



Oregon

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May 11, 2015

Via Electronic Filing and U.S. Mail

OREGON PUBLIC UTILITY COMMISSION
ATTENTION: FILING CENTER
PO BOX 1088
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RE: Docket No. UM 1717 – In the Matter of NORTHWEST NATURAL GAS COMPANY, dba NW NATURAL, Application for Prudence Review of Costs of Post-Carry Wells.

Enclosed for electronic filing is Public Utility Commission Staff's Opening Testimony.

Pages 6, 8, 21, 27, 28, 30, 31 and 32 of Exhibit 100, Exhibit 102 and Exhibit 103 contains confidential information and are protected under Protective Order no. 15-081. A copy of these confidential materials has been mailed today to all parties who have signed the protective order as indicated on the UM 1717 Service List.

/s/ Kay Barnes

Kay Barnes

Filing on Behalf of Public Utility Commission Staff

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**PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1717

**STAFF OPENING TESTIMONY OF
ERIK COLVILLE**

**In the Matter of
NORTHWEST NATURAL GAS COMPANY,
dba NW NATURAL,
Application for Prudence Review of Costs of Post-
Carry Wells.**

**REDACTED
May 11, 2015**

CASE: UM 1717
WITNESS: ERIK COLVILLE

**PUBLIC UTILITY COMMISSION
OF
OREGON**

STAFF EXHIBIT 100

Staff Opening Testimony

REDACTED
May 11, 2015

**CERTAIN INFORMATION CONTAINED IN
STAFF EXHIBIT 100
PAGES 6, 8, 21, 27, 28, 30, 31 and 32
ARE CONFIDENTIAL AND SUBJECT TO PROTECTIVE
ORDER NO. 15-081**

1 **Q. Please state your names and business address.**

2 A. My name is Erik Colville, P.E. My business address is 3930 Fairview Industrial
3 Drive SE, Salem, Oregon 97302.

4 **Q. Mr. Colville, please state your occupation and your witness
5 qualifications.**

6 A. I am a Senior Utility Analyst in the Energy Resources and Planning Division of
7 the Utility Program of the Public Utility Commission of Oregon. My
8 qualifications are set forth in Staff/101.

9 **Q. What is the purpose of your testimony?**

10 A. The purpose of my testimony is to evaluate the prudence of Northwest Natural
11 Gas Company's (NWN) decisions related to its joint venture agreement,
12 originally entered into with Encana Oil and Gas (USA), Inc. (Encana) and later
13 transferred to Jonah Energy, LLC (Jonah Energy), and its 2014 investments in
14 related gas wells (known as post-carry wells). NWN asserts its decision to
15 invest in the seven post-carry wells at issue was reasonable, and NWN
16 requests that the Commission issue an order finding that (1) the investment
17 was prudent; and (2) the costs of the investment should be included in
18 customer rates through the 2015 Purchased Gas Adjustment (PGA), and
19 subsequent PGAs as additional costs are incurred.

20 **Q. Did you prepare exhibits for this docket?**

21 A. Yes. I prepared Staff/101, consisting of 1 page, Staff/102 consisting of two
22 pages, and Staff/103 consisting of three pages.

23 **Q. Please summarize your testimony.**

1 A. First, my testimony examines the prudence of NWN's decision to release
2 Encana from the obligation to drill additional carry wells under the original joint
3 venture agreement, in return for certain accommodations and a concession.
4 The result of this decision was an amended agreement with Jonah Energy. I
5 conclude that NWN's decision in this regard was prudent and recommend the
6 Commission conclude so as well.

7 Next, my testimony examines the prudence of NWN's decisions to invest in gas
8 wells (known as post-carry wells) under the amended agreement with Jonah
9 Energy. The prudence standard is that NWN must show that the investments
10 were prudently made, based on the information that it knew or should have
11 known at the time of the utility's actions and decisions without the advantage of
12 hindsight. To inform its decisions to invest in the post-carry wells, NWN
13 compared the expected cost of gas from each of the proposed post-carry wells
14 to the benchmark cost of a 10-year financial hedge. NWN admits that the post-
15 carry wells under the amended agreement carry more risk than did the carry
16 wells under the original agreement, while also admitting that its investment
17 analysis approach for the proposed post-carry wells was basically the same as
18 that used for the original agreement carry wells.

19 I found one major and two minor deficiencies in the process NWN followed for
20 informing its post-carry well investment decisions. While I found three
21 deficiencies in NWN's post-carry well investment analysis, I conclude that
22 NWN's failure to conduct adequate risk analyses, as required by the Order
23 No. 07-002 Guidelines, is a major deficiency. It is upon this major deficiency

1 that I base my prudence recommendation. I recommend the Commission find
2 that the seven post-carry well investments (well numbers 83-34, 98-34, 84-34,
3 97-34, 109-33, 72-34 and 105-34) were not prudently made because NWN did
4 not perform adequate analysis, as measured by the objective standard of the
5 Order No. 07-002 Guidelines, to inform its post-carry well investment decisions.
6 While there is a precedent in PacifiCorp, dba Pacific Power, Docket No. UE
7 246 for a one-year revenue requirement disallowance as a consequence for
8 inadequate investment analysis, I recommend a disallowance of gas costs for
9 ratepayers that exceed the market cost of gas for the gas from the seven post-
10 carry wells. As an alternate, because hedging is an existing part of NWN's gas
11 supply strategy, I recommend a disallowance of gas costs for ratepayers that
12 exceed a 10-year financial hedge benchmark price of \$0.4725 per therm for the
13 gas from the seven post-carry wells.

14 **Q. How does the Commission determine prudence?**

15 A. NWN must show that the investments were prudently made, based on the
16 information that it knew or should have known at the time of the utility's actions
17 and decisions without the advantage of hindsight. *See generally In re*
18 *PacifiCorp*, Order No. 12-493 (UE 246) at 25-27.¹

19 **Q. Did NWN make a specific prudence review request?**

¹ See also *In re PGE*, Order No. 99-033 (UE 102) at 36-37 ("Prudence is determined by the reasonableness of the actions 'based on information that was available (or could reasonably have been available) at the time.'), and *In re Northwest Natural Gas*, Order No. 99-697 (UG 132) at 52 ("In this review, therefore, we must determine whether the NW Natural's actions and decisions, based on what it knew or should have known at the time, were prudent in light of existing circumstances.").

1 A. Yes. In its February 26, 2015 filing (Application), NWN specifically asked for a
2 prudence review of its investments in seven post-carry wells.

3 **Q. Is a more broad prudence review required?**

4 A. Yes. While the original joint venture agreement with Encana (Original
5 Agreement) was reviewed and found prudent by the Commission in Order
6 No. 11-176, that agreement was amended in the process of Encana
7 transferring its interests to Jonah Energy. As a result, I conclude it is necessary
8 to review the prudence of NWN's decision to enter into the agreement with
9 Jonah Energy (Second Amended Agreement).

10 **Q. Why is a prudence review of the Second Amended Agreement**
11 **necessary?**

12 A. The Second Amended Agreement alters the Original Agreement that was
13 previously reviewed and found prudent by the Commission. The Second
14 Amended Agreement has not yet been reviewed for prudence by the
15 Commission. Thus, a prudence review related to that Second Amended
16 Agreement is a necessary step in the Commission's mission to ensure that
17 utility services are provided to consumers at just and reasonable rates.

