

**BEFORE THE
PUBLIC SERVICE COMMISSION OF UTAH**

**IN THE MATTER OF THE
APPLICATION OF MILFORD
WIND CORRIDOR PHASE I, LLC
AND MILFORD WIND
CORRIDOR PHASE II, LLC FOR
CERTIFICATES OF
CONVENIENCE AND
NECESSITY FOR THE MILFORD
PHASE I AND PHASE II WIND
POWER PROJECT**

Docket No. 08-2490-01

Sur-Rebuttal Testimony of

Larry Henriksen

**Exhibit MWC 3.0SR
[NON-CONFIDENTIAL VERSION]**

On behalf of

**Milford Wind Corridor Phase I, LLC and
Milford Wind Corridor Phase II, LLC**

September 22, 2008



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SUR-REBUTTAL TESTIMONY OF LARRY HENRIKSEN

1

2 **Q Please state your name.**

3 A Larry Henriksen.

4 **Q What is your occupation and by whom are you employed?**

5 A I am an electrical engineer, employed by POWER Engineers, Inc., P.O. Box
6 1066, 3940 Glennbrook Drive, Hailey, ID 83333.

7 **Q On whose behalf are you appearing in this proceeding?**

8 A I am appearing on behalf of Milford Wind Corridor Phase I, LLC and Milford Wind
9 Corridor Phase II, LLC ("Milford Wind").

10 **Q Please describe your education and work experience.**

11 A I graduated in 1968 from Idaho State University with a Bachelor's Degree in
12 General Engineering and from Washington State University in 1975 with a
13 Bachelor's Degree in Electrical Engineering. In 2001 I received a Masters
14 Degree in Electrical Engineering from the University of Idaho. I worked for
15 Westinghouse Electric Corporation from 1968 to 1972; Cowlitz County

16 (Washington) Public Utility District #1 from 1975 to 1985 and was the Chief
17 Engineer for the Cowlitz County PUD from 1981 to 1985; POWER Engineers
18 from 1985 to 1997; Schweitzer Engineering Laboratories from 1999 to 2001
19 where I served as Director of Systems and Services; and POWER Engineers
20 from 2001 to the present. At POWER Engineers I have served as Department
21 Manager for the Transmission Line Design department, Operations Manager,
22 Project Manager, Senior Studies Engineer, Studies Department Manager and am
23 currently the Business Unit Director for the SCADA and Analytical Services
24 Business Unit. I am a Registered Professional Engineer in states of Idaho and
25 Washington.

26 **Q Do you have experience with electrical system studies and transmission**
27 **and substation planning, design, and construction?**

28 A Yes. My resume is attached as Exhibit MWC 3.1

29 **Q What is the purpose of your testimony?**

30 A I will adopt the statements of Evelyn Lim in paragraphs 21 and 24 Milford Wind
31 Corridor's Application, which are attached hereto as Appendix 1. Primarily I will
32 address the questions of whether the generator lead line conflicts with or
33 adversely affect the operations of any existing utility; and whether the
34 transmission line was designed and will be maintained in a safe and reliable
35 manner. I will also respond to the testimonies of Dr. Joni Zenger and Mike
36 Velarde concerning the effect on the grid of interconnecting Milford Wind's
37 generator lead line. In particular I address the following issues:

- 38 • Whether the system impact studies indicate that interconnecting Milford Wind's
39 proposed line would pose a problem for any existing certificated utility;
- 40 • The effect of connecting Milford Wind's 345 kV generation lead line to the
41 transmission system at the Intermountain Power Project ("IPP").
- 42 • The construction and maintenance standards applicable to the line.
- 43 • I do not address the question of whether the line extends into the service territory
44 of a certificated Utah public utility.

45 **Q What documents have you reviewed in preparation for offering this**
46 **testimony?**

47 A I have reviewed the Milford Valley Wind Project Interconnection at Intermountain
48 System Impact Study Final Report, dated February 24, 2007 ("System Impact
49 Study") ; the Milford Wind Corridor Interconnection Project at Intermountain
50 Optional Phase I System Impact Study Final Report, dated March 5, 2008
51 ("Optional System Impact Study"); the Milford Wind Corridor Interconnection
52 Project ("MWCIP") Facility Development Study prepared by Los Angeles
53 Department of Water and Power ("LADWP"), dated March 10, 2008; an
54 accompanying White Paper on Project Technical Details and Roles and
55 Responsibilities, prepared by LADWP, dated March 10, 2008, the UPC Wind
56 Project Connection to IPP Switchyard Independent Review, performed by R.W.
57 Beck, dated January 15, 2008. I have also reviewed the Pre-Filed Rebuttal
58 Testimony of Joni S. Zenger, Ph.D., filed in this proceeding on September 8,

59 2008, on behalf of the Division of Public Utilities (“Division”), and the Testimony
60 of Mike Velarde, also filed September 8, 2008, on behalf of UAMPS.

