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February 6, 2014

Ms. Barcy F. McNeal, Secretary  
Public Utilities Commission of Ohio  
180 E. Broad Street, 11th Floor  
Columbus, OH 43215-3793

Re: Case No. 10-369-EL-BGN

Dear Ms. McNeal:

Attached please find a letter from Bill Whitlock, Executive Vice President, Eastern Division of EDP Renewables concerning the April 24, 2012 Turbine Failure at Timber Road II Wind Farm. We request that you file this document in the open Timber Road II docket, Case No. 10-369-EL-BGN.

Thank you for your cooperation in this matter.

Sincerely,

M. Howard Petricoff

MHP/jaw



February 5, 2014

Klaus Lambeck  
Chief  
Facilities, Siting & Environmental Analysis Division  
Department of Energy and Environment  
180 East Broad Street  
Columbus, Ohio 43215-3793

RE: April 24, 2012 Turbine Failure at Timber Road II Wind Farm ("Timber Road II")

Dear Mr. Lambeck,

This letter continues the communications between your office, the Ohio Power Siting Board ("OPSB"), and EDP Renewables North America LLC ("EDPR NA") on behalf of its subsidiary, Paulding Wind Farm II LLC ("Timber Road II"), regarding the April 24, 2012 failure of two blades on one Vestas V100-1.8 MW wind turbine at Timber Road II ("Incident"). Following the last letter from EDPR NA to OPSB dated May 31, 2013, this letter provides an update in regards to the next steps to return Timber Road II to full operation.

As you are aware, since the Incident, Vestas, the turbine manufacturer, has been developing and implementing a plan to remedy all blades at Timber Road II that Vestas identified are at risk of having a defect similar to the one that caused the Incident ("Remediation Plan"). Recently, Vestas received certification letters from Det Norske Veritas (DNV), an independent certifying body, certifying that the laser shearography and spar reinforcement developed by Vestas as part of the Remediation Plan will return the at-risk blades to their originally assumed design level. Attached to this letter you will find a letter from Vestas along with the two certification letters from DNV.

Vestas has determined that once the Remediation Plan is implemented on all at-risk blades on a turbine that Load Reduced Mode ("LRM") can be removed and the turbine can be returned to full, unrestricted operation. However, to provide further comfort to the OPSB, Vestas has developed a plan to inspect the effectiveness of the spar reinforcement on a sample of the remediated blades after a period of time at full operation ("Inspection Plan"). The Inspection Plan will be reviewed by an independent engineer, who will provide a written opinion of the suitability of the inspection to detect failures of the spar reinforcement. EDPR NA and Vestas

*msc*



expect to be able to share the details of the Inspection Plan and the letter from the independent engineer with the OPSB by March 31, 2014.

Moving forward, once the Remediation Plan is implemented on all at-risk blades on a turbine, the turbine will be removed from the mitigation plan and allowed to return to full, unrestricted operation. Vestas estimates that the Remediation Plan will be implemented on all at-risk blades at Timber Road II by April 2014.

We appreciate the OPSB's continued cooperation as we work to return Timber Road II to full operation in a safe and responsible manner.

Sincerely yours,

EDP Renewables North America LLC

A handwritten signature in black ink, appearing to read 'Bill Whitlock'.

Bill Whitlock  
Executive Vice President, Eastern Region

cc: Gabriel Alonso, EDPR NA  
Brian Hayes, EDPR NA  
Leslie Freiman, EDPR NA  
Erin Bowser, EDPR NA  
Christian Venderby, Vestas  
Kim Wissman, OPSB

Handwritten initials in black ink, possibly 'MB' or 'MBL'.

January 24, 2014

EDP Renewables North America, LLC  
Attn: Brian Hayes, Executive Vice President, Asset Operations  
808 Travis St, Ste 700  
Houston, TX 77002

RE: Timber Road II

Dear Mr. Hayes,

The Timber Road II wind power plant has continued to safely operate under a Load Reduced Mode (LRM) since the two blades failed on a single V100-1.8 MW turbine on April 24, 2012.

Vestas has successfully completed the final testing of the V100-1.8 MW blade spar reinforcement solution which has been certified by Det Norske Veritas (DNV) as well as the acceptance shearography criteria. Attached to this letter you will find the certification letters from DNV.

The Vestas blade production plant in Brighton, Colorado, has taken all measures to ensure that the spar reinforcement work and processes are in compliance with the quality program and standards.

