - Clay Henderson	07/29/2022	100.00	2.50	250.00	07/29/2022 06:30:00 AM	07/29/2022 09:00:30 AM	Incomplete / In Progress
	_6E40JBDV5	DVR		164,640	CLAYHEN960 - Clay Henderson	07/29/2022	100.00	0.21	21.00	07/29/2022 08:48:17 AM	07/29/2022 09:00:43 AM	Incomplete / In Progress
	_6E80IB7ZW	DVR		164,640	GREGMACD99 - Greg MacDonald	07/30/2022	100.00	3.00	300.00			Field Complete
Sub								**5.71**	**571**			
Parts												
	_6E80IEC5W	Parts		164,640	DVR-04945 - SENSOR-TEMPERATURE- AIR	07/30/2022	1,700.00	1.00	1,700.00			
	_6E80IJF8Q	Parts		164,640	DVR-03988 - SEAL-GE-TURB	08/02/2022	1.00	1.00	1.00			
Sub								**2.00**	**1,701.00**			
Total								**7.71**	**2,272.00**			

Work Instructions

Complete?	Completed By?	Brief Task Description	Comments	Comment By?	Instruction Sequence	Equip ID	Equipment Description	Task No.
☑	GREGMACD99	Perform Lockout of KD2			1			
☑	GREGMACD99	Replace temperature element			2			
☑	GREGMACD99	Remove Lockout			3			
☑	GREGMACD99	Observe Temperature Element on the subsequent Kd2 startup/online run.			4			

J.S.A./P.P.E.

Created Date	Brief Description	1 - Hazard Source	2 -Hazard Source	3 - Hazard Source	4 - Hazard Source
07/29/2022	Primary Liquid Manifold Temperature Alarm Event - Replace Sensor	PRESSURIZED EQUIPMENT/PIPING	CHEMICAL EXPOSURE	FLAMMABLE SUBSTANCE	Pandemic Flu

Comment History

Work Comment Added By	Date/Time Added	Work Comments
CLAYHEN960	07/29/2022 08:48:28 AM	7/28/2022 @ 20:07 on the KD2 HMI, KD2 started having problems with the Primary Liquid Fuel Manifold temperature. It tripped the unit once for sure, but subsequent faults were able to be recovered from as the operator was able to be out there and reset the HMI before the unit went into shutdown. At the same time, the Secondary Liquid Fuel Manifold Temperature was doing just fine. I do not understand why there are two elements monitoring the same temperature, but losing one can trip the unit. Observing the trends from the HMI confirms that it was only the Pri. Liq Fuel Man. temp. that was faulty. - checked the wiring in the TCP - Good - checked the wiring in the MTTB cabinet - Good - removed the canon plug from the Primary fuel sensor and inspected - Good and Clean. KD2 was called on for economics so we could not replace the sensor. Will attempt to replace once the unit is offline.
GREGMACD99	08/02/2022 08:36:07 AM	GM - 7/30/22: Replaced Primary Liquid Manifold Temperature Sensor. During subsequent runs, the temperature indicated as expected.

Table 2 Technical Specification

Cormetech Product Specification	CM27T
Fuel	Natural Gas
Fuel Gas Velocity Maldistribution	+/- 15% RMS normal
Flue Gas Temperature Maldistribution	+/- 20°F
NH_3/NO_x Molar Ratio Maldistribution	+/- 10% RMS normal
NO/NO_2	≥ 50%
Minimum Operating Temperature with NH3 Injection*	480°F
Maximum Operating Temperature	800°F

* For natural gas firing conditions only. For other fuels contact Cormetech.

LAST PAGE

EXHIBIT E

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF AIR QUALITY
STATE STREET COMMONS
100 W. WATER STREET, SUITE 6A
DOVER, DELAWARE 19904

ENGINEERING & COMPLIANCE

PHONE (302) 739-9402

August 14, 2023

Energy Center Dover LLC
1280 W. North Street
Dover, DE 19904

Certified # 7022 1670 0000 9991 4289
RETURN RECEIPT REQUESTED

ATTENTION: Ernst Just
Plant Manager

SUBJECT: **Notice of Violation**
Energy Center Dover LLC
Permit: AQM-001/00127 (Renewal 4)(Revision 1)
Emission Unit CT-2 Rolling Twelve (12) Month Emission Exceedance

Dear Mr. Just:

The full compliance evaluation (FCE) at Energy Center Dover, LLC (facility), conducted August 18, 2022, consisted of visual inspection of all the operating equipment listed in the facility's operating **Permit: AQM-001/00127 (Renewal 4)(Revision 1)** and a review of all record keeping requirements. Operating records reviewed ranged from January 2020 through August 2022. While reviewing the rolling twelve-month emissions spreadsheet provided by the facility in an email dated August 15, 2022, the Department discovered that the facility exceeded the rolling twelve-month NOx emissions limit for emission unit CT-2 for the period August 1, 2021-July 31, 2022. Condition 3- Table 1(b)(2)(ii)(A) states that "NOx emissions from Emission Unit CT-2 shall not exceed 15 tons in any rolling twelve (12) month period based on the CEMS."

In the spreadsheet provided, the rolling twelve-month period NOx emissions ending July 31, 2022, was listed at 15.8 tons. In an email submitted to the Department on September 2, 2022, your facility included a fax attachment reporting this exceedance as well as an additional exceedance of the rolling 12-month average for NOx emissions on August 31, 2022, at 17.1 tons. Your facility is required to submit a written report of excess emissions to the Department pursuant to Condition 3 – Table 1(b)(1)(x)(A). In a letter dated September 9, 2022, received by the Department on September 30, 2022, your facility provided the written report which included additional details concerning the exceedance and corrective actions being undertaken to prevent recurrence.

Your facility stated in the letter that the hot weather experienced across the region during the summer, coupled with high natural gas prices and significant capacity retirements (removal of electrical power generating units from the electrical grid/market availability) in recent years, contributed to unforeseen volatility in wholesale electric markets. By virtue of its physical location and operating characteristics, unit CT-2 offered PJM a valuable resource with which to respond to these market demands. Your facility claimed that the loss of, or limited access to, this resource would have placed an unnecessary burden on PJM's mission to provide reliable and cost-effective power to customers in the region. Your facility acknowledged that a monitoring plan going beyond the monthly/quarterly review requirement by the permit could have allowed you to forewarn PJM that unit CT-2 may not be available for parts of July and/or August.

Based upon information provided in the September 9, 2023, letter, corrective actions taken by your facility included removing unit CT-2 from the day ahead and real time market and placing it in an emergency status in the PJM market on September 2, 2022. Based on the operating records, unit CT-2 continued operation through August 31, 2022. Your facility has also updated the data acquisition and handling system ("DAHS") to include real time monitoring, including an alarm for the rolling 12-month period NOx tonnage, on the operators' dashboard for both combustion turbines. The enhanced monitoring approach will provide your facility with an hourly update to the 12-month rolling NOx calculation, thus providing the opportunity to better plan for future operation without risking an exceedance of the permit limit. In an email dated July 26, 2023, facility officials stated that the unit was restored to market availability on October 11, 2022, with additional monitoring in place to prevent exceeding the rolling 12-month NOx limit. Unit CT-2 did not operate due to a PJM emergency between September 2, 2022, and October 11, 2022, when the rolling twelve-month NOx total fell below 15 tons.

Energy Center Dover, LLC is found to be in violation of the following permit condition:

1. In Condition 3 – Table 1(b)(2)(ii)(A) of **Permit: AQM-001/00127 (Renewal 4)(Revision 1)**, it states:

   "NOx emissions from Emission Unit CT-2 shall not exceed 15 tons in any rolling twelve (12) month period based on the CEMS."

   In the spreadsheet provided by your facility as part of the August 18, 2022, full compliance evaluation, NOx emissions for unit CT-2 for the rolling twelve-month period ending July 2022 were listed at 15.8 tons. Additionally, in an email dated September 2, 2022, your facility submitted an attached faxed report to the Department, that the NOx emissions of 17.1 tons for the rolling twelve-month period ending August 2022 also exceeded the permit limit.

ACTION ITEMS:

In the letter dated September 9, 2022, received by the Department on September 30, 2022, your facility provided corrective actions undertaken to prevent recurrence. Corrective actions taken included removing emission unit CT-2 from the day ahead and real time market and placing it in an emergency status in the PJM market on September 2, 2022. Your facility also updated the DAHS to include real time monitoring, including an alarm for the rolling 12-month period NOx tonnage, on the operators' dashboard for both combustion turbines. Energy Center Dover, LLC shall submit a permit amendment request within 60 days of the receipt of this letter, to include the added NOx emissions enhanced monitoring plan in the Title V permit for unit CT-2 as part of the monitoring requirements under Condition 3 - Table 1(b)(2)(vi).

Please be advised that this Notice of Violation will be made available through the Department's Internet site, which can be found at http://www.dnrec.delaware.gov. Information concerning your Company's failure to comply will be posted following confirmation by the Department of your receipt of this Notice of Violation. Upon further review of the violation(s), the Department reserves the right to pursue further investigation, and, as it deems appropriate, enforcement action.

If you have any questions, please contact me at (302) 323-4542.

Sincerely,

Amy S. Mann, P.E.
Administrator
Engineering & Compliance Branch

ASM: OIO:KMN
F:\EngAndCompliance\KMN\Energy Center Dover, LLC\kmn23078 Energy Center Dover NOV Letter.doc

pc: Dover Title V File
Okesola Olayiwola P.E.
Kevin Njoroge
Dawn Minor

EXHIBIT F

Energy Center Dover LLC
1280 West North Street
Dover, DE 19904

Phone: (302) 678-4666

November 10, 2023

Mr. Kevin Njoroge
DNREC/Division of Air Quality
100 W. Water St., Ste 6A
Dover, DE 19904

Subject: Report on the Third quarter 2023, CO2 Equivalent Emissions Exceedance Involving Emission Unit CT1/CC at Energy Center Dover, LLC
Reference: Permit No. AQM-001/00127(Renewal 4)

Dear Mr. Njoroge,

Description of exceedance –

After further review of the third quarter 2023 Emissions Data Reporting (EDR) generation and the verification of the Heat Inputs for the units from July through September, it was noticed that the CO2 Equivalent (CO2e) emissions calculations showed a value over the adjusted calculated limit for Unit 2 (CT1/CC). The calculated CO2e values from August and September are over the limit. The limitations are defined in Condition 3 – Table 1(a)(1)(ii)(I). These are rolling 12-month values calculated using the formula in the permit – there is no real-time indication of the CO2e value. These values are calculated following EDR generation.

Explanation of exceedance –

The unit exceeded the permitted limit (as a rolling 12- month average) of equivalent CO2 (CO2e) in the months of August and September 2023. The total emissions on a rolling 12-month average were 997 lbCO2e/MWh for August (with a limit of 994.76) and 1,006 lbCO2e/MWh for September (with a limit of 997.07). Emissions and limits are specified in Permit No. AQM-001/00127(Renewal 4)(Revision 2), Condition 3 – Table 1(a)(1)(ii)(I).

Energy Center Dover is investigating several possible causes for this exceedance, including:

- A change in the method of operation of U2 (CT-1/CC) allowing the unit to be more available to respond to grid conditions. . The unit dispatch model was changed to allow the unit to be offered at a lower base load, which is inherently less efficient. Calculations show that the engine efficiency should be 9,117 BTU/kWh or better over the measurement period to meet the requirements of Condition 3 – Table 1(a)(1)(ii)(I). Operation of the engine at lower base load shows heat rates above 9,117 BTU/kWh.
- Changes in gas quality, including changes in the heating value, or as yet unidentified parameters, of the delivered pipeline natural gas.
- Engine degradation. Engine performance can degrade over time based on normal aging of the machine or unanticipated malfunctions.

Steps taken to mitigate emissions, and corrective actions –

Immediate:

1. It is proposed that the most expeditious way to return to compliance is to operate the Combined Cycle system in its most efficient manner. To that end, the unit dispatch model has been changed to increase the minimum load offered thus improving the heat rate. This more efficient mode of operation of the Combined Cycle system is currently providing a calculated heat rate of approximately 8,900 BTU/kWh, which is better than the 9,117 BTU/kWh calculation. This mode of operation will allow the calculated CO2e emissions to return to compliance, based on the calculations outlined in Condition 3 – Table 1(a)(1)(ii)(I) of the referenced permit.
2. The attached calculations demonstrate a return to compliance by the end of December based on the expected values.

Follow-up:

1. A sample of the pipeline natural gas that is delivered to the site was performed to determine if gas quality matches the posted analysis from the provider and meets contract specifications. Results were received Nov 9, 2023 and analysis is ongoing.
2. The engine will be inspected for any unserviceable issues that may contribute to reduced efficiency. This is currently scheduled for the weeks of Nov 13th through the 28th 2023.

Ongoing:

1. Energy Center Dover will conduct training with operations staff on the importance of monitoring the real-time unit operating heat rate, in order to ensure that the unit is operated in the most efficient mode possible.

I certify, based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate and complete.

Ernie Just
Plant Manager
Energy Center Dover LLC

cc: Gregory MacDonald – DCO Energy
Grace Buczny – DCO Energy

Attachment 1 – Calculations

Running CC efficiently (~8,800 BTU/kWh) for the same run time as last year (November and December), and using the actual heating value for the gas, the CC CO2e emissions should return to compliance level by the end of December. However, there is an outage period scheduled for Nov 11-26. Therefore, the running hours will most likely be reduced. Calculations are below. *NOTE: THE VALUES BELOW ARE APPROXIMATIONS AND BEST GUESSES. ACTUAL VALUES MAY VARY.*

The heat rate value used is the value as determined by the DCS. This uses a Natural Gas heating value of 1,035. The calculated total heat input in mmBTU will be adjusted based on the actual heating value, as measured from the Parkesburg meter from Transco, averaged for the respective month.

November

1. assume 45 hours (realistically, only 10-14 days available for operation)
2. assume heat rate of ~8,800 BTU/kWh – value achieved during last operational period.
3. assume Natural Gas heating value ~1,030 BTU/scf (from Transco Parkesburg station data for October) – adjustment calculations on pg2.
4. assume 54 MW gross (48 MW KD1 and 6 MW GF1) – values achieved during last operational period.
5. Assume the same steam flow as the previous month.
6. Then, the following data would be entered into the spreadsheet:
    a. 54 MW for 45 hours = 2,430 MWh (approx.)
    b. 8,800 BTU/kWh for the 2,430 MWh = ~21,384 mmBTU

December

1. assume 132 hours based on weather expectations and past operations.
2. assume heat rate of ~8,800 BTU/kWh – value achieved during last operational period.
3. assume Natural Gas heating value ~1,030 BTU/scf (from Transco Parkesburg station data for October) – adjustment calculations on pg2.
4. assume 54 MW gross (48 MW KD1 and 6 MW GF1) – values achieved during last operational period.
5. Assume the same steam flow as the previous month.
6. Then, the following data would be entered into the spreadsheet:
    a. 54 MW for 132 hours = 7,128 MWh (approx.)
    b. 8,800 BTU/kWh for the 7,128 MWh = ~62,727 mmBTU

Calculations

November:

$$45\ hr \times 54\ MW = 2{,}430\ MWh$$

$$45\ hr \times 54\ MW \times \frac{8{,}800\ BTU}{kWh} \times \frac{1{,}000\ kWh}{MWh} \times \frac{mmBTU}{1{,}000{,}000\ BTU} = 21{,}384\ mmBTU$$

December:

$$132\ hr \times 54\ MW = 7{,}128\ MWh$$

$$132\ hr \times 54\ MW \times \frac{8{,}800\ BTU}{kWh} \times \frac{1{,}000\ kWh}{MWh} \times \frac{mmBTU}{1{,}000{,}000\ BTU} = 62{,}726\ mmBTU$$

If we use these values in the data calculation spreadsheet, the CO2e values and limits for the rolling 12-month periods are as follows:

1. End of November:
    a. Limit = 1,002.34 lbs/MWh
    b. Calc emissions = 1,004.81 lbs/MWh
    c. This is 100.25% of the limit.

2. End of December:
    a. Limit = 1,006.30 lbs/MWh
    b. Calc emissions = 1,003.85 lbs/MWh
    c. This is 99.76% of the limit (Back in specs)

Attachment 2 – Gas Analysis

ATLANTIC
ANALYTICAL
LABORATORY

GAS ANALYSIS REPORT

Catalyst Air Management
2505 Byington-Solway Road
Knoxville, TN 37931
Maggie Cangro
maggie.cangro@catalystair.com

AAL Number: 69510
Sampled On: 01-Nov-23
Received On: 02-Nov-23
Report Date: 07-Nov-23
PO Number: CCARD

Sample ID: Pipeline Natural Gas - Energy Center Dover; Sample Time: 02:42pm
Sample ID: Sample Received in AAL Cylinder # 0575

Composition (Normalized, % v/v, by ASTM D1945)

Non-Hydrocarbon Gases	Result	D.L.
Nitrogen:	0.24	0.01
Oxygen:	nd	0.01
Argon:	nd	0.01
Carbon Dioxide:	0.09	0.05
Carbon Monoxide:	nd	0.05
Hydrogen:	nd	0.05

Hydrocarbon Gases	Result	D.L.
Methane:	97.3	0.001
Ethylene:	nd	0.001
Ethane:	2.24	0.001
Propylene:	nd	0.001
Propane:	0.093	0.001
Isobutane:	0.004	0.001
n-Butane:	0.006	0.001
Butenes:	nd	0.001
Isopentane:	nd	0.001
n-Pentane:	nd	0.001
Pentenes:	nd	0.001
Hexanes+:	nd	0.001

	ppm v/v	D.L.	ppm w/w	D.L.	lbs/MMSCF	D.L.
Water	85	1	93.06	1.0	4.048	0.048

	Result	D.L.
Dew Point (@ 0 psig)	-46 °F	-105 °F
	-44 °C	-76 °C

PJLA Testing
Accreditation # 59415

Atlantic Analytical Laboratory, LLC
Mailing: P.O. Box 220 · Whitehouse, NJ 08888
Shipping: 291 Route 22 East, Salem Industrial Park - Bldg 2 · Lebanon, NJ 08833
(908).534.5600 · www.AtlanticAnalytical.com

Catalyst Air Management

AAL Number 69510

Elemental Composition (Normalized, % w/w)

Element	Result
Carbon Content (% C, w/w)	74.8
Hydrogen Content (% H, w/w)	24.6
Oxygen Content (% O, w/w)	0.18
Nitrogen Content (% N, w/w)	0.41

Heat of Combustion & Physical Properties (by ASTM D3588)

I. @ ASTM Base Conditions; 14.696 psia, 60°F, Dry Gas Format

		Result
Net Heat of Combustion	(Lower Heating Value, BTU/ft^3):	923
Gross Heat of Combustion	(Higher Heating Value, BTU/ft^3):	1,025
Gross Heat of Combustion	(Water Saturated Gas Format,BTU/ft^3):	1,007
Net Heat of Combustion	(Lower Heating Value, BTU/lb):	21,320
Gross Heat of Combustion	(Higher Heating Value, BTU/lb):	23,664
Molecular Weight:		16.44
Density (lb/ft^3):		0.0433
Specific Gravity (vs. dry/normal air):		0.5678
Compressibility Factor (z):		0.9979

II. @ ASME Base Conditions; 14.73 psia, 60°F, Dry Gas Format

		Result
Net Heat of Combustion	(Lower Heating Value, BTU/ft^3):	926
Gross Heat of Combustion	(Higher Heating Value, BTU/ft^3):	1,028
Gross Heat of Combustion	(Water Saturated Gas Format, BTU/ft^3):	1,010
Net Heat of Combustion	(Lower Heating Value, BTU/lb):	21,370
Gross Heat of Combustion	(Higher Heating Value, BTU/lb):	23,719

Siloxanes by GC/MS (Amt. ppm v/v)

Target Analyte:	Result	D.L.
Hexamethyldisiloxane (MM)	nd	0.01
Hexamethylcyclotrisiloxane (D3)	nd	0.01
Octamethyltrisiloxane	nd	0.01
Octamethylcyclotetrasiloxane (D4)	nd	0.01
Decamethyltetrasiloxane	0.01	0.01
Decamethylcyclopentasiloxane (D5)	0.02	0.01
Dodecamethylpentasiloxane	0.01	0.01
Other Siloxanes	nd	0.1

Total Siloxanes = 0.04 ppm v/v

Notes: **D.L.** = Instrumental detection limit for the reported analyte. nd = indicates concentration is less than the accompanying report detection limit. -- = test not performed. % = parts per hundred. ppm = parts per million. ppb = parts per billion. w/w = weight analyte/weight sample. v/v = volume analyte/volume sample (equivalent to mole fraction for normalized, ideal gas mixtures). **Conversions:** 0.0001% = 1 ppm = 1,000 ppb.

Ralph Ciotti
President / CEO

Analysis as reported on Transco Website (PNG Provider)

Gas Day 11/1/2023

Constituents	Location Parkesburg
BTU/CF	1026.7
N2	0.24
CO2	0.036
Methane	97.801
Ethane	1.873
Propane	0.05
Ibutane	0
Nbutane	0.001
Ipentane	0
Npentane	0
Hexanes Plus	0
C5+	0
Relative Density	0.566

EXHIBIT G

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF AIR QUALITY
STATE STREET COMMONS
100 W. WATER STREET, SUITE 6A
DOVER, DELAWARE 19904

ENGINEERING & COMPLIANCE

PHONE
(302) 739-9402

June 21, 2024

Energy Center Dover LLC
1280 W. North Street
Dover, DE 19904

Certified # 7018 1130 0000 5799 2889
RETURN RECEIPT REQUESTED

ATTENTION: Ernst Just
Plant Manager

SUBJECT: **Notice of Violation**
Energy Center Dover, LLC
Permit: AQM-001/00127 (Renewal 4)(Revision 2)
Emission Unit CT-1/C-2 rolling twelve (12) month emission exceedances

Dear Mr. Just:

In an email dated October 19, 2023, Energy Center Dover, LLC ("facility"), submitted an attached electronic copy of a faxed notification of exceedance transmitted on October 18, 2023, regarding emission unit CT-1/C-2. The faxed report, dated October 11, 2023, stated that unit CT-1/C-2 exceeded the permitted limit (as a rolling twelve-month average) of Carbon Dioxide Equivalent ("CO_2e") emissions in the months of August and September 2023. The total emissions on a rolling twelve-month average were 1,008 lb CO_2e/MWh for August (with a limit of 994.76 lb CO_2e/MWh) and 1,017 lb CO_2e/MWh for September (with a limit of 997.07 lb CO_2e/MWh).

The CO_2e emissions are limited under Condition 3 – Table 1(a)(1)(ii)(I) of operating Title V **Permit: AQM-001/00127 (Renewal 4)(Revision 2)**. Condition 3 - Table 1(a)(1)(ii)(I)(1) states, "CO_2e emissions from the generating unit shall not exceed 1,085 pounds per gross megawatt hour (MWh) equivalent basis on a twelve (12) month rolling average." Condition 3 - Table 1(a)(1)(ii)(I)(2) provides a formula that adjusts the provided CO_2e emission limitation under Condition 3 - Table 1(a)(1)(ii)(I)(1), for thermal energy exports (i.e. steam exports) by applying the ratio of gross electric generation to equivalent gross energy production. Condition 3 - Table 1(a)(1)(ii)(I)(3) provides a formula for how the facility shall calculate the CO_2e emissions based on the total heat input for the period, an emission factor for natural gas combustion (119 lb CO_2e/MBtu), total electric generation for the period, the steam exported during the period and the conversion factor for steam Mlb to MWh steam.

Following the receipt of the emailed notification of exceedance, the facility requested a follow-up virtual meeting to discuss the report which was held via Zoom on October 27, 2023, and attended by Ernst Just, Gregory MacDonald, and Grace Buczny of the facility, and Amy Mann, Olayiwola Okesola, and the author representing the Department. In the meeting, the facility officials detailed the findings of the exceedance and the steps forward to return the unit to compliance. A possible cause for the exceedance was noted as

a change in method of operation for unit CT-1/C-2, to run the unit at a lower base load, that allowed the unit to be more available to respond to grid conditions. This change was determined to be inherently inefficient. The facility indicated it would operate the unit in its most efficient manner by increasing the minimum load offered, thus improving the heat rate which would allow the calculated CO_2e emissions to return to compliance over time.

The Title V Permit Condition 3- Table 1(a)(1)(x)(A), requires that the facility submit an excess emissions and monitoring systems performance report and/or summary report form to the Department quarterly, postmarked by the 30th day following the end of the quarter. The excess emissions summary for the 3rd Quarter 2023 was dated October 24, 2023, and received on October 27, 2023. Additionally, the facility submitted a detailed report on the CO_2e emissions exceedance for unit CT-1/C-2, dated November 13, 2023, received on November 15, 2023, and reviewed on November 21, 2023. The report expanded on the previously submitted excess emissions summary. In the detailed report, the facility provided an explanation of the exceedance that included several possible causes. In addition to the change in method of operation, the facility noted that changes in gas quality, including changes in the heating value, or as yet unidentified parameters, of the delivered pipeline natural gas as a possible cause and engine degradation, where engine performance can degrade over time based on normal aging of the machine or unanticipated malfunctions.

Immediate steps taken to mitigate emissions were to operate the combined cycle system in its most efficient manner by increasing the minimum load offered thus improving the heat rate. The more efficient mode of operation for unit CT-1/C-2 was calculated to a heat rate of approximately 8,900 BTU/kWh, better than the previous 9,117 BTU/kWh calculation. The facility attached calculations showing an anticipated return to compliance by the end of December 2023 based on the expected values. As a follow-up, a sample of the pipeline natural gas was performed to determine if gas quality matched the posted analysis from the provider. To date, the Department has not been informed of the results of this sampling. In addition, the engine was scheduled for inspection between November 13 through November 28, 2023, to identify any issues that may contribute to reduced efficiency. To date, the Department has not been informed of the results of this engine inspection. Lastly, the facility also stated that they will conduct training with operations staff on the importance of monitoring the real-time unit operating heat rate, in order to ensure the unit is operated in the most efficient mode possible.

