

**STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION**

DOCKET NO. DE 14-120

In The Matter of

**PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
2013 ENERGY SERVICE AND STRANDED COST RECOVERY CHARGE
RECONCILIATION**

DIRECT TESTIMONY OF

**Michael D. Cannata, Jr., P. E.
Senior Consultant
ACCION GROUP, INC.**

March 25, 2015

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1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. Mr. Cannata, please state your full name.**

3 A. My name is Michael D. Cannata, Jr.

4

5 **Q. Please state your employer and your business address.**

6 A. For this proceeding, I am engaged by Accion Group, LLC (“Accion Group” or “Accion”) whose
7 business address is 244 North Main Street, Concord, New Hampshire 03301.

8

9 **Q. In what capacity are you employed?**

10 A. I am generally responsible for the review of energy utility engineering and operations
11 management, practices, and procedures.

12

13 **Q. Please describe your educational background, work experience, and major**
14 **accomplishments of your professional career?**

15 A. My educational background, work experience, and major career accomplishments are
16 presented in Exhibit MDC-1.

17

18 **Q. To what professional organizations or industry groups do you belong or have you**
19 **belonged?**

20 A. I am a member of the Institute of Electrical and Electronic Engineers and its Power
21 Engineering Society, and am a Registered Professional Engineer in the State of New
22 Hampshire (#5618). I served as a member of virtually all of the former New England Power
23 Pool (“NEPOOL”) Task Forces and Committees except for their executive Committee, where
24 my role was supportive to an Executive Committee member. I also served as a member of

1 the New England/Hydro Quebec DC Interconnection Task Force and the Hydro Quebec
2 Phase Two Advisory Committee. These two groups designed the Hydro Quebec Phase One
3 and Phase Two 450kV DC interconnections with New England. The various committees and
4 groups that I have served on existed to address the functions now being performed by the
5 Independent System Operator – New England (“ISO-NE”).

6

7 On national issues, I represented Public Service Company of New Hampshire (PSNH) at the
8 Northeast Power Coordinating Council as its Joint Coordinating Committee member, at the
9 Edison Electric Institute as its System Planning Committee member, and at the Electric
10 Power Research Institute as a member of the Power Systems Planning and Operations Task
11 Force.

12

13 While employed by the of the State of New Hampshire, I managed a professional staff
14 engaged in investigations regarding safety, operations, reliability, emergency planning, and
15 the implementation of public policy in the electric, gas, telecommunications, and water
16 industries. I also served as a full member of the New Hampshire Site Evaluation Committee
17 responsible for siting major energy facilities (Generating stations, gas transmission lines,
18 electric transmission lines, and gas storage facilities). At the request of the New Hampshire
19 Public Utilities Commission’s (“NHPUC” or “Commission”) Chairman, I sat on the State
20 Emergency Response Commission as a designated member. I was also a member of the
21 former Staff Subcommittee on Engineering of the National Association of Regulatory Utility
22 Commissioners.

1 **Q. Have you testified before regulatory bodies before?**

2 A. I have testified before the NHPUC in rate case, condemnation, least cost planning, fuel
3 adjustment, electric industry restructuring, and unit outage review proceedings. I have
4 testified before the Kentucky Public Service Commission and the Maine Public Utilities
5 Commission in transmission siting proceedings, the Maryland Public Service Commission and
6 the Massachusetts Department of Public Utilities with respect to system reliability/storm
7 restoration proceedings, and have submitted testimony at proceedings at the Federal
8 Energy Regulatory Commission ("FERC"). I have also testified at the request of the
9 Commission as required before Committees of the New Hampshire Legislature on a variety
10 of matters concerning regulated utilities.

11
12 **II. SUMMARY OF TESTIMONY**

13 **Q. Please describe the areas that your testimony addresses today.**

14 A. My testimony addresses three main areas and other lesser issues. Accion was requested to
15 review (1) the market-based capacity and energy transactions performed by PSNH that
16 augmented its own generation to supply 2013 Energy Service to Public Service Company of
17 New Hampshire (PSNH) d/b/a/ Eversource Energy customers, (2) the outages that occurred
18 at all PSNH generating units during 2013 and recommend any specific disallowances and/or
19 operational changes related to those outages, and (3) the review of PSNH's efforts to
20 address the recommendations remaining from the settlement agreements in Docket DE 12-
21 116 and DE 13-108, the 2012 and 2013, reviews of PSNH's 2011 and 2012 Energy
22 Cost/Stranded Cost Recovery Charge ("ES/SCRC") costs and revenues. I also present my
23 views regarding the unit availabilities, capacity factors, heat rates of PSNH generating units

1 for 2013, and the adequacy of 2013 capital and O&M expenditures for reliable and efficient
2 plant operations.

3

4 This testimony addresses the review areas either through the questions and answers
5 presented below, or through a series of individual reports, which are attached as exhibits to
6 my testimony and are organized as follows.

7

Capacity/Energy Transactions:

8

Exhibit MDC-2, 2013 Capacity and Energy Transactions

9

Generating Unit Outages:

10

Exhibit MDC-3, Merrimack Outages for 2013

11

Exhibit MDC-4, Newington Outages For 2013

12

Exhibit MDC-5, Schiller Unit Outages For 2013

13

Exhibit MDC-6, Hydroelectric Unit Outages For 2013

14

Exhibit MDC-7, Combustion Turbine Outages For 2013

15

Exhibit MDC-8, W. F. Wyman-4 Outages for 2013

16

Prior Stipulation Items

17

Exhibit-MDC-9, Open Stipulation Items from the 2012/2013 ES/SCRC proceedings,

18

Dockets DE 12-116/DE 13-108.