We are pleased our team of experts have systematically identified and developed a plan to resolve the blade spar issue that will enable Timber Road II to return to full unrestricted operation.

Now, having the final DNV acceptance and production processes in place, Vestas kindly requests that the spar-reinforced blades are approved to be released to full, unrestricted operation by removing the Load Reduced Mode (LRM) implemented as precautionary measure at Timber Road II.

Reference doc:

- IC-1753-162WVVT-1.Reinforcement\_Testing\_Reinf\_Criterion
- IC-1753-162WVVT-3.Shearography

I would kindly request your response within a week, so we may know how you intend to proceed.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'CB', is positioned above the printed name.

Chris Brown  
President  
Vestas-American Wind Technology, Inc.



Vestas Wind Systems A/S  
Hedeager 42

8200 Århus N  
Denmark  
Att: Kaj Morbech Halling

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Your ref:

Our ref:

DNV Reg. No.: OC-1753-18E4HJK\_CT.01  
Sign: EMC/BEVE  
Corresp. No.: IC-1753-162WVVT-3

Date:

2013-08-13

### **Shearography Method to Detect Wrinkles in 49 m blades**

Dear Kaj Morbech Halling

DNV have assessed the approach of Vestas Technology R&D, to utilize the non-destructive testing (NDT) method Laser Shearography (LS) for detecting and measuring wrinkles of more than 0.1 height/length (H/L) ratio in the UD laminate on a Vestas 49m blade.

A 'Spider' has been developed in cooperation with [REDACTED] as carrier for their [REDACTED] digital LS scanner. In an on-ground LS scanning the Spider has been demonstrated to secure the positioning of the LS-scanner during scanning of the blade from the inside. The position radius is referenced to a tape measure that is deemed sufficiently accurate to give a reliable location of discontinuities found in the scanning process.

A method and tools for applying controlled loads to the blade have been developed and have been demonstrated to produce reactions that are detectable with LS and presented real time in the form of monitor screen images (called 'signatures'). These 'signatures' are captured and recorded for reference and further processing.

The 'signatures' picked up by LS have been demonstrated to represent discontinuities in the laminate. Positioning and characterization of the discontinuities identified as fibre misalignments have been demonstrated for the full laminate thickness and documented.

By dissection of components with documented LS responses, and by visual inspection and measuring of H/L ratios, a library of references has been developed.

Personnel operating the LS equipment and personnel interpreting the captured signatures have been educated, trained and examined in accordance with a procedure that complies with internationally recognised certification schemes.

It has been decided to perform two (2) independent interpretations on each set of results.

A Gauge R&R study (a standardized method for assessing a measurement system) has been carried out which confirm that the final interpretations of test results are within the recommendation of AIAG MSA on repeatability and reproducibility.



DNV hereby approve the approach in qualifying the Laser Shearography method for blade examination.

The documentation verified by DNV to issue this letter is listed in the Appendix to this letter.

Yours sincerely  
for Det Norske Veritas Danmark A/S

Erik M. Christiansen  
Lead Auditor / Senior Engineer

Bente Vestergaard  
Head of Section, Principal Engineer

**Appendix.- List of verified documents**

| #   | <i>Doc</i> | <i>Rev</i> | <i>Title</i>                                 |
|-----|------------|------------|----------------------------------------------|
| /1/ | 0037-6787  | V01        | Shearography Measurement System Report       |
| /2/ | 0035-6244  | V01        | Guideline of NDT Shearography Certification  |
| /3/ | 0034-2684  | V00        | Laser Shearography Inspection of V100 blades |
| /4/ | 0038-1150  | V02        | SWI On-ground LS scanning of 49m Blades      |
| /5/ | 0037-3718  | V00        | Wrinkle Library                              |





Vestas Wind Systems A/S  
Hedeager 42

8200 Århus N  
Denmark  
Att: Kaj Morbech Halling

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Your ref:

Our ref:

Date:

DNV Reg. No.: OC-1753-18D5AIM Sign: AMQ/BEVE  
Corresp. No.: IC-1753-162WVVT-1

2013-09-05

## **Reinforcement of 12m for 49m blades with misaligned carbon fibres**

Dear Kaj Morbech Halling

A number of Vestas' 49m blades have been affected by misaligned carbon fibres in the load carrying spar. Vestas has established and documented the root cause for the misaligned fibres, including position and severity for the misaligned fibres. DNV has previously approved the root cause analysis and the corresponding reports under DNV letters OC-642246-I2PVMBF-11 and OC-642246-I2PVMBF-12.