In an email dated January 17, 2024, the Department requested the facility provide an update on the return to compliance with the rolling twelve-month CO_2e emissions for unit CT-1/C-2. In an emailed response on the same date, the facility stated, "*The energy market did not run the CT1/C2 unit as much as expected in December, thus the CO_2e value is still over the limit (~100.3% of limit). With an increase in runtime, we expect to return to compliance very soon.*" In another email dated February 20, 2024, the Department requested the facility provide an update on the return to compliance. In a response email dated February 21, 2024, the facility updated their rolling twelve-month emissions for January and the CO_2e emissions were 100.18% over the limit. The facility stated that in the worst-case scenario, they anticipated a return to compliance by the end of March 2024. An update from the facility in an email dated March 4, 2024, indicated that the rolling twelve-month CO_2e emissions ending February 2024 were at 100.08% of permit limit. On April 1, 2024, the facility provided an update through email that unit CT-1/C-2 had returned to compliance as of midnight at 99.89% of the permit limit. The rolling twelve-month emissions spreadsheet was provided through email on May 2, 2024, and showed that at the end of April 2024, the rolling twelve-month average CO_2e emissions were at 99.40% of permit limit. A partial compliance evaluation report was completed by the Department on May 27, 2024, following the review of all information received. The table below lists the provided calculated rolling twelve-month average CO_2e emissions and emissions limitations, adjusted for thermal energy exports, for the months of August 2023 through April 30, 2024:

Table 1: Rolling twelve-month CO_2e Emissions

Ending Months	Calculated CO_2e Limits adjusted for Thermal Energy Exports (lbs/MWh)	CO_2E Emissions (lbs/MWh)	Percent within limit (%)
August 2023	994.7	997.0	**100.23**
September 2023	997.07	1,005.5	**100.85**
October 2023	999.88	1,005.2	**100.53**
November 2023	1,002.72	1,005.7	**100.29**
December 2023	1,004.61	1,007.3	**100.26**
January 2024	1,003.87	1,005.6	**100.18**
February 2024	1,003.47	1,004.25	**100.08**
March 2024	1,004.80	1,003.65	99.89
April 2024	1,005.87	999.84	99.40

Energy Center Dover, LLC is found to be in violation of the following permit condition:

1. In Condition 3 – Table 1(a)(1)(ii)(I)(1) of **Permit: AQM-001/00127 (Renewal 4)(Revision 2)**, it states:

   "CO_2e emissions from the generating unit shall not exceed 1,085 pounds per gross megawatt hour (MWh) equivalent basis on a twelve (12) month rolling average."

   Energy Center Dover, LLC emailed the Department, on October 19, 2023, an electronic copy of the faxed report of emissions in excess of permitted limits, faxed on October 18, 2023, notifying the Department of the exceedance of the rolling twelve-month average CO_2e emissions for unit CT-1/C-2. The emission unit CT-1/C-2 exceeded the permitted limit (as a rolling twelve-month average) of CO_2e emissions in the months of August and September 2023. The total emissions on a rolling twelve-month average were 1,008 lb CO_2e/MWh for August (with a limit of 994.76) and 1,017 lb CO_2e/MWh for September (with a limit of 997.07). Subsequent updates showed the rolling twelve-month average CO_2e emissions continued to exceed the permitted limit through March 30, 2024.

ACTION ITEMS:
In a letter dated November 13, 2023, Energy Center Dover, LLC provided the steps taken to mitigate emissions and the corrective actions taken. One of the immediate steps taken to mitigate emissions was to operate the combined cycle system in its most efficient manner by increasing the minimum load offered thus improving the heat rate. The more efficient mode of operation for unit CT-1/C-2 was calculated to a heat rate of approximately 8,900 BTU/kWh, better than the previous 9,117 BTU/kWh calculation. Additional follow-up actions taken were, sampling of the pipeline natural gas to determine if gas quality matched the posted analysis from the provider; a planned inspection of the engine between November 13 through 28th, 2023, to identify issues that may have contributed to reduced efficiency; and conducting training with operations staff on the importance of monitoring the real-time unit operating heat rate to ensure the unit is operated in the most efficient mode possible.

Within 30 days of receipt of this NOV, Energy Center Dover LLC shall submit to the Department:

- The name and address of its Registered Agent.
- The results of natural gas quality analysis.

- The engine inspection report associated with the planned inspection conducted between November 13 through November 28, 2023. For any identified issues, the actions required to return the engine to compliant operation shall be included
- Records documenting the training of operations staff.

Please be advised that this Notice of Violation will be made available through the Department's Internet site, which can be found at https://www.dnrec.delaware.gov. Information concerning your Company's failure to comply will be posted following confirmation by the Department of your receipt of this Notice of Violation. Upon further review of the violations, the Department reserves the right to pursue further investigation, and, as it deems appropriate, enforcement action.

If you have any questions, please contact me at (302) 323-4542.

Sincerely,

Amy S. Mann, P.E.
Administrator
Engineering & Compliance Section

ASM:KMN
F:\EngAndCompliance\KMN\Energy Center Dover, LLC\kmn24059 Energy Center Dover NOV Letter.doc

pc: Dover Title V File
Kevin Njoroge
Dawn Minor

EXHIBIT H

Energy Center Dover LLC
1280 West North Street
Dover, DE 19904

Phone: (302) 678-4666

July 18, 2024

Amy Mann
DNREC/Division of Air Quality
100 W. Water St., Ste 6A
Dover, DE 19904

Subject: Acknowledgement of Receipt of Notice of Violation
Energy Center Dover, LLC Permit AQM-001/00127 (Renewal 4)(Revision 2),
Submission of Action Items

Dear Ms. Mann,

Energy Center Dover, LLC acknowledges receipt of the Notice of Violation dated June 21, 2024.

In response to the Action Items identified in the Notice, Energy Center Dover, LLC herein includes the following:

Item 1: Name and address of Registered Agent

Name: Ernie Just
Address: 1280 W. North St., Dover, DE 19904

Item 2: Natural Gas analysis

A sample of the pipeline natural gas supplied to the engine was obtained and sampled. Results showed no issues with the gas quality. The sample report is attached.

Item 3: Internal engine inspections

The engine was borescope inspected in November 2023. The inspection report noted minor deficiencies. The engine was borescope inspected again in May 2024 with corrections or comments of the minor deficiencies identified in the previous report. The inspection deficiencies identified in these reports have no effect on engine efficiency. Both reports are attached for review.

Item 4: Operations staff training

Training was conducted with the Control Room operators as to the changes in unit method of operation. This training is documented on the attached roster signature sheet.

Summary

It has been determined that the root cause of the exceedance was the change in unit dispatch model. This change allowed the CT to operate at lower load levels, resulting in inefficient engine operation (i.e. higher heat rate). The unit dispatch model was changed to prevent lowering the CT's output. This return to efficient operation resulted in return to compliance. Additional monitoring measures have also been established – monitoring of heat rate during unit operation and more frequent reviews of the CO2e emissions.

If you have any further questions regarding this incident, or if you require any additional information, please contact me at (302) 678-4353.

I certify, based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate and complete.

Ernie Just
Plant Manager
Energy Center Dover LLC

cc: Greg MacDonald – DCO Energy
Kevin Njoroge – DNREC
Erin Barry – DCO Energy
Grace Buczny – DCO Energy

CATALYST
AIR MANAGEMENT, INC.

November 9, 2023

Mr. Gregory MacDonald
Clearway Energy
1280 W North Street
Dover, DE 19904

Re: Natural Gas Sample Analysis – Catalyst Air Management, Inc. – Project 317-017

Dear Mr. MacDonald:

Attached are the analyses for the natural gas sample that was collected on November 1, 2023, and delivered to Atlantic Analytic Laboratory (AAL) by Roger Hughes of Catalyst on November 2, 2023. The samples were analyzed by AAL and reported on November 7, 2023.

If you have any questions, please contact Ms. Maggie Cangro at (813) 994-5880 or me at (865) 531-0075.

Sincerely,

Michael J. Taylor
President

2505 Byington-Solway Road
Knoxville, TN 37931
(865) 531-0075 • Fax (865) 531-0750

29541 Morningmist Drive
Wesley Chapel, FL 33543
(813) 994-5880

3505 East Main Street
Morgantown, PA 19543
(865) 531-0075

ATLANTIC
ANALYTICAL
LABORATORY

GAS ANALYSIS REPORT

Catalyst Air Management
2505 Byington-Solway Road
Knoxville, TN 37931
Maggie Cangro
maggie.cangro@catalystair.com

AAL Number: 69510
Sampled On: 01-Nov-23
Received On: 02-Nov-23
Report Date: 07-Nov-23
PO Number: CCARD

Sample ID: Pipeline Natural Gas - Energy Center Dover; Sample Time: 02:42pm
Sample ID: Sample Received in AAL Cylinder # 0575

Composition (Normalized, % v/v, by ASTM D1945)

Non-Hydrocarbon Gases	Result	D.L.
Nitrogen:	0.24	0.01
Oxygen:	nd	0.01
Argon:	nd	0.01
Carbon Dioxide:	0.09	0.05
Carbon Monoxide:	nd	0.05
Hydrogen:	nd	0.05

Hydrocarbon Gases	Result	D.L.
Methane:	97.3	0.001
Ethylene:	nd	0.001
Ethane:	2.24	0.001
Propylene:	nd	0.001
Propane:	0.093	0.001
Isobutane:	0.004	0.001
n-Butane:	0.006	0.001
Butenes:	nd	0.001
Isopentane:	nd	0.001
n-Pentane:	nd	0.001
Pentenes:	nd	0.001
Hexanes+:	nd	0.001

	ppm v/v	D.L.	ppm w/w	D.L.	lbs/MMSCF	D.L.
Water	85	1	93.06	1.0	4.048	0.048

	Result	D.L.
Dew Point (@ 0 psig)	-46 °F	-105 °F
	-44 °C	-76 °C

ISO/IEC 17025:2017 Accredited
PJLA Testing
Accreditation # 59415

Elemental Composition (Normalized, % w/w)

Element	Result
Carbon Content (% C, w/w)	74.8
Hydrogen Content (% H, w/w)	24.6
Oxygen Content (% O, w/w)	0.18
Nitrogen Content (% N, w/w)	0.41

Heat of Combustion & Physical Properties (by ASTM D3588)

I. @ ASTM Base Conditions; 14.696 psia, 60°F, Dry Gas Format

		Result
Net Heat of Combustion	(Lower Heating Value, BTU/ft^3):	923
Gross Heat of Combustion	(Higher Heating Value, BTU/ft^3):	1,025
Gross Heat of Combustion	(Water Saturated Gas Format,BTU/ft^3):	1,007
Net Heat of Combustion	(Lower Heating Value, BTU/lb):	21,320
Gross Heat of Combustion	(Higher Heating Value, BTU/lb):	23,664
Molecular Weight:		16.44
Density (lb/ft^3):		0.0433
Specific Gravity (vs. dry/normal air):		0.5678
Compressibility Factor (z):		0.9979

II. @ ASME Base Conditions; 14.73 psia, 60°F, Dry Gas Format

		Result
Net Heat of Combustion	(Lower Heating Value, BTU/ft^3):	926
Gross Heat of Combustion	(Higher Heating Value, BTU/ft^3):	1,028
Gross Heat of Combustion	(Water Saturated Gas Format, BTU/ft^3):	1,010
Net Heat of Combustion	(Lower Heating Value, BTU/lb):	21,370
Gross Heat of Combustion	(Higher Heating Value, BTU/lb):	23,719

Siloxanes by GC/MS (Amt. ppm v/v)

Target Analyte:	Result	D.L.
Hexamethyldisiloxane (MM)	nd	0.01
Hexamethylcyclotrisiloxane (D3)	nd	0.01
Octamethyltrisiloxane	nd	0.01
Octamethylcyclotetrasiloxane (D4)	nd	0.01
Decamethyltetrasiloxane	0.01	0.01
Decamethylcyclopentasiloxane (D5)	0.02	0.01
Dodecamethylpentasiloxane	0.01	0.01
Other Siloxanes	nd	0.1

Total Siloxanes = 0.04 ppm v/v

Notes: **D.L.** = Instrumental detection limit for the reported analyte. nd = indicates concentration is less than the accompanying report detection limit. -- = test not performed. % = parts per hundred. ppm = parts per million. ppb = parts per billion. w/w = weight analyte/weight sample. v/v = volume analyte/volume sample (equivalent to mole fraction for normalized, ideal gas mixtures).
Conversions: 0.0001% = 1 ppm = 1,000 ppb.

Ralph Ciotti
President / CEO

Atlantic Analytical Laboratory, LLC
Mailing: P.O. Box 220 · Whitehouse, NJ 08888
Shipping: 291 Route 22 East, Salem Industrial Park - Bldg 2 · Lebanon, NJ 08833
(908).534.5600 · www.AtlanticAnalytical.com

Borescope Inspection Report

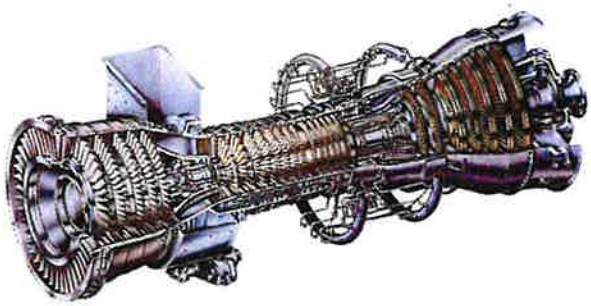
November 13, 2023

DCO Energy

Dover
KD1
ESN 191-234

Oracle Project Number (OPN) 7319407
PowerMax Number (PMx) I01-096667

Customer Representative: Ernest Just
GE Field Service Representative: Robert Piercy



Purpose of visit: The purpose of this visit was to perform a Periodic Borescope Inspection IRW GEK 105059 WP 4015 00.

Engine Serial Number 191-234 is **available** for continued operation and is considered **not serviceable.**

Report Completed By: Robert Piercy

Detail Findings Main Concerns:	LPC- Inner vane shroud Busing Protrusion- Unserviceable- Engineering's notes found below. KD1 is on a 500 HR watch for HPT cracks this inspection reflects that and watch remains in place. HPT- Stage one shroud cracks- Noted below- remain within limit per GEK HPT- Stage 2 Shroud cracks– Noted below– remain within limits per GEK
PAC Number (if available):	**AERO-20231116-0780**
Notifications (CSL/CPM/PM/ENGR/or FieldCore SM/RM):	Evans Midy- Remain monitoring conditions in future BSI's

Follow Up Action Items for Engineering:

Follow Up Action Items CSL/CPM/PM:

Anticipate LPC shroud work for next depot visit-
Continue monitoring power loss issue with customer and engineering.

Outage Data

Engine Data:

Engine and Package Hours and Starts were obtained from: Customer's Log Book

ESN	191-234	**Engine Fired Hours**	17,945.85
Model	LM6000 PC	**Engine Fired starts**	2,298
Engine Cycles		**Package Hours**	

Maintenance Data:

WP, SB, SL, PB, PL Performed	Revision/manual reference	Date WP completed	Comments
WP 4015 00	GEK 105059		Not Serviceable

DETAILS AND DATA

Work performed:

Inspected the following areas using the Mentor Visual IQ referencing GEK WP 4015 00.

NOTE: Please see photos below as well for further info as there was to much info to put all in the section

Low Pressure Compressor (LPC): Stage 3 vane bushing protrusion noted and measured to be .172" this condition **is UNSERVICEABLE per GEK. Table 1. 4. e.** 'Bushing protrusion into airstream. Any number, Provided vane is not wearing into bushing and protrusion is less than 0.060' Bushing protrusion measured out to be 0.172. this is 0.112 beyond the allowed able serviceability. Photo of this condition on PG.12 of this report.

Engineering disposition-This has been marked as unserviceable but in the sense that it can be done during the next depot visit. I would like to have the 2020 BSI and the latest one when available attached to this case for Chuks, Justin, and myself to review. Disposition probably will not change as we have spoken with CSL. The power loss issue described could be many things that the BSI reports may help us reveal. We can review and make recommendations from this case once received.

Stage 4 Vanes: No bumper protrusion noted, dirt streaking/buildup noted on vanes.

High Pressure Compressor Module (HPC): Teflon missing in stage 1 as noted in previous BSI- No preameters for field service available.

HPC Stage 1 Blade Midspans Carboloy Pads: within limits, NO discrepancies

HPC Blades and Vanes: No Discrepancies Found.

Combustor: Primary swirler TAB ware noted, no retainer ware noted yet- Monitor this condition. Rest of combustor found in nice/ serviceable condition.

Igniter Plugs: Both found in serviceable condition- No discrepancies

Fuel Nozzles: No Discrepancies Found. As requested by customer- 6 random nozzles were selected to be removed and inspected for ware and condition- Photos, Position & S/N below. Pages 41-43

CRF oil Tubes: CRF horn found dry, CRF oil tubes found to be in good condition with little to no coking notable , NO discrepancies

High Pressure Turbine Module (HPT): Please see comments below and photos of condition-

HPT Stage 1 Nozzle: As mentioned in the previous BSI's unit is on the 500hr watch

HPT Stage 1 Shrouds: Light rubs noted, within limits per GEK. Shrouds has multiple cracks threw-out and remains within limits per GEK- Diagram of general location provided below.

HPT Stage 2 Nozzle: Multiple cracks and erosion areas- A general diagram of location of these conditions below.

- Multiple Vane cracks and erosion.
- Multiple areas of erosion and crack on outer platform.

HPT Stage 2 Blades: No Discrepancies Found.

HPT Stage 2 Shrouds: No Discrepancies Found.

HPT Borescope Plugs: Serviceable- No discrepancies

Stage 11 Check Valves: All found to be intact and with no Discrepancies Found.

Stage 11 Spoolies: The seventh spoolie from the Cavity access is dislodged from the retaining slot, but still in place and does not seem to have moved since the last BSI.

Low Pressure Turbine Module (LPT): No Discrepancies Found.

P48 & T48 probes- P48 removed and inspected in serviceable condition, All T48 found serviceable

Stage 1: No Discrepancies Found.

Stage 2: No Discrepancies Found.

Stage 3: No Discrepancies Found.

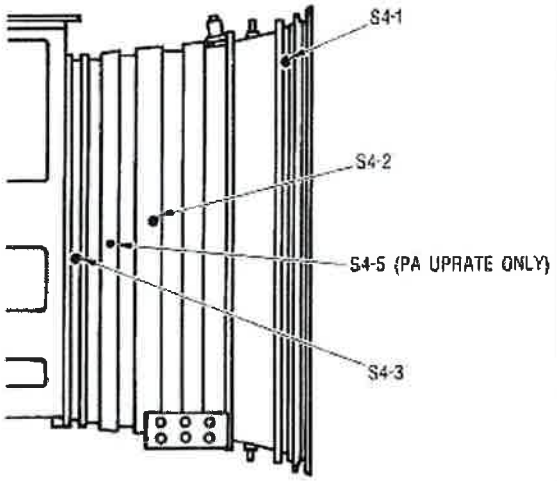
Stage 4: No Discrepancies Found.

Stage 5: No Discrepancies found-

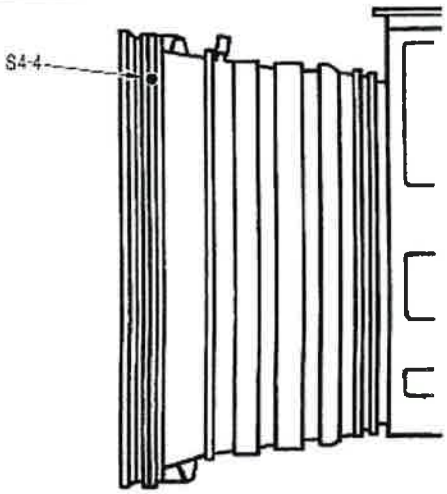
CONCLUSIONS

- **Continue watching LPC shround bushing protrusion.**
- **Continue 500HR watch of HPT shroud cracks.**
-

Low Pressure Compressor



Right Hand Side



Left Hand Side

Inspection Area
Inspect stages 0 through 4 blades and vanes for cracks, nicks, burrs, tears, curl, missing material, dents, scratches, pits.
Inspect for airfoil erosion, corrosion or deposits.
Inspect visible portion of stage 0-3 vane inner bushing for cracking, protrusion into air stream, or missing pieces.
Inspect Stage 4 vane inner bushing for cracking, protrusion into air stream, or missing pieces.
Inspect Stage 4 stator vane bumper

Inspection Details

Menu Directed	LM6000PC
Engine Serial Number	191234
Date	11/13/2023
Time	09:54:05
Study Instance ID	f5429538-a2eb-475e-a7b0-ad9ea772ff9f-1912a4152

Inspection Summary

- No Images/Approved Nodes
- No Flagged Images
- Flagged Images

	Inspection Points	Approved Inspection Points	Images	Images with Analytic	Flagged Images	Recorded Videos
Engine Data Plate	1	0	1	0	0	0
LPC	9	0	9	0	0	0
IGB-If S/B 220 not C/W	1	0	0	0	0	0
HPC1-7	17	0	23	0	0	0
HPC8-14	16	0	17	0	0	0
Comb	6	0	15	0	0	0
Fuel Nozzle	1	0	6	0	0	0
HPT	15	0	67	0	0	0
HPT Diff-If S/B 216 not C/W	1	0	0	0	0	0
Stg 11 Check Valves	1	0	34	0	0	0
S7-1 and S7-2 Borescope Plugs	1	0	1	0	0	0
LPT	11	0	22	0	0	0

Report Completed By:

Engine_Data_Plate_001.JPG

Section	Engine Data Plate
Comments	191-234

LPC_Stage0_LE_001.JPG

Section	LPC
Stage	Stage0_LE
Comments	

LPC_Stage0_LE_002.JPG

Section	LPC
Stage	Stage0_LE
Comments	

LPC_Stage1_TE_001.JPG

Section	LPC
Stage	Stage1_TE
Comments	

Section	LPC
Stage	Stage2_LE
Comments	

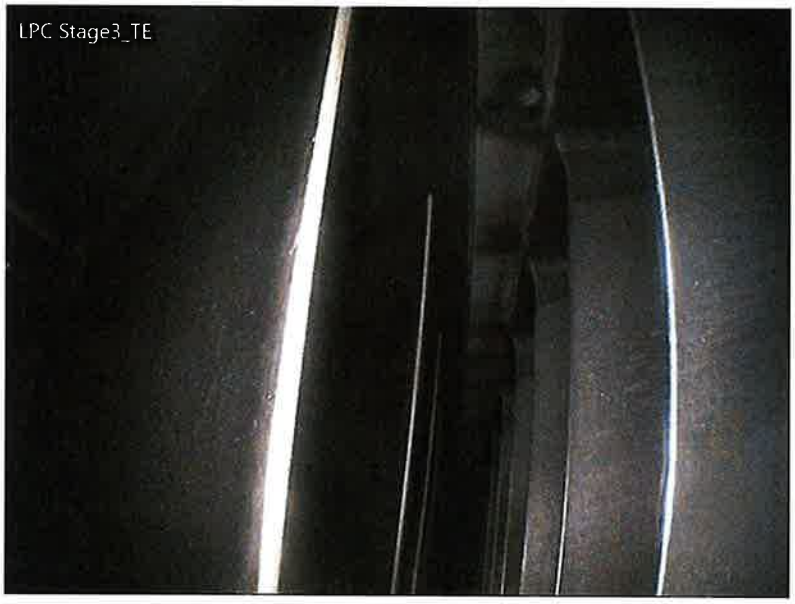
LPC_Stage2_LE_001.JPG

Section	LPC
Stage	Stage2_TE
Comments	

LPC_Stage2_TE_001.JPG

LPC_Stage3_LE_001.JPG

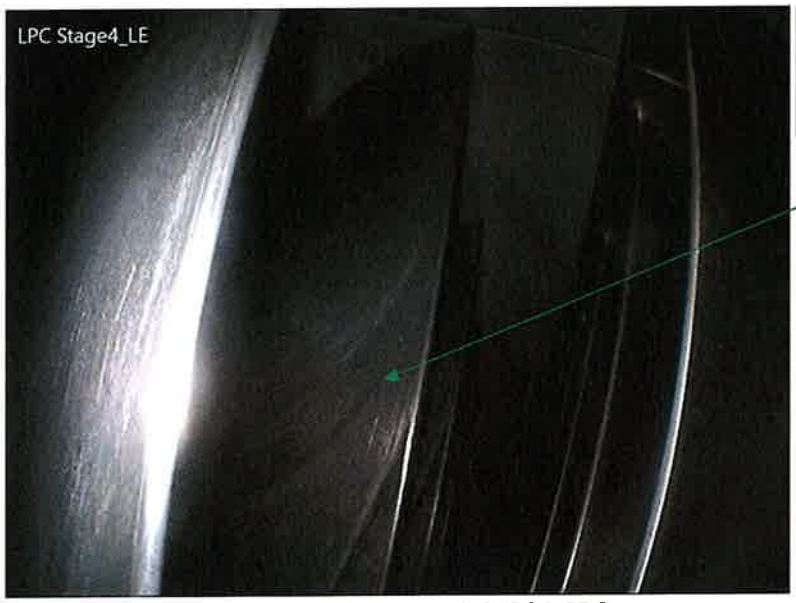
Section	LPC
Stage	Stage3_LE
Comments	



Section	LPC
Stage	Stage3_TE
Comments	

Section	LPC
Stage	Stage 3 shround bushing protrusion-
Comments	UNSERVICEABLE **per GEK. Table 1. 4. e.**

LPC_Stage3_TE_001.JPG

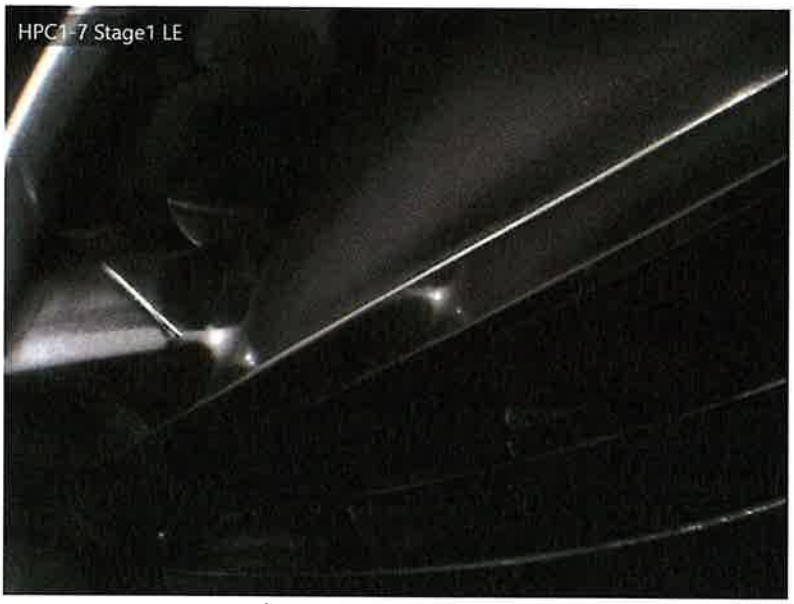


Section	LPC
Stage	Stage4_LE
Comments	Dirt buildup and Streaking

LPC_Stage4_LE_001.JPG

Section	LPC
Stage	Stage 4 Stator Vane Bumpers
Comments	No Bumper Protrusion noted