61 **Q What has been your involvement in the Milford Wind Project ?**

62 A I was involved with the design of the Milford Wind substation and the generator
63 lead line. I am familiar with the plans and with the physical arrangements of
64 interconnection at IPP. The work I was responsible for primarily consisted of
65 analyses to assist in the selection of 345 kV line conductors, optical ground wire
66 and equipment at the Milford substation. I also assisted in the selection of the
67 Milford substation topology.

68 **Q Were you involved in performing the either of the system impact studies**
69 **that you mentioned earlier?**

70 A No. The Los Angeles Department of Water and Power prepared the system
71 impact studies. Based upon my review of the system impact statements I do not
72 find any reason to believe them unreliable or otherwise inadequate. I form this
73 opinion based upon over 30 years of experience in which I have routinely
74 reviewed and been responsible for preparing electrical system studies. In my
75 presentation position engineers under my supervision routinely perform many
76 types of electrical system studies, including the detailed electrical analyses to
77 support system impact studies.

78 **Q In Dr. Zenger’s analysis of whether the transmission line would conflict**
79 **with the operations of existing utility, at L. 96-102, she quoted from the**
80 **System Impact Study dated February 24, 2007. Can you compare that**

81 **System Impact Study with the “Optional System Impact Study” dated**
82 **March 5, 2008?**

83 A Both of these studies evaluate the effects of the proposed interconnection on the
84 surrounding electrical transmission grid, including neighboring electric utility
85 systems. Both of these studies assume that the wind farm is generating
86 approximately 400 MW of power, approximately 200 MW from an initial phase
87 and approximately 200 MW from a second phase. The studies will tend to
88 overstate the impact of the wind farm as only 300 MW of generation is being
89 currently permitted instead of the 400 MW used in the studies.

90 **Q. What is the difference between them?**

91 A The primary difference between the two studies is the type and number of
92 turbines that would be used to generate the power. The turbine mix studied in
93 the Optional System Impact Study more accurately reflects the turbine mix
94 Milford Wind currently plans to construct.

95 **Q What is the stated purpose of these studies?**

96 A The original System Impact Study states that its purpose is **[begin confidential**
97 **testimony]**

98

99

100 **[end confidential]**

101 **Q Do both of these studies support Dr. Zenger’s conclusion that the**
102 **transmission line will not adversely affect the operations of existing public**
103 **utilities in the state of Utah?**

104 **A Yes. The System Impact Study (2/24/07) concludes on page 15 [begin**
105 **confidential]**

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110 **[end confidential]** The Optional System Impact Study reaches the same result
111 at page 12: **[begin confidential]**

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117 **[end confidential]**

118 **Q Dr. Zenger’s testimony at L. 96-102, discusses whether, in the event of**
119 **outage contingencies, Milford I, Milford II or IPP could continue to operate**
120 **without the need to be “backed down.” Do you agree with her conclusion?**

121 **A Yes. But, because she evidently relied on only the first System Impact Study,**
122 **her response may be incomplete. Both system impact studies confirm that**

123 conclusion. Note that the Optional Phase I System Impact Study identifies the
124 need for a special protection system (SPS) described on page 4 of the report

125 **[begin confidential]**

126

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128

129 **[end confidential]**

130 This would be an extreme situation, with loss of the STS 500 kV line and both
131 IPP-Mona 345 kV lines, which would require de-energizing the Milford wind farm.

132 I did not find any outage contingencies reported in the system impact studies that
133 would require reducing (backing down) generation levels at Milford I, Milford II, or
134 IPP. Note that the new SPS described in the Optional Phase I System Impact
135 Study appears to affect only the wind generation and should not result in any
136 change in system performance under this difficult set of contingencies.

137 **Q Mr. Velarde's testimony apparently claims that the Optional System Impact**
138 **Study shows that "the generation of IPP Units 1 and 2 will be reduced." Do**
139 **you agree?**

140 **A** No. Mr. Velarde appears to be confusing the technical capabilities of the system
141 after Milford Wind's line is interconnected, with the market choices that buyers
142 and sellers of power will have once the wind plant comes on line.

143 **Q Please explain.**

144 A There are two potential circumstances that may affect whether IPP's generating
145 unit outputs need to be reduced. The first circumstance is where there is an
146 interruption on the regional transmission system. This circumstance was
147 assessed in both the System Impact Study and the Optional System Impact
148 Study. As part of their contingency analyses, these studies assessed a number
149 of scenarios where it was assumed that Milford I, Milford II and IPP would be
150 operating and an unexpected interruption of service on one or more of the
151 transmission lines including line in Utah, Nevada, and the Southern Transmission
152 System DC Line to California ("STS")) would occur. The studies are based upon
153 maximum steady generation at IPP required to keep the STS 500 kV DC line
154 operating at 1920 MW.