19

Exhibits

20

I present the data responses in this exhibit that I relied upon in my testimony as:

21

Exhibit- MDC-10, Data Responses

1 **III. DISCUSSION OF CAPACITY AND ENERGY TRANSACTIONS**

2 **Q. Please summarize your capacity and energy transaction testimony.**

3 A. With regard to capacity and energy transactions, Accion concluded that PSNH's filing is an
4 accurate representation of the capacity and energy purchasing process that took place in
5 2013. Accion concluded that PSNH made sound and prudent management decisions with
6 regard to its capacity and energy purchases and that they were consistent with its 2013
7 Least Cost Integrated Resource Plan ("LCIRP") requirements¹. PSNH made additional
8 progress in reducing the cost of short-term sales of excess energy and capacity once energy
9 or capacity was purchased. PSNH used its recently modified energy procurement
10 procedures, which limit exposure to market forces to govern all aspects of supplemental
11 energy purchases and sales. PSNH's effort continued to focus more on the short-term and
12 has reduced net supplemental energy costs. The net cost of supplemental energy service
13 decreased from \$91.4 million in 2011, to \$71.8 million in 2012, and to \$23.1 million in 2013.
14 Accion attributes the improvement in reduced cost to continued improvement in PSNH
15 understanding and interaction with its market environment.

16
17 Accion also reviewed the capacity and energy testimony filed by PSNH, conducted an on-site
18 interview with knowledgeable personnel responsible for the capacity and energy transaction
19 function at PSNH, requested follow-up information, monitored two PSNH bi-weekly market
20 calls, and reviewed detailed backup information of the summary results supplied by PSNH.
21 Accion also concluded that the capacity factor projections for PSNH units used for 2013
22 market purchases were reasonable and projections included ongoing discussions with

¹ 2007 LCIRP as amended on March 28, 2008 for the period from January 1, 2013 through January 28, 2013 and the 2010 LCIRP approved by the Commission on January 29, 2013 for the period from January 29, 2013 through December 31, 2013.

1 generating plant personnel. Accion is satisfied with the manner in which PSNH modeled
2 short-term reliability outages in 2013 and the impact of economic reserve status on its
3 forecasts in 2013. In addition, Accion concluded that while the volume of customer
4 migration in 2013 was reasonably constant throughout the year, it still introduced some
5 uncertainty into the supplemental energy procurement process due to the inability to adjust
6 purchases in a timely manner for unforeseeable customer decisions.

7 PSNH's primary energy procurement focus in 2013 was the short-term market. In fact, no
8 energy purchases were for longer than a month, and all short-term purchase decisions
9 (weekly and daily) were made within a week of the beginning of the energy transaction. Of
10 the 7 monthly bilateral energy purchases, 4 were made for the spring maintenance season
11 in March and April, and 3 were made in June for the fall maintenance season. Of the 6
12 weekly bilateral energy purchases, 2 were made for the spring maintenance period, 3 were
13 made for the summer load period, and 1 was made for the winter load period. Of the 56
14 daily bilateral energy purchases, 23 were made during the summer load period.

15

16 In addition, PSNH has further developed an in-depth understanding of all of its units'
17 operational requirements in a lower-priced short-term market such that it stands ready to
18 respond quickly to reverse those practices and procedures as required when market prices
19 increase. Accion concluded that PSNH continues to make progress in reducing the costs of
20 their units.

21

22 **Q. Do you have recommendations regarding future capacity and energy transaction issues?**

23 **A.** No, I do not. This proceeding does not address those future issues.

1 **IV. DISCUSSION ON OUTAGES**

2 **Q. Please state the results of your review of the PSNH unit outages that occurred during**
3 **2013.**

4 A. With regard to planned and forced unit outages, Accion found that the base-load units (by
5 design) on the PSNH system ran well in 2013, but running times of the coal units remained
6 at approximate 2012 levels due to reserve economic shutdowns. PSNH made reasonable
7 estimates of economic reserve times and factored them into operations and unit outages.

8 Accion reviewed outage information filed, responses to data requests, conducted on-site
9 interviews, and submitted follow-up requests for information as necessary. In each outage,
10 except those noted below, Accion found the outages to be reasonable and not unexpected
11 for the particular unit, its vintage, or that the outage was necessary for proper operation of
12 the unit. Accion also concluded that PSNH conducted proper planning and management
13 oversight regarding the aforementioned planned and forced unit outages. Additionally,
14 from its review of unit outages, Accion also has recommendations it believes will improve
15 PSNH's efforts in achieving additional improvement in unit operation.

16

17 **Q. Which outages did you find unreasonable?**

18 A. Accion found a few of the PSNH unit outages to be unreasonable when measured against
19 the standard of prudence and they are noted below. Accion further lists outages below
20 which were found reasonable, but the circumstances presented an opportunity for PSNH to
21 improve its processes. Accion will first present its findings with regard to unreasonable
22 outages.