18 **Q. Please summarize the Encana Original Agreement.**

19 A. The Original Agreement called for NWN and Encana to jointly fund the drilling
20 of 102 "carry wells" in exchange for a share of the gas produced in certain
21 sections of the Jonah Field.² Approximately 54 carry wells were to be drilled in
22 Sections 32, 33, and 34 (the "Updip Area") while 48 carry wells were to be

² The wells are known as "carry wells" because NWN was required to "carry" a portion of Encana's pro rata share of the drilling costs. See NWN/100, Summers/4.

1 drilled in Sections 8 through 17, (the “Downdip Area”). For each carry well
2 drilled in the Updip Area, NWN would receive a share of the gas produced in
3 Sections 32, 33, or 34; for each carry well drilled in the Downdip Area, NWN
4 would receive a share of gas produced in Sections 32, 33 or 34, plus an
5 interest in the gas produced from the specific Downdip well drilled. Interests
6 assigned to NWN with each well would begin in Section 32 until NWN’s interest
7 reached 45 percent, then move to Section 33 until NWN’s interests reached 45
8 percent, and then move to Section 34 where interests would be assigned until
9 NWN’s interest reached 32.5 percent.

10 In addition, after all of the carry wells had been drilled, NWN would have the
11 option to participate in drilling additional elective “post-carry wells”. For each
12 post-carry well for which NWN helped fund the drilling, it would receive a
13 percentage of the gas produced from that specific well (as opposed to a
14 percentage from one of the sections). Importantly, for the post carry wells,
15 NWN would be required to fund only its pro rata share of the costs—equivalent
16 to its interest in the relevant section. NWN/100, Summers/4 lines 6-23 and
17 Summers/5 lines 1-5.

Second Amended Agreement

18 **Q. What event brought about the Second Amended Agreement?**

19 A. On January 14, 2014, after 72 of the 102 carry wells had been drilled pursuant
20 to the Original Agreement, Encana notified NWN that it intended to sell its
21 interests in the Jonah Field. At that same time, Encana requested that NWN

1 agree to terminate its obligation to fund and drill the remaining 30 carry wells,
2 in order to remove certain conditions of the Original Agreement that could
3 possibly burden the sale. Application at page 3, lines 12-16.

4 **Q. What options did NWN have in response to Encana's request?**

5 A. <begin confidential> [REDACTED]
6 [REDACTED]
7 [REDACTED]
8 [REDACTED]
9 [REDACTED]
10 [REDACTED]
11 [REDACTED]
12 [REDACTED]
13 [REDACTED]
14 [REDACTED]
15 [REDACTED]
16 [REDACTED]
17 [REDACTED] <end

18 confidential> These Original Agreement provisions effectively gave NWN three
19 options to respond to Encana's termination request: (1) retain its interests,
20 including the carry well drilling program, under the terms of the Original
21 Agreement, with the new buyer as partner (Original Agreement option); (2) sell
22 its interests (including the future production from the carry wells that had been
23 drilled) along with Encana's interests (Sell option); or (3) terminate the

1 obligation to fund and drill carry wells, but retain all other rights under the
2 Original Agreement, including the option to consent to the development of
3 future post-carry wells (Terminate option).

4 **Q. Please summarize the Second Amended Agreement.**

5 A. After weighing its options, NWN agreed to release Encana from the obligation
6 to drill additional carry wells, in return for certain accommodations (the
7 Terminate option discussed below). Application at page 3, lines 16-21. It is this
8 release of Encana in return for certain accommodations that form the Second
9 Amended Agreement.

10 The main accommodation in the Second Amended Agreement is related to the
11 volumes of gas NWN will receive from the carry wells that had been drilled
12 under the Original Agreement. Due to lower well gas production volume than
13 had been originally forecasted, and also due to some changes to the drilling
14 schedule, NWN had received lower gas volumes than it had expected at the
15 time it entered into the Original Agreement. NWN/100, Summers/7 lines 13-17.
16 Prior to executing the Second Amended Agreement, NWN had been assigned
17 a 45 percent interest in Section 32, a 41.4 percent interest in Section 33, and
18 no interest in Section 34. Paragraph 3.3 of the Second Amendment provides
19 that NWN's ownership interest remain unchanged in Section 32, increases to
20 45 percent in Section 33, and to 49 percent in Section 34. NWN/100,
21 Summers/8 lines 7-12, as corrected by NWN response to Staff Data Request
22 (DR) 3.

1 After the ownership interest adjustments, NWN expects to receive from the
2 carry wells between 65 and 67.1 billion cubic feet (Bcf) of gas,³ which is nearly
3 the same volume (prorated) that NWN expected to receive from the carry wells
4 under the Original Agreement. NWN/100, Summers/9 lines 2-5.
5 NWN and Encana implemented these changes in the Second Amended
6 Agreement. Importantly, all other rights and obligations conferred by the
7 Original Agreement remained in place, including the terms governing the
8 drilling of post-carry wells. Application at page 3, line 21 and at page 4, lines 1-
9 2.

10 **Q. Were there concessions made by NWN in negotiation of the Second**
11 **Amended Agreement?**

12 A. Yes. NWN's response to Staff DR 17 identified that <begin confidential> [REDACTED]
13 [REDACTED]
14 [REDACTED]
15 [REDACTED]
16 [REDACTED] <end confidential>

17 **Q. How did NWN evaluate its options in response to Encana's request?**

18 A. To evaluate its options in response to Encana's Original Agreement termination
19 request, NWN calculated the net present value (NPV) of the total cost of gas
20 under each option.⁴ To calculate the NPV, NWN started with an estimate of the
21 gas reserve volumes that would be expected under each option, as well as the

³ Production from approximately <begin confidential> [REDACTED] <end confidential> remaining years.

⁴ Production from approximately <begin confidential> [REDACTED] <end confidential> remaining years.

1 costs of those volumes. For the Sell option, the cost of reserve gas was offset
2 by the expected revenue from the sale of reserve interests.

3 Next, because the volumes under the Terminate and Sell options were less
4 than those expected under the Original Agreement option, NWN identified the
5 volumes of replacement gas required to bring all options to equivalent volumes,
6 and priced the replacement gas using a forward price curve. Once NWN had
7 used this information to calculate the cost of the reserve gas and the cost of
8 replacement gas, for equivalent volumes under each option, it brought the total
9 cost to an NPV.

10 The evaluation identified the Terminate option as the lowest cost option, with a
11 total NPV of \$243 million for 64.7 Bcf. The Sell option had a total NPV of \$260
12 million for 64.7 Bcf; and the Original Agreement option had the highest cost
13 option at an NPV of \$299 million for 64.7 Bcf.

14 **Q. Did NWN consider its negotiation concessions in its evaluation of**
15 **options?**

16 A. No. I consider the value of NWN's negotiation concessions de minimis in the
17 evaluation of its options in response to Encana's Original Agreement
18 termination request. As a result, I do not find this to be a deficiency in NWN's
19 evaluation.

20 **Q. Did Encana ultimately sell its interests in the Jonah Field?**

21 A. Yes. On March 28, 2014, Encana signed an agreement to sell its interests in
22 the Jonah Field to Jonah Energy. NWN/100, Summers/12 lines 5-7.

23 **Q. Should NWN have evaluated its options differently?**

1 A. I did not identify a deficiency in or an alternative to NWN's evaluation of options
2 in response to Encana's Original Agreement termination request.

3 **Q. What is your recommendation related to the prudence of NWN's**
4 **decision to enter into the Second Amended Agreement?**

5 A. I conclude that NWN's decision to enter into the Second Amended Agreement
6 was prudent and recommend the Commission conclude so as well.