Stage_4_Stator_Vane_Bumpers_001.JPG

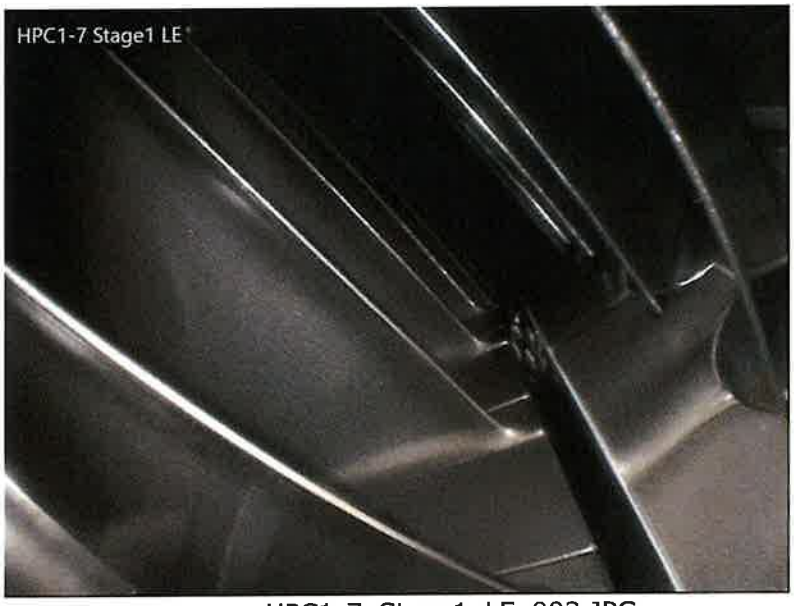


Section	HPC1-7
Stage	Stage1
Component	LE
Comments	

HPC1-7_Stage1_LE_001.JPG

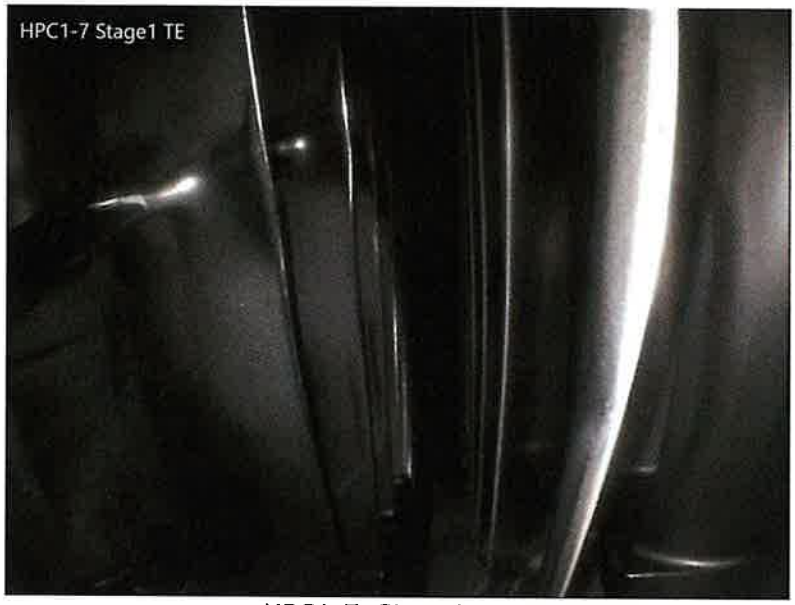
Section	HPC1-7
Stage	Stage1
Component	LE
Comments	Retainers all found properly seated and in serviceable condition

HPC1-7_Stage1_LE_002.JPG



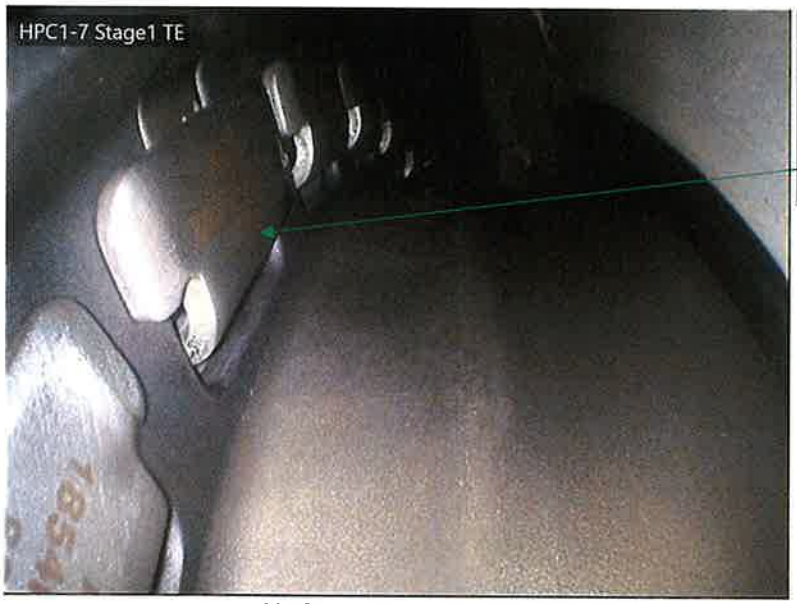
Section	HPC1-7
Stage	Stage1
Component	LE
Comments	

HPC1-7_Stage1_LE_003.JPG



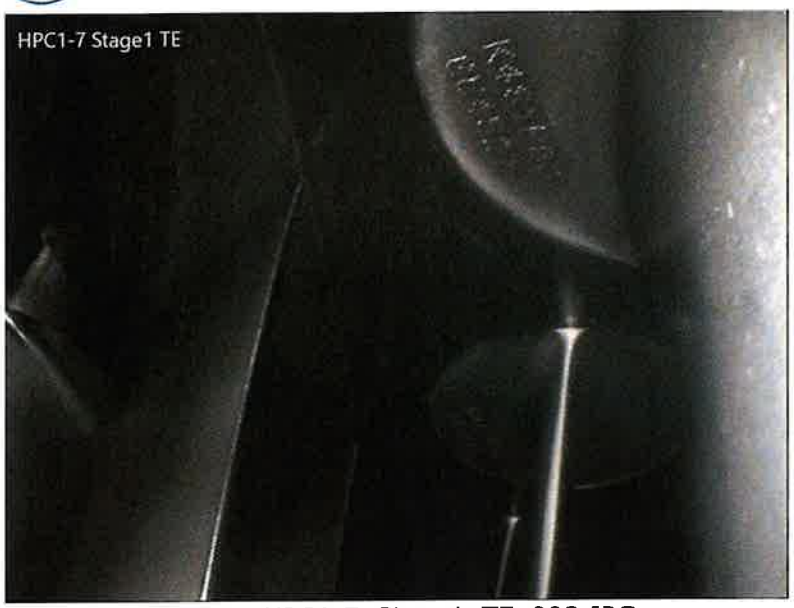
Section	HPC1-7
Stage	Stage1
Component	TE
Comments	

HPC1-7_Stage1_TE_001.JPG



Section	HPC1-7
Stage	Stage1
Component	TE
Comments	Retainers all found seated and serviceable.

HPC1-7_Stage1_TE_002.JPG



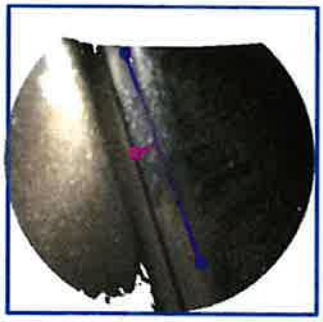
HPC1-7_Stage1_TE_003.JPG

LM6000 PC

Section	HPC1-7
Stage	Stage1
Component	TE
Comments	

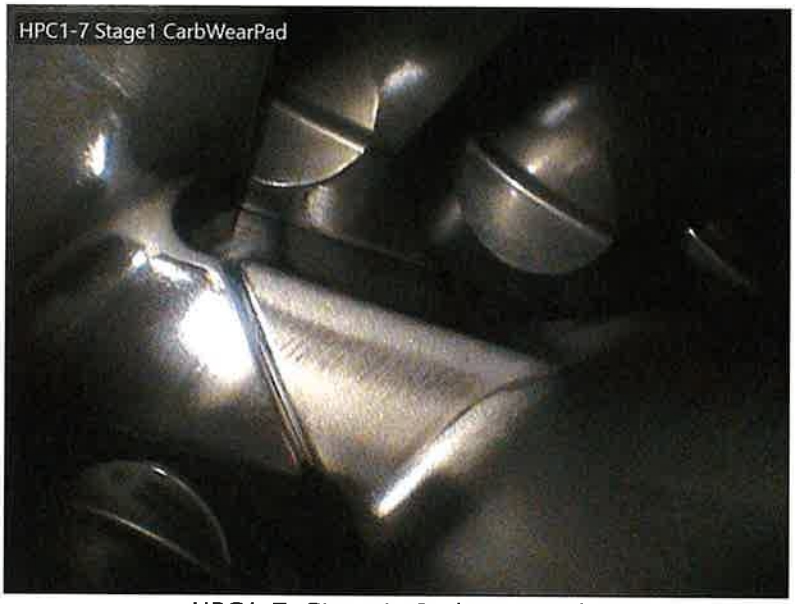
HPC1-7_Stage1_CarbWearPad_001.JPG

Section	HPC1-7
Stage	Stage1
Component	CarbWearPad/Mid Span Damper
Point To Line	0.020 in
Comments	No discrepancies



Section	HPC1-7
Stage	Stage1
Component	CarbWearPad/Mid Span Damper
Point To Line	0.022 in
Comments	No discrepancies

HPC1-7_Stage1_CarbWearPad_002.JPG



Section	HPC1-7
Stage	Stage1
Component	CarbWearPad/Mid Span Damper
Comments	

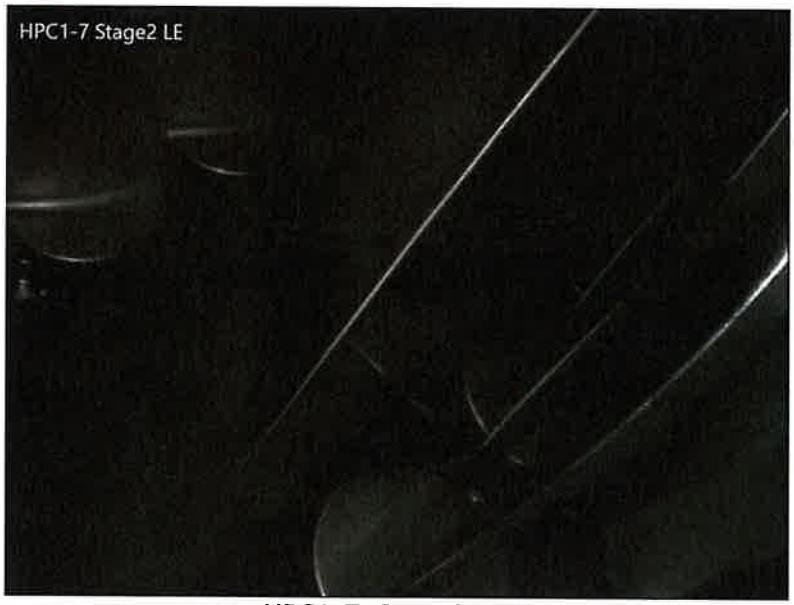
HPC1-7_Stage1_CarbWearPad_003.JPG

Weep_Hole_001.JPG

Section	HPC1-7
Stage	Stage1
Component	Weep Hole
Comments	Found clean/ No pooling of oil

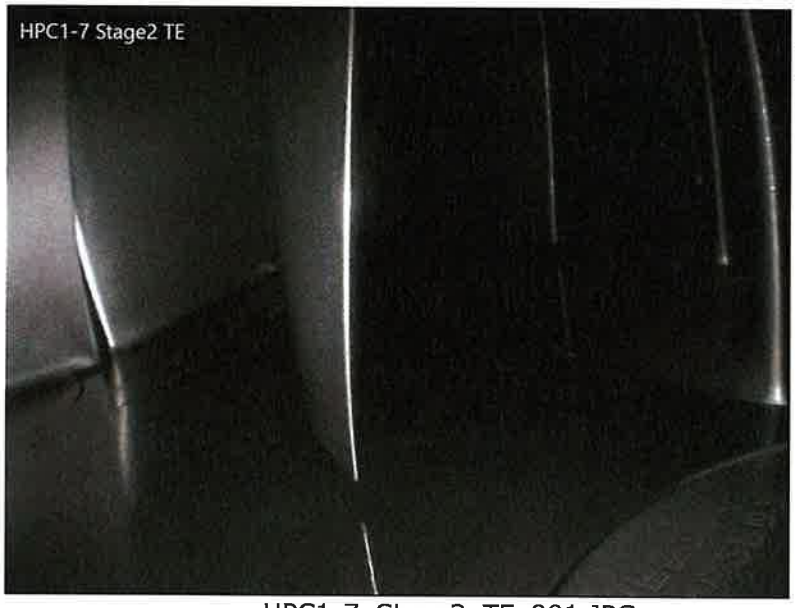
Weep_Hole_002.JPG

Section	HPC1-7
Stage	Stage1
Component	Weep Hole
Comments	Found clean/ No pooling of oil



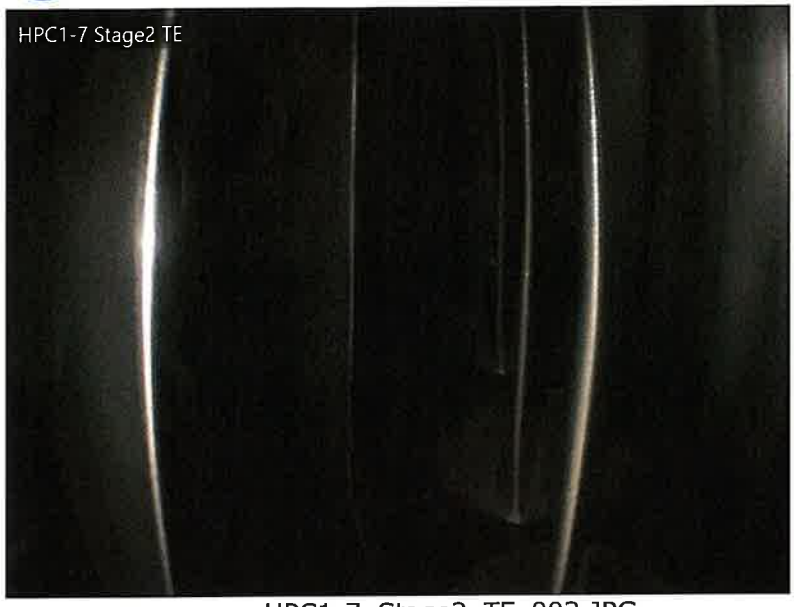
HPC1-7_Stage2_LE_001.JPG

Section	HPC1-7
Stage	Stage2
Component	LE
Comments	



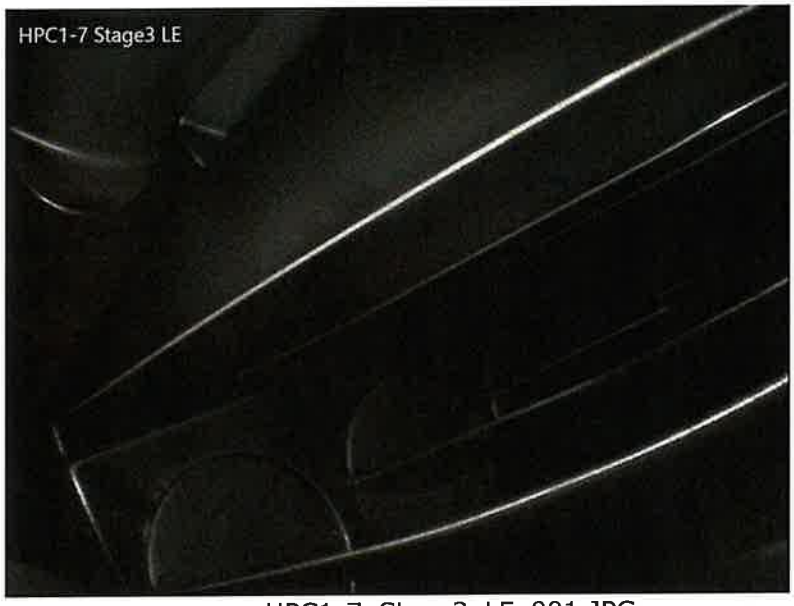
HPC1-7_Stage2_TE_001.JPG

Section	HPC1-7
Stage	Stage2
Component	TE
Comments	



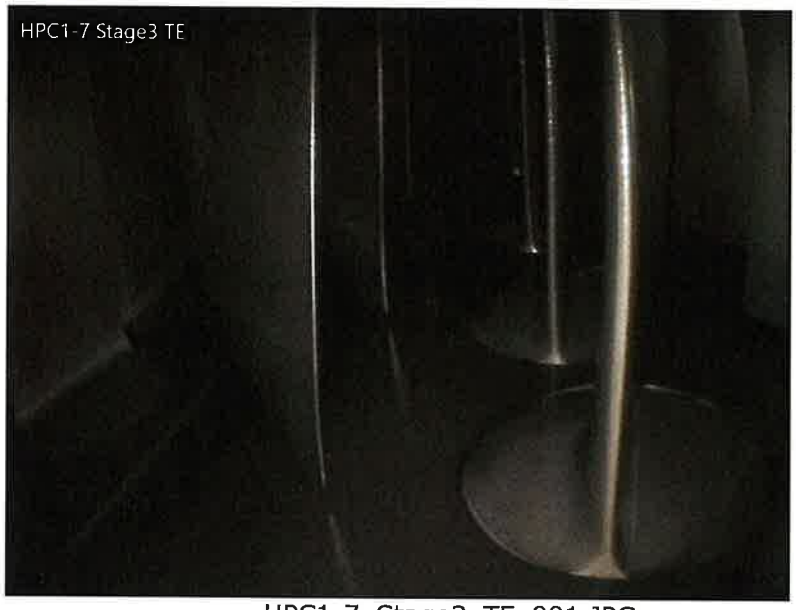
Section	HPC1-7
Stage	Stage2
Component	TE
Comments	

HPC1-7_Stage2_TE_002.JPG



Section	HPC1-7
Stage	Stage3
Component	LE
Comments	

HPC1-7_Stage3_LE_001.JPG



HPC1-7_Stage3_TE_001.JPG

Section	HPC1-7
Stage	Stage3
Component	TE
Comments	

HPC1-7_Stage4_LE_001.JPG

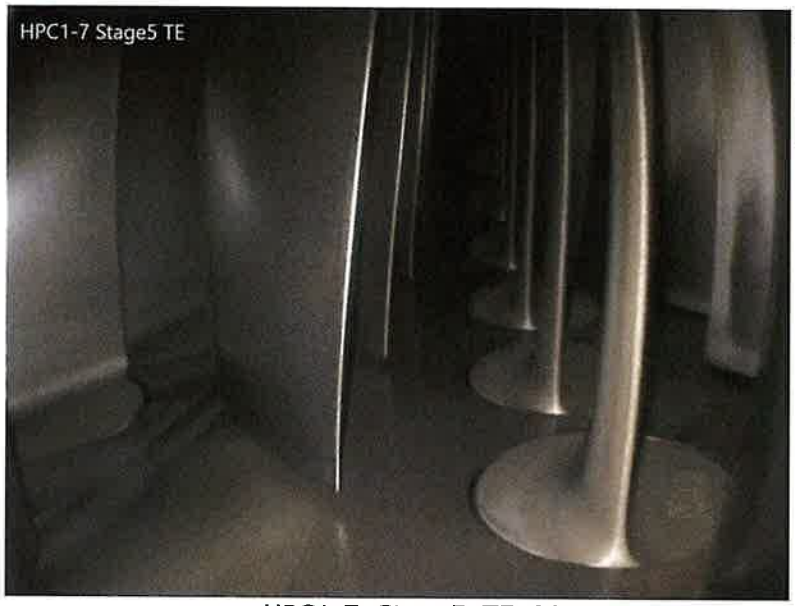
Section	HPC1-7
Stage	Stage4
Component	LE
Comments	

HPC1-7_Stage4_TE_001.JPG

Section	HPC1-7
Stage	Stage4
Component	TE
Comments	

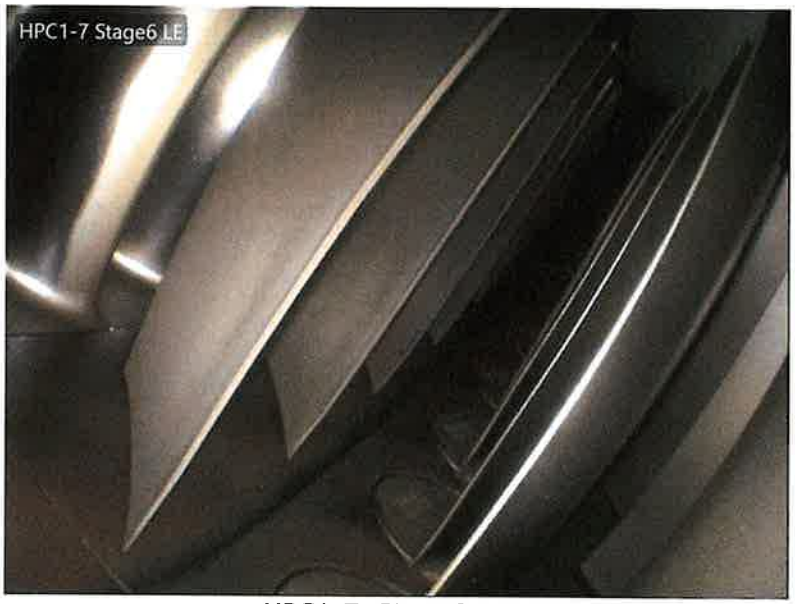
HPC1-7_Stage5_LE_001.JPG

Section	HPC1-7
Stage	Stage5
Component	LE
Comments	



HPC1-7_Stage5_TE_001.JPG

Section	HPC1-7
Stage	Stage5
Component	TE
Comments	



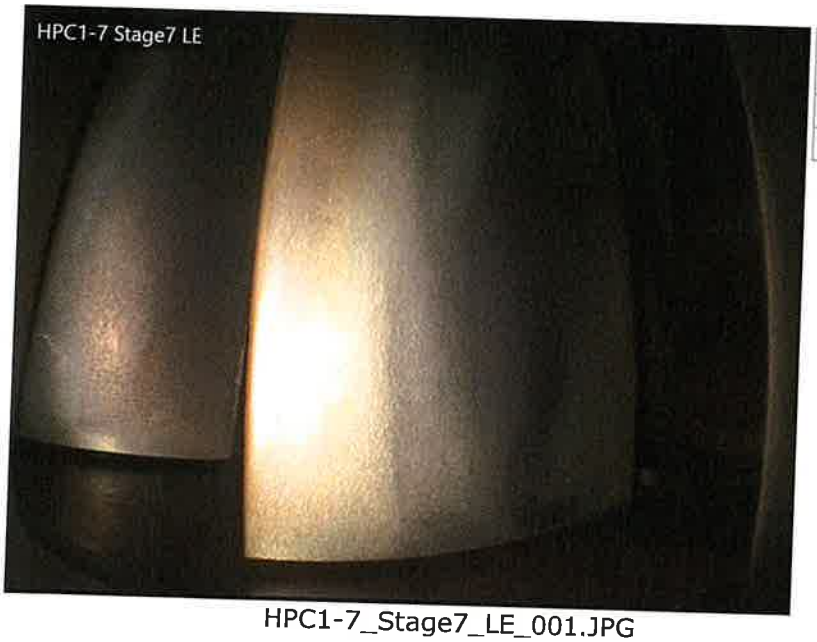
HPC1-7_Stage6_LE_001.JPG

Section	HPC1-7
Stage	Stage6
Component	LE
Comments	

HPC1-7_Stage6_TE_001.JPG

LM6000 PC

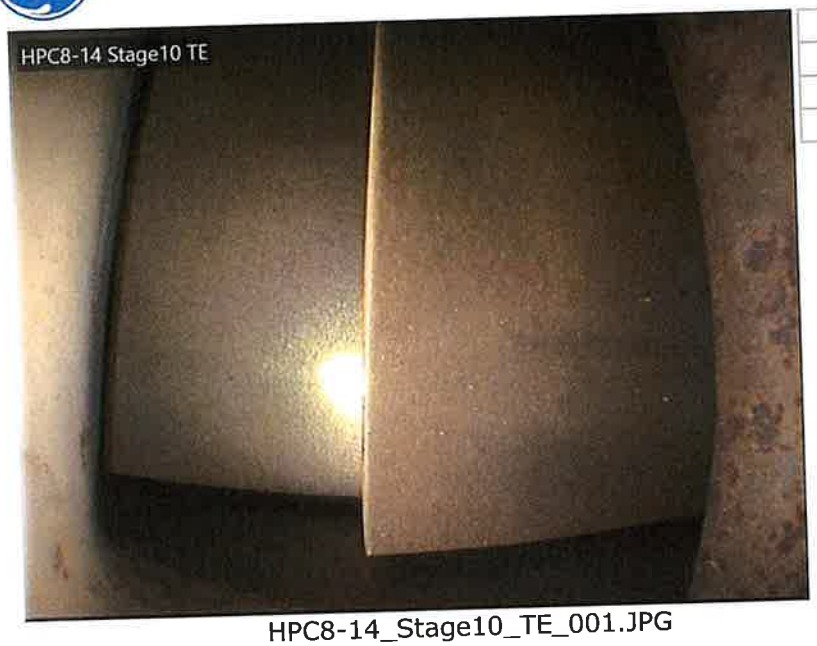
Section	HPC1-7
Stage	Stage6
Component	TE
Comments	