1 The first outage that Accion believes to be unreasonable is that of Newington Outage 1C.

2

3 The unit tripped on low water level because the steam driven boiler feed pump could not
4 supply sufficient water to the boiler.

5

6 PSNH's investigation found a restricted air supply into the control valve that puts steam into
7 the feed pump valve. (The steam pump replaces the electric pump at an 80 MW feedwater
8 level).

9 PSNH's investigation found that the steam restriction was due to a partially closed manually
10 operated petcock valve. PSNH believes that the petcock valve was apparently bumped
11 during normal operations of the plant, partially closing the valve. PSNH has reviewed
12 similar valves throughout the plant and tie-wrapped them to prevent similar events from
13 occurring.

14

15 Accion has reviewed the location of this valve and does not find that it is in the path of
16 personnel moving throughout the area. In addition, the air valve handle is protected from
17 such accidental movement by the physical placement of the valve itself and other adjacent
18 equipment. Further, Accion finds that accidental partial activation of this valve could not
19 reasonably take place by entanglement of tool belts without the operator being aware of
20 such movement or restriction. Accion finds the partial movement of this valve due to
21 operator inattentiveness. Accion recommends disallowance of replacement power costs
22 related to this event.

1 The second set of outages Accion believes to be unreasonable is associated with Schiller
2 Station; Outages 4F and 6G in Exhibit MDC-5.

4 **Outage Schiller 4F**

5 The unit was being placed on line at the request of the ISO-NE. The Control Operator "CO"
6 adjusted the overfire air dampers to 99% in the manual mode. The CO placed the overfire
7 air dampers in the automatic mode when dampers started to close, cutting off combustion
8 air for the boiler. The boiler went into a pressure swing and tripped out on low boiler
9 pressure. PSNH stated that, prior to placing the overfire air dampers in the automatic
10 mode, the CO should have made the automatic set point 99% open, and this action was
11 missed by the CO. Without this action, the set point reverted back to its last position of 52%
12 causing the boiler pressure swing. In this outage, the CO did not properly set the air damper
13 automatic set point as required by procedure. A CO is the senior operator in a power plant
14 and is expected to possess required knowledge for proper unit operation.

15
16 In this instance, the CO did not demonstrate the level of knowledge of plant operations
17 required for the position and follow procedure. Accion recommends that replacement
18 power costs related to this outage not be recovered from customers.

20 **Outage Schiller 6G**

21 The unit was in reserve shutdown when it was called to perform a cold start by the ISO-NE.

22
23 While operating in manual mode, the CO allowed the ID fans to speed up excessively by
24 setting the dampers too high. That action allowed the unit to have two low furnace

1 pressure trips that caused the unit to miss its required startup time as committed to the ISO-
2 NE.

3
4 In this instance, the CO did not demonstrate the level of knowledge of plant operations
5 required for his/her position or follow procedures. Accion recommends that replacement
6 power costs related to this outage not be recovered from customers.

7
8 The next outage Accion believes to be unreasonable is associated with Amoskeag, Outage 2F
9 in Exhibit MDC-6. The unit tripped due to a signal from a transducer in the inflatable flash
10 board's logic circuit. When the transducer activated, it went to the high water maximum
11 position which caused the automatic deflation of the flashboards. As the pond level
12 decreased, the pond level control system backed down the unit and eventually shut it down.
13 The Electric System Control Center (ESCC) believed that the unit was taken off line due to
14 the pond level control and did not inform hydro personnel of the shutdown. No alarms are
15 transmitted to the ESCC for normal pond control operation or deflation of the inflatable
16 flashboards.

17
18 PSNH found that the transducer did not fail but produced an inaccurate signal. The
19 inflatable flashboards were raised in the manual mode, pond level was rebuilt, the
20 transducer was replaced, and the unit returned to service.

21
22 The ESCC has flow data available to it and should have recognized at the time that flows of
23 approximately 2,250 cfs (cubic feet per second) would not have resulted in an orderly
24 shutdown of the unit due to pond flow control operation. Accion attributes this outage due

1 to operator inattention. Accion therefore recommends that replacement power costs for
2 this outage not be recovered from customers.

3 The next outage Accion believes to be unreasonable is associated with Eastman Falls,
4 Outage 1C in Exhibit MDC-6. The unit tripped on reverse power. The dispatcher at the ESCC
5 reported that upon starting the unit, it ramped up to full load. The dispatcher reported
6 sending 23 lower output pulses to the unit and it did not respond. After 30 minutes, the
7 dispatcher sent an additional 3 lower pulses to the unit. A hydro operator at the station
8 placed the unit in manual operation, sent multiple pulses to the unit in both the up and
9 down direction, found the unit responded correctly, and returned the unit to service.

10

11 PSNH investigation found that the incident was due to dispatcher inattention at the ESCC.
12 This matter has been addressed by PSNH as part of dispatcher training. Accion therefore
13 recommends that replacement power costs for this outage not be recovered from
14 customers. The next outages that Accion recommends to be disallowed relate to the
15 Garvins Falls hydro plant and are labeled Garvins Station Outage B, (S-B), Garvins Station
16 Outage D (S-D), and Garvins 4C Partial. Those outages appear below:

17

18 **Outage Garvins S-B**

19 A station outage was taken to assure that oil from the G4 sump pump pit did not get
20 dispersed. PSNH investigation found that the float switch for the G4 sump pump failed to
21 operate resulting in the oil intrusion to the tailrace. A minor amount of oil was found in the
22 sump pump line that had entered the tailrace. Absorbent booms were deployed and no
23 additional oil was evident by morning. PSNH determined that the sump pump line had not
24 been flushed as required by procedure.