Post-Carry Well Investments

7 **Q. Please summarize the post-carry well investment.**

8 A. In April 2014, acting under the terms of the Second Amended Agreement,
9 Jonah Energy informed NWN that it was tentatively planning to propose the
10 drilling of four post-carry wells. On May 7, 2014, Jonah Energy followed up this
11 notice with formal requests to drill two wells and requests for another seven
12 wells followed shortly thereafter. NWN had 30 days to decide whether to invest
13 in the proposed post-carry wells. Application at page 4, lines 8-11.

14 There are two areas of risk presented by the post-carry wells that were not
15 present with the carry wells: volume risk and the risk of capital cost over-runs.

16 As to volume risk, for post-carry wells, NWN receives an interest in the gas
17 volume produced by only the specific well drilled. As to capital cost risk, while
18 NWN bears only its own pro rata share of capital investment in each post-carry
19 well, the cost is not capped. Thus, there is no mitigation of the risk that well gas
20 volumes will fall short of forecast or that capital costs will exceed estimates.

21 NWN/100, Summers/13 lines 5-23.

1 **Q. What did NWN do to inform its post-carry well investment decisions?**

2 A. NWN compared the expected cost of gas from each of the proposed post-carry
3 wells to the benchmark cost of a 10-year financial hedge (including the cost of
4 a credit facility). Like the carry wells in the Original Agreement, the post-carry
5 wells were seen as a long-term hedge in NWN's gas portfolio. The Original
6 Agreement recognized that over a 10-year period the transaction would, on
7 average, provide 10 percent of NWN's annual gas supply. NWN then
8 questioned whether each post-carry well's gas volume could be obtained
9 economically for ratepayers. The investment decision criterion was that if the
10 expected cost of gas from the proposed post-carry well was lower than the cost
11 of a 10-year hedge, then NWN would consent to participate in that specific
12 post-carry well. NWN/100, Summers/15 lines 7-23.

13 **Q. Was NWN's investment analysis approach for the post-carry wells the**
14 **same as that used for the Original Agreement carry wells?**

15 A. Yes. NWN testified that its investment analysis approach for the proposed
16 post-carry wells was basically the same as that used for the Original
17 Agreement carry wells. NWN/100, Summers/16 lines 1-2.

18 **Q. How did NWN calculate the expected cost of gas from the post-carry**
19 **wells?**

20 A. Estimating the cost of gas was a two-step process. First, NWN estimated the
21 costs, both capital and ongoing, that would be incurred to drill and operate the
22 post-carry wells. The cost estimate included three components: operating
23 costs, depletion costs, and carrying costs. The total well cost was the sum of

1 these three components and was modeled by month over the expected life of
2 each post-carry well.⁵ These costs were then divided by the forecast gas
3 production volumes each month, to develop a cost per therm, which would
4 allow a direct comparison to the benchmark 10-year hedge price per therm.
5 NWN/100, Summers/16 lines 4-11.

6 **Q. What are the operating, depletion, and carrying costs?**

7 A. Operating costs are variable costs that reflect the costs of actually
8 operating the wells to provide NWN with its share of the gas production
9 volume. In addition, the operating costs include severance and ad valorem
10 taxes levied by the state of Wyoming, which are based on the volumes
11 produced, the market price, and the tax rate. The operating costs also
12 include midstream costs, which are the costs of gathering and processing
13 the gas between the wellhead and the interstate pipeline. The operating
14 costs were estimated by Netherland Sewell & Associates, Inc. (NSAI)⁶ and
15 corroborated by NWN's experience with the operation of the carry wells in
16 the Jonah Field thus far. NWN/100, Summers 16 lines 13-23 and
17 Summers/17 lines 1-6.

18 Depletion cost is essentially amortization and is based on the total capital
19 cost of the wells. It was calculated on a dollar per therm basis and

⁵ The expected life varies by well but is approximately 20 years.

⁶ According to NWN/200, Miller/2, Netherland Sewell & Associates, Inc. was the oil and gas consultant that provided the well forecasts used to evaluate the original transaction with Encana (the Original Agreement).

1 recorded based on forecast gas volumes produced. NWN/100,
2 Summers/17 lines 8-12.

3 Carrying costs are the financing costs incurred by NWN to fund the capital
4 investment. By including carrying costs equal to NWN's regulated rate of
5 return in the cost of gas, NWN assumed recovery of its regulated return on
6 this investment. NWN/100, Summers/17 lines 14-18.

7 **Q. How did NWN estimate the expected gas volumes from the post-carry**
8 **wells?**

9 A. NWN used three approaches to estimating expected gas volumes in its
10 estimate of projected costs of gas. NWN 100 Summers/17, lines 21-23 and
11 Summers/18 lines 1-23.

12 First, NWN estimated gas volumes by drawing from NSAI's average forecasts
13 for the remaining undrilled economic wells—or Proved Undeveloped
14 Reserves—for the sections in which drilling was proposed. This approach
15 was called the "Section Average" approach. To determine NWN's expected
16 gas volumes, the total forecast gas volumes were multiplied by NWN's net
17 ownership interest in the applicable section. The net ownership interest was a
18 function of NWN's ownership percentage in the section, less the royalties that
19 will be paid. This calculation yielded the net gas volume that would be
20 produced under NWN's interest.

21 Second, NWN estimated gas volumes using the forecast provided by NSAI
22 for the individual post-carry well proposed for drilling. This approach was

1 termed the “Individual Well” approach. Instead of averaging these estimates,
2 as in the Section Average Approach, for the Individual Well approach NWN
3 used the forecast for the individual well proposed.

4 Third, NWN used the actual gas volumes produced by the carry wells in
5 which it had participated to estimate expected gas volumes for future post-
6 carry wells, on a section average basis. This approach was called the
7 “Historical Performance” approach. *See generally* NWN/100, Summers/17-
8 18.

9 **Q. How did NWN determine the benchmark cost of a 10-year financial**
10 **hedge?**

11 A. NWN obtained quotes from two financial counterparties for 10-year financial
12 hedges, which were \$0.435 per therm and \$0.4545 per therm, respectively.⁷
13 In addition to the price of the hedge itself, NWN considered the additional
14 cost incurred if it purchased a credit facility. The credit facility is essentially an
15 insurance policy to protect NWN and ratepayers in the event that the
16 counterparty to the 10-year hedge is unable to fulfill its end of the obligation.
17 The estimated cost of a credit facility of 18 cents per dekatherm was added to
18 the hedge quote, producing a total 10-year financial hedge benchmark price
19 range between \$0.453 and \$0.4725 per therm. NWN/100, Summers/19 lines
20 2-14.

⁷ Per NWN’s response to Staff DR 10, two currently active financial counterparties were asked for quotes. Because both quotes were similar in amount, there was likely no benefit to be gained by seeking additional quotes.

1 **Q. What was the result of NWN's post-carry well investment analysis?**

2 A. NWN consented to participate in the drilling of a specific proposed post-carry
3 well if the highest of the three estimated costs of gas (one estimated cost of
4 gas using each of the above three gas volume forecast approaches) for that
5 post-carry well was less than the benchmark 10-year hedge price. NWN/100,
6 Summers/18 lines 21-23.

7 In addition, on a gas volume basis, NWN's analysis determined that any post-
8 carry well forecast to produce 1.6 billion cubic feet (Bcf) of gas or better would
9 be economic compared to a 10-year hedge. NWN/100, Summers/19 lines 15-
10 17.

11 In tabular form (cost per therm of gas), the result of NWN's analysis of the
12 first five proposed post-carry wells is presented below. NWN/100,
13 Summers/20-21.⁸

⁸ The well number indicates the number of the well and the Section in which it is located. For example, well number 109-33 means well number 109 located in Section 33.