HPC1-7_Stage7_LE_001.JPG

Section	HPC1-7
Stage	Stage7
Component	LE
Comments	

Report Completed By: Robert Piercy



Section	HPC8-14
Stage	Stage10
Component	TE
Comments	

HPC8-14_Stage10_TE_001.JPG

Section	HPC8-14
Stage	Stage11
Component	LE
Comments	

HPC8-14_Stage11_LE_001.JPG

Section	HPC8-14
Stage	Stage12
Component	TE
Comments	

HPC8-14_Stage12_TE_001.JPG

Section	HPC8-14
Stage	Stage12
Component	TE
Comments	

HPC8-14_Stage12_TE_002.JPG

Section	HPC8-14
Stage	Stage13
Component	LE
Comments	

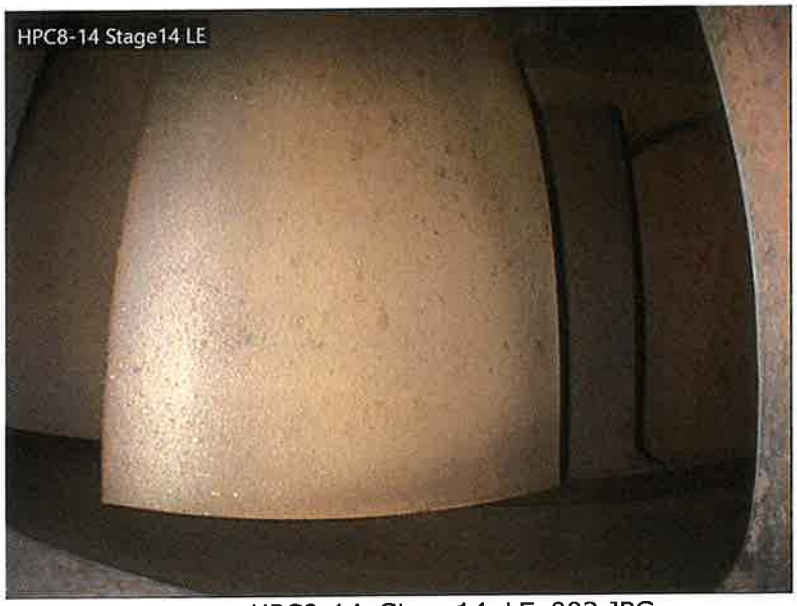
HPC8-14_Stage13_LE_001.JPG

Section	HPC8-14
Stage	Stage13
Component	TE
Comments	

HPC8-14_Stage13_TE_001.JPG

Section	HPC8-14
Stage	Stage14
Component	LE
Comments	Light saw toothing noted

HPC8-14_Stage14_LE_001.JPG

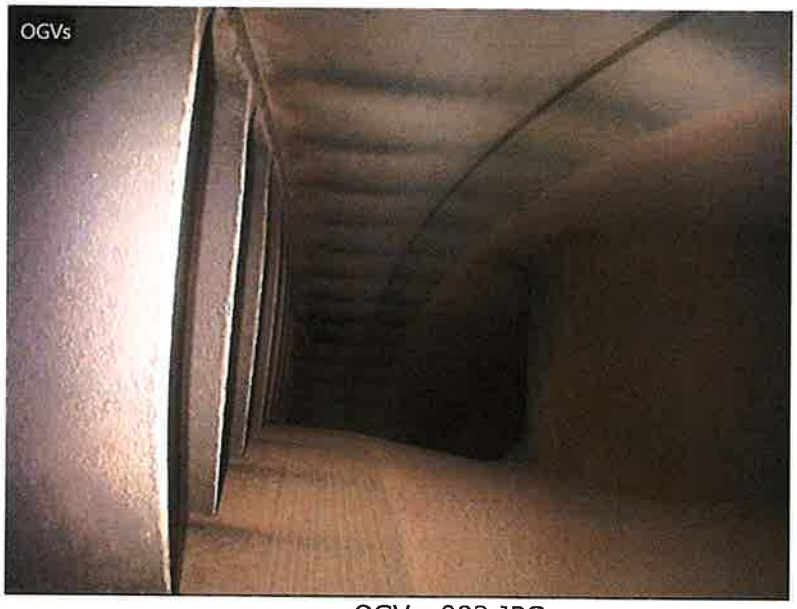


Section	HPC8-14
Stage	Stage14
Component	LE
Comments	

HPC8-14_Stage14_LE_002.JPG

Section	HPC8-14
Stage	Stage14
Component	OGVs
Comments	

OGVs_001.JPG



Section	HPC8-14
Stage	Stage14
Component	OGVs
Comments	

OGVs_002.JPG

CRF_Oil-Air_Tubes_001.JPG

Section	HPC8-14
Stage	CRF Oil-Air Tubes
Comments	

CRF_Oil-Air_Tubes_002.JPG

Section	HPC8-14
Stage	CRF Oil-Air Tubes
Comments	

Section	HPC8-14
Stage	CRF Oil-Air Tubes
Comments	

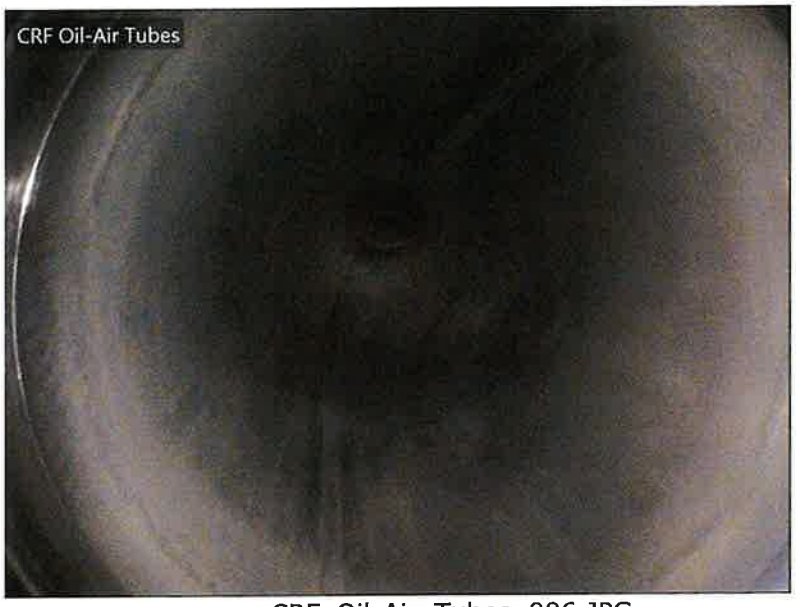
CRF_Oil-Air_Tubes_003.JPG

Section	HPC8-14
Stage	CRF Oil-Air Tubes
Comments	

CRF_Oil-Air_Tubes_004.JPG

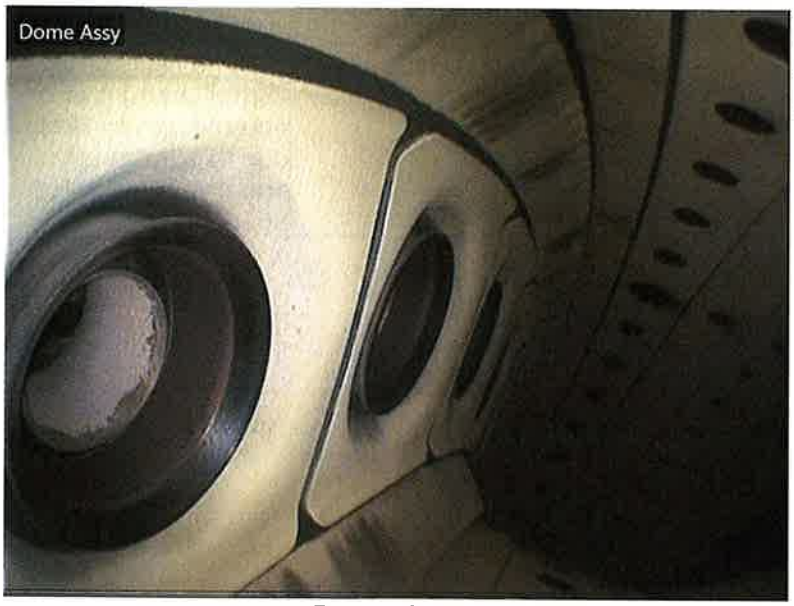
CRF_Oil-Air_Tubes_005.JPG

Section	HPC8-14
Stage	CRF Oil-Air Tubes
Comments	Small amount of oil noted in cavity likely due to waterwash and cranks prior too BSI



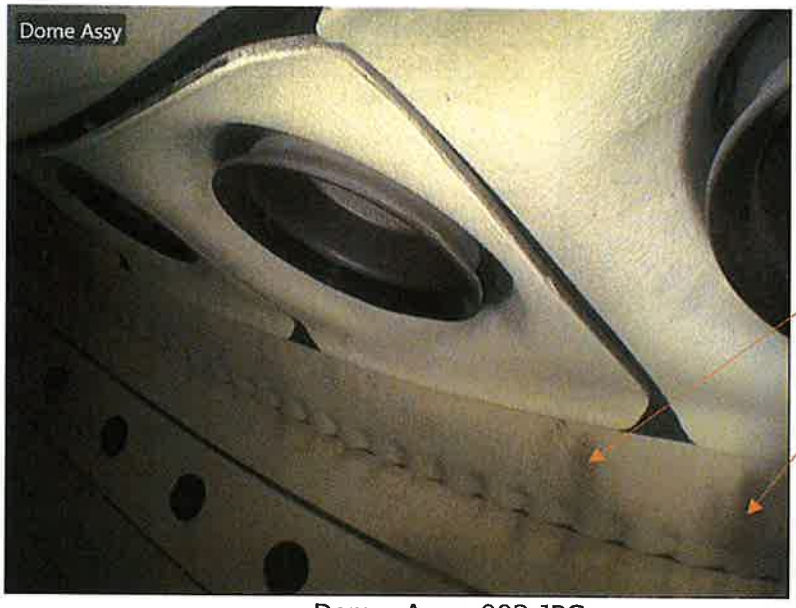
CRF_Oil-Air_Tubes_006.JPG

Section	HPC8-14
Stage	CRF Oil-Air Tubes
Comments	CRF horn found free of oil and clean



Section	Comb
Stage	Dome Assy
Comments	No discrepancies

Dome_Assy_001.JPG

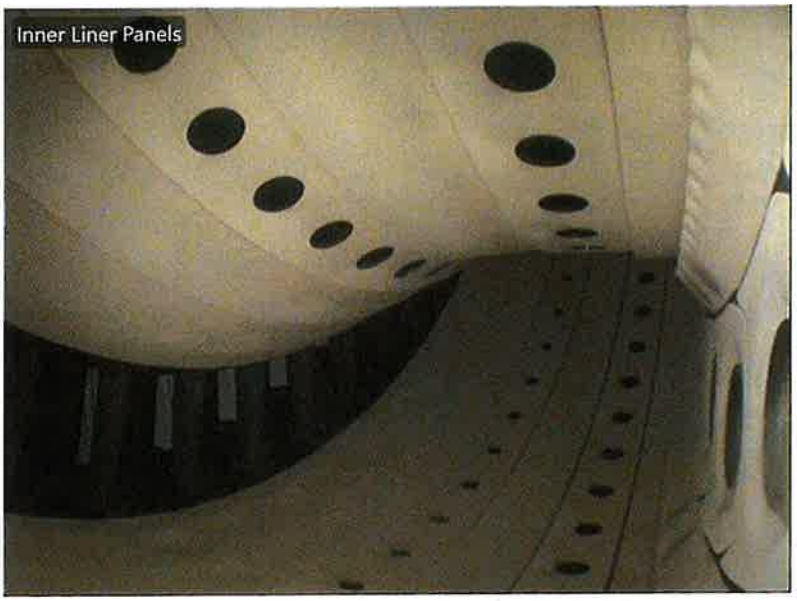


Section	Comb
Stage	Dome Assy
Comments	Very light dirt buildup/ discoloration noted

Dome_Assy_002.JPG

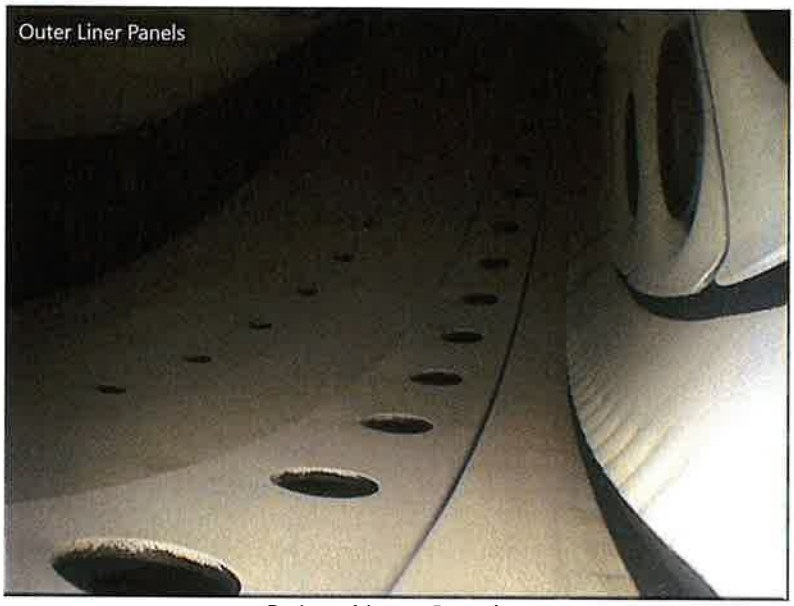
Inner_Liner_Panels_001.JPG

Section	Comb
Stage	Inner Liner Panels
Comments	No discrepancies



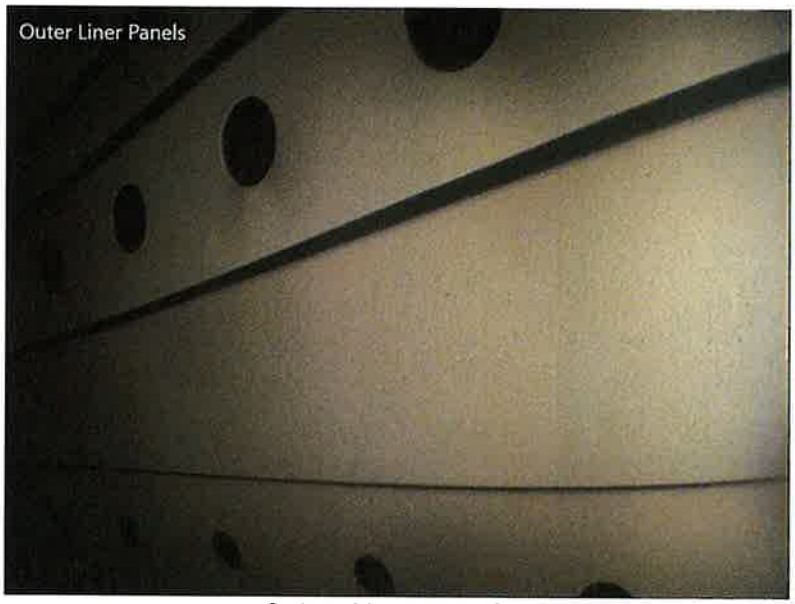
Inner_Liner_Panels_002.JPG

Section	Comb
Stage	Inner Liner Panels
Comments	



Section	Comb
Stage	Outer Liner Panels
Comments	No Discrepancies

Outer_Liner_Panels_001.JPG



Section	Comb
Stage	Outer Liner Panels
Comments	

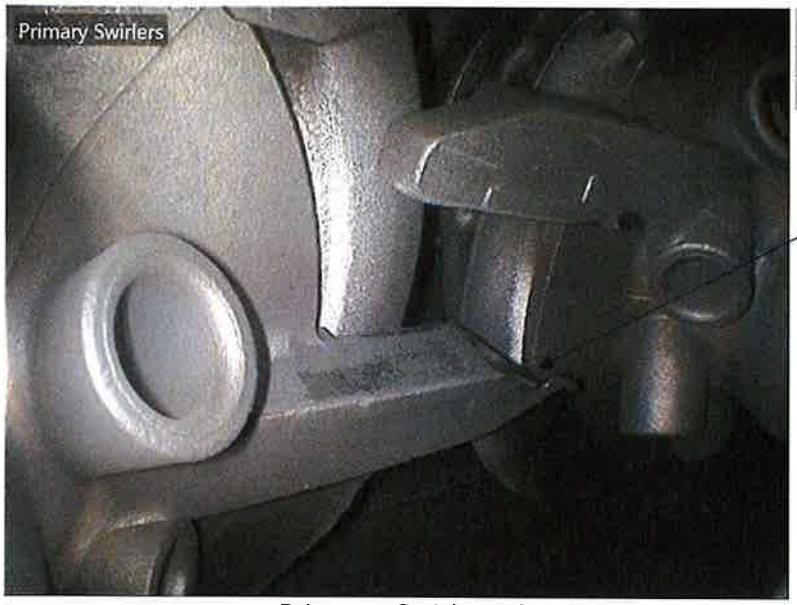
Outer_Liner_Panels_002.JPG

Section	Comb
Stage	Cowl
Comments	No Discrepancies

Cowl_001.JPG

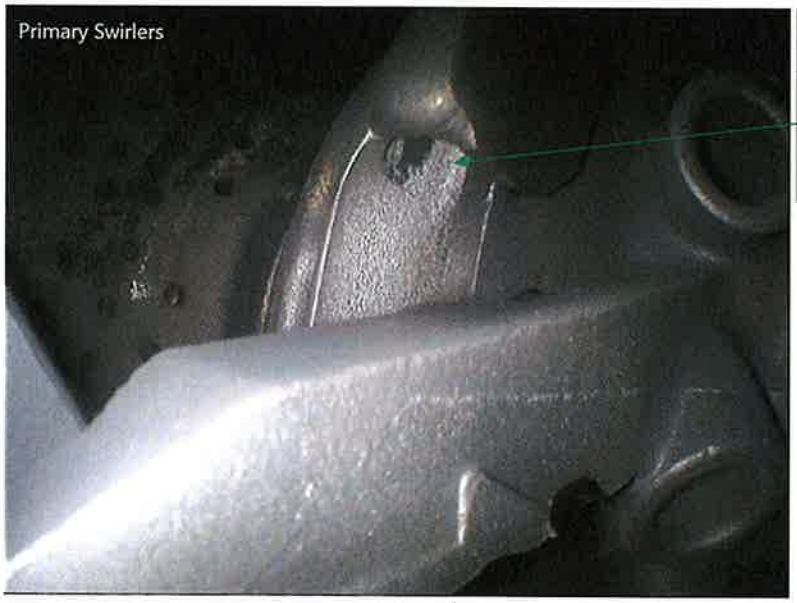
Section	Comb
Stage	Cowl
Comments	

Cowl_002.JPG



Section	Comb
Stage	Primary Swirlers
Comments	Tab ware

Primary_Swirlers_001.JPG



Section	Comb
Stage	Primary Swirlers
Comments	Retainer- No ware noted- moniter condition in future inspections

Primary_Swirlers_002.JPG

Primary_Swirlers_003.JPG

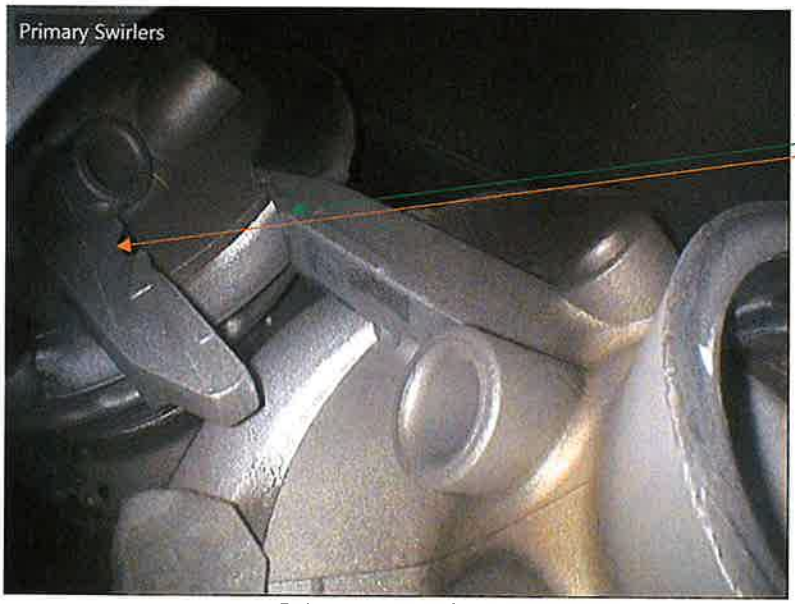
Section	Comb
Stage	Primary Swirlers
Comments	

Primary_Swirlers_004.JPG

Section	Comb
Stage	Primary Swirlers
Comments	

Section	Comb
Stage	Primary Swirlers
Comments	

Primary_Swirlers_005.JPG



Section	Comb
Stage	Primary Swirlers
Comments	Tab ware noted

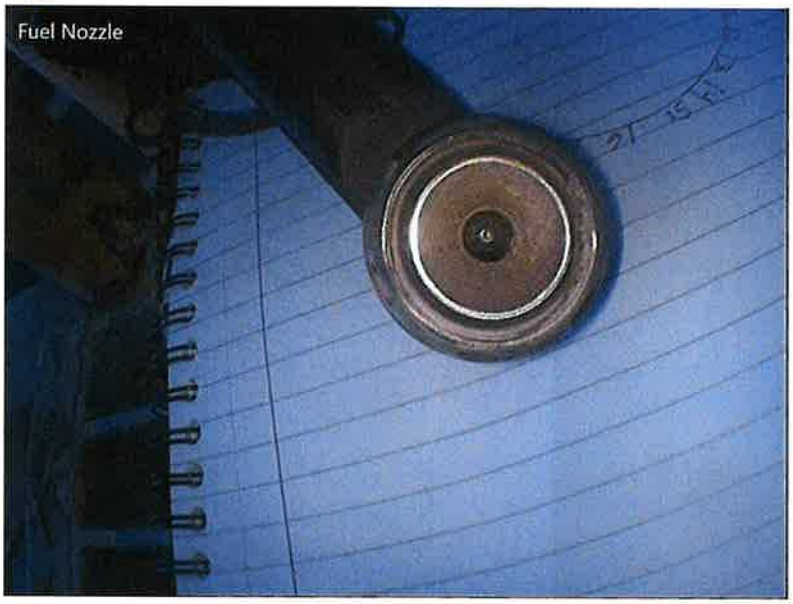
Primary_Swirlers_006.JPG

Venturi_(Secondary_Swirlers)_001.JPG

Section	Comb
Stage	Venturi (Secondary Swirlers)
Comments	

Fuel_Nozzle_001.JPG

Section	Fuel Nozzle
Comments	Nozzle 5
	#5- S/N P4CO11K2- No discrepancies



Fuel_Nozzle_002.JPG

Section	Fuel Nozzle
Comments	Nozzle 7
	#7- S/N PHCJR163- No discrepancies

Fuel_Nozzle_003.JPG

Section	Fuel Nozzle
Comments	Nozzle 11
	#11- S/N PHCJR168- No discrepacnices

Fuel_Nozzle_004.JPG

Section	Fuel Nozzle
Comments	Nozzle 29
	#29- S/N-PHC316K8- No discrepancies

Fuel_Nozzle_005.JPG

Section	Fuel Nozzle
Comments	Nozzle 22
	#22- S/N PHCJR200- No discrepancies

Fuel_Nozzle_006.JPG

Section	Fuel Nozzle
Comments	Nozzle 19
	#19-S/N OHPV4163- No discrepancies

HPT_Stage_1_Nozzle_LE_001.JPG

Section	HPT
Stage	Stage 1 Nozzle
Component	LE
Comments	

HPT_Stage_1_Nozzle_LE_002.JPG

Section	HPT
Stage	Stage 1 Nozzle
Component	LE
Comments	

HPT_Stage_1_Nozzle_LE_003.JPG

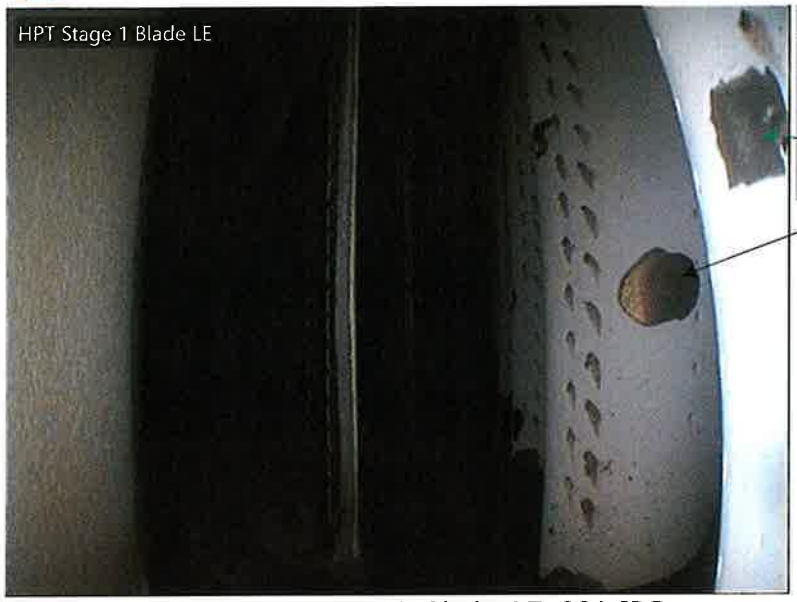
Section	HPT
Stage	Stage 1 Nozzle
Component	LE
Comments	

HPT_Stage_1_Nozzle_TE_001.JPG

Section	HPT
Stage	Stage 1 Nozzle
Component	TE
Comments	

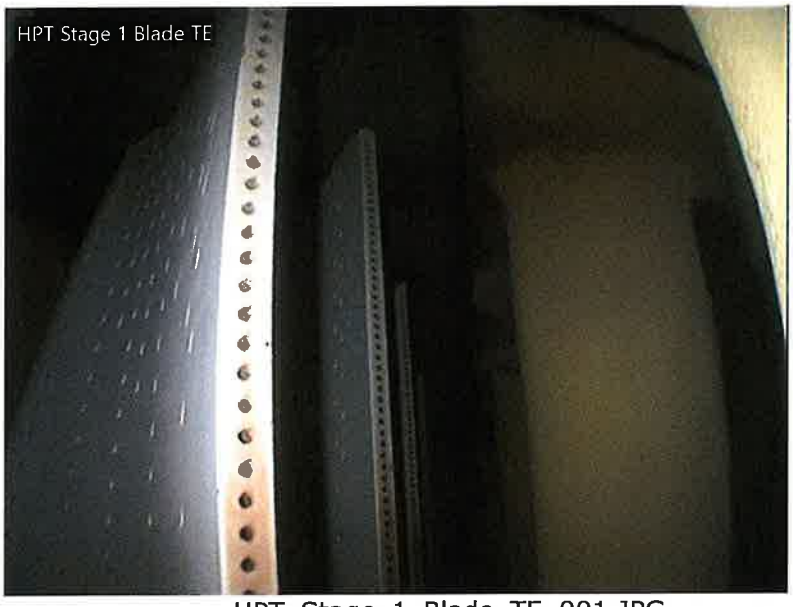
HPT_Stage_1_Nozzle_TE_002.JPG

Section	HPT
Stage	Stage 1 Nozzle
Component	TE
Comments	



Section	HPT
Stage	Stage 1 Blade
Component	LE
Comments	TBC coating loss noted- within limits per GEK

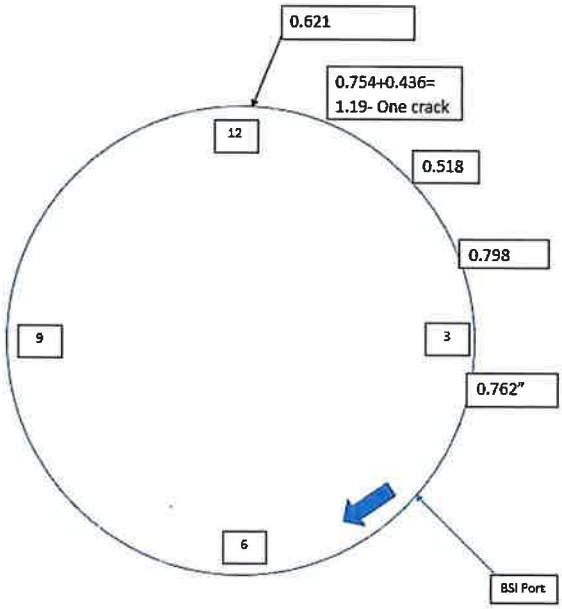
HPT_Stage_1_Blade_LE_001.JPG



Section	HPT
Stage	Stage 1 Blade
Component	TE
Comments	

HPT_Stage_1_Blade_TE_001.JPG

AFT Looking FWD



Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Map	Aft looking Forward
Comments	The above diagram maps out a rough location of the cracks noted below.