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PSNH procedures require that the line from the sump pump to the tailrace be flushed when cleaning oil intrusion into the sump area. This procedure was not followed. Accion therefore recommends that replacement power costs for this outage not be recovered from customers.

Outage Garvins S-D and 4-C (Part)

The unit was in reserve shutdown and was taken out of service due to the failure of the sump pump in the outer shifting ring area. The sump pump failure resulted in water rising in this area to a point where it entered the lower guide bearing oil reservoir which ultimately overfilled. The over fill entered a second sump area which is designed to trap water from the main shaft seal for the unit. That sump pumped a small amount of the oil/water mixture into the draft tube resulting in a minor oil sheen on the water.

A contractor cleaned up the oil sheen, the sump pump was replaced, and the station returned to service. Upon starting the unit, another oil sheen in the tailrace occurred due to residual oil that was in the draft tube. It was the second oil sheen that resulted in the station outage, Outage S-D, above. PSNH found that an oil line to the draft tube had not been flushed.

PSNH procedures require that the line from the sump pump to the draft tube be flushed when cleaning oil intrusion into the sump area. This procedure was not followed. Accion therefore recommends that replacement power costs for this part of Outage 4-C and Outage S-D not be recovered from customers.

1

2 **Q. Is that the extent of the outages that you find to be unreasonable?**

3 A. Yes, it is.

4

5 **Q. How should the replacement power costs of the outages you believe to be unreasonable**
6 **be quantified?**

7 A. PSNH has consistently used a method to quantify replacement power costs in recent Energy
8 Service/Stranded Cost Recovery Charge reviews. I recommend PSNH continue to use that
9 methodology in a modified form for these outages and provide such quantification for
10 review prior to the hearing in this proceeding.

11

12 **Q. How should the replacement power cost calculation be modified?**

13 A. The methodology is essentially sound, but due to short time periods where the units may be
14 in economic reserve or in operation, an inaccuracy is introduced. The current methodology
15 does not take into consideration the start-stop characteristics of the unit, but merely
16 calculates cost or benefit for the day and then nets them to calculate a cost for the outage. I
17 recommend that if the Commission determines that replacement costs should not be
18 recovered for certain outages, that the methodology is refined to factor in the start-stop
19 characteristics of the unit.

20

21 **V. UNIT OPERATION RECOMMENDATIONS**

22 **Q. In addition to your recommendations regarding the recovery of outage costs, you**
23 **mentioned that you have recommendations that you believe will support and elevate**

1 **PSNH's efforts in achieving additional improvement in unit operation or deserving**
2 **discussion in future dockets. Please present those recommendations.**

3 A. First, let me clarify that while Accion found the following referenced outages reasonable and
4 recommends the recovery of all costs related to these outages, the outages present
5 opportunities for PSNH to improve operating proficiency and, thus, lower costs to
6 customers.

7
8 Accion's first recommendation relates to the operation of Newington Station, Exhibit MDC-
9 4.

10 This recommendation relates to Outage C, which took place at Newington Station as
11 described in Exhibit MDC-4. In this outage, an air valve was inadvertently bumped by plant
12 personnel which Accion found to be operator inattentiveness. Accion recommends that
13 PSNH share with other plants the capability to disturb physical valve settings in walkways
14 and other areas where workmen may pass and to implement prevent preventative solutions
15 where practicable.

16
17 The next recommendation relates to the August 2013 oil sample testing of the two
18 generator step transformers (TB-354 and TB-355) at Amoskeag Station where TB-355
19 demonstrated indication of internal arcing (indicated by gasses in the oil and insulation
20 degradation) resulting in a high power factor test result. A replacement transformer was
21 required. While TB-355 was being replaced, station output had to be restricted to 10 MVA
22 (9 MW plus MVAR) through the remaining TB-354 transformer. Total station output was
23 limited to approximately the output of 1 and one-half units and resulted in times where full
24 station output was not possible and power output was lost. Lost power conditions related to

1 the transformer replacement are listed as a station derate during the TB-355 transformer
2 replacement. Lost generation was approximately 1,175 MWh in September, 0 MWh in
3 October, 720 MWh in November, and 825 MWh in December (2,720 total MWh).

4
5 Station output had to be restricted to 10 MVA (9 MW plus MVar) through the remaining TB-
6 354 transformer with the addition fins and fans. PSNH was unable to locate a mobile
7 transformer that would have had greater capability. Total station output was limited to
8 approximately the output of 1 and one-half units under this configuration.

9
10 PSNH decided to replace both TB-354 and TB-355 with a 24 MVA dry type transformer
11 because of potential similar problems with TB-354. The transformer had to be newly
12 manufactured. As a result, station output was restricted from 8/20/13 through 9/30/14
13 resulting in lost generation at the station of 2,720 MWh in 2013.

14
15 Accion notes that this outage overlaps two reporting years. The majority of the outage time
16 occurred in 2014, so according to the convention previously developed in this review, Accion
17 recommends that this outage be addressed in 2014.