Well Number	Section Average	Historical Performance	Individual Well	Hedge Benchmark	Economic or Non-economic
83-34	\$0.322	\$0.363	\$0.290	\$0.435 - \$0.455	Economic
98-34	\$0.322	\$0.363	\$0.294	\$0.435 - \$0.455	Economic
84-34	\$0.322	\$0.363	\$0.315	\$0.435 - \$0.455	Economic
97-34	\$0.322	\$0.363	\$0.328	\$0.435 - \$0.455	Economic

1

Well Number	Section Average	Historical Performance	Individual Well	Hedge Benchmark	Economic or Non-economic
109-33	\$0.369	\$0.387	\$0.412	\$0.435 - \$0.455	Economic

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Following completion of the analysis result presented above, and investment in the first five post-carry wells, NWN updated its analysis method using refined NSAI gas volume forecasts, and began to include the credit facility cost in the 10-year hedge benchmark cost. The analysis result (i.e. economic) for the first four post-carry wells discussed above remained unchanged with the updated analysis, but the fifth post-carry well (well number 109-33) result became questionable (i.e. mixed result) under the Historical Performance gas volume forecast approach, as shown in the table below. NWN/100, Summers 21-24.

Well Number	Section Average	Historical Performance	Individual Well	Hedge Benchmark	Economic or Non-economic
109-33	\$0.398	\$0.525	\$0.429	\$0.453 - \$0.473	Mixed result

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In tabular form (cost per therm of gas), the result of NWN's analysis of the sixth through ninth proposed post-carry wells is presented below. NWN/100, Summers/22.

Well Number	Section Average	Historical Performance	Individual Well	Hedge Benchmark	Economic or Non-economic
99-33	\$0.398	\$0.525	\$0.573	\$0.453 - \$0.473	Non-economic
72-34	\$0.359	\$0.387	\$0.338	\$0.453 - \$0.473	Economic
41-33	\$0.398	\$0.525	\$0.572	\$0.453 - \$0.473	Non-economic
105-34	\$0.359	\$0.387	\$0.347	\$0.453 - \$0.473	Economic

5

6

Q. Please summarize NWN's post-carry well investment decision.

7

A. NWN exercised its option under the Second Amended Agreement to invest in the following seven post-carry wells: well numbers 83-34, 98-34, 84-34, 97-34, 109-33, 72-34 and 105-34.

8

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Q. Did NWN abide by its post-carry well investment decision criteria?

1 A. Yes. As described above, NWN's decision criterion for investment in a
2 proposed post-carry well was to participate if the highest of the three
3 estimated costs of gas (one estimated cost of gas using each of the three gas
4 volume forecast approaches) for that post-carry well was less than the
5 benchmark 10-year hedge price. NWN/100, Summers/18 lines 21-23. The
6 NWN analysis of the nine proposed post-carry wells showed that seven of
7 those proposed wells should be economic – because the highest of the three
8 estimated costs of gas for those post-carry wells was less than the
9 benchmark 10-year hedge. Using its decision criterion, NWN consented to
10 invest in the seven “economic” proposed post-carry wells (specifically well
11 numbers 83-34, 98-34, 84-34, 97-34, 109-33, 72-34 and 105-34), but not the
12 two “non-economic” proposed post-carry wells (well numbers 99-33 and 41-
13 33).

14 In addition, on a gas volume basis, NWN identified a decision criterion that
15 any post-carry well forecast to produce 1.6 Bcf of gas or better would be
16 economic compared to a 10-year hedge. NWN/100, Summers/19 lines 15-17.

17 NWN abided by this investment decision criterion when it suspended
18 consideration of additional post-carry wells once it learned that actual gas
19 volumes from earlier approved post-carry wells were consistently below the
20 1.6 Bcf gas flow threshold. NWN/100, Summers/24 lines 6-11.

21 Refer to my testimony below as to why abiding by its decision criteria is not a
22 key to determining the prudence of NWN's investment in the post-carry wells.

1 **Q. Was there a complication in the analysis process and application of the**
2 **decision criteria?**

3 A. Yes. Following the decision to invest in the first five proposed post-carry wells
4 (well numbers 83-34, 98-34, 84-34, 97-34, and 109-33), NWN updated its
5 analysis method using refined NSAI gas volume forecasts. NWN/100,
6 Summers/22 lines 6-10. NWN also began, at this point, to include the credit
7 facility in the 10-year hedge benchmark cost. NWN/100, Summers/20
8 footnote 4. The analysis result (i.e. economic) for the first four post-carry wells
9 remained unchanged using the updated analysis method. However, NWN
10 witness Summers testified that the fifth post-carry well (well number 109-33)
11 decision became questionable (i.e. mixed result) under the Historical
12 Performance gas volume forecast approach in the updated analysis method,
13 as shown in the table above. NWN/100, Summers/23 lines 10-14.

14 **Q. Are the post-carry wells more or less risky than the carry wells?**

15 A. More risky. NWN admits that the post-carry wells under the Second Amended
16 Agreement carry more risk than did the carry wells under the Original
17 Agreement. NWN/100, Summers/13 lines 5-23. While the Second Amended
18 Agreement provides many of the same protections as were provided for the
19 carry wells in the Original Agreement, there are two areas of increased risk
20 presented by the post-carry wells: volume risk and the risk of capital cost
21 over-runs.

1 For the carry wells, if the specific well drilled produced significantly less than
2 forecast, the risk was mitigated because NWN would receive an increased
3 percentage of other producing wells. As such, NWN would still be
4 compensated to a significant extent. However, for post-carry wells, NWN
5 receives an interest in only the gas volume produced by only the specific well
6 drilled. Therefore, if a post-carry well produces 50 percent of forecast gas
7 volumes, and meets the expected cost, the value received by NWN for that
8 specific investment will be 50 percent of that expected.

9 The second difference pertains to the risk in development costs. While NWN
10 bears only its own pro rata share of capital investment in each post-carry well,
11 the cost is not capped, as it was for carry wells.

12 Thus, there is no mitigation of the risk that post-carry well gas volumes will fall
13 short of forecast or that capital costs will exceed estimates.

14 **Q. What was the post-carry well investment amount?**

15 A. Based upon NWN's response to Staff DR 15, NWN's capital investment in the
16 seven post-carry wells is \$10.8 million (average of \$1.54 million per well). In
17 addition to capital investment, there are on-going operating, depletion, and
18 carrying costs that must be paid. Based upon NWN's response to Staff DR
19 15⁹ the forecast lifetime¹⁰ average operating and depletion costs, and the
20 forecast lifetime average carrying costs for the seven post-carry wells is

⁹ Excel spreadsheet titled "OPUC_DR_15_Attachment-1_CONFIDENTIAL.xlsx." Operating and depletion cost in OPEX tab, column I. Carrying cost in ROI-A tab, column AI.

¹⁰ The expected well life varies by well, but is approximately 20 years.

1 <begin confidential> [REDACTED] <end confidential>,
2 respectively.

3 **Q. Because the post-carry wells were known to be more risky than the**
4 **carry wells, was the analysis process NWN followed adequate to inform**
5 **its investment decision?**

6 A. No.

7 **Q. Why not?**

8 A. NWN witness Summers testifies that NWN's investment analysis approach for
9 the proposed post-carry wells was basically the same as that used for the
10 Original Agreement carry wells. NWN/100, Summers/16 lines 1-2. I argue that
11 knowing the post-carry wells were more risky than the carry wells, as
12 admitted by NWN's witness (NWN/100, Summers/13 lines 3-23), NWN
13 should have conducted a more robust analysis process for informing its post-
14 carry well investment decisions than was used for the carry wells.