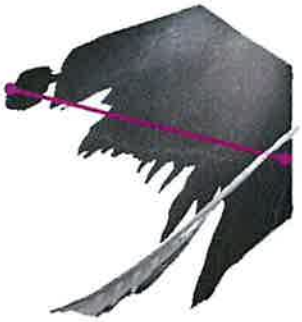
HPT_Stage_1_Blade_Shroud_001.JPG

XP9
BLK

Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.762 in
Comments	

Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	

HPT_Stage_1_Blade_Shroud_002.JPG



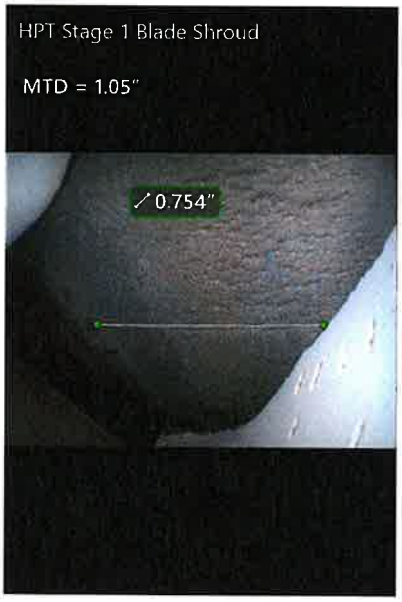
Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.798 in
Comments	

HPT_Stage_1_Blade_Shroud_003.JPG

HPT_Stage_1_Blade_Shroud_004.JPG

LM6000 PC

Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.518 in
Comments	



HPT_Stage_1_Blade_Shroud_005.JPG

Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.754 in
Comments	Crack

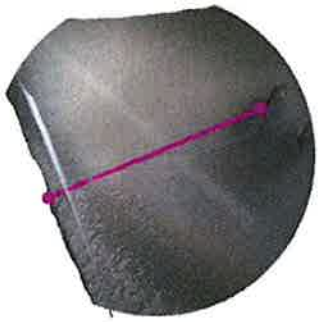
Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	Crack

HPT_Stage_1_Blade_Shroud_006.JPG

Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.436 in
Comments	Crack

HPT_Stage_1_Blade_Shroud_007.JPG

LM6000 PC

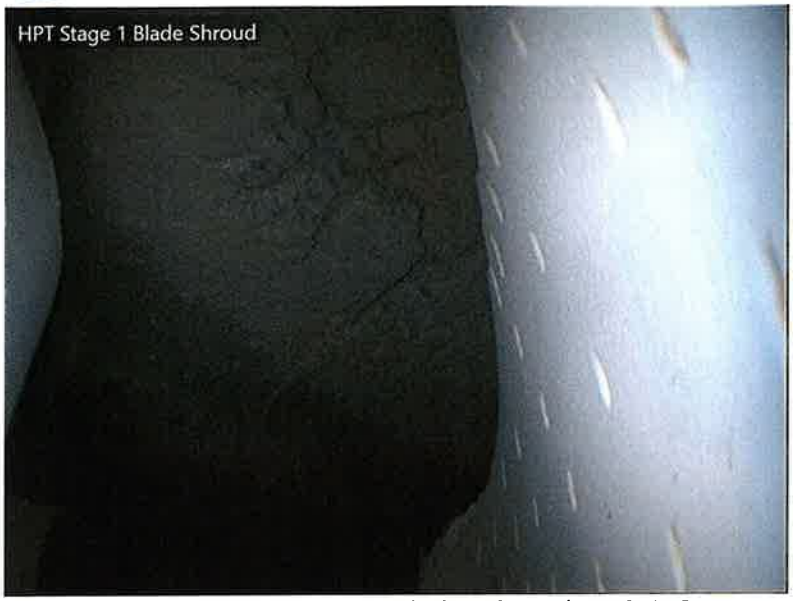


Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.436 in
Comments	Crack

HPT_Stage_1_Blade_Shroud_008.JPG

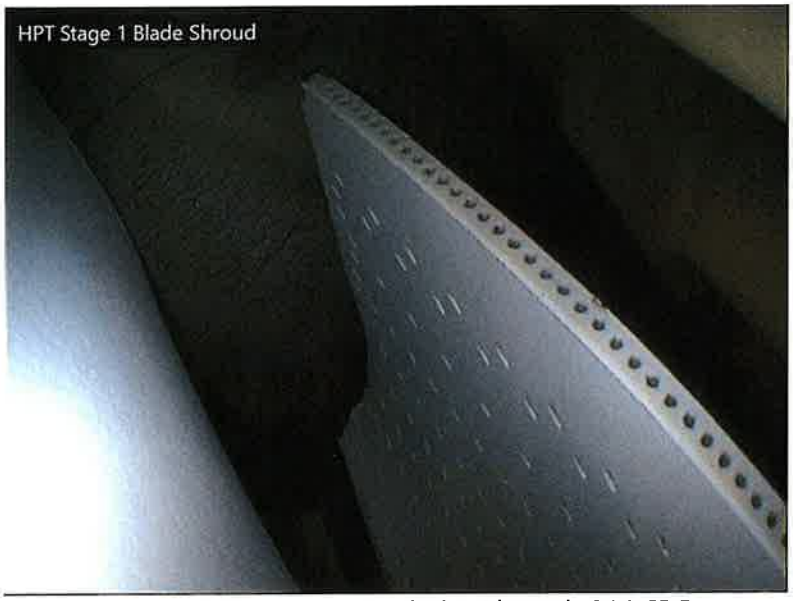
Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.621 in
Comments	Crack

HPT_Stage_1_Blade_Shroud_009.JPG



Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	Crack

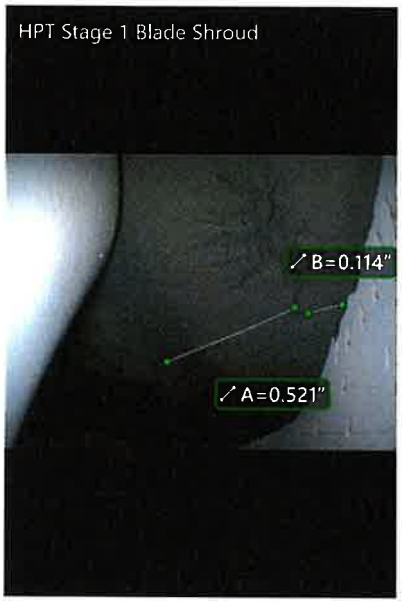
HPT_Stage_1_Blade_Shroud_010.JPG

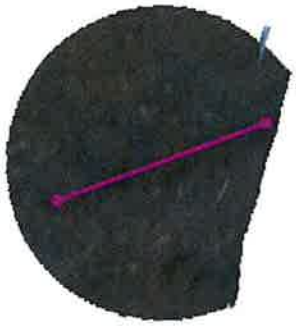


Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	

HPT_Stage_1_Blade_Shroud_011.JPG

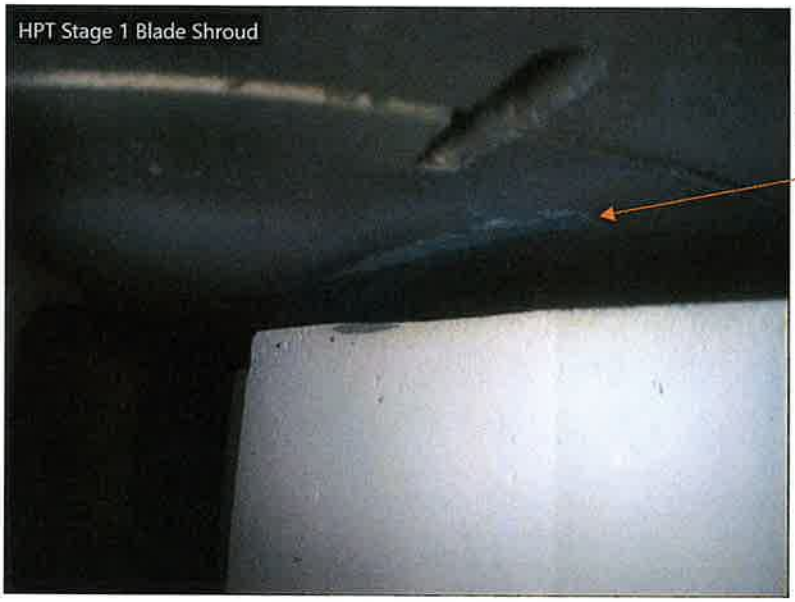
LM6000 PC





Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Length	0.521 in
Length	0.114 in
Comments	Crack's

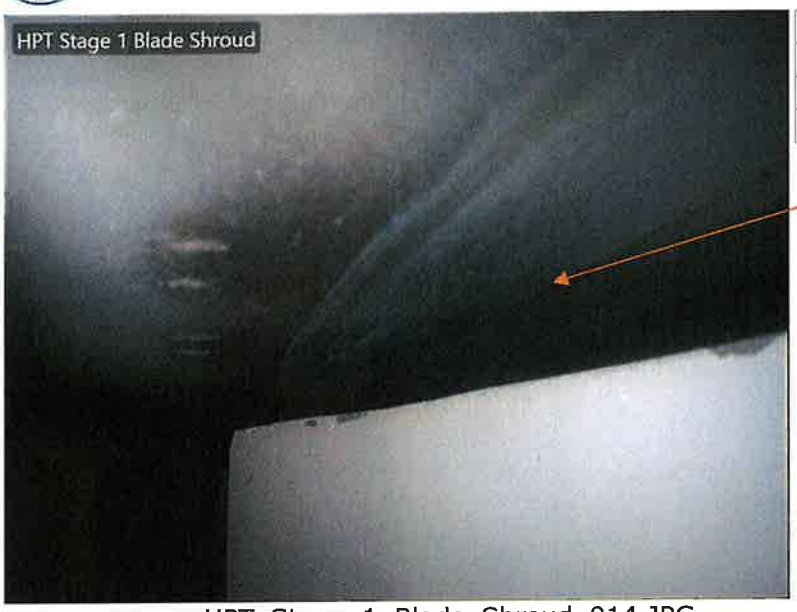
HPT_Stage_1_Blade_Shroud_012.JPG



Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	Rub

HPT_Stage_1_Blade_Shroud_013.JPG

LM6000 PC



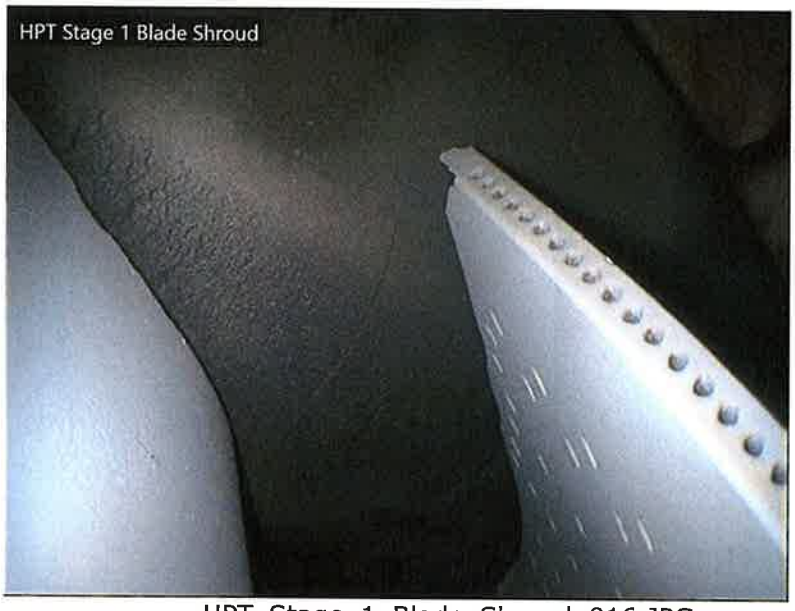
Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	Rub

HPT_Stage_1_Blade_Shroud_014.JPG

Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Multi-Segment	0.950 in
Comments	Crack

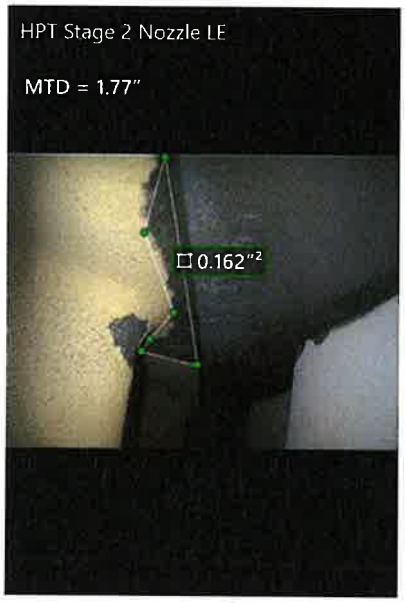
HPT_Stage_1_Blade_Shroud_015.JPG

LM6000 PC



Section	HPT
Stage	Stage 1 Blade
Component	Shroud
Comments	

HPT_Stage_1_Blade_Shroud_016.JPG

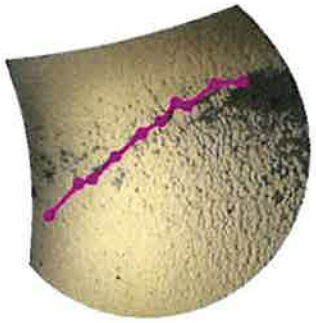


Section	HPT
Stage	Stage 2 Nozzle
Component	LE
Area	0.162 sq in
Comments	

HPT_Stage_2_Nozzle_LE_001.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	LE
Comments	Measurement in next photo.

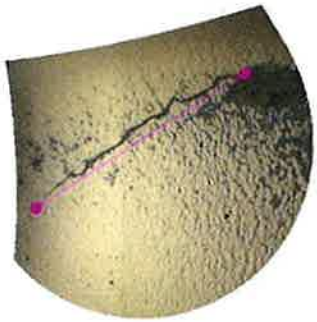
HPT_Stage_2_Nozzle_LE_002.JPG



Section	HPT
Stage	Stage 2 Nozzle
Component	LE
Multi-Segment	0.623 in
Comments	

HPT_Stage_2_Nozzle_LE_003.JPG

LM6000 PC

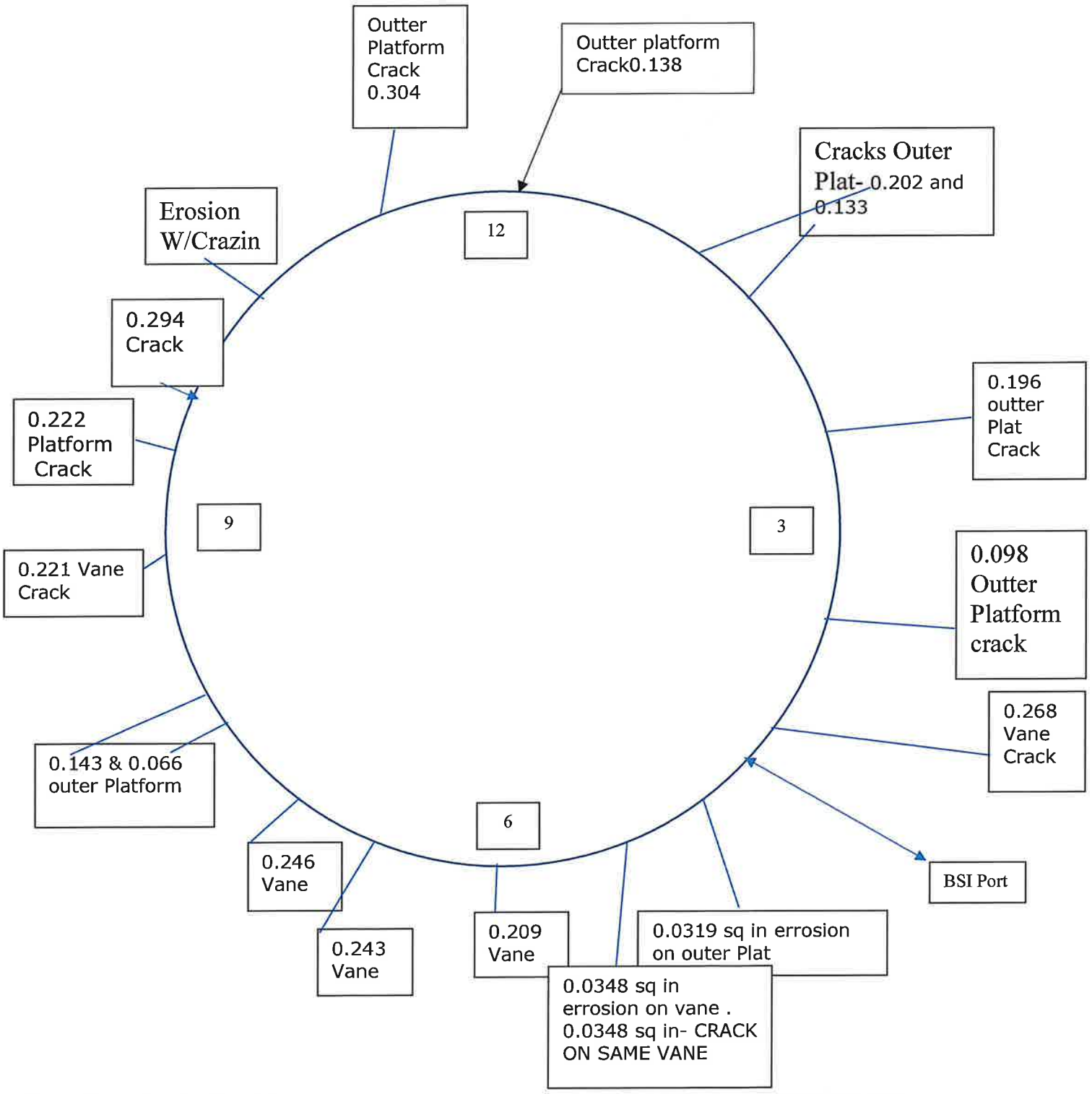


Section	HPT
Stage	Stage 2 Nozzle
Component	LE
Length	0.602 in
Comments	Same crack as above- measured with straight line

HPT_Stage_2_Nozzle_LE_005.JPG

AFT Looking FWD

Stage 2 Nozzle TE- approximate location of cracks and errosion condition in module .



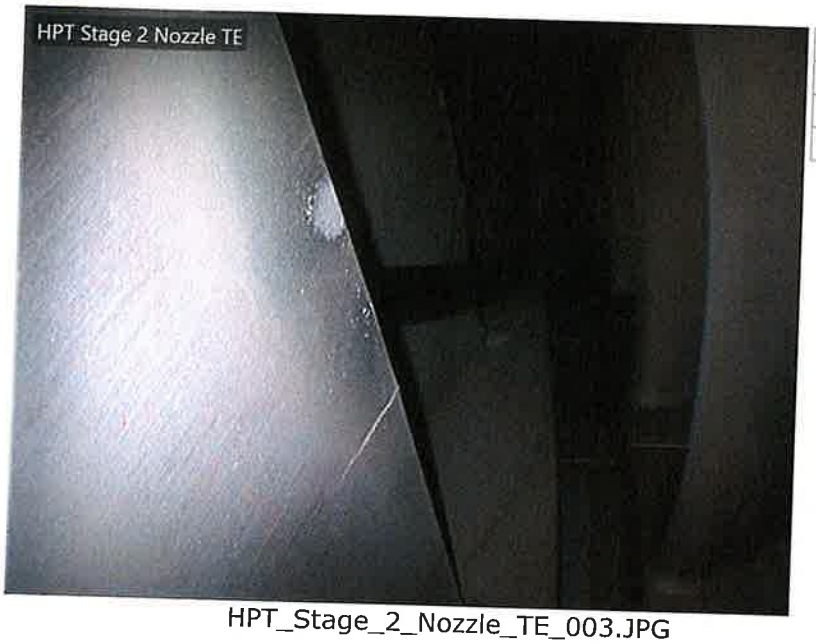
Report Completed By: Robert Piercy

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	Photo represents the I have snaked all the way around module.

HPT_Stage_2_Nozzle_TE_001.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.268 in
Comments	Crack Directly next to BSI entry point.

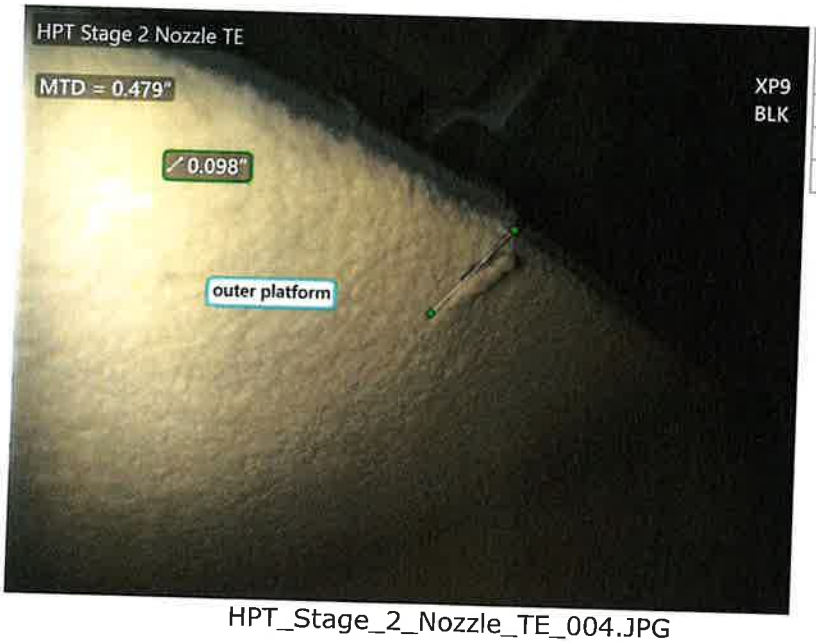
HPT_Stage_2_Nozzle_TE_002.JPG



HPT_Stage_2_Nozzle_TE_003.JPG

LM6000 PC

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	



HPT_Stage_2_Nozzle_TE_004.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE- Outer
Length	0.098 in
Comments	

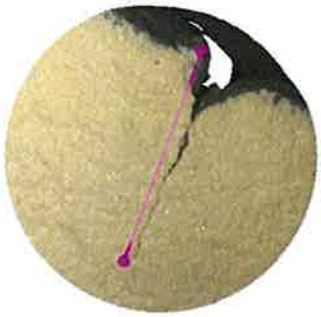
Report Completed By: Robert Piercy

HPT_Stage_2_Nozzle_TE_005.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

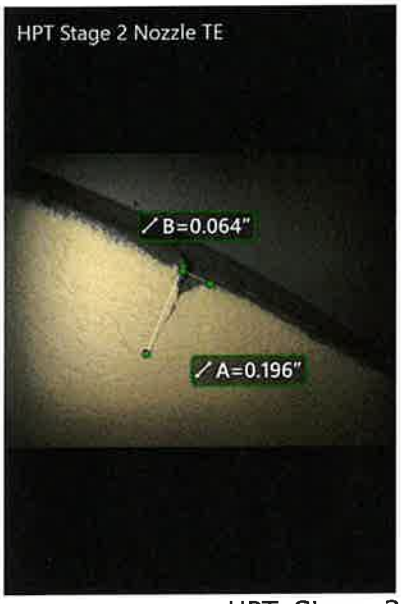
HPT_Stage_2_Nozzle_TE_006.JPG

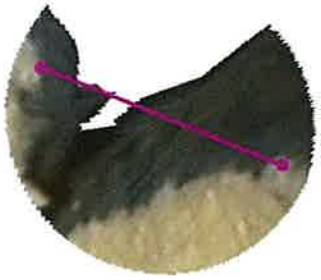
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	



Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.196 in
Comments	

HPT_Stage_2_Nozzle_TE_007.JPG



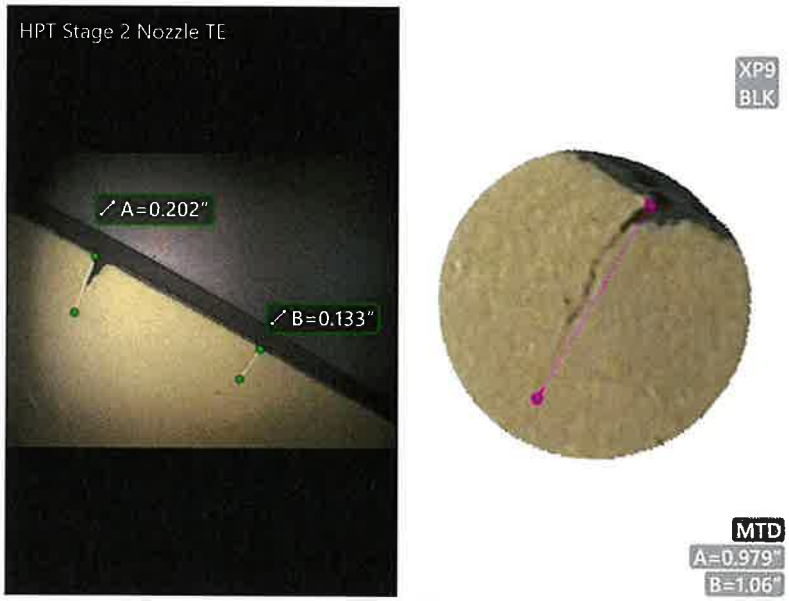


Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.196 in
Length	0.064 in
Comments	

HPT_Stage_2_Nozzle_TE_008.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

HPT_Stage_2_Nozzle_TE_009.JPG



Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.202 in
Length	0.133 in
Comments	

HPT_Stage_2_Nozzle_TE_010.JPG

HPT_Stage_2_Nozzle_TE_011.JPG

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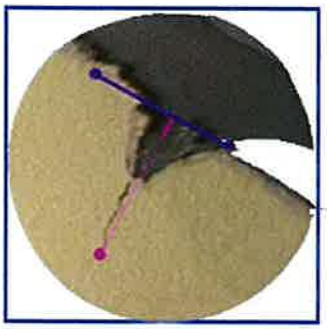
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.624 in
Comments	

HPT_Stage_2_Nozzle_TE_012.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

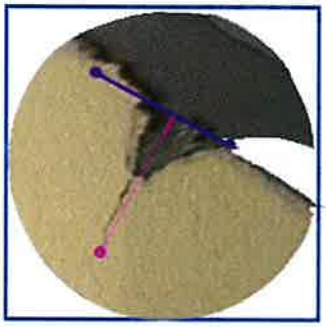
XP9
BLK



Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Point To Line	0.138 in
Comments	

HPT_Stage_2_Nozzle_TE_013.JPG

XP9
BLK



Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Point To Line	0.138 in
Comments	

HPT_Stage_2_Nozzle_TE_014.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.304 in
Comments	

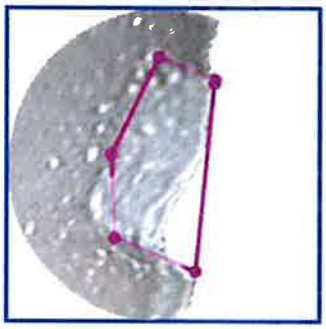
HPT_Stage_2_Nozzle_TE_015.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

HPT_Stage_2_Nozzle_TE_016.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	Errosion with crazing

HPT_Stage_2_Nozzle_TE_017.JPG

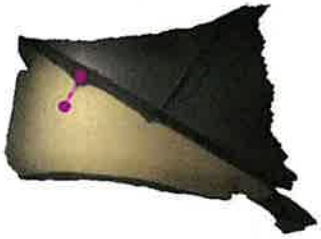


Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Area	0.0123 sq in
Area	0.0170 sq in
Comments	