18
19 The next outage for discussion (Outage Gorham S-A) concerns an event where the TB-47
20 115/22kV transformer differential operated at the Berlin substation. Units #1, #2, and #3 at
21 Gorham over tripped due to overvoltage conditions. The system was returned to
22 operational status and the units returned to service.

1 PSNH investigation into the cause of unit trips is not complete at this time. Accion
2 recommends that the review of this unit outage be continued into the 2014 "ES/SCRC"
3 review.

4

5 The next recommendation relates to Outage Eastman Falls 2I from Docket DE 13-108 where
6 PSNH sought \$144,614 of insurance proceeds for the outage. PSNH informs Accion that the
7 insurance claim process is still in progress and has not been settled.

8

9 Accion recommends that PSNH inform the Commission of the results of this insurance case
10 in their 2015 ES/SCRC filing.

11

12 The next Accion recommendation relates to Outages Lost Nation CT-1-D and Canaan 1L. In
13 that outage, the TB-33 115/34.5kV transformer tripped at Lost Nation due to a 115kV bus
14 fault at the East Side 115kV substation in Berlin. At the same time, the D-142 115kV line
15 from Lost Nation to Whitefield was out of service and the Smith Hydro Z-177 115kV line
16 temporarily tapped onto the S-136 115kV line between Whitefield and East Side substation
17 to facilitate the interconnection of the Burgess biomass-fired power plant.

18

19 With the D-142 115kV line out of service, the Lost Nation Jet was connected to the Berlin
20 115kV substation.

21 A transmission contractor attached a fused jumper while conducting relay testing to verify
22 the integrity of the Z-177 115kV tripping logic. The jumper fell off and made contact with
23 another terminal causing the S-136 115kV breaker to trip and lockout. The subsequent

1 outage caused the outage of Canaan Hydro (Outage CAN-1-L), the outage of Lost Nation CT-
2 1 (Outage Lost Nation CT-1-D), and would have caused the outage of Smith Hydro but for
3 the fact it was on annual overhaul at the time.
4

5 PSNH does not have formal procedures when working in substations that are out of normal
6 configuration. In addition, PSNH was not able to provide contractor tail gate instructions
7 because the information is only retained for 30 days.
8

9 These outages occurred when a transmission substation contractor was working in the East
10 Side substation. A fused jumper fell off of a relay terminal during relay testing and came
11 into contact with another terminal.
12

13 Accion is not able to determine if these outages are simply employee error, utilization of a
14 jumper that was too short for the job at hand, or lack of the due care required when
15 working in substations that are out of normal configuration.
16

17 Accion recommends that PSNH review the protocol under which transmission work is done
18 in substations that can impact PSNH generation and ensure that tailgate instructions include
19 a requirement that proper precautionary measures are taken when potential generation trip
20 conditions are identified.

1 VI. OPEN STIPULATION ITEMS FROM THE 2013 ES/SCRC REVIEW

2 Q. Commission Staff also requested that you review PSNH's efforts with regard to the
3 remaining items agreed to in a Stipulation and Settlement Agreement ("Settlement
4 Agreement") Docket No. DE 13-108. Please present the results of your review.

5 A. The details of my review are contained in Exhibit MDC-9. Exhibit MDC-9 describes
6 the issue in each remaining stipulated item, PSNH's actions, Accion Group's view regarding
7 whether PSNH's effort was appropriate and complete, and Accion Group's recommendation
8 as to the disposition of the item. A summary of Exhibit MDC-9 appears directly below.

9
10 Recommendation 2012-7 Re: Date of Hydro Station Seasonal Temperature Setting
11 Changes

12 Accion recommended that PSNH review and modify the time of year it changes its hydro
13 stations to summer temperature settings to account for early or late season weather events,
14 or that PSNH eliminate the winter temperature period altogether.

15
16 PSNH agreed to review the time of year it changes temperature settings to address early or
17 late season temperature changes.

18
19 During the spring, particularly when the building ventilation system is not configured for
20 summer time operation, outages have occurred due to elevated building temperatures.

21
22 PSNH's readiness for summer-time ventilation operation of its hydro stations requires,
23 among other things, manual modifications of louvers. To address this issue, PSNH triggers a
24 discussion that starts on April 15th with hydro personnel that will institute summer-time

1 building ventilation system requirements if weather conditions require such action. In
2 addition, PSNH is considering ventilation controlled by barometric dampers to reduce the
3 chance of high bearing temperature conditions. Accion agreed that PSNH's actions satisfy
4 the intended purpose of the Settlement Agreement and recommends closure of this item
5 with the caveat that PSNH submit the results of its barometric controlled ventilation analysis
6 along with its future plans in this regard in the 2014 review of 2013 ES/SCRC costs and
7 revenues.

8
9 PSNH stated that only five hydro stations were the focus of the summer building ventilation
10 system program. Those stations were Amoskeag, Ayers Island, Garvins Falls, Jackman, and
11 Smith Hydro. In calendar year 2013, building temperature issues developed at Eastman Falls
12 Hydro station, which was not on the summer station ventilation watch list. Since the
13 building temperature excursions that occurred at Eastman Falls in 2013, that station has
14 been added to the summer building ventilation system program.

15
16 Accion recommends that PSNH now include all of its hydro stations in the review of building
17 temperatures related to various bearing temperature alarms and trip set points, and that
18 each station be considered for inclusion in the summer ventilation program.