15 **Q. You testified earlier that NWN complied with its decision criteria. Why**
16 **isn't that compliance adequate to inform its investment decision?**

17 A. As I testify immediately above, the post-carry wells were a greater risk than
18 were the carry wells. For this reason a more robust investment analysis was
19 warranted. Instead, NWN conducted a "business as usual" investment
20 analysis. As discussed below, NWN's post-carry well investment analysis
21 approach also suffered from deficiencies. Given the need for more robust
22 analyses and deficiencies in the analyses performed, the decision criteria

1 established by NWN was not adequately supported, and thus was not reliable
2 for decision making.

3 **Q. What deficiencies did you find in NWN's post-carry well investment**
4 **analysis approach?**

5 A. I found one major and two minor deficiencies in the process NWN followed for
6 informing its post-carry well investment decisions:

7 1. NWN did not perform adequate risk analysis to support its decisions to
8 proceed with drilling each post-carry well. I conclude this is a major
9 deficiency in NWN's post-carry well investment analysis.

10 2. NWN did not analyze its investment options on a "comparable-risk" basis.
11 While important, I term this to be a minor deficiency as compared to
12 NWN's failure to perform adequate risk analysis.

13 3. NWN did not seek an independent second opinion regarding the forecast
14 gas volumes from the post-carry wells. Again, while important, I term this
15 to be a minor deficiency as compared to NWN's failure to perform
16 adequate risk analysis.

**Major Deficiency - NWN did not Perform Adequate Risk Analysis to Support
its Decisions to Proceed with Drilling Each Post-Carry Well**

17 **Q. Did NWN perform adequate risk analysis to support its decisions to**
18 **proceed with drilling the post-carry wells?**

19 A. No.

20 **Q. Please explain.**

1 A. Staff DR 18 requested NWN to provide all risk analyses performed to support
2 each decision to proceed with investment in each post-carry well. NWN's
3 response stated that DR 12 confidential Attachments 8 through 21 present an
4 NPV analysis for each well. The NPV analysis for each well showed the
5 amount by which its expected outcome exceeded the NPV of entering into a
6 10-year financial hedge. NWN stated that this favorable variance provided its
7 measurable risk tolerance for the participation in each well. In addition, NWN
8 stated that DR18 confidential Attachment-2 "Breakeven tab" demonstrates
9 the positive NPV associated with the 1.6 Bcf decision criteria as another
10 calculation to show the measurable risk tolerance associated with its post-
11 carry well investment decisions. Lastly, NWN stated that DR18 confidential
12 Attachment-1 was prepared as a summary for its Executive Committee. This
13 Executive Committee summary presented various cases where the drilling
14 costs and/or the gas volumes were varied, and presented the resulting
15 estimated cost of gas. NWN stated this summary was prepared before any
16 post-carry well investments had been consented to.

17 I find that a favorable NPV variance, by itself, is not a risk analysis approach.
18 Further, while the Executive Committee summary presented a single-point-in-
19 time (rudimentary) risk analysis, I find even this rudimentary risk analysis was
20 inadequate, as discussed below. I find no evidence of NWN performing other
21 risk analyses. As I testified earlier, I conclude this lack of adequate risk
22 analyses is a major deficiency in NWN's post-carry well investment analysis.

1 **Q. Is it reasonable to expect that NWN perform risk analysis before making**
2 **an investment decision?**

3 A. Yes. In Order No. 89-507, the Commission established that “Least-Cost
4 Planning” would guide resource decision making in Oregon. More recently,
5 Order No. 07-002 established in Guideline 1(b) that “Risk and uncertainty
6 must be considered.” Guideline 2(c) in that same Order states “The primary
7 goal must be the selection of a portfolio of resources with the best
8 combination of expected costs and associated risks and uncertainties for the
9 utility and its ratepayers” and “To address risk...include, at a minimum: Two
10 measures of...risk: one that measures variability of cost and one that
11 measures severity of bad outcomes.” In addition, in Guideline 1(c), in the
12 third and fourth bullets, the Commission requires utilities to include a
13 “[d]iscussion of the proposed use and impact on costs and risks of physical
14 and financial hedging” and to explain how their “resource choices
15 appropriately balance cost and risk.” As a result, the approach of considering
16 risk and uncertainty is well established as an expectation in resource
17 decisions (including hedges) by Oregon utilities.

18 **Q. Is there precedent for NWN performing risk analysis before making an**
19 **investment decision?**

20 A. Yes. For example, NWN’s Docket No. LC 60 (2014 Integrated Resource Plan)
21 includes an action item stating as follows:

1 “Conduct cost risk analysis on acquiring capacity on the proposed
2 Pacific Connector pipeline to ensure that the Company has fully
3 analyzed its options should the project move forward.” Action Item
4 2(c)(iii).

5 Thus, I conclude it is within NWN’s on-going business practices to perform
6 risk analysis before making investment decisions.

7 **Q. Is it reasonable to apply the Order No. 07-002 Guidelines to NWN’s post-**
8 **carry well investment analysis?**

9 A. Yes. In her testimony, NWN witness Summers presents the post-carry wells
10 as a long-term hedge in NWN’s gas portfolio. NWN/100 Summers/15 lines 7-
11 8. As such, the post-carry wells are one of the resources in NWN’s portfolio of
12 resources to meet customer demand. Thus, it is reasonable to apply
13 approaches and expectations from the Order No. 07-002 Guidelines
14 (resource planning guidelines) to NWN’s post-carry well investment analyses.

15 **Q. What is the expected content of a risk analysis in accordance with the**
16 **Order No. 07-002 Guidelines?**

17 A. The expected content of a risk analysis in accordance with the Order
18 No. 07-002 Guidelines would consider how variations in inputs to the post-
19 carry well investment analysis would impact the analysis result, as well as
20 consider the likelihood and conditions of those variations occurring. More
21 specifically, the risk analysis would consider the potential variability of well
22 drilling cost, well development and completion cost, well operation and

1 maintenance cost, well gas production volume, and forward gas price. This
2 approach to considering risk is captured in Order No. 07-002 Guidelines 1(b)
3 and 1(c). While the NWN Executive Committee summary discussed above
4 considered variations in well gas production volume and variations in capital
5 cost, I find even this rudimentary risk analysis was inadequate, as discussed
6 below. As a result, NWN did not perform adequate risk analysis to support its
7 post-carry well investment decisions that meets the Order No. 07-002
8 requirements.

9 **Q. How are the Order No. 07-002 Guidelines for risk analysis typically**
10 **applied in decision making by Oregon utilities?**

11 A. To comply with the Order No. 07-002 Guidelines, Oregon utilities generally
12 perform risk analysis using three approaches.¹¹ These three approaches
13 describe the consideration of risk that is captured in Order No. 07-002
14 Guidelines 1(b) and 1(c):

- 15 1. Deterministic Analysis – a process where various more or less “worst
16 case” scenarios are defined (e.g. potential variations in well drilling cost,
17 well development and completion cost, well operation and maintenance
18 cost, well gas production volume, and forward gas price), and the
19 expected outcomes calculated and compared.
- 20 2. Stochastic (statistically based) Analysis – a process where various
21 conditions and combinations of conditions (e.g. well drilling cost, well

¹¹ For example, these approaches are found in NWN's 2014 Integrated Resource Plan (Docket No. LC 60) Chapter 7.