HPT_Stage_2_Nozzle_TE_018.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

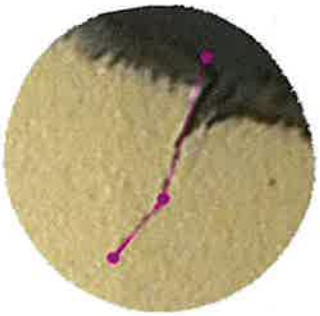
HPT_Stage_2_Nozzle_TE_019.JPG



XP9
BLK

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.294 in
Comments	

HPT_Stage_2_Nozzle_TE_020.JPG

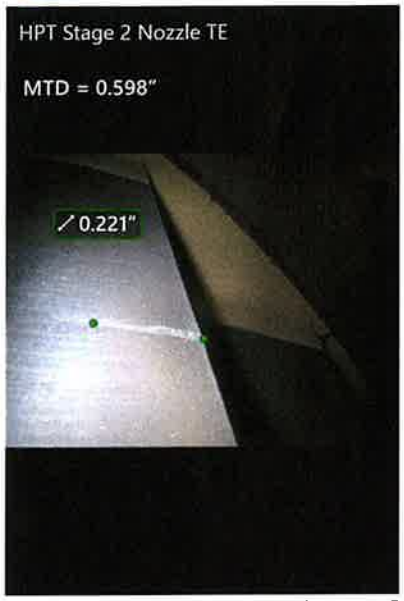


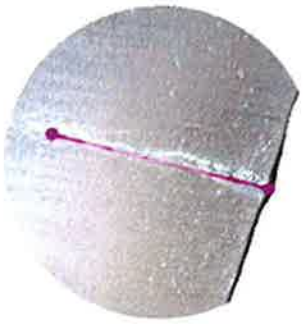
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Multi-Segment	0.222 in
Comments	

HPT_Stage_2_Nozzle_TE_021.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

HPT_Stage_2_Nozzle_TE_022.JPG





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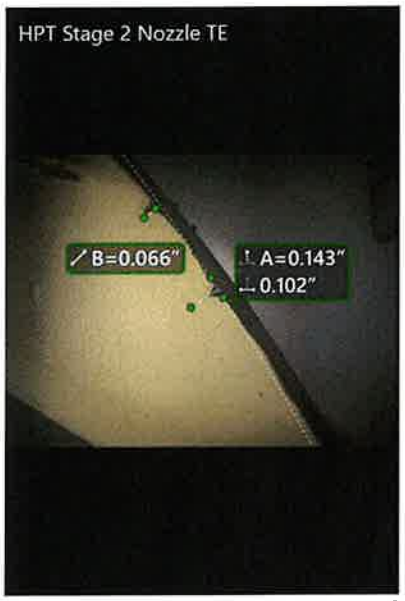
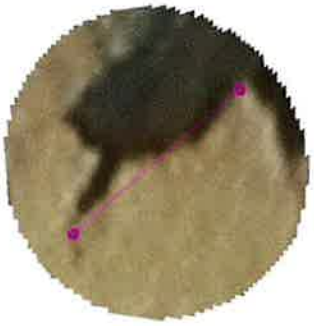
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.221 in
Comments	

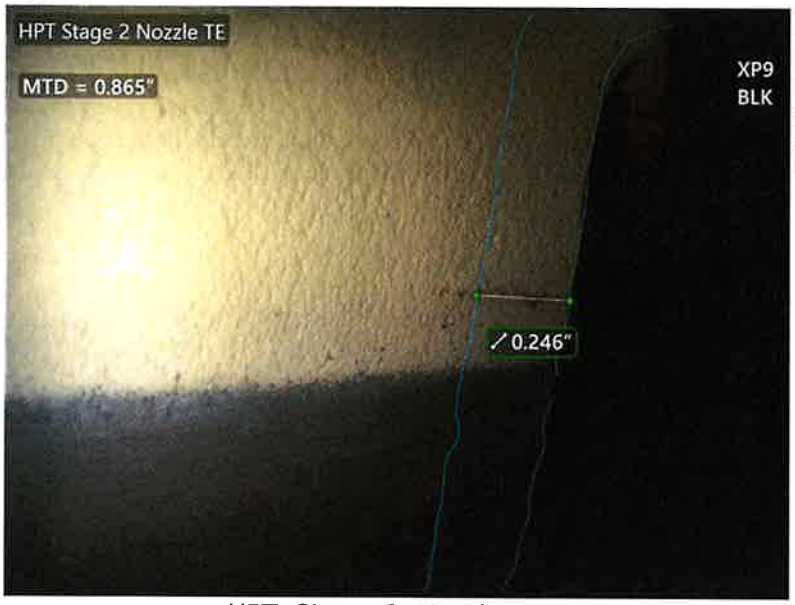
HPT_Stage_2_Nozzle_TE_023.JPG





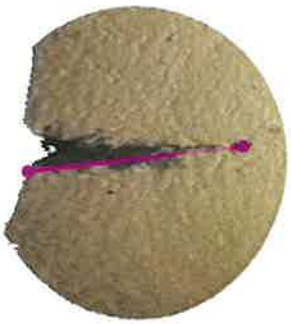
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Point To Line	0.143 in
Length	0.066 in
Comments	

HPT_Stage_2_Nozzle_TE_024.JPG



HPT_Stage_2_Nozzle_TE_025.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.246 in
Comments	



HPT_Stage_2_Nozzle_TE_026.JPG

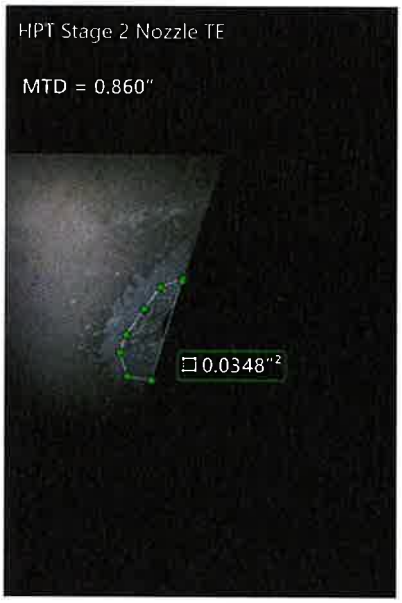
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.243 in
Comments	

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Comments	

HPT_Stage_2_Nozzle_TE_027.JPG

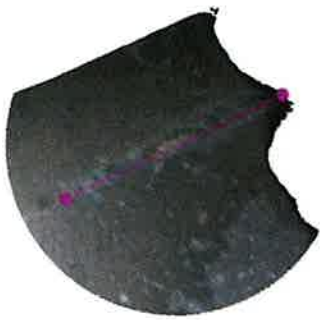
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.209 in
Comments	

HPT_Stage_2_Nozzle_TE_028.JPG



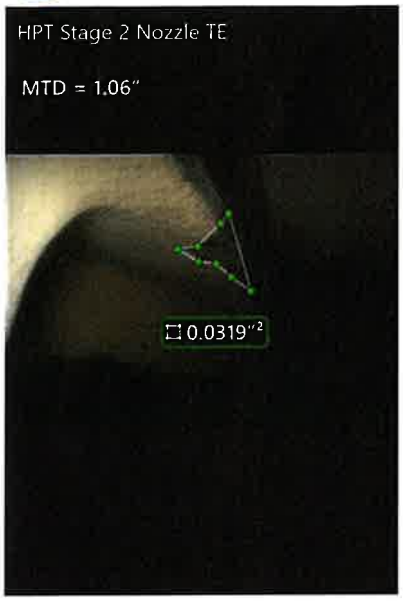
Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Area	0.0348 sq in
Comments	

HPT_Stage_2_Nozzle_TE_029.JPG



Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Length	0.0348 sq in in
Comments	

HPT_Stage_2_Nozzle_TE_030.JPG



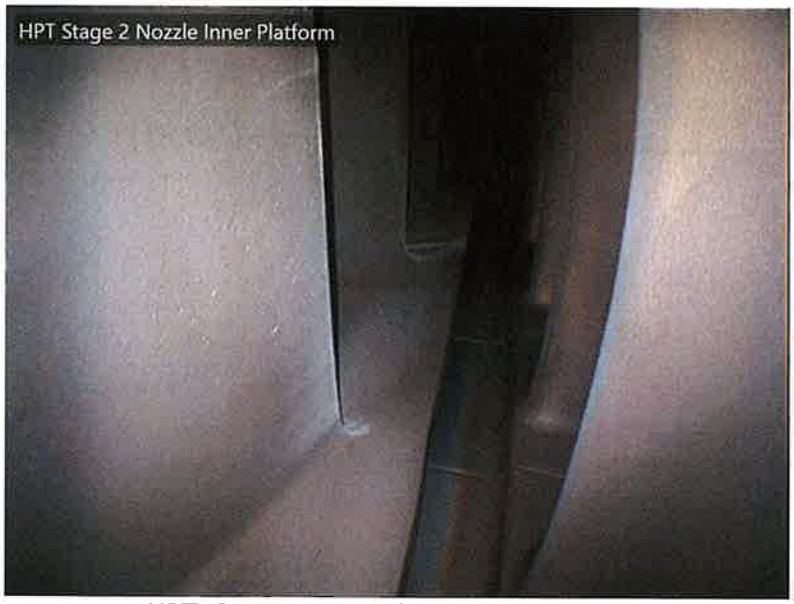
LM6000 PC

Section	HPT
Stage	Stage 2 Nozzle
Component	TE
Area	0.0319 sq in
Comments	

HPT_Stage_2_Nozzle_TE_031.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	Inner Platform
Comments	

HPT_Stage_2_Nozzle_Inner_Platform_001.JPG



HPT_Stage_2_Nozzle_Inner_Platform_002.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	Inner Platform
Comments	

HPT_Stage_2_Nozzle_Outer_Platform_001.JPG

Section	HPT
Stage	Stage 2 Nozzle
Component	Outer Platform
Comments	

Section	HPT
Stage	Stage 2 Blade
Component	LE
Comments	

HPT_Stage_2_Blade_LE_001.JPG

Section	HPT
Stage	Stage 2 Blade
Component	LE
Comments	

HPT_Stage_2_Blade_LE_002.JPG

HPT_Stage_2_Blade_TE_001.JPG

Section	HPT
Stage	Stage 2 Blade
Component	TE
Comments	

HPT_Stage_2_Blade_TE_002.JPG

Section	HPT
Stage	Stage 2 Blade
Component	TE
Comments	

HPT_General_001.JPG

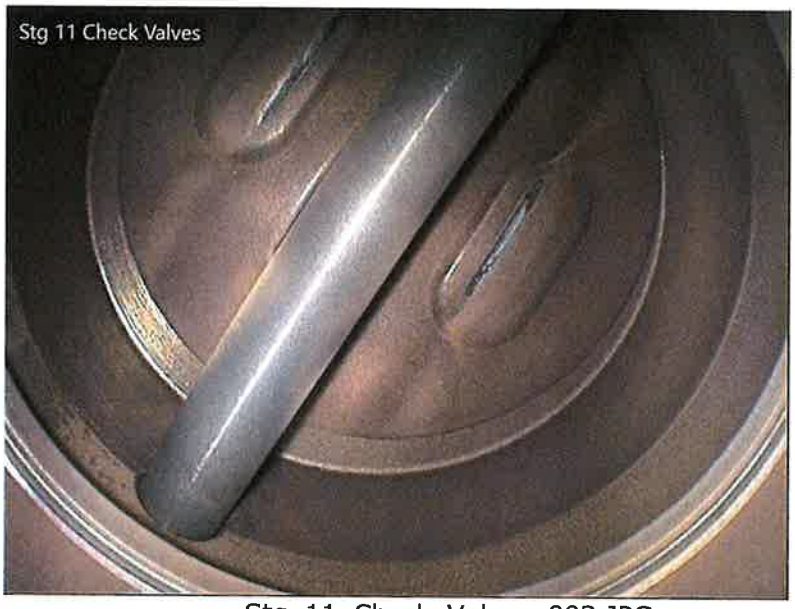
Section	HPT
Stage	HPT General
Comments	3 O-clock postition

HPT_General_002.JPG

Section	HPT
Stage	HPT General
Comments	5 O-clock Position

Stg_11_Check_Valves_001.JPG

Section	Stg 11 Check Valves
Comments	



Stg_11_Check_Valves_002.JPG

Section	Stg 11 Check Valves
Comments	

Stg_11_Check_Valves_003.JPG

Section	Stg 11 Check Valves
Comments	

Stg_11_Check_Valves_004.JPG

Section	Stg 11 Check Valves
Comments	

Section	Stg 11 Check Valves
Comments	

Stg_11_Check_Valves_005.JPG

Section	Stg 11 Check Valves
Comments	

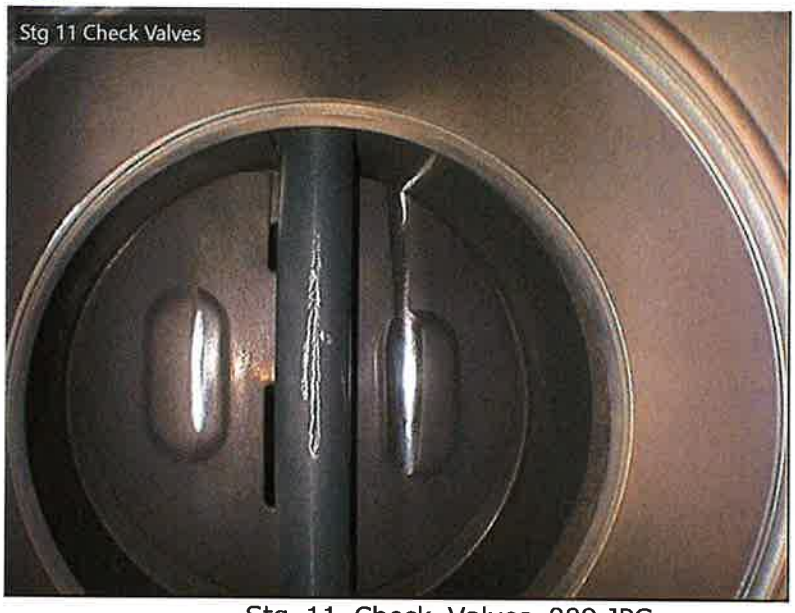
Stg_11_Check_Valves_006.JPG

Section	Stg 11 Check Valves
Comments	

Stg_11_Check_Valves_007.JPG

Section	Stg 11 Check Valves
Comments	

Stg_11_Check_Valves_008.JPG



Stg_11_Check_Valves_009.JPG

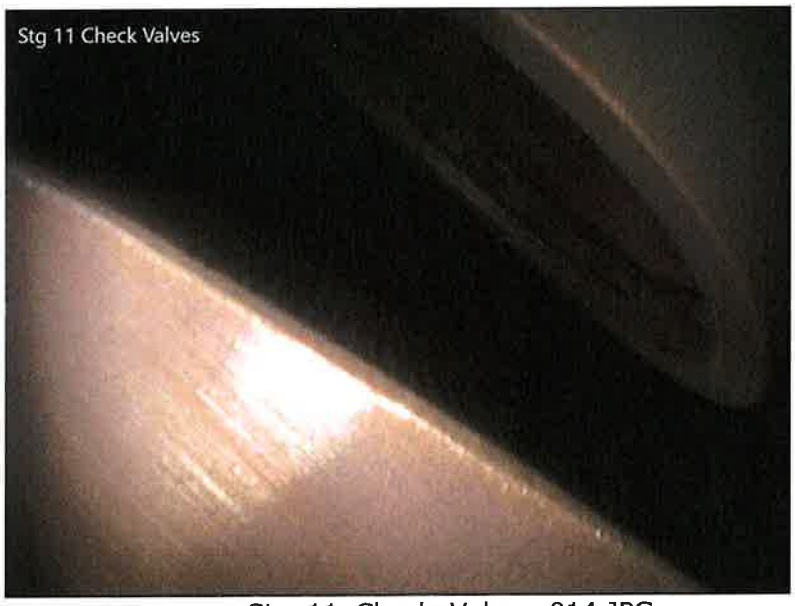
Section	Stg 11 Check Valves
Comments	

Stg_11_Check_Valves_011.JPG

Section	Stg 11 Check Valves
Comments	Photo represents that I have snaked all the way around cavity to inspect all spoolies

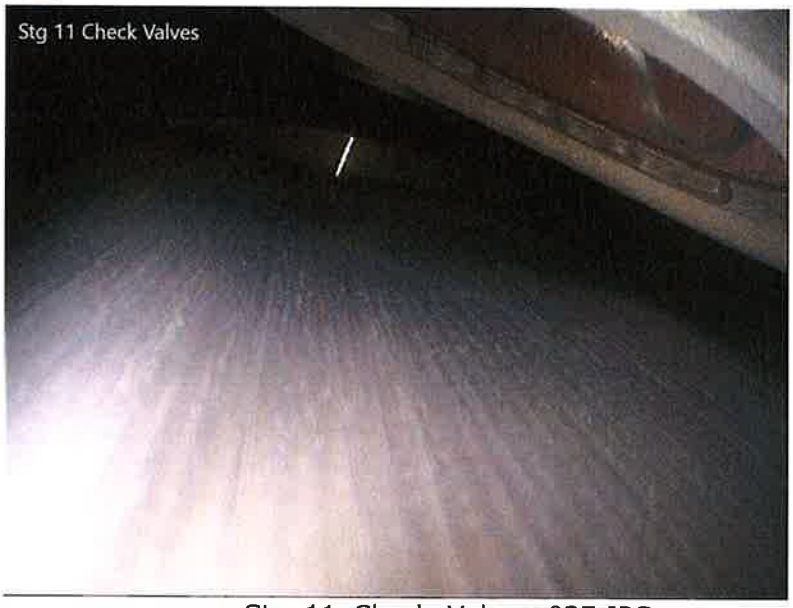
Section	Stg 11 Check Valves
Comments	Spoolie 24

Stg_11_Check_Valves_012.JPG



Section	Stg 11 Check Valves
Comments	Spoolie 23

Stg_11_Check_Valves_014.JPG



Section	Stg 11 Check Valves
Comments	Spoolie 22

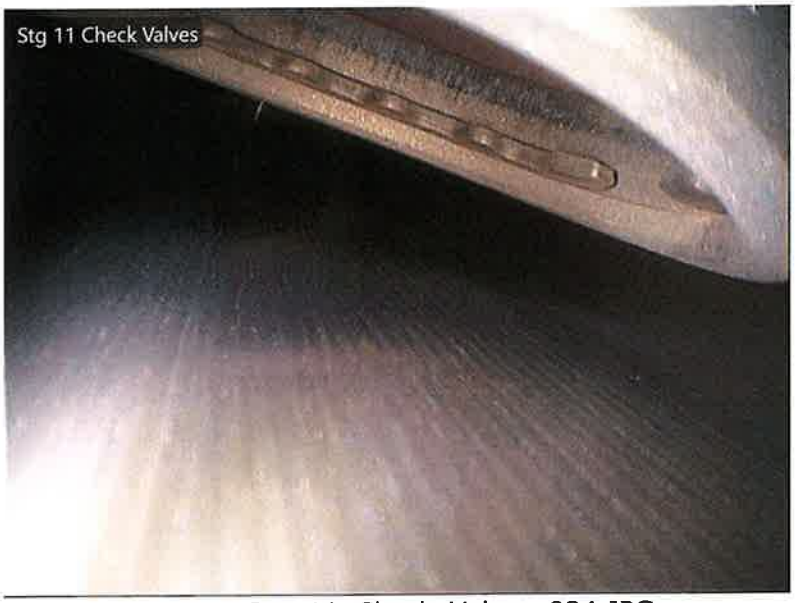
Stg_11_Check_Valves_027.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 21

Stg_11_Check_Valves_029.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 20

Stg_11_Check_Valves_032.JPG



Section	Stg 11 Check Valves
Comments	Spoolie 19

Stg_11_Check_Valves_034.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 18

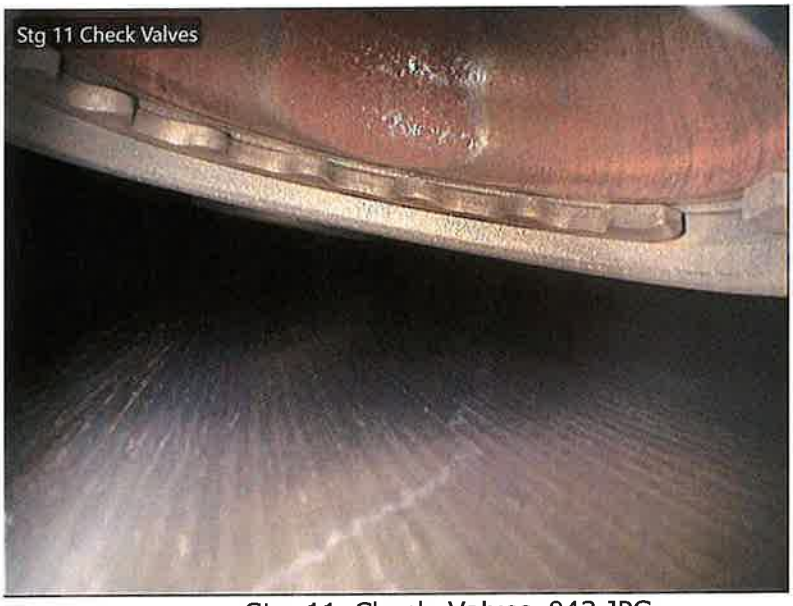
Stg_11_Check_Valves_039.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 17

Stg_11_Check_Valves_040.JPG

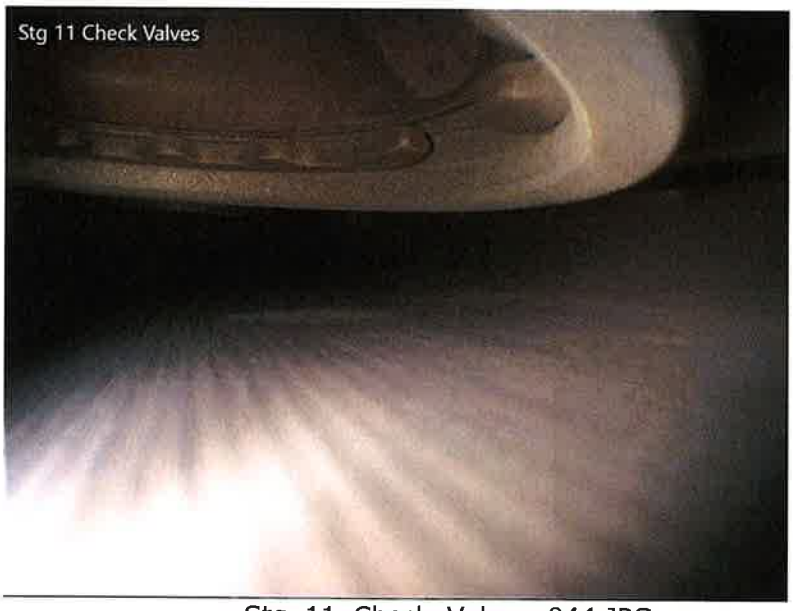
Section	Stg 11 Check Valves
Comments	Spoolie 16

Stg_11_Check_Valves_042.JPG



Section	Stg 11 Check Valves
Comments	Spoolie 15

Stg_11_Check_Valves_043.JPG



Section	Stg 11 Check Valves
Comments	Spoolie 14

Stg_11_Check_Valves_044.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 13

Stg_11_Check_Valves_045.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 12

Stg_11_Check_Valves_046.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 11

Stg_11_Check_Valves_048.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 10

Stg_11_Check_Valves_049.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 9

Stg_11_Check_Valves_050.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 8

Stg_11_Check_Valves_051.JPG

Section	Stg 11 Check Valves
Comments	Postion 7- A.L.F Clockwise from cavity entry

Stg_11_Check_Valves_052.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 6

Stg_11_Check_Valves_053.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 5

Stg_11_Check_Valves_054.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 4

Stg_11_Check_Valves_055.JPG

Section	Stg 11 Check Valves
Comments	Spoolie 3

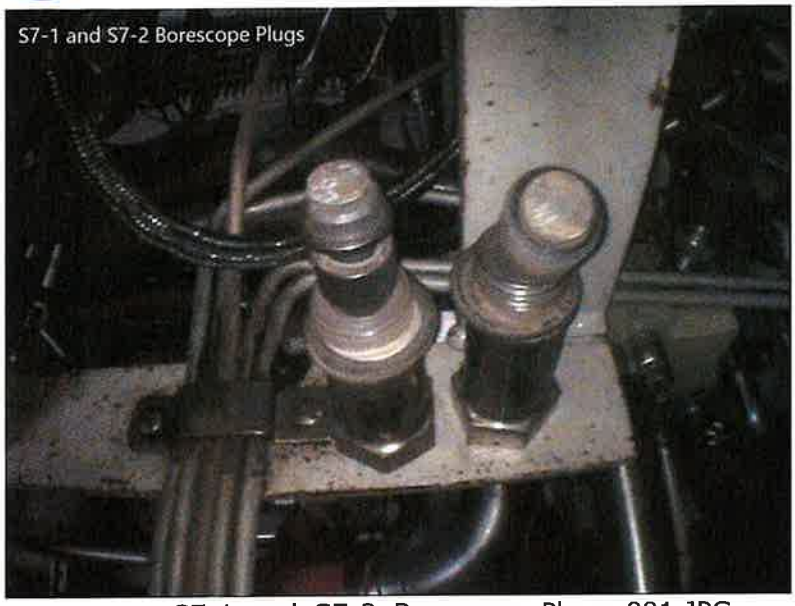
Stg_11_Check_Valves_056.JPG

Section	Stg 11 Check Valves
Comments	Spoolie #2

Stg_11_Check_Valves_057.JPG

Section	Stg 11 Check Valves
Comments	Spoolie #1

Stg_11_Check_Valves_058.JPG



S7-1_and_S7-2_Borescope_Plugs_001.JPG

Section	S7-1 and S7-2 Borescope Plugs
Comments	

Stage_1_Blade_LE_001.JPG

Section	LPT
Stage	Stage 1 Blade
Component	LE
Comments	

Stage_1_Blade_LE_002.JPG

Section	LPT
Stage	Stage 1 Blade
Component	LE
Comments	

Stage_1_Blade_TE_001.JPG

Section	LPT
Stage	Stage 1 Blade
Component	TE
Comments	

Section	LPT
Stage	Stage 1 Nozzle
Comments	

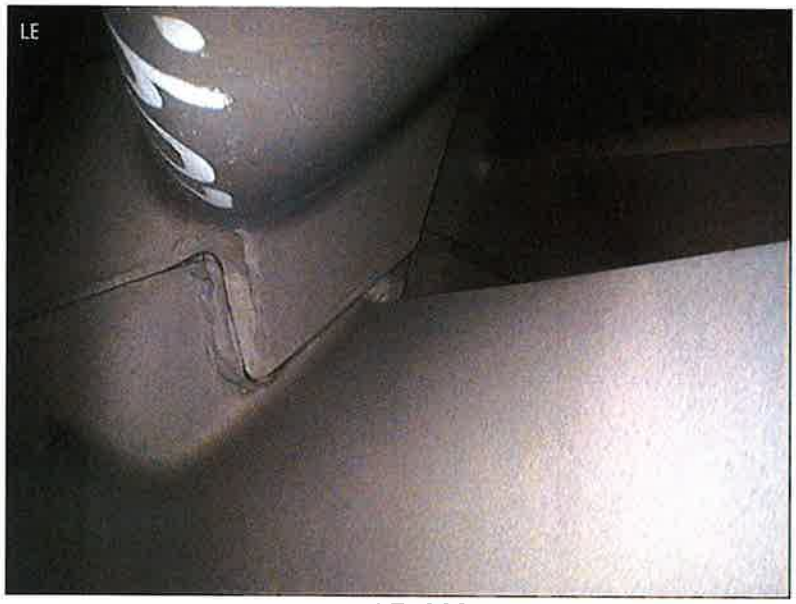
Stage_1_Nozzle_001.JPG

Section	LPT
Stage	Stage 1 Nozzle
Comments	

Stage_1_Nozzle_002.JPG

LE_001.JPG

Section	LPT
Stage	Stage 2 Blade
Component	LE
Comments	



LE_002.JPG

Section	LPT
Stage	Stage 2 Blade
Component	LE
Comments	

Section	LPT
Stage	Stage 3 Blade
Component	TE
Comments	

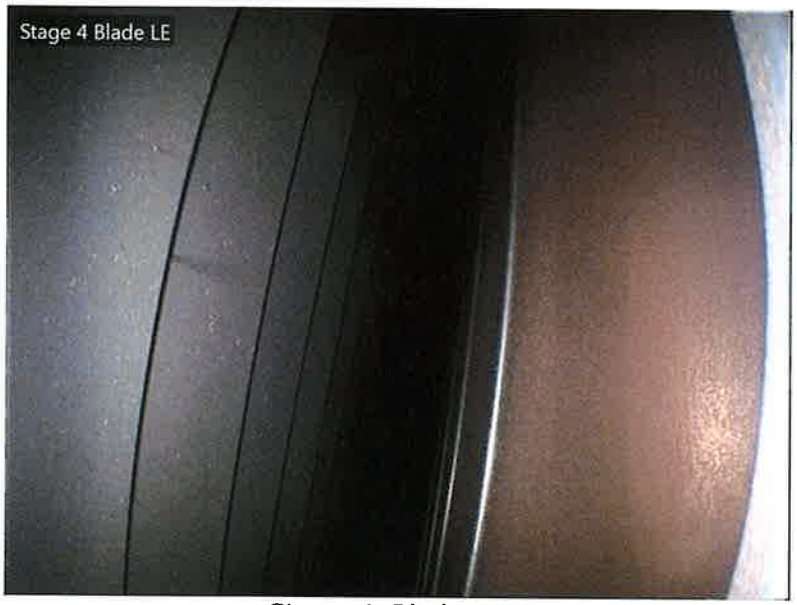
Stage_3_Blade_TE_001.JPG

Section	LPT
Stage	Stage 3 Blade
Component	TE
Comments	

Stage_3_Blade_TE_002.JPG

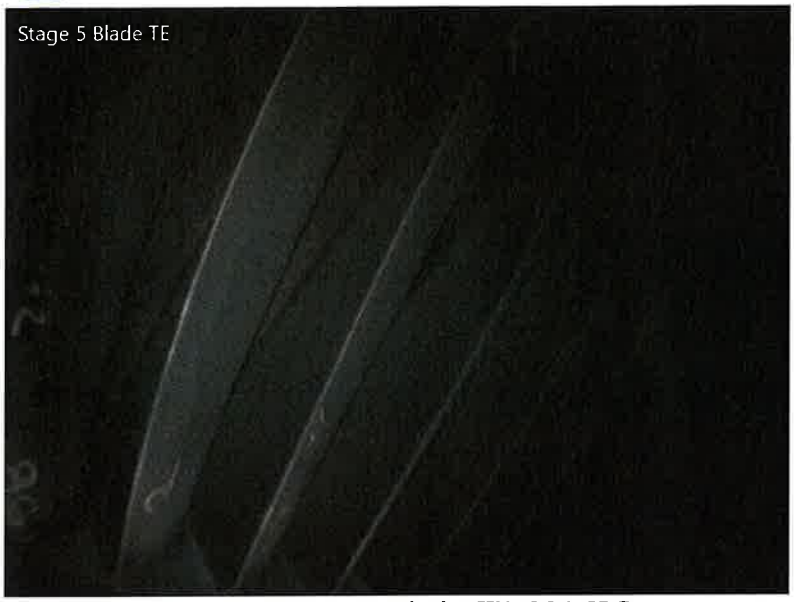
Section	LPT
Stage	Stage 4 Blade
Component	LE
Comments	

