

**AUDIT OF THE PRE-OPERATIONAL AND PROPOSED OPERATIONAL ONSITE
METEOROLOGICAL MONITORING PROGRAMS**

Dates: July 21 & 22, 2009

Location: PPL Bell Bend, LLC
38 Bomboy Lane
Berwick, PA 18603

NRC Audit Team Members:

- Michael D. Mazaika - Audit Leader
- Michael Braden - Audit Support
- Michael Canova - Project Management
- Ross Powers - Administrative Support

Applicant Participants:

- Rocco Sgarro, PPL Bell Bend
- Terry Harpster, PPL Bell Bend
- Jim Freels, UniStar Nuclear Energy (UNE), Licensing
- Jerry Fields, PPL Bell Bend
- Frank Hickey, PPL, Susquehanna Steam Electric Station (SSES), Chemistry Group
- Theodore Messier, Meteorologist, AREVA NP
- Cory Poncavage, PPL, SSES System Engineer
- Michael Yox, UNE (July 22 only)
- Mark Abrams, ABS Consulting (July 22 only, via phone)

Purpose

This audit is intended to review the siting of the existing meteorological tower(s) at the Susquehanna Steam Electric Station, the documentation associated with its data collection methods and equipment, their adequacy to provide the data being utilized to support the results and conclusions made in the Bell Bend application regarding meteorology, and the siting of the proposed meteorological tower to be located at the Bell Bend Nuclear Plant site.

Planning

The staff provided the applicant with an Audit Plan and a list of information needs that were intended to be addressed during this audit (Agencywide Documents Access and Management System [ADAMS] Accession Number ML091890011).

Activities

The information presented in this trip report was gathered through interviews with the prospective applicant's staff [and contractors] as well as a review of the prospective applicant's system documentation and procedures.

On Tuesday, July 21, 2009, PPL Bell Bend, LLC provided the Nuclear Regulatory Commission (NRC) staff with a project overview and a general site tour, noting that the plant location may move to the north in order to minimize impacts to wetlands. The tour included stops at various locations across the Susquehanna Steam Electric Station (SSES) site including both that site's primary and back-up meteorological towers and a supplemental offsite monitoring tower. During this tour, the System Engineer described the facilities to the staff. In the afternoon, the staff continued its tour of the existing SSES property to become familiar with the topographic influences of the surrounding property. The staff then visited the Bell Bend Nuclear Power Plant (BBNPP) site and the proposed meteorological tower location. Upon returning to the 38 Bomboy Lane office, the NRC staff began their review of the materials provided in support of the requests for information provided to PPL Bell Bend on July 10, 2009.

The staff began its evaluation of meteorological instrument channels (specifications for which are shown in Tables 1 and 2) by reviewing the contractors annual report (Document 1).

Documentation Available for Review – Proprietary (Not Retained by Staff)

1. Susquehanna Steam Electric Station 2008 Meteorological Summary – April 2009, ABS Consulting Report No. R-1710010-04, Rev 0.
2. Susquehanna Steam Electric Station 2007 Meteorological Summary –May 2008, ABS Consulting Report No. R-1710010-02, Rev 0.
3. Radioactive Effluent Release Report – 01/01/08 thru 12/31/08, Francis J. Hickey, Health Physicist, PPL Susquehanna, LLC.
4. Susquehanna Steam Electric Station Units 1 & 2, 2008, Annual Report – April 2009, Annual Radiological Environmental Operating Report, H.L. Riley, Health Physicist, PPL Susquehanna, LLC.
5. Semi-annual Calibration of Wind Speed Instrument Loop X-3701 (60m), 4/15/2009, SI-099-313, Rev. 17.
6. Semi-annual Calibration of Wind Direction Instrument Loop X-3702 (60m), 2/27/2009, SI-099-314, Rev. 15.
7. Semi-annual Calibration of Wind Speed Instrument Loop X-3703 (10m), 4/15/2009, SI-099-315, Rev. 17.
8. Semi-annual Calibration of Wind Direction Instrument Loop X-3704 (10m), 3/26/2009, SI-099-316, Rev. 13.
9. Semi-annual Calibration of Delta Temperature Instrument Loop X-3707, Ch.1 (10-60m), 2/6/2009, SI-099-317, Rev. 14.
10. Semi-annual Calibration of Delta Temperature Instrument Loop X-3708 Ch. 2 (10-60m), 3/17/2009, SI-099-318, Rev. 14.
11. PP&L Calculation J-RCM-209, Meteorological Monitoring System Upgrade, Design Activity DCP87-7005 (per Commitment Correspondence PLA-2715).
12. PPL Susquehanna LLC Procedure CH-RM-005, Rev. 0, SSES Meteorological Monitoring Program.
13. PPL Work Order Fact Sheets PCWO 705990, PCWO 719694, PCWO 663332, PCWO 665129, PCWO 615771, PCWO 687321. (Related to maintenance activities on the

meteorological system equipment.)