1 development and completion cost, well operation and maintenance cost,
2 well gas production volume, and forward gas price) are randomly
3 "shocked/sampled" using defined probability distribution functions in
4 order to create a probability density function of discounted future values.

5 3. Sensitivity Analysis – a process used to refine and test analysis
6 outcomes for specific conditions (e.g. potential variations in well drilling
7 cost, well development and completion cost, well operation and
8 maintenance cost, well gas production volume, and forward gas price).

9 The choice of which approaches to use, and how to combine the approaches,
10 is driven by the specific needs of the utility to support prudent decision
11 making (i.e. what the utility knew or should have known at the time).

12 **Q. You testified earlier that the Executive Committee rudimentary risk**
13 **analysis was inadequate. Please explain.**

14 A. The Executive Committee rudimentary risk analysis considered cases with: a

15 <begin confidential> [REDACTED]
16 [REDACTED]
17 [REDACTED]
18 [REDACTED]
19 [REDACTED] <end confidential>.

1 As depicted in the table below, using information NWN knew at the time of the
 2 post-carry well investment analysis,¹² that the 72 carry wells gas production
 3 volume had been more than 40 percent over-estimated.

	formulae	Original		
Original wells	a	102		
Adjusted bcf (economic)	b	93.1		
Bcf per well	c=b/a	0.91		
New well count	d	72		
Relative bcf	e=c*d	65.7		
Production, bcf	f	6.5	so far	
Remaining reserves, bcf	g=e-f	59.2		
Projected reserves, bcf	h	32.5	left in the 72 wells	
Additional gas needed, bcf	i=g-h	26.7	shortfall	40.7%

4
 5 With known past errors of more than 40 percent in forecasting carry well gas
 6 production volume, a reasonable concern in the post-carry well investment
 7 analysis would be that forecast post-carry well gas volume could suffer from
 8 errors similar in magnitude. As a result, considering at most, a <begin
 9 confidential> [REDACTED] <end confidential>, as NWN did
 10 in its Executive Committee risk analysis, is inadequate.

11 As depicted below, the post-carry well investment analysis results for post-
 12 carry well numbers 83-34, 98-34, 84-34, 97-34, 109-33, 72-34, and 105-34,
 13 had economic margins of approximately minus 10 percent to slightly over 25

¹² The information used in the table is presented in NWN/100, Summers/8 line 19, NWN's response to Staff DR 4 Attachment 2 NPV Summary tab, and NWN response to Staff DR 16. This information was known at the time the investment decisions were made.

1 percent between the highest of the three forecast costs of gas for each post-
2 carry well and the benchmark 10-year hedge.¹³

Well Number	Highest Forecast Cost of Gas	10-Year Hedge (highest)	Economic Margin
83-34	\$0.363	\$0.455	25.3%
98-34	\$0.363	\$0.455	25.3%
84-34	\$0.363	\$0.455	25.3%
97-34	\$0.363	\$0.455	25.3%
109-33	\$0.387	\$0.455	17.6%
99-33	\$0.525	\$0.473	-9.9%
72-34	\$0.387	\$0.473	22.2%
41-33	\$0.525	\$0.473	-9.9%
105-34	\$0.387	\$0.473	22.2%

3
4 With economic margins that were smaller than known past errors in forecast
5 carry well gas production volume, a rudimentary risk analysis of shortfalls in
6 post-carry well gas production volume, at least as great as past experience
7 dictated, would have offered NWN useful information in its post-carry well
8 investment analysis.¹⁴ The usefulness of this information could have included
9 supporting a decision not to invest in a specific post-carry well, or supported a
10 decision to perform more comprehensive risk analysis, or supported
11 performance of statistically based risk analysis to further inform its investment
12 decisions.

¹³ To be conservative in my criticism of NWN's analysis, I used the best case post-carry well investment analysis results presented in NWN/100 Summers/20 line 5, Summers/21 line 7, Summers/22 above line 1, Summers/23 line 6, and Summers/24 line 1.

¹⁴ As discussed above, NWN's post-carry well investment analysis result is directly related to well gas production volume. Therefore, comparing well gas production volume variability to economic margin is valid.

1 Q. Did you find other inadequacies in the Executive Committee
2 rudimentary risk analysis?

3 A. Yes. As depicted in confidential Staff/102, the Executive Committee
4 rudimentary risk analysis considered the impact on the estimated cost of gas
5 of variations in gas production volume and capital costs. The baseline for this
6 risk analysis was the <begin confidential> [REDACTED]
7 [REDACTED] <end
8 confidential>.

9 While this rudimentary risk analysis considered <begin confidential> [REDACTED]
10 [REDACTED] <end
11 confidential>, NWN's post-carry well investment analysis used three
12 approaches to estimating expected gas volumes in its estimate of projected
13 costs of gas: Section Average; Individual Well; and Historical Performance.
14 As discussed above, NWN's decision criterion was to consent to participate in
15 the drilling of a specific proposed post-carry well if the highest of the three
16 estimated costs of gas (one estimated cost of gas using each of the three gas
17 volume forecast approaches) for that post-carry well was less than the
18 benchmark 10-year hedge price.

19 Staff/102 shows that the <begin confidential> [REDACTED]
20 [REDACTED]
21 [REDACTED]
22 [REDACTED]

1

2

[REDACTED] <end confidential>.

3

4

Given that NWN's Executive Committee rudimental risk analysis did not consider the <begin confidential> [REDACTED] <end

5

confidential>, as its decision criterion dictated, NWN's risk analysis was

6

inadequate to support its investment decision. The usefulness of this

7

information could have included supporting a decision not to invest in a

8

specific post-carry well, or supported a decision to perform more

9

comprehensive risk analysis, or supported performance of statistically based

10

risk analysis to further inform its investment decisions.

11

Q. The Executive Committee rudimentary risk analysis discussed above considered factors at a single point in time. Would a more comprehensive risk analysis present more refined information?

12

13

14

A. Yes. A more comprehensive risk analysis that considered costs and benefits over the life of each post-carry well would provide more refined information to inform NWN's post-carry well investment decision than a rudimentary risk analysis.

15

16

17

18

Q. Please provide an example of a more comprehensive risk analysis and describe how it would have aided NWN's post-carry well investment analysis.

19

20

1 A. As an example of a more comprehensive risk analysis, using information
2 NWN knew at the time of its post-carry well investment decisions,¹⁵ I used the
3 Excel spreadsheet provided by NWN titled "OPUC DR 12 Attachment-
4 17_CONFIDENTIAL.xlsx" to test the sensitivity of post-carry well investment
5 analysis to post-carry well gas production volume forecast variance. As
6 shown in confidential Staff/103, the approximate point where well number
7 109-33 tips from economic to non-economic is the case where forecast post-
8 carry well gas production volume is <begin confidential> [REDACTED]
9 [REDACTED] <end confidential>

10 With known past errors of more than 40 percent in forecasting carry well gas
11 production volume, a reasonable concern in the post-carry well investment
12 analysis would be that forecast post-carry well gas volume could suffer from
13 errors of similar magnitude.

14 As I testified above, with economic margins (<begin confidential> [REDACTED] <end
15 confidential> percent in this example) that were smaller than known errors in
16 forecast carry well gas production volume (40 percent for the carry wells), a
17 more comprehensive risk analysis of post-carry well gas production volume
18 would have offered NWN more refined useful information in its post-carry well
19 investment analysis. As also testified above, the usefulness of this
20 information could have included supporting a decision not to invest in a

¹⁵ Staff DR 12 requested workpapers to support the tables at NWN/100, Summers/20 line 5, Summers/21 line 7, Summers/22 above line 1, Summers/23 line 6, and Summers/24 line 1. NWN's response noted that DR 12 confidential Attachments 8 through 21 present the table results as well as NPV analysis for each well, which showed the amount by which its expected outcome for each well exceeded the NPV of entering into a financial hedge.