Stage_4_Blade_LE_001.JPG



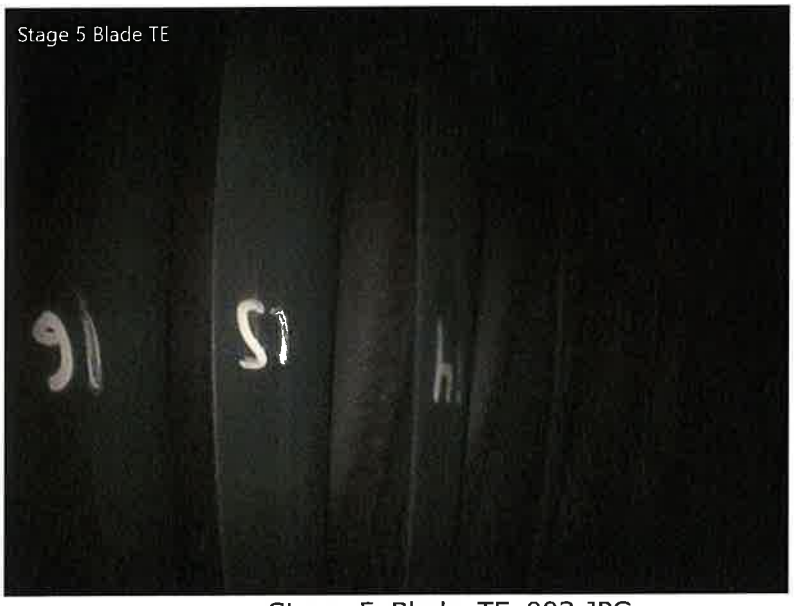
Section	LPT
Stage	Stage 4 Blade
Component	LE
Comments	

Stage_4_Blade_LE_002.JPG



Section	LPT
Stage	Stage 5 Blade
Component	TE
Comments	

Stage_5_Blade_TE_001.JPG



Section	LPT
Stage	Stage 5 Blade
Component	TE
Comments	

Stage_5_Blade_TE_002.JPG

Section	LPT
Stage	LPT General
Comments	

LPT_General_001.JPG

Section	LPT
Stage	LPT General
Comments	

LPT_General_002.JPG

Section	LPT
Stage	LPT General
Comments	

LPT_General_003.JPG

Section	LPT
Stage	LPT General
Comments	

LPT_General_004.JPG

Section	LPT
Stage	LPT General
Comments	

LPT_General_005.JPG

Section	LPT
Stage	LPT General
Comments	

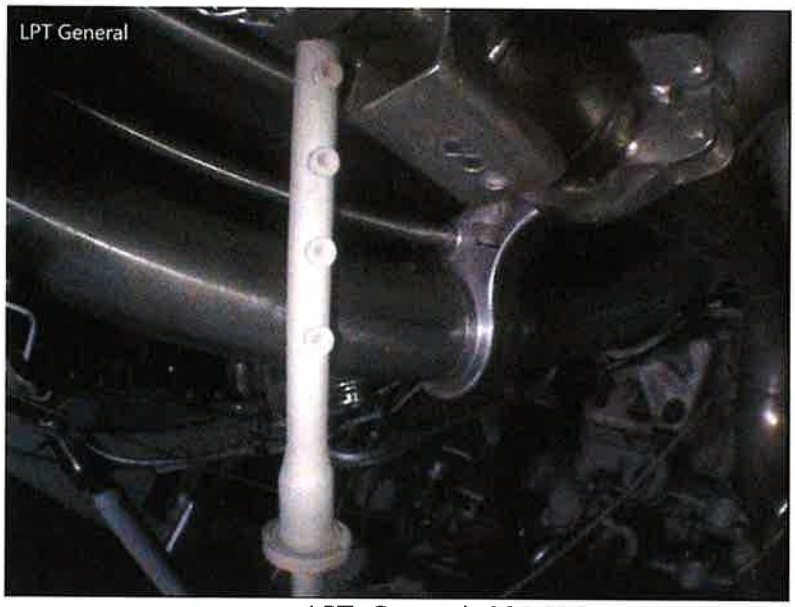
LPT_General_006.JPG

Section	LPT
Stage	LPT General
Comments	

LPT_General_007.JPG

Section	LPT
Stage	LPT General
Comments	

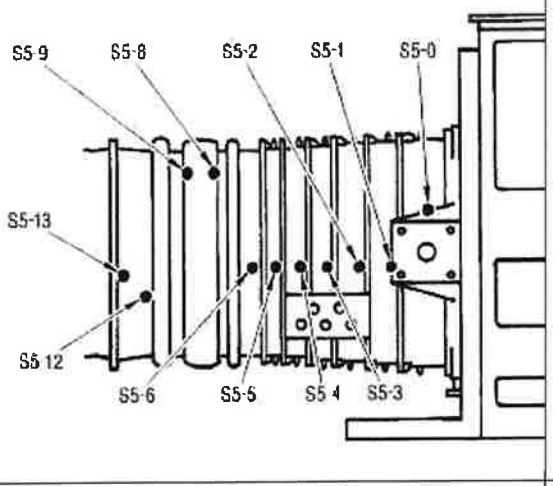
LPT_General_008.JPG



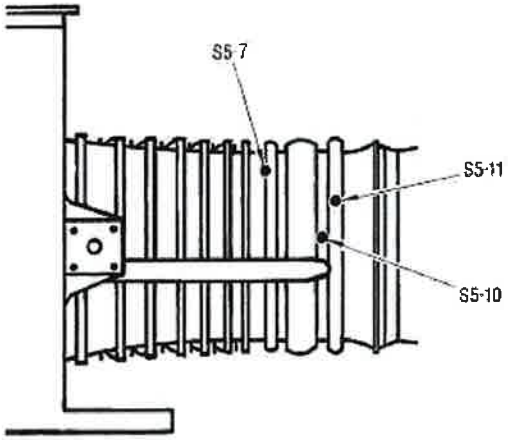
LPT_General_009.JPG

Section	LPT
Stage	LPT General
Comments	

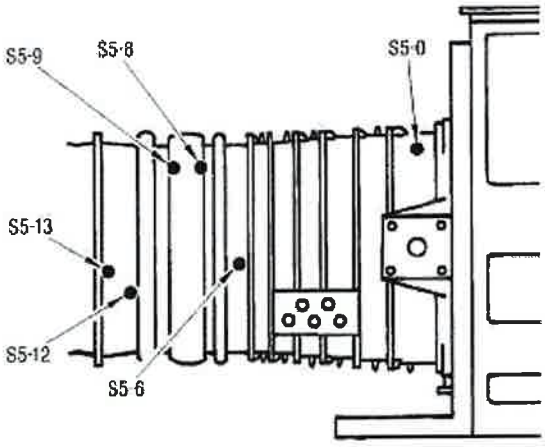
High Pressure Compressor



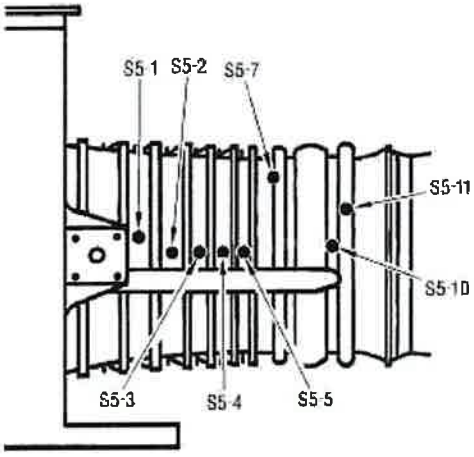
Right Side – Low Boss Case



Left Side – Low Boss Case



Right Side – High Boss Case

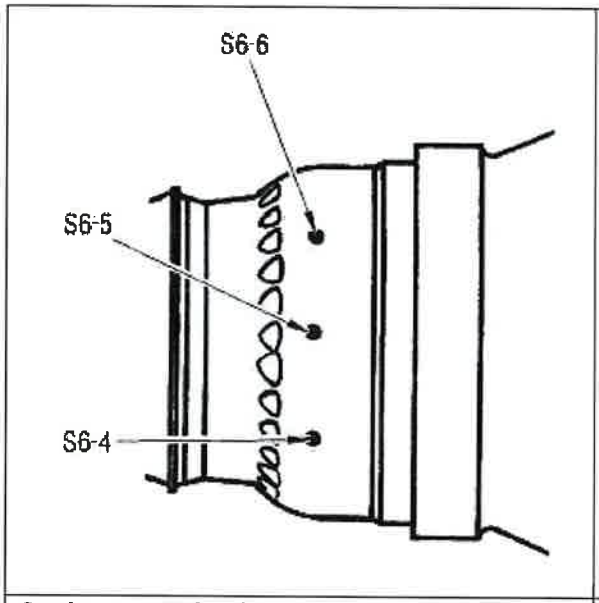


Left Side – High Boss Case

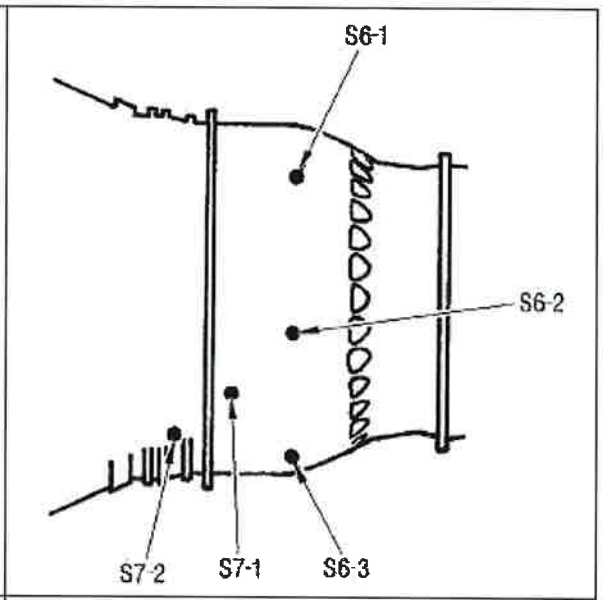
Inspection Area
IGB Inspection- Only required Before S/B 220
Inspect stages 1 through 14 blades for cracks, nicks, tears, burrs, dents, missing material, evidence of tip clang, curl or deformation. ** BSI Port are inside manifold*
Inspect the stage 1 mid-span shroud interlock wear, shingling, a gap or a missing pad.
Inspect for erosion, corrosion or deposits.
Inspect for platform shingling, bowing, distortion or cracks
Inspect CRF air tubes/clamps/oil manifold for leaks, twisted or rotated clamps, ensure CRF horn is clean with no signs of oil blowing through.

Report Completed By: Robert Piercy

Combustor



Combustor – Left Side

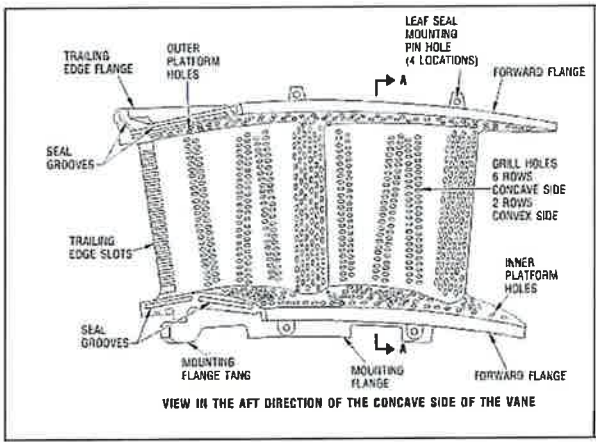


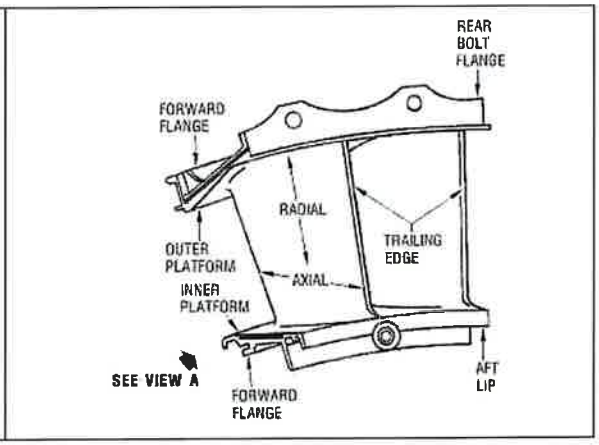
Combustor – Right Side

Inspection Area
Inspect combustor and 1st stage HPTN Leading Edge from all CRF BSI ports S6-1 to S6-6 (or with flex scope) for burning, cracks, erosion, discoloration, wear and missing metal.
Venturi's
Swirler Cups
Trumpets
Dome Plates
Inner/Outer Liners
Inner/Outer Rivet Bands
1st Stage Nozzle
Igniter Tube Area
Inspect all visible fuel nozzle tips for contamination or damage from all CRF BSI ports with flex scope
Remove 2 fuel nozzles and check outer cowl for cracks or missing material. Inspect secondary swirlers for water erosion, missing material or deposits.

High Pressure Turbine

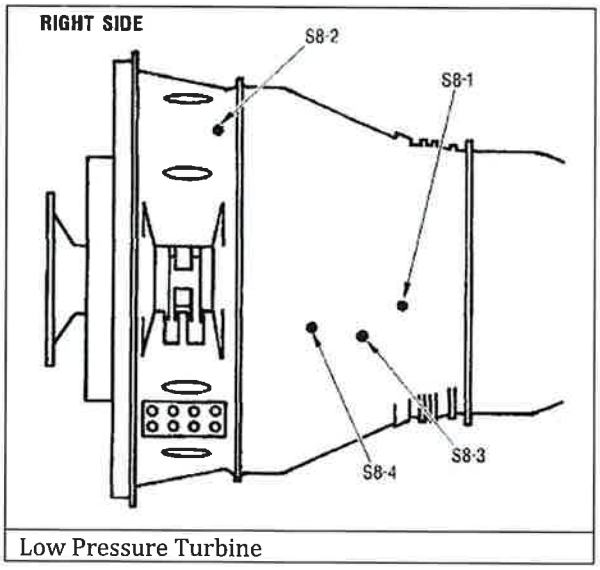
Inspection Area
Inspect stage 1 and 2 shrouds for cracks, missing material, wear and erosion. Stage 1 HPT Shrouds, BSI port S7-2 Stage 2 HPT Shrouds, BSI port P48 & T48 probe
Inspect stage 1 and 2 blades for missing TBC coating, oxidation parent material, plugged cooling holes. Stage 1 HPT Blades (Qty 80) Leading Edge, BSI port S7-1 and Trailing Edge, S7-2
Stage 2 HPT Blades (Qty 74) Leading Edge, BSI port S7-2 and Trailing Edge, P48 or T48 probe
Inspect stage 1 and 2 blade airfoils for cracks, nicks, tears, burrs, dents and missing material, Stage 1 HPT (Qty 80) Leading Edge, BSI port S7-1 and Trailing Edge, S7-2 Stage 2 HPT (Qty 74) Leading Edge, BSI port S7-2 and Trailing Edge, P48 or T48 probe
Inspect the stage 1 and 2 blade platform for bowing and cracks. Stage 1 HPT (Qty 80) platform, BSI port S7-1 and S7-2 Stage 2 HPT (Qty 74) platform, BSI port S7-2 and P48 probe
HPT Diffuser Inspection if S/B 216 is not C/W
11th Stage Check Valve Inspection
S7-1 and S7-2 Borescope Plugs Inspection





Low Pressure Turbine

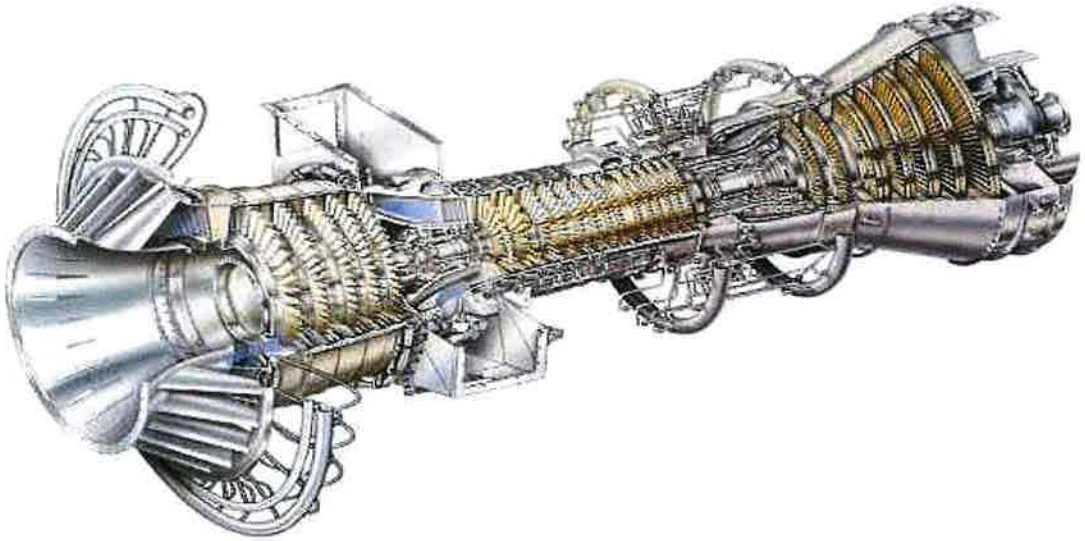
Inspection Area
Inspect stages 1 through 5 blades and vanes for cracks, nicks, burrs, tears, curl, missing material, dents, scratches, pits. Stage 1 LPT Nozzle, BSI ports S8-1 & P48 probe. Stage 1 LPTR Blades (Qty 118) & Vanes, BSI ports S8-1 & S8-3. Stage 2 LPTR Blades (Qty 124) & Vanes, BSI ports S8-3. Stage 3 LPTR Blades (Qty 88) & Vanes, BSI ports S8-4. Stage 4 LPTR Blades (Qty 80) & Vanes, BSI ports S8-4. Stage 5 LPTR Blades (Qty 74) & Vanes, BSI ports S8-2.
Inspect blade shroud interlocks for wear and shingling.
Inspect for erosion, corrosion or deposits.



Low Pressure Turbine

TRANSCANADA TURBINES

LM6000 PC
BORESCOPE INSPECTION REPORT



DOVER ENERGY CENTER
KD1

ENGINE SERIAL NUMBER: **191-234**
TCT SALES ORDER NUMBER: US9017327
DATE INSPECTED: 4/25/24.
SERVICEABILITY AT DATE OF INSPECTION: SERVICEABLE

BACKGROUND

Customer:	Dover Energy Center		
Location:	Dover, DE		
Work Order:	US80005032		
Performed by:	Matt Tanner		
Package S/N and Manufacturer:	**S/N:** 313694	**Manufacturer:**	GE
Engine Model:	LM6000 PC		
Engine Hours:	**Operating hours:** 28,171		
Starts:	**Fired starts:** 2,662	**Start attempts:**	2,373

Purpose of Visit:

Perform routine borescope inspection in accordance with GEK 105059, WP 4015 00.
Igniter Inspection in accordance with GEK 105059, WP 1516 00.
T48 Probe Inspection and Sleeve verification in accordance with GEK 105059, WP 1711 00.
P48 Probe Inspection in accordance with GEK105059, WP 1712 00.
Inspect CRF Clamps and Tubes

Summary of Overall Condition:

- **LPC:** Blades and vanes inspected with no signs of any damage. Inner vane shroud bushings in place. RTV is starting to weep out of Stage 3 bushings. This is still a serviceable condition. Previous inspection stated it was bushing protrusion, it has been confirmed it is only RTV at this time not bushing material.
- **IGB:** No major spline wear or backlash on the gears, no sludge noted around bearing retainer. SB220 has been completed.
- **HPC:** Stage 1 mid-span shrouds carboly wear pads in good condition, retaining tabs all in place and no cracks observed. Stage 2 weep hole did not have any oil residue present. Pictures of HPC will be provided in the HPC shroud replacement report.
- **Combustor:** Inner and outer liners
- **Stage 1 HPT:** Shroud cracks were noted at multiple locations. These cracks were noted in previous inspection. Cracks have not appeared to have gotten worse. TBC loss was noted on several blades.
- **Stage 2 HPT:** Found several areas of the nozzle assembly with minor erosion. No areas are considered serviceable currently. 1 crack found on leading edge on

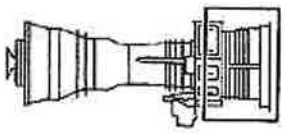
convex side of nozzle. This is considered serviceable currently, this crack will still require a 500hr inspection interval.

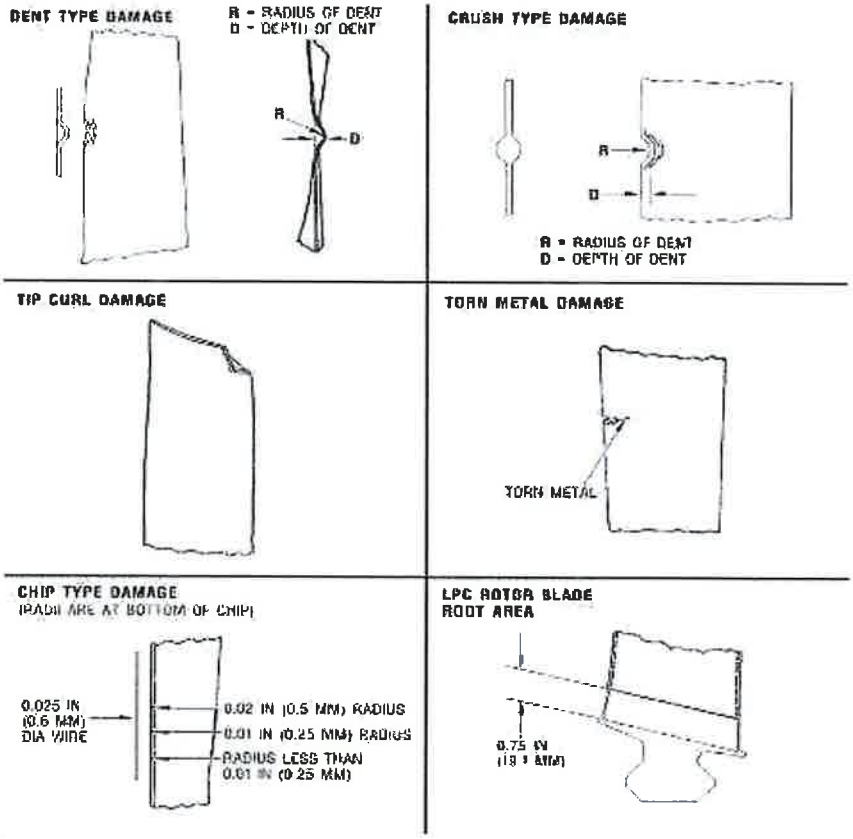
- **LPT**: No cracks found on 1st stage nozzle segment outer platforms. P48 sensor and T48 probes in serviceable condition with minor wear. Stages 1-5 were inspected with no defects observed.
- **Fuel Nozzles:** 2 fuel nozzles were pulled, 5 and 22, both were found in good condition.
- **11th Stage Check Valves:** No defects noted.
- **CRF Clamps:** No defects observed.

Recommendations:

- The engine is still on a 500hr BSI inspection interval due to crack in Stage 2 nozzle segment.
- Continue with scheduled water washes.
- Continue to monitor oil consumption from leaking actuators. We are changing the left side (AFT looking forward) VSV and VBV LVDT actuators during this outage.
- Continue to monitor Combustor anti-rotation arms during 500hr bsi inspections. Locations 4 and 7 are the swirlers and rotation tabs in question. These are still serviceable at this time but should be looked at when possible.