19
20 Accion also recommends that PSNH ensure that its summer ventilation control
21 requirements are in place by May 15th of each year and that they remain in place until
22 October 15th to allow for early/late seasonal temperatures.

1 **Recommendation 2012-10 Re: Over-Trips on Lower Voltage System, Coordination**
2 **Studies, Transient Stability Analysis**

3 Accion noted that PSNH is conducting coordination studies that also require a transient
4 stability analysis. Accion recommended that if the over-trip outages are found to be
5 systemic upon conclusion of the PSNH analysis, that system reliability design criteria
6 incorporate the unit over trips on a local basis only if other economic remedies are not
7 available.

8
9 PSNH agreed to perform coordination studies at its smaller stations. PSNH also agreed to
10 acquire the capability to perform in-house transient stability and perform transient stability
11 studies at the Canaan and Jackman hydro station study areas before proceeding with other
12 generating locations. In addition, PSNH agreed that subsequent to the completion of these
13 two transient stability analyses, PSNH will identify the most cost-effective next steps.
14 Relative to the extent that systemic issues are identified as associated with over trip
15 outages, PSNH will determine prudent action on an on-going basis using good engineering
16 judgment.

17
18 Since the 2012 update, PSNH has completed a relay coordination study at Smith Station.
19 The study concluded that overlapping zones of protection protected Smith Station. In
20 addition, high speed fault clearing will occur for all phase faults within the facility and that
21 no transmission coordination problems exist. Recommended relay setting adjustments will
22 be completed during the 2013 annual inspection outage for the unit.

23

1 In 2012, PSNH also developed the in-house capability to conduct transient stabilities, trained
2 in-house personnel in that expertise, and conducted transient stability studies at the Canaan
3 and Jackman stations, the two units most prone to system instability. PSNH modeled both
4 peak and light load conditions, and simulated faults in the area of the study unit. The results
5 of those studies generally agree with actual fault scenarios, but not as well as anticipated.
6 The PSNH model included the generator step-up transformer impedance as part of that of
7 the unit. In the Jackman study, some units were netted with load and not dynamically
8 represented. Accion requested that PSNH verify that the model was conservative as stated
9 by PSNH by rerunning some faults with all step-up transformers represented, all generators
10 represented, and an updated load model that PSNH was currently developing.

11

12 In 2013, PSNH made the adjustments to their analyses as recommended by Accion. Results
13 were slightly less conservative. In addition, PSNH did not include the Lost Nation CT in their
14 analysis of the Canaan hydro area. PSNH agreed to revise their Canaan analysis with the Lost
15 Nation CT included. PSNH noted that no overspeed trips were observed in either the
16 Jackman or Canaan analyses. PSNH also noted that there is no reverse power relay at
17 Canaan, and that the reverse power relay at Jackman has a 4 second time delay.
18 Subsequent PSNH investigation revealed that out of the 8 time overcurrent trips related to
19 the 357 breaker at Canaan, 6 of them were expected for the faults that occurred on the 355
20 34.5kV line. The other two were due to mis-coordination resulting from mechanical wear
21 on the relay or instability.

22

23 PSNH states that it conducts its 10-year power system analyses assuming no hydro or wind
24 generation in service in addition to the largest local area generator being out of service.

1 PSNH believes that this action allows any potential problems to surface early on in the
2 development of potential area solutions. PSNH reliability guidelines only require the outage
3 of the largest local area generator in determining actual system reliability additions.

4 PSNH stated that the 357 overcurrent relay will be replaced at Canaan in 2015. Accion
5 states that PSNH must make specific recommendations on how it plans to rectify any
6 shortcomings discovered in its analyses of the Jackman and Canaan facilities within
7 economic boundaries with the Lost Nation CT included in the analyses.

8
9 Accion observes that PSNH can group the remaining low-voltage hydro generators and
10 White Lake CT into 4 study areas. Accion also is aware that there will be system
11 configuration changes by 2017 in some areas of the PSNH system. Accion, therefore,
12 recommends that the remaining four system areas be studied and completed during 2015
13 and 2016, with future anticipated system configurations, and that the results be reported in
14 the subsequent SCRC reconciliation filings in May 2016 and May 2017.

15
16 Accion recognizes that PSNH's 10-year system studies are structured to identify system
17 reliability problems at an early date. Accion also believes that performing the remaining
18 analyses with all hydro and other units off-line to determine construction requirements is
19 too conservative an approach, because study results will likely require the addition of excess
20 system equipment at an earlier date than is required by PSNH published guidelines. Accion
21 recommends that actual construction requirements be determined with system studies that
22 utilize PSNH hydro generation at seasonally adjusted values, so that some load relief and
23 reactive support from the existing facilities can be reflected in the budgeted system

1 requirements. In the case where hydro facilities have been both on-line at low values or off
2 at system peak, PSNH should model both conditions to determine system reinforcement
3 requirements.

4 The company disagrees with Accion's assessment and states that the four areas of interest
5 should be studied based on a cost/benefit basis. Accion disagrees. The Accion position is
6 that mis-coordination should not be designed into the system design and that PSNH should
7 first understand what problems they have designed into the system. When those problems
8 are known and understood, then that is the proper time that economics should dictate
9 PSNH remedial actions.

10
11 Accion recommends that this item remain open.