1 specific post-carry well, or supported performance of statistically based risk
2 analysis to further inform its investment decisions.

**Second Deficiency - NWN did not Analyze its Investment Options on a
Comparable-Risk Basis**

3 **Q. What do you mean by a “comparable-risk” basis?**

4 A. Comparable risk is defined as¹⁶ comparison of two or more risks with respect
5 to a common scale. In quantitative analysis, comparative risk is expressed as
6 a ratio, while in qualitative analysis it is expressed in relative terms, as one
7 risk being greater than the other. A common phrase expressing this concept
8 is comparing “apples to apples” rather than “apples to oranges.”

9 **Q. Did NWN analyze its investment options on a comparable-risk basis?**

10 A. No. The process NWN followed to inform its post-carry well investment
11 decisions included comparing the forecast cost of gas from each proposed
12 post-carry well to the cost of a 10-year hedge. The cost of a 10-year hedge
13 that NWN used included the cost of a credit facility. The credit facility is
14 essentially an insurance policy to protect NWN and ratepayers in the event
15 that the counterparty to the 10-year hedge is unable to fulfill its part of the
16 obligation. NWN/100, Summers/19 lines 9-12. There was no “insurance
17 policy” cost included in the forecast cost of gas from the proposed post-carry
18 wells. As a result, comparing the risky forecast cost of gas from a particular
19 post-carry well to the virtually guaranteed cost of a 10-year hedge does not

¹⁶ <http://www.businessdictionary.com/definition/comparative-risk.html>

1 support a decision to invest in a particular post-carry well. The comparison is
2 irrational because it inappropriately compares “apples to oranges.” As I
3 testified earlier, while important, I term this to be a minor deficiency as
4 compared to NWN’s failure to perform adequate risk analysis.

5 **Q. Was it possible for NWN to compare the investment in the post-carry**
6 **wells on a comparable-risk basis with the 10-year financial hedge?**

7 A. Yes. Requesting quotes for an “insurance policy” to protect NWN and
8 ratepayers in the event that the post-carry wells did not perform as forecast,
9 and adding to the forecast cost of gas a cost premium to reflect that
10 “insurance policy” would have provided NWN a more comparable analysis. In
11 the alternative, the cost of a credit facility could have been ignored altogether
12 in the analysis.

13 **Q. Did NWN’s post-carry well investment analysis suffer from another**
14 **comparability deficiency?**

15 A. Yes. I found that NWN’s post-carry well investment analysis compared the
16 cost of well gas for an approximate 20 year well life¹⁷ to the cost of a 10-year
17 financial hedge. In a similar vein to the comparable-risk deficiency I testified
18 to above, for an “apples to apples” comparison, the term, or life, of the post-
19 carry well gas cost and the financial hedge cost should have been equal. My
20 testimony regarding this comparability deficiency is brief because, like the

¹⁷ The expected well life varies by well but is approximately 20 years.

1 second deficiency above, I term this to be a minor deficiency as compared to
2 NWN's failure to perform adequate risk analysis.

**Third Deficiency - NWN did not Seek an Independent Second Opinion
Regarding the Forecast Gas Volumes from the Post-Carry Wells**

3 **Q. Did NWN seek an independent second opinion regarding the forecast**
4 **gas volumes from the post-carry wells?**

5 A. No. There is no evidence that NWN sought an independent second opinion
6 regarding the forecast post-carry well gas volumes that form the basis for the
7 forecast cost of gas.

8 **Q. Is it reasonable to expect that NWN would seek a second opinion**
9 **regarding forecast gas volumes from the post-carry wells?**

10 A. Yes. As I describe above, NWN's investment analysis approach for the
11 proposed post-carry wells was basically the same as that used for the
12 Original Agreement carry wells. I testified earlier that NWN should have
13 engaged in a more robust process for informing post-carry well investment
14 decisions than was used for the carry wells because it knew the post-carry
15 wells were more risky than the carry wells. I conclude a reasonable response
16 to the increased risk would be to seek an independent second opinion of the
17 forecast gas volumes to support its investment decisions.

18 **Q. What could be included in an independent second opinion of the gas**
19 **volume forecast?**

- 1 A. An independent second opinion could include,¹⁸ in order of increasing rigor:
- 2 1. Process Review. A Process Review is the result of an investigation by a
- 3 person who is qualified by experience and training to address the
- 4 adequacy and effectiveness of an entity's internal processes and controls
- 5 relative to reserves estimation. The Process Review does not include an
- 6 opinion relative to the reasonableness of the reserves quantities or
- 7 Reserves Information and should be limited to the process and control
- 8 system reviewed.
- 9 2. Reserves Audit. A Reserves Audit is the process of reviewing certain of
- 10 the pertinent facts interpreted and assumptions made that have resulted in
- 11 an estimate of reserves and/or Reserves Information prepared by others
- 12 and the rendering of an opinion about (1) the appropriateness of the
- 13 methodologies employed, (2) the adequacy and quality of the data relied
- 14 upon, (3) the depth and thoroughness of the reserves estimation process,
- 15 (4) the classification of reserves appropriate to the relevant definitions
- 16 used, and (5) the reasonableness of the estimated reserves quantities
- 17 and/or the Reserves Information.
- 18 3. Reserves Estimate. The acceptable methods for estimating reserves
- 19 include (i) the volumetric method, (ii) evaluation of the performance
- 20 history, (iii) development of a mathematical model through consideration
- 21 of material balance and computer simulation techniques, and (iv) analogy

¹⁸ Standards Pertaining to the Estimating and Auditing of Oil and Gas Reserve Information. Society of Petroleum Engineers Board of Directors, Oil and Gas Reserves Committee, June 2001. http://www.spe.org/industry/docs/Reserves_Audit_Standards_2007.pdf

1 to other reservoirs if geographic location, formation characteristics, or
2 similar factors render such analogy appropriate.

3 I note that second opinion option three would replicate the work performed by
4 NSAI in preparing its forecast of post-carry well gas volume production.

5 **Q. Within the 30 days NWN had to make post-carry well investment**
6 **decisions, was there time to obtain an independent second opinion?**

7 A. Having been a consulting Professional Engineer for more than 25 years, in
8 my judgement, it is likely NWN could have obtained second opinion option
9 one, but it is not likely that an opinion concerning options two or three could
10 have been obtained in the allotted timeframe.

11 Regardless, I testified above that a reasonable response to the increased risk
12 of the post-carry wells over that of the carry wells would be to seek an
13 independent second opinion of the forecast gas volumes to support its
14 investment decisions. Not having enough time to obtain an independent
15 second opinion could reasonably support a decision not to invest in a specific
16 post-carry well, or supported a decision to perform comprehensive risk
17 analysis, or supported performance of statistically based risk analysis to
18 further inform its investment decisions. NWN did nothing in this regard. As I
19 testified earlier, while important, I term this to be a minor deficiency as
20 compared to NWN's failure to perform adequate risk analysis.