Low Pressure Compressor:





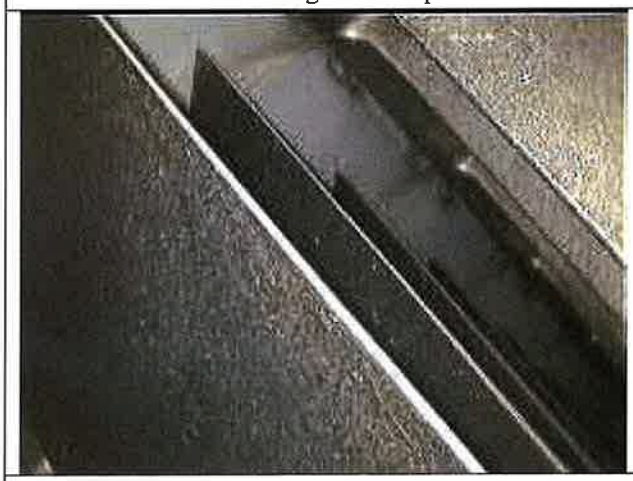
Low Pressure Compressor	Comments:
LPC (Rotor Blades – Stages 0-4)	No dents, tip curl, or damage
LPC (Vanes – Stages 0-4)	No tears, nicks, or missing material
LPC Inner Shrouds & Bushings	Shrouds and Bushings in serviceable condition. RTV protrusion noted in the 3rd stage
Additional Comments	Serviceable

LPC VIGV

LPC Stage 0 L/E

LPC Stage 1 T/E Tip

LPC Stage 1 T/E Root

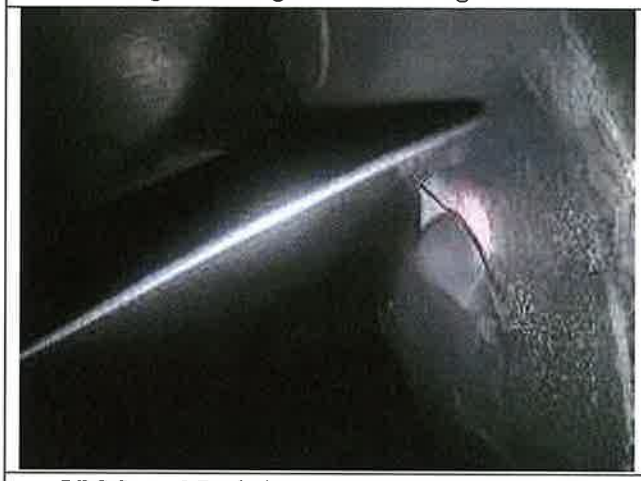


LPC Stage 2 L/E Tip

LPC Stage 2 L/E Root

LPC Stage 3 Bushings RTV Protruding Serviceable

LPC Stage 3 Bushings RTV Protruding Serviceable



LPC Stage 3 Bushnings RTV Protruding Serviceable

LPC Stage 3 Bushings RTV Protruding Serviceable

LPC Stage 3 Bushings RTV Protruding Serviceable

LPC Stage 3 Bushings RTV Protruding Serviceable

LPC Stage 2 T/E Tip

LPC Stage 2 T/E Root

LPC Stage 4 L/E Tip

LPC Stage 4 L/E Root

LPC Stage 4 T/E Tip

LPC Stage 4 Bushings

IGB Spline Inspection:

IGB Splines

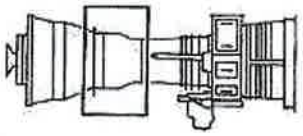
IGB Splines

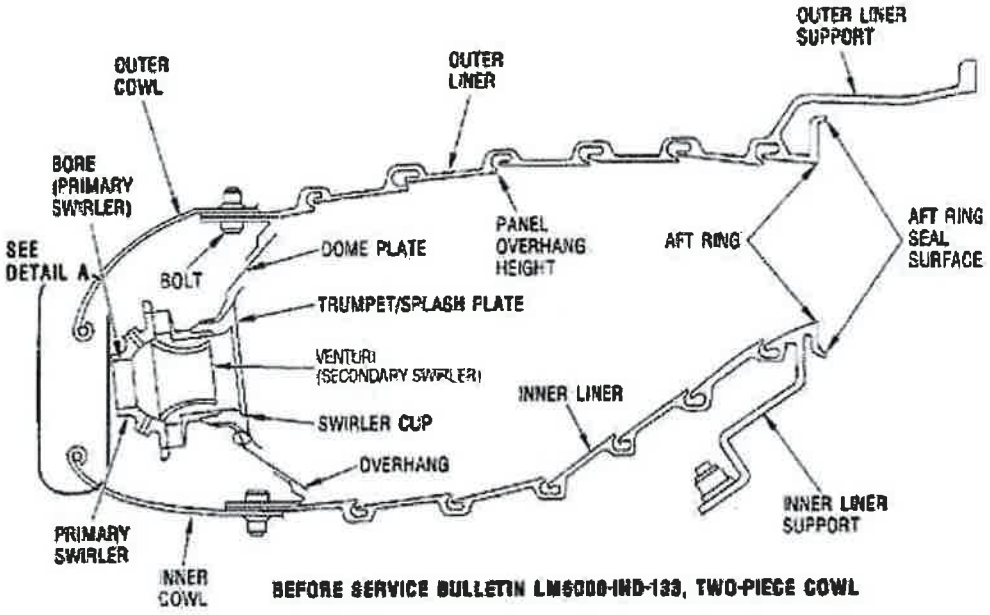
CRF Manifold Clamping Inspection:

CRF Manifold Clamping

CRF Dry LP Recoup Horn

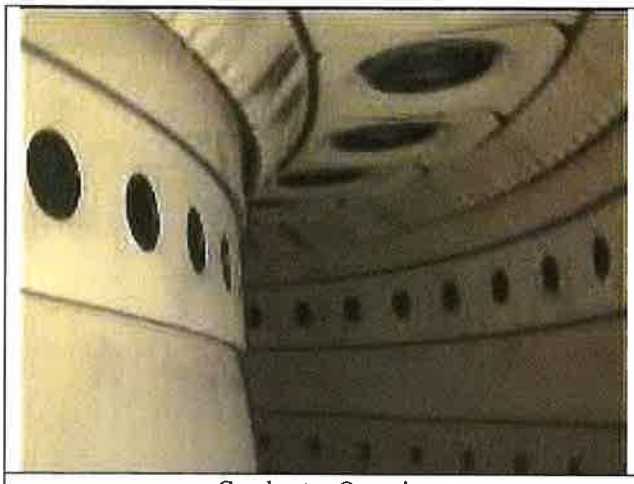
Combustor:





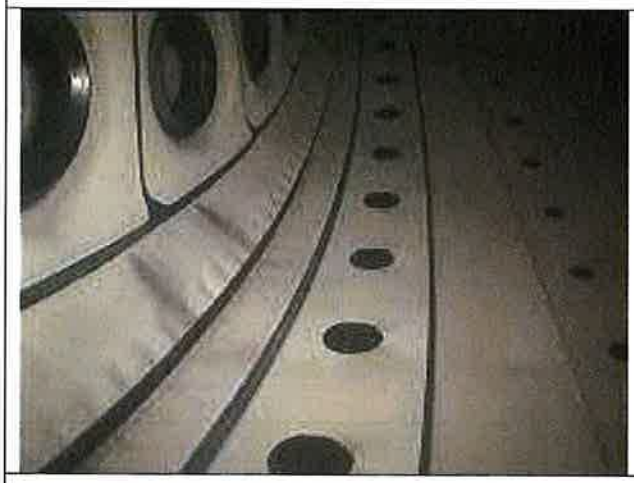
BEFORE SERVICE BULLETIN LM6000-IND-133, TWO-PIECE COWL

Combustor	Comments:
All Surfaces	Serviceable
Cowl	No burn or cracks
Primary Swirlers	Wear noted in anti-rotation arms. Serviceable
Dome Assembly (Dome Plate, Trumpet/ Splash Plate)	Very minor discoloration.
Inner & Outer Liner	No cracks observed/discoloration and heat erosion of TBC
Secondary Swirlers	No cracks or distortion
Fuel Nozzles	Serviceable Condition
Igniters	Igniters found in serviceable condition
CRF Oil-In Manifold Clamping	No issues noted in this area
Additional Comments	Serviceable condition

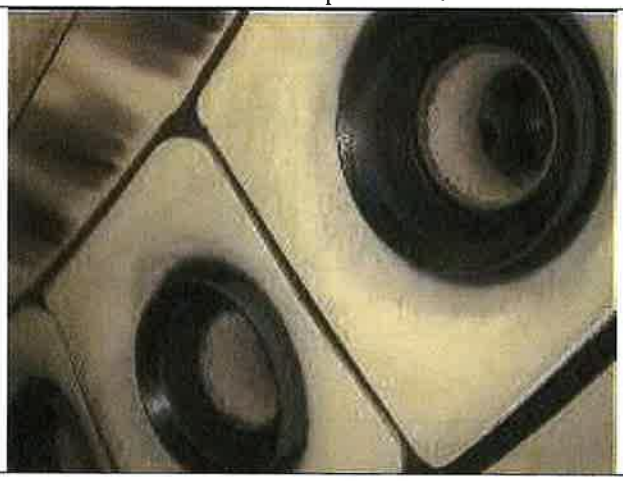


Combustor Overview

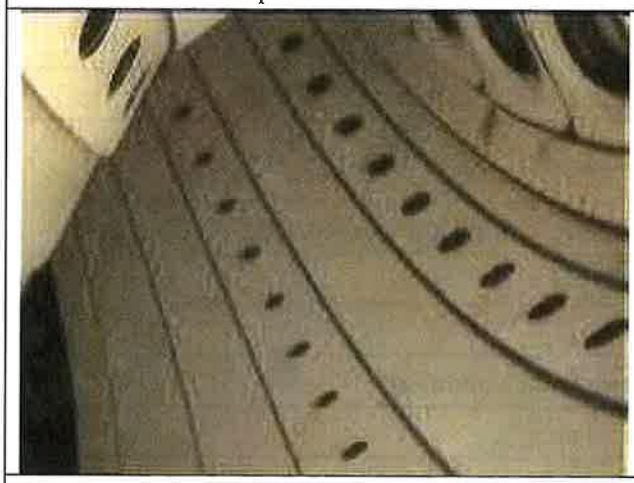
Combustor Splash Plates



Combustor Splash Plates and outer liner

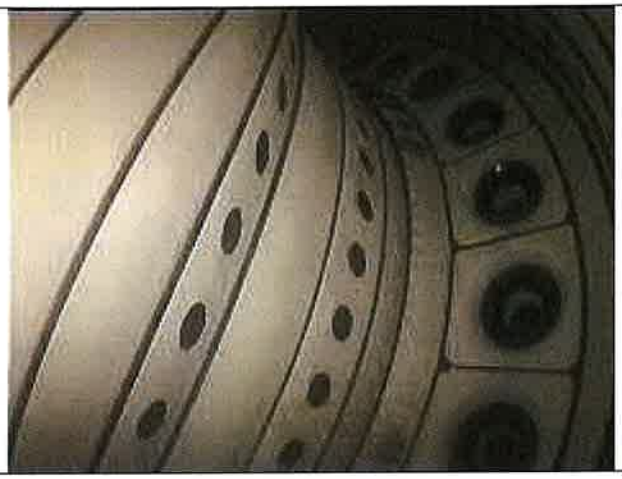


Combustor Secondary Swirler

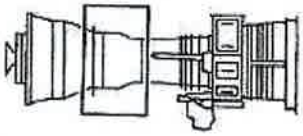


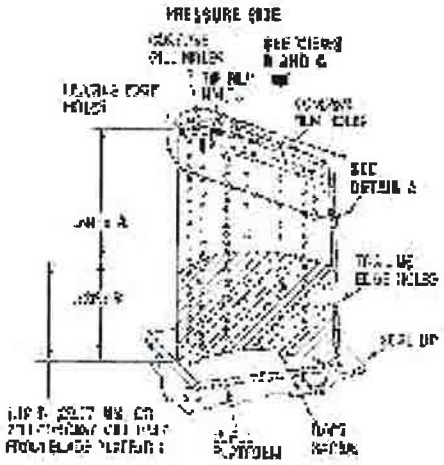
Combustor Outer Liner

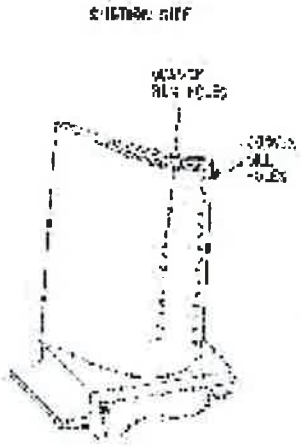
Combustor Inner Liner

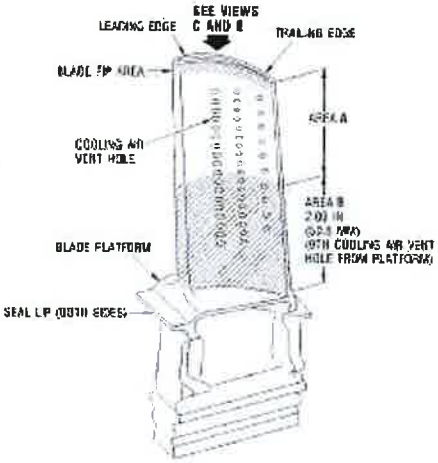
	
Combustor Overview	Combustor Splash Plates
	
Anti-Rotation Tabs with wear	Anti-Rotation Tabs with wear
	
Fuel Nozzle	Fuel Nozzle

High Pressure Turbine:









High Pressure Turbine	Comments:
HPT Stage 1 Nozzles	No issues noted in this area
HPT Stage 1 Shrouds	Serviceable cracks noted from previous inspections.
HPT Stage 1 Rotor Blades	Minor TBC loss on numerous blades. Serviceable condition.
HPT Stage 2 Nozzles	Segment with crack that is on a 500hr watch has not gotten worse. T/E erosion has gotten slightly worse. Still serviceable. All other issues noted in previous reports have not gotten worse.
HPT Stage 2 Shrouds	Minor shroud rub noted throughout the stage
HPT Stage 2 Rotor Blades	No issues noted on any stage 2 blades
Stage 11 Check Valves	All flappers in place
Additional Comments	Serviceable

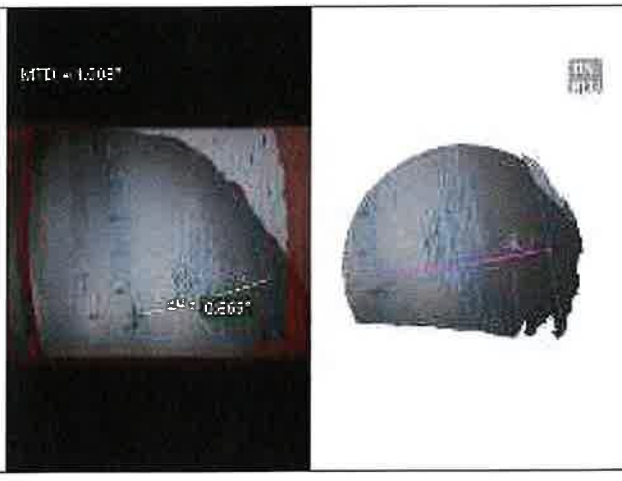
HPTR1 T/E Tip.

HPTR1 T/E Root.

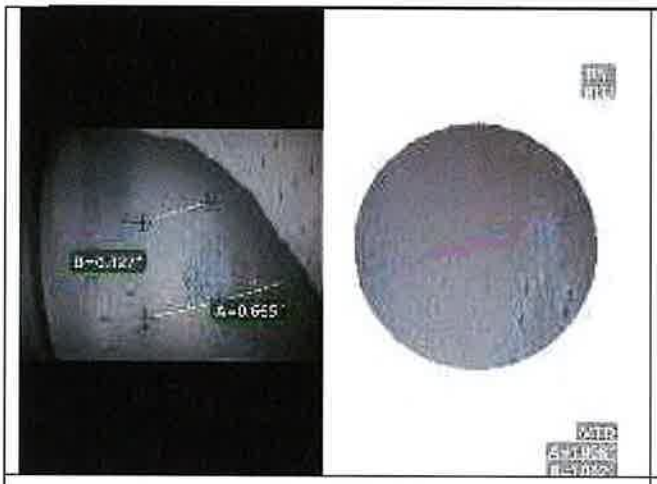
HPTN1 L/E.

HPTN1 L/E.

HPTN1 T/E.

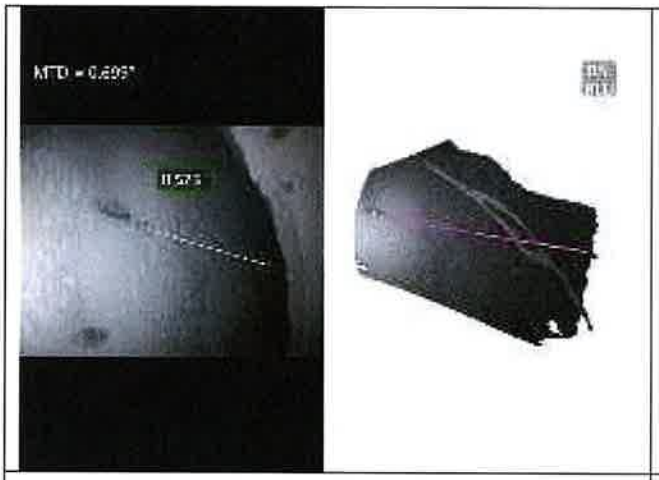


Stage 1 HPT Shroud Crack Servieable



Stage 1 HPT Shroud Crack Servieable

Stage 1 HPT Shroud Crack Servieable



Stage 1 HPT Shroud Crack Servieable

Stage 1 HPT Shroud Crack Servieable

Stage 1 HPT Shroud Crack Servieable

Stage 1 HPT Shroud Crack Servieable

Stage 1 HPT Shroud Crack Servieable

Stage 1 HPT Shroud Crack Servieable

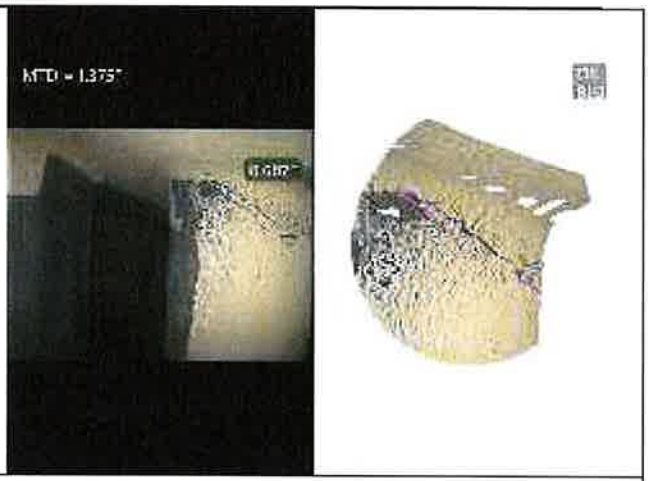
HPTR1 L/E Tip

HPTR1 L/E Root

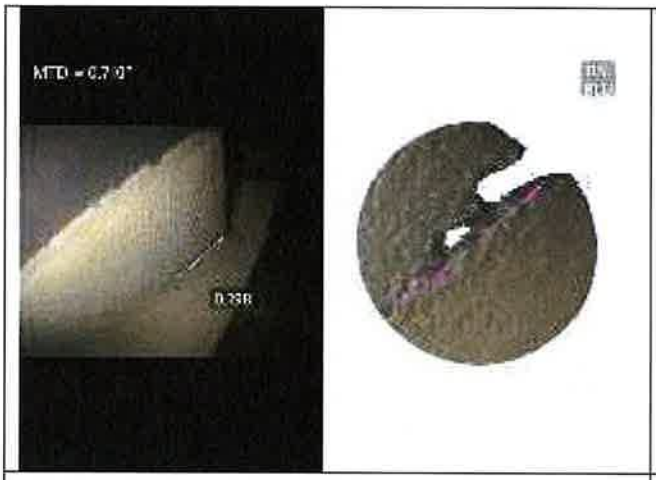
HPTR1 L/E Tip

HPTR 1 LE Root

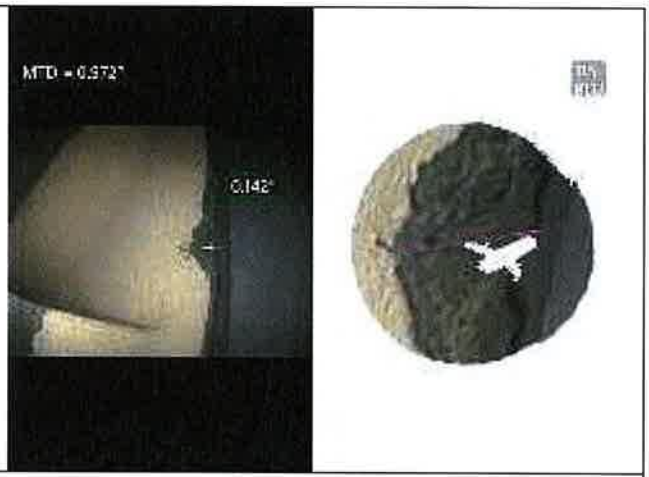
HPTN2 T/E and Outer Platform 500hr watch



HPTN2 T/E and Outer Platform 500hr watch



HPTN2 T/E and Outer Platform



HPTN2 T/E and Outer Platform.

HPT Stage 2 shroud

HPT Stage 2 nozzle serviceable erosion

HPTR2 L/E Tip

HPT2N Concave Serviceable Erosion

HPTR2 T/E Tip

HPTR2 T/E Root

Stage 11 check valve

Stage 11 Check valve

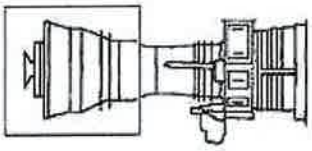
Stage 11 check valve.

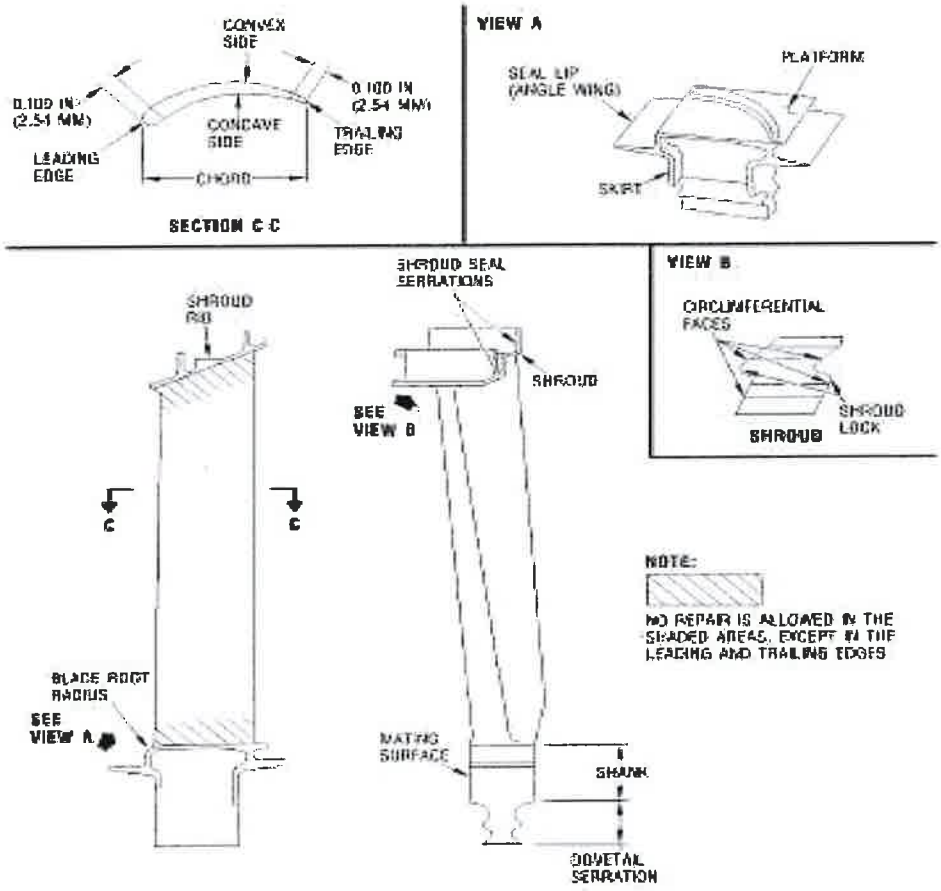
Stage 2 cooling tube

HPTR2 L/E Tip

HPT2N T/E Platform Erosion

Low Pressure Turbine:





Low Pressure Turbine	Comments:
Nozzle Vanes	No issues noted in this area
Rotor Blades	No issues noted on any blades in LPT
T4.8 Probes	All probes in serviceable condition
P4.8 Probe	Probe is serviceable condition
Additional Comments	Serviceable

T48 Probe.

T48 Probe.

LPT Stage 1 L/E Outer Platform

LPT Stage 1 L/E Inner Platform

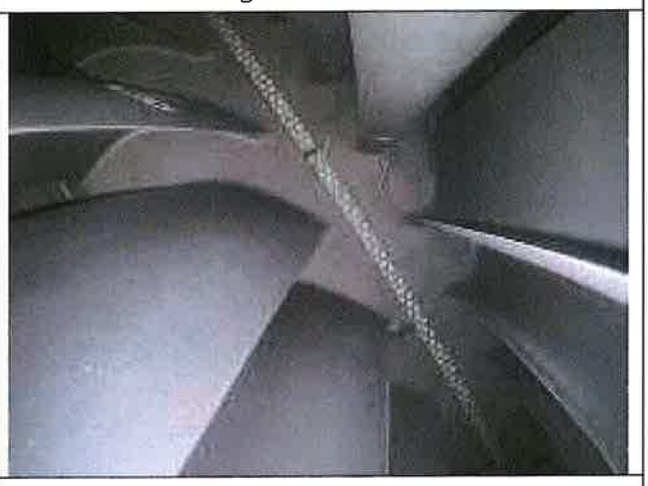
LPT Stage 1 T/E Outer Platform

LPT Stage 1 T/E Inner Platform

LPT Stage 2 L/E Outer Platform

LPT Stage 2 L/E Inner Platform

LPT Stage 3 T/E Outer Platform



LPT Stage 3 T/E Inner Platform

LPT Stage 4 L/E Outer Platform

LPT Stage 4 L/E Inner Platform

LPT Stage 5 T/E Outer Platform

LPT Stage 5 T/E Outer Platform

LPT Stage 5 T/E Outer Platform

LPT Stage 5 T/E Outer Platform

Intentionally Blank

Intentionally Blank

Training Roster

Subject: CC1 operations change (for CROs and Manager)

Location: Dover Conference Room

	Name	Dept	Signature	Date
	Jarman, Mark	A Shift CRO		11/13/23
	Pepper, Gregg	B Shift CRO		10/30/23
	Frazier, Kenneth	C Shift CRO		3NOV23
	Tkachuk, Alexander	D Shift CRO		11-6-23
	Just, Ernst	Manager - Dover		10/25/23
	Lukens, Robert	Lead Operator		10/25/23
	MacDonald, Gregory	EHS/ I&C Lead		10/25/23