14. ABS Consulting Report R-1903966-01, Rev. 0, Effect of Plant Structures on the Wind Speed and Direction at the Meteorological Tower at the Susquehanna Steam Electric Plant, April 2008, T. Edward Fenstermacher (prepared for UniStar Nuclear).

On Wednesday, July 22, 2009:

- Documentation review continued;
- Information discussions resumed with PPL staff and contractors regarding the SSES primary and back-up meteorological monitoring program covering the pre-operational period of record (POR) input to Final Safety Analysis Report (FSAR) Section 2.3 of the Combined Operating License (COL) application, including: tower exposures; instrument siting; routine operation, maintenance and calibration; data recording; data processing, validation, reporting and archiving; problems reports and corrective action;
- The proposed BBNPP operational phase meteorological monitoring program (including commonalities, similarities, and differences with the SSES primary monitoring program); and
- Other identified information needs.

The audit concluded with a close-out meeting and exit discussion including a joint mark-up of an applicant-supplied spreadsheet of the previously identified information needs (an electronic copy of which was retained by the NRC as on previous environmental audits). Attachment C of this report is a slightly edited (clarified) version of that spreadsheet.

Detail, Discussion and Observation Points during Two-Day Audit Period:

1. Site
 - PPL Bell Bend's site is a 424 acre green-field site located adjacent to PPL's SSES, two-unit nuclear power station in Luzerne County, PA.
 - The BBNPP site is approximately 6 miles northeast of Berwick PA, and approximately 1.5 miles north and west of the Susquehanna River.
 - The proposed Bell Bend site is a single unit site with no provision for future expansion.
2. Proposed Met Tower Location
 - BBNPP's Proposed Met Tower site may require tree maintenance to North and South tree lines (open fields are located to the East and West). The applicant stated that the treeline to the North may be in undisturbed wetland and will need to investigate whether tree removal would be an issue.
 - The applicant should address in its application the potential for transmission line electromagnetic field (EMF) interference at the primary BBNPP Met Tower.
3. Pre-operational Monitoring Program
 - In response to the NRC's request for additional information (RAI) 3, BBNPP submitted 7 years of meteorological data from the SSES's onsite meteorological monitoring program. The 7-year data collection period, from 2001 through 2007, corresponds to the period of record (POR) used in the dispersion modeling analyses in COL FSAR Sections 2.3.4 and 2.3.5.
 - PPL's response to RAI 3 has been provided as ADAMS Accession Number ML091620642.
4. Tower Location and Exposure
 - The current pre-operational meteorological tower is located on the SSES site.

- Information regarding distances to and dimensions and grade elevations of significant SSES features are identified in the attached Audit Summary Spreadsheet under Info Needs #2. These needs will be submitted as RAIs on the BBNPP Docket.
- As stated in the PPL BBNPP FSAR, “The area is generally level, increasing slightly in elevation to the north and west. South and east of the tower the topography slopes down towards the Susquehanna River. Vegetation in the immediate vicinity consists of low weeds with some deciduous trees in a gully to the south. The deciduous trees are approximately 40 ft (12 m) in height and are approximately 100 ft (30 m) from the tower.”
- The SSES primary meteorological tower is a 200ft (60m), guyed, triangular open-lattice tower with an 18in. (46cm) face. The met tower location has an approximate base elevation of 650 ft (198 m) mean sea level (msl). Instrumentation booms extend outward towards approximately the WSW and are 6 to 8 ft (1.83 to 2.44 m) in length, extending beyond the tower.
- SSES primary meteorological tower re-located to current position in November 2001, about 25 m southwest of previous position. Same instrumentation utilized. Equipment change-out occurred over a period of about seven days. Applicant believes instrument boom orientation is the same but needs to verify.
- RAI will be issued relating to boom length and orientation decisions for SSES primary tower, as well as exposure of instruments relative to tower structure.