155 **Q What do the system impact studies say about the effect on the regional**
156 **system?**

157 A The studies conclude that under these circumstances, there would be no
158 overload on any line in the regional system. The System Impact Study
159 concluded on page 15: **[begin confidential]**

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164 **[end confidential]**

165 **Q Did the Optional System Impact Study reach the same result?**

166 A Yes. The Optional Phase I System Impact Study concluded on page 12 that
167 **[begin confidential]**

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172 **[end confidential]**

173 **Q Please describe the second circumstance that may require “backing**
174 **down.”**

175 A The second circumstance, which is also contemplated in the System Impact
176 Study and the Optional System Impact Study, relates to the purchasing choices
177 by the owners of rights to transmit power on the STS. These rights owners, by
178 selecting from among the resources available on the STS, determine what power
179 will flow south on the DC line. When Milford I and Milford II go into operation,
180 there will be additional resources available for transmission for these rights
181 holders to select from. To the extent the STS rights owners choose resources
182 other than IPP, and to the extent any resulting “excess” power from IPP is not
183 chosen by some other rights holder with access to some other line such as the
184 Nevada (IPP to Gonder) or Utah (IPP to Mona) lines, then generation at IPP
185 might have to be “backed down.” Over all, the addition of Milford I and Milford II
186 would serve to increase the total generation resources available to all customers.

187 **Q. Mr. Velarde claims that “any such reduction” of Unit 1 and 2 and the effect**
188 **it may have on Utah purchases was not explained or addressed in the**
189 **studies.” How do you respond?**

190 A First, it is not clear which “purchasers” Mr. Velarde might be referring to. Both
191 system impact studies that I have reviewed for this project examine specified
192 transmission lines interconnecting at IPP. Second, as discussed above, the
193 system impact studies are meant to show the physical capability of the facilities
194 to accept the interconnection of a new generation resource. To the extent the
195 availability of the new resource displaces some of the demand for an existing
196 resource, then the existing resource may have to reduce its output. But that is an
197 economic consequence of interconnecting the new resource, not a physical
198 consequence or limitation of the system. The existing electric transmission lines
199 and generation resources are unchanged by the addition of the Milford Wind
200 Project. The only difference is that an additional generation resource will be
201 added. So long as system stability is not somehow adversely affected (which
202 two system impact studies show it would not be) the additional generation
203 resource should only serve to make the electrical grid more robust and more able
204 to serve other purchasers of power. The ability to schedule and transmit the
205 generation potentially freed up by the addition of the Milford Wind Project may
206 prove to be of value to other purchasers of electric power.

207 **Q Dr. Zenger notes that Milford plans to expand the generation capacity of**
208 **the project by as much as 600 MW beyond Phase I and Phase II. Will that**
209 **require expansion of the interconnection line?**

210 A As proposed, the line will have sufficient capacity to transmit up to a maximum of
211 approximately 1000 MW. Milford Wind should have no need to expand the line
212 geographically, or to increase the capacity of the line, as it proceeds to develop
213 and expand the generation capacity at the wind farm.

214 **Q What safety codes have been followed in designing the generator lead line**
215 **and interconnection?**

216 A The line is designed in accordance with national standards for the design of
217 transmission structures set by the National Electric Safety Code (NESC) and the
218 American Society of Civil Engineering (ASCE). The 345-KV Interconnection to
219 the IPA Switchyard, attached as Appendix A to the Generator Interconnection
220 Agreement was designed by Los Angeles Department of Water and Power.

221 **Q What is required to maintain the line after it has become operational?**

222 A Transmission lines require little routine maintenance. They have no moving
223 parts. This line in particular consists of steel structures; conductor systems made
224 of steel and aluminum; insulators and hardware that are designed for a long life,
225 in excess of 30 years. The vegetation in the vicinity of this line will not require
226 routine tree trimming. Regularly scheduled line visual inspections should be
227 performed, and all electrical faults should be carefully analyzed and the

228 structures where the faults occurred carefully inspected for damage to insulators
229 or conductor.

230 **Q Does this conclude your testimony?**

231 **A Yes.**

232

233

APPENDIX 1

234

STATEMENTS ADOPTED FROM APPLICATION

235

236 21. The Project complies with the criteria set out at Utah Code Ann. § 54-4-25(3) because the
237 Project will not interfere with the operation of the facilities or systems of any public utilities. As
238 described above, the power from Phase I will be delivered by Milford I to SCPPA through
239 interconnection facilities at the IPP substation, and that power will then be transmitted through
240 the existing IPA 500 kV DC transmission line to southern California. None of the Phase I power
241 will enter a transmission system owned by or serving any Utah public utility, and there will be no
242 effect on any such system.

243

....

244 24. As required by Section 54-4-25(4)(B) of the code, Milford I and II state that none of their
245 proposed facilities will conflict with or adversely affect the operations of any existing
246 certificated fixed public utility which supplies electric power or service to the public, and that
247 Milford I and II facilities will not constitute an impermissible extension into the territory
248 certificated to the existing fixed public utility.

249