12
13 **Recommendation 2012-11 Re: Vegetation Outages along Rights-of-Way (Associated with**
14 **Generation)**

15 Accion recommended that PSNH initiate a five-year distribution vegetation management
16 program that continually addresses danger trees (known as risk trees to PSNH) outside of
17 the rights-of-way as part of its distribution maintenance cycle and that PSNH initiate a
18 similar program for the transmission rights-of-ways.

19
20 PSNH agreed to conduct a vegetation inspection along the 355 and 355X10 34.5kV circuits
21 connected to the Canaan Hydro Station during the fourth quarter of 2012 in preparation of
22 full right-of-way maintenance in 2013, and a vegetation inspection of the 335/332 34.5kV
23 circuits that are connected to the Hooksett and Garvins Hydro Stations. PSNH transmission

1 further agreed to implement the recently developed transmission plan to remove trees from
2 outside the right-of-way when they pose a risk to the line and the easement allows for
3 removal of such trees, contingent upon funding and available easements. PSNH will notify
4 the NHPUC of the final budgeted amount and the completion of the project versus the
5 transmission right-of-way maintenance program.

6
7 PSNH distribution agreed to complete a circuit by circuit analysis and identify the rights-of-
8 way that contain easements that allow PSNH to address risk trees outside of the right-of-
9 way. PSNH also agreed to continue its full right-of-way clearing program for the duration of
10 the existing Reliability Enhancement Program ("REP"). PSNH will remove risk trees outside
11 of the right-of-ways when they are identified and the easement allows for removal of such
12 trees. If the easement does not allow removal, a reasonable attempt will be made to
13 contact the property owner for permission to remove the tree.

14
15 PSNH inspected the 355X10 34.5 kV line in 2011 and all hazard trees were removed. The 355
16 34.5 kV line was patrolled in 2011 and hazard trees were removed in 2012. Additionally, the
17 right-of-way for the 355 34.5 kV line will be mowed in 2013.

18
19 PSNH patrolled the 335/332 34.5 kV lines in 2010 and hazard trees were removed in 2011.

20
21 PSNH distribution completed a circuit-by-circuit analysis and identified which easements
22 have the authority to remove hazard trees that are outside of the right-of-way. PSNH
23 reports that most of the easements have these tree removal rights. PSNH incorporated the

1 removal of hazard trees into its scheduled and enhanced vegetation management programs
2 for the duration of the REP.

3 PSNH distribution vegetation management tracks all right-of-way costs by acreage. In 2013,
4 277 hazard trees were removed from the sides of 1,501 acres of distribution rights-of-way
5 (out of a total of 6,557 acres) at a cost of \$204,250. PSNH also stated that approximately
6 two-thirds of the trees were very large trees at 12" to 30" DBH.² PSNH indicated that
7 additional funds were to be allocated in 2014.

8
9 PSNH transmission also agreed to the removal of hazard trees outside of its rights-of-ways if
10 allowed to do so by easement. Transmission vegetation management tracks all costs by line
11 number. Seven Hundred Thousand Dollars (\$700,000) was initially included in the proposed
12 2013 budget request and \$600,000 was ultimately approved for New Hampshire
13 transmission rights-of-ways to begin a four-year schedule for hazard tree removal. In 2013,
14 \$706,106 was actually spent for the removal of 7,607 hazard trees along 388 side miles³ of
15 transmission rights-of-way.⁴

16
17 PSNH also stated that many of the trees removed along transmission rights-of-ways were of
18 very small diameter and were not required to be chipped or removed.

19

² DBH is defined as diameter at breast height which is considered to be 4.5 feet from ground level.

³ A transmission line can have either 0, 1, or 2 side miles of right-of-way depending on the number of lines in the right-of-way and the line's position in the right of way. For example, a single transmission line in a right-of-way would have 2 side miles per mile of line while a transmission line in the middle of a three line right-of-way would have zero side miles of right-of-way per mile of line.

⁴ PSNH has 727 miles of transmission right-of-way and therefore 1,454 side miles of transmission right-of-way.

1 Accion recommends that PSNH continue to submit the results of its transmission and
2 distribution efforts to remove hazard trees as part of its annual reconciliation filing of
3 ES/SCRC costs and revenues for the next three filings beginning in May 2015. At the end of
4 that time the distribution and transmission systems would have vegetation management
5 cycles completed.

6 Accion further recommends that REP funding continue to be made available to remove
7 distribution hazard trees and full distribution right-of-way width clearing as it relates to
8 impacts on generation operation.

9

10 PSNH transmission also agreed to the removal of hazard trees outside of its rights-of-ways if
11 allowed to do so by easement. In 2013, \$600,000 was allocated to New Hampshire
12 transmission rights-of-ways to begin a four-year schedule for hazard tree removal. As of
13 October 2013, \$675,000 was spent for the removal of over 5,550 hazard trees. PSNH also
14 stated that the program was contingent on funding and easements.

15

16 Accion confirmed that PSNH transmission is also making a good faith effort to remove
17 hazard trees that are out of the right-of-way where no easement exists. PSNH stated that
18 the removal program was included in the 2014 budget, but that budget had not been
19 approved by the end of 2013.

20

21 Accion agrees that PSNH's actions satisfy the intended purpose of the Settlement
22 Agreement and recommends that this item remain closed, except for the limited purposes
23 of tracking results as described.