5. Instrumentation

- The instrumentation on the primary SSES meteorological tower was as follows:
 - 197-ft (60-m) level - wind speed and direction, temperature
 - 33-ft (10-m) level - wind speed and direction, temperature, dew point
 - Sigma theta (standard deviation of horizontal wind direction fluctuation) calculated for 197-ft (60-m) and 33-ft (10-m) wind measurement levels.
 - Wind speed and wind direction at the 197-ft (60-m) and 33-ft (10-m) levels and the temperature difference (delta-T) between the 60-m and 10-m levels are designated as Tech Spec parameters. Delta-T system includes redundant channels (designated as A and B) with the latter being a back-up.
 - Lightning protection provided for tower and input signals.
 - The SSES primary meteorological monitoring system utilizes a Climatronics instrumentation package (see Table 1), a digital data logger, and telemetry transmitters in a rack-mount assembly located in an equipment building at the base of the tower.
 - Table 2 shows the two primary channels of the Climatronics Instrument Translator and their related functions.
 - The data recording system is a Campbell Scientific CR21X Micrologger.
 - The wind speed and direction sensors are mechanical three-cup type anemometers and vanes, respectively. The temperature sensors are thermistor-type.
 - All temperature sensors were located in fan-aspirated solar radiation shields. Delta-temperature data between the 197-ft (60-m) and 33-ft (10 m) levels is calculated by the CR21X data logger.
 - Dew point sensor was mounted in the temperature aspirators at 33 ft (10-m) level.
 - Dew point is calculated directly using a Lithium Chloride (LiCl) sensor. PPL is considering a possible equipment upgrade to a relative humidity

Generally poor data recovery up to about 2008.

- An RAI will be issued requesting verification of sample rate for all meteorological parameters and information on how 15-minute and 1 hour average values are calculated. Applicant believes that sampling interval is once every 5 seconds (180 samples per 15 minutes), but is not clear if that rate applies to all parameters. RAI will also address the minimum number of valid samples required for a 15-minute average and the minimum number of valid samples or 15-minute averages required for a 1 hour average. Applicant believes 67 percent sample recovery required for 15-minute averages but is not sure.

7. Calibration and Surveillance

- Calibration is performed by I&C technicians on a 6 month basis for all towers. Only one tower monitoring system (i.e., either the SSES primary or back-up is taken out of service at a time for calibration).
- Wind speed sensors are changed out at the time of calibration for bearing replacement. Wind direction sensors are changed out on an annual basis for bearing replacement.
- Temperature sensors are calibrated using either an ice bath or a co-located transfer method.
- Tower and equipment walk downs are typically performed on a monthly basis by system engineers. System engineers also oversee tower structure issues (e.g., foundations, guy wires).
- Operational checks are performed, and log sheets generated, for inclusion in a monthly report to the nuclear utility.
- Maintenance logs are generated for routine and call-out maintenance, and are also included in the monthly reports when they occur.
- An RAI will be issued requesting a description of the calibration methods employed for the meteorological instrument sensing elements.

8. Data Processing

- For all three SSES meteorological towers, digitized meteorological data is available via modem connection to the Campbell Scientific CR21X Micrologger.
- The Micrologger is directly connected to the instrument signal transmitters in a rack in the related equipment shelters.
- The data is downloaded by a consultant on a daily basis to insure data integrity and evaluate any anomalies.
- The analog data is processed into phone line, tone-based telemetry signals and transmitted to the control room. The signals are received by companion receivers which convert these signals to 0-1 VDC instrument loop signals for input to the plant integrated computer system (PICS) and Control Room data logging recorders.
- The SSES primary and back-up tower data is utilized for system monitoring analysis, and Emergency Planning purposes.
- An RAI will be issued requesting expansion and clarification regarding data processing, validation, reporting, and archiving for the pre-operational and operating phase monitoring programs including data sharing and priorities between the SSES and BBNPP meteorological monitoring systems.
- The Technical Support Center acquires the meteorological data from the plant computer or Control Room strip chart recorder.

Audit Summary of Results and Actions

The Audit Summary Spreadsheet included as Attachment C of this report summarizes the activities and information related to