21 **Q. Should NWN have analyzed its post-carry well investments differently?**

1 A. Yes. Given that the post-carry wells were more risky than the carry wells, NWN
2 should reasonably have performed a more robust process for informing its
3 post-carry well investment decisions than was used for the carry wells. That
4 more robust analysis should reasonably have included a risk analysis, as
5 guided by the Order No. 07-002 Guidelines, and by NWN's past practices, that
6 considered how variations in inputs to the post-carry well investment analysis
7 would impact the analysis result, as well as considered the likelihood and
8 conditions of those variations occurring.

9 **Q. What specifically should NWN have done as risk analysis to adequately**
10 **inform its post-carry well investment decisions?**

11 A. To be in minimal compliance with the Order No. 07-002 Guidelines, NWN's
12 post-carry well investment analysis should have included risk analyses in the
13 form of both an adequate rudimentary well gas production volume sensitivity
14 analysis followed by a more comprehensive risk analysis. The comprehensive
15 risk analysis should have considered costs and benefits over the life of each
16 post-carry well by testing analysis outcomes for specific analysis input
17 variations (e.g. potential variations in well drilling cost, well development and
18 completion cost, well operation and maintenance cost, well gas production
19 volume, and forward gas price). The magnitude and combinations of the
20 specific input variations considered should have reflected the likelihood and
21 conditions of those input variations occurring. This risk analysis approach is
22 what I termed above as deterministic analysis. The results from this risk
23 analysis could then be used to support a decision to invest in a specific post-

1 carry well, support a decision not to invest in a specific post-carry well, or
2 support performing statistically based risk analysis to further inform its
3 investment decisions.

4 NWN did not perform risk analyses that met these considerations to support its
5 post-carry well investment decisions. As a result, I conclude NWN post-carry
6 well investment analysis was inadequate, based upon failing to meet the
7 objective standard of the Order No. 07-002 Guidelines.

8 **Q. Is there a precedent for a disallowance for inadequate investment**
9 **analysis?**

10 A. Yes. In PacifiCorp, dba Pacific Power, Docket No. UE 246, the Commission
11 ordered a one-year revenue requirement disallowance equal to 10 percent of
12 the underlying investment for inadequate analysis and decision-making.¹⁹ The
13 Commission based its decision on the fact that it was impossible, on the
14 record, to precisely quantify the impact of Pacific Power's imprudence, but
15 concluded that sufficient evidence existed to support a 10 percent (\$17 million)
16 disallowance. With NWN's \$10.8 million capital investment in these seven post-
17 carry wells a 10 percent disallowance would be \$1.1 million. However, in this
18 case, I believe that a precise quantification of the impact of NWN's inadequate
19 investment analysis can be achieved comparing the cost of gas from the post-
20 carry wells to the market cost of gas or to the cost of gas using a long-term
21 financial hedge.

¹⁹ Order No. 12-493 pages 31 and 32.

1 **Q. What is your recommendation related to prudence of the post-carry**
2 **well investments?**

3 A. I recommend the Commission find that the seven post-carry well investments
4 (well numbers 83-34, 98-34, 84-34, 97-34, 109-33, 72-34, and 105-34) were
5 not prudently made because NWN did not perform adequate analyses, as
6 measured by the objective standard of the Order No. 07-002 Guidelines, to
7 inform its post-carry well investment decisions.

8 While I testified earlier that I found three deficiencies in NWN's post-carry well
9 investment analysis, I also testified that NWN's failure to conduct adequate risk
10 analyses is a major deficiency. It is upon this major deficiency that I base my
11 prudence recommendation.

12 **Q. Do you have a recommended consequence for NWN's failure to make**
13 **prudent investment decisions?**

14 A. Yes. I recommend a disallowance of gas costs for ratepayers that exceed the
15 market cost of gas²⁰ for the gas from the seven post-carry wells (well numbers
16 83-34, 98-34, 84-34, 97-34, 109-33, 72-34, and 105-34). As an alternate,
17 because hedging is an existing part of NWN's gas supply strategy, I
18 recommend disallowance of gas costs for ratepayers that exceed a 10-year
19 financial hedge benchmark price of \$0.4725 per therm for the gas from the
20 seven post-carry wells. My disallowance recommendations protect ratepayers
21 from damage due to NWN's imprudent post-carry well investments.

²⁰ Represented by the weighted average cost of gas for each applicable Purchased Gas Adjustment gas year.

1 **Q. Please describe the basis for limiting the ratepayer cost of gas to the 10-**
2 **year financial hedge benchmark price of \$0.4725 per therm in your**
3 **alternate disallowance recommendation.**

4 A. As I testified above, the post-carry wells were seen as a long-term hedge in
5 NWN's gas portfolio. The alternative to the post-carry well investment that
6 NWN considered was the 10-year financial hedge. The 10-year financial hedge
7 benchmark price used in NWN's analysis ranged between \$0.453 and \$0.4725
8 per therm (including the credit facility). I am recommending the hedge price at
9 the upper end of the analyzed range as the limit for ratepayer cost of gas. The
10 Commission may elect, at its discretion, to set a different limit for ratepayer
11 cost of gas.

12 **Q. Does this conclude your testimony?**

13 A. Yes.

CASE: UM 1717
WITNESS: ERIK COLVILLE

**PUBLIC UTILITY COMMISSION
OF
OREGON**

STAFF EXHIBIT 101

Witness Qualification Statement

May 11, 2015

WITNESS QUALIFICATION STATEMENT

NAME: Erik E. Colville, P.E.

EMPLOYER: Public Utility Commission of Oregon

TITLE: Senior Utility Analyst/Electric Rates and Planning

ADDRESS: 3930 Fairview Industrial Drive SE, Salem, Oregon 97302

EDUCATION: Bachelor of Science in Agricultural Engineering
Washington State University, Pullman, WA, 1979

Master of Business Administration
City University, Seattle, WA, 1989

Licensed Professional Engineer since 1984, and licensed as such
in Oregon since 1997

EXPERIENCE: I have been employed by the Public Utility Commission of Oregon
since June of 2010. I am a Senior Utility Analyst in the Energy
Resources and Planning Division of the Utility Program. Current
responsibilities include lead analyst for integrated resource planning
and resource acquisition, analyst for rate case elements, and other
regulated utility matters.

I have approximately 36 years of professional engineering
experience, including approximately 23 years:

- Relating to air, water and soil environmental issues; and
- Evaluating, planning, permitting, designing, and supporting
construction of energy facilities

CASE: UM 1717
WITNESS: ERIK COLVILLE

**PUBLIC UTILITY COMMISSION
OF
OREGON**

STAFF EXHIBIT 102

**Exhibits in Support
Of Opening Testimony**

May 11, 2015

STAFF EXHIBIT 102
IS CONFIDENTIAL AND SUBJECT TO
PROTECTIVE ORDER NO. 15-081.

CASE: UM 1717
WITNESS: ERIK COLVILLE

**PUBLIC UTILITY COMMISSION
OF
OREGON**

STAFF EXHIBIT 103

**Exhibits in Support
Of Opening Testimony**

May 11, 2015

STAFF EXHIBIT 103
IS CONFIDENTIAL AND SUBJECT TO
PROTECTIVE ORDER NO. 15-081.

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CERTIFICATE OF SERVICE

UM 1717

I certify that I have, this day, served the foregoing document upon all parties of record in this proceeding by delivering a copy in person or by mailing a copy properly addressed with first class postage prepaid, or by electronic mail pursuant to OAR 860-001-0180, to the following parties or attorneys of parties.

Dated this 11th day of May, 2015 at Salem, Oregon



Kay Barnes
Public Utility Commission
3930 Fairview Industrial Drive SE
Salem, Oregon 97302
Telephone: (503) 378-5763