24

1 Q. Are there any other operational performance improvements recommendations that you
2 wish to discuss?

3 A. No, there are not.
4

5 VII. UNIT AVAILABILITIES AND CAPACITY FACTORS

6 Q. What was the result of your review of the unit availability factors and capacity factors of
7 the PSNH units?

8 A. From a capacity factor basis, PSNH's coal units performed somewhat better than the level
9 that PSNH had forecasted.

10 B. PSNH's units generally performed well from an availability perspective and with very high
11 availability on the 30 highest priced energy days during 2013 (96% to 100%) with a fleet
12 availability of 98% for those same days. The fleet availability was the highest it has been
13 since prior to 2008 and approximately 4 % higher than 2011.
14

15 Accion Group made the following observations regarding 2013 overall unit availability
16 factors:

17 All unit availability factors remained high during the thirty high cost periods.
18

19 Q. Are there other observations you made with regard to the availabilities and capacity
20 factors of PSNH generating units?

21 A. No, there are not.

1 **VIII. UNIT HEAT RATES**

2 **Q. What are your observations regarding the heat rates of the PSNH major generating units?**

3 A. The full load heat rates of the PSNH units have remained relatively constant over the last
4 seven years and remained at those levels in 2013 except for Newington, Schiller 4 and
5 Schiller 6. Accion comments on each major unit below:

- 6 • The actual heat rates for Merrimack 1 remained about the same for 2013 and
7 increased slightly for Merrimack 2 from 2012 reflecting their reduced hours of full-
8 load operation.
- 9 • The Newington heat rate in 2013 increased from 2012. Accion believes that is a
10 direct reflection on how ISO-NE dispatches the unit for the benefit of the New
11 England region.
- 12 • Heat rates for Schiller-4 and Schiller-6 decreased markedly for 2013 versus 2012 and
13 2011 levels. Accion believes that better understanding of specific unit operation in a
14 low energy cost market is the reason for the decrease.
- 15 • The heat rate for Schiller-5 remained relatively constant from its improved 2011
16 levels.

17
18 **IX. CAPITAL AND OPERATIONS AND MAINTENANCE ("O&M") EXPENDITURES**

19 **Q. What did you form as a conclusion when you reviewed the 2012 spending for capital
20 projects and O&M at PSNH generating stations?**

21 A. Accion reviewed the 2013 capital and O&M budgets (business plan) for Merrimack Station,
22 Newington Station, Schiller Station and the Wyman #4 unit. Accion also reviewed the 2013
23 business plan for the Hydro group. In addition, Accion reviewed the fossil five-year and

1 hydro ten-year conceptual budget plans. Accion Group made the following general
2 observations, and drew the following conclusions.

3
4 **Capital**

- 5 • PSNH’s 2013 capital expenditures at the coal units continued to be reduced
6 from historic levels reflecting reduced capacity factors that allow capacity
7 budget planning to be stretched out.
- 8 • The reduced operation of the coal units due to increased economic reserve
9 status requires a downward adjustment of capital expenditures because
10 most capital expenditures are based on run-time. This is the same process
11 that PSNH used at Newington to align capital expenditures with actual
12 operation. Some in the industry refer to this as the “snowplow effect”
13 where major maintenance items are pushed into the future.⁵
- 14 • PSNH has included FERC licensing requirements, dam repairs, and general
15 capital project replacements in its budget projections at all stations.
- 16 • Newington and other non-coal units’ capital spending remained relatively
17 constant.
- 18 • Capital spending adequately addresses expected maintenance issues.

19
20 **O&M**

- 21 • PSNH’s 2013 O&M expenditures at the coal units were significantly reduced
22 from historic levels. The reduced operation of the coal units due to

⁵ Accion notes that if unit operation is increased because of increasing market prices that maintenance items would then be brought into closer time frames and could be coined as a “tsunami effect”.

1 increased economic reserve status requires a downward adjustment of
2 O&M expenditures because most O&M expenditures are based on run-
3 time. This is the same process that PSNH used at Newington to align O&M
4 expenditures with actual operation.

- 5 • PSNH's O&M expenditures at non-coal units remain relatively constant.
- 6 • O&M spending adequately addresses expected maintenance issues.

7

8 Accion Group concluded that PSNH is currently spending sufficient funds for capital
9 replacement/improvement and maintenance projects to assure continued high
10 performance of its units consistent with good utility practice, and with recognition of unit
11 age and operational duty cycle as required.

12 **Q. Are there any other items you wish to discuss?**

13 **A.** I only wish to present the data responses relied upon by Accion Group in preparation of its
14 testimony in addition to the materials filed by PSNH so they may be officially admitted into
15 the record. Those data responses appear as Exhibit MDC-10 and are identified as:

16 **Staff Set 01**

17 Data Responses 1, 3 through 5, and 9 through 22.

18 **Staff Set 02**

19 Data Responses 1 through 31.

20 **Office of Consumer Advocate Set 01**

21 Data Responses 1, 3, 5, 10 through 14, 16 through 28, and 32 through 34.

22 **Office of Consumer Advocate Set 02**

23 Data Responses 1, 3, and 6 through 10.

1 **TECH Set 02**

2 Data Responses 1 through 2.

3

4 **Q. Does that conclude your testimony?**

5 A. Yes, it does.