To restore the blades extreme and fatigue strength to the assumed design level, Vestas has developed a reinforcement solution - 'reinforcement patch' - for blades affected by misaligned fibres. The reinforcement patch uses a pre-cured laminate which is bonded onto the blade spar lee ward and wind ward internal surfaces. In order to decide if the reinforcement patch is to be installed on blades with misaligned fibres, Vestas has developed and implemented a criterion based on shearography results as detailed in Vestas report 0039-9791. The reinforcement criterion is approved by DNV. The shearography method was approved by DNV under letter IC-1753-162WVVT-3.

A 12 m reinforcement patch installed in 49 m blades with fibre misalignments has been subjected to full scale testing, to verify the extreme and fatigue strength. The blade under testing was selected from the affected population with wrinkles and installed with the reinforcement patch of 12 m, blade #131217 (CIM#6). CIM#6 has been subjected to a test program as follows: pre-fatigue static, fatigue, and post-fatigue static tests in accordance to IEC 61400-23 requirements. The test campaign was completed satisfactorily without any significant damages in the reinforced area, or in other sections of the blade.

Based on the documentation submitted by Vestas, DNV agrees that the static and fatigue strength of the blade with misaligned fibres is fully restored to the assumed design level by implementing the 12 m reinforcement patch.

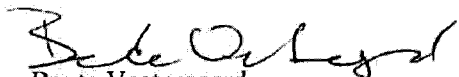


The documentation verified by DNV to issue this letter is listed in the Appendix.

Yours sincerely  
for Det Norske Veritas Danmark A/S



Amilcar Quispitupa Yupa  
Engineer



Bente Vestergaard  
Head of Section, Principal Engineer



### Appendix.- List of verified documents

| <i>Document No.</i> | <i>Revision</i> | <i>Title</i>                                                             |
|---------------------|-----------------|--------------------------------------------------------------------------|
| 0032-8579           | 4 / 2013-07-15  | REINFT ASSY FULL PATCH, 49M                                              |
| 29002987            | 4 / 2013-07-15  | Carbon Slab Full Patch                                                   |
| 29003062            | 3 / 2013-07-12  | Biax 1 full patch                                                        |
| 29003063            | 3 / 2013-07-12  | Biax 2 full patch                                                        |
| 29003064            | 3 / 2013-07-12  | Biax 3 full patch                                                        |
| 29003065            | 3 / 2013-07-12  | Biax 4 full patch                                                        |
| 29010584            | 0 / 2013-06-21  | Biax PP tap patch 49 m                                                   |
| 0038-7429           | 1               | V100 Spar Reinforcement 12m Panel Installation                           |
| 0039-2013           | 0 / 2013-07-19  | V100 CIM6 Certification Documents Overview                               |
| 0035-6244           | 1 / 2013-05-31  | Guideline NDT Shearography certification                                 |
| 0037-6787           | 1 / 2013-04-05  | Laser Shearography System for Winkle Detection                           |
| 0038-1748           | 0 / 2013-03-06  | V100 CIM6 Full-Scale Blade Test, Initial Fatigue Life Test Specification |
| 0037-1992           | 0 / 2013-07-19  | V100 CIM6 Full-Scale Blade Test, Static Test Specification               |
| 0037-2207           | 0 / 2013-03-06  | V100 CIM6 Full-Scale Blade Test, Fatigue Test Specification              |
| 0039-1243           | 0 / 2013-07-19  | V100 CIM6 Blade Initial Life Fatigue Test                                |
| 0039-1343           | 0 / 2013-07-19  | V100 CIM6 Blade Static test 1, Laboratory Report                         |
| 0039-3549           | 0 / 2013-07-19  | V100 CIM6 Fatigue Test Report, Reinforcement Patch Validation            |
| 0039-3700           | 0 / 2013-07-19  | V100 CIM6 Blade Static Test 2, Laboratory Report                         |
| 0038-0534           | 0 / 2013-04-26  | V100 - CIM 6 visual inspection form                                      |
| 0035-1730           | 2012-11-08      | CIM6 Shearography inspection blade#131217 R10-R37                        |
| 0039-9791           | 2013-08-29      | Misalignment Criterion for V100 CIM Affected Population                  |

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**2/6/2014 3:08:09 PM**

**in**

**Case No(s). 10-0369-EL-BGN**

Summary: Correspondence regarding the April 24, 2012 Turbine Failure at Timber Road II Wind Farm electronically filed by M HOWARD PETRICOFF on behalf of EDP Renewables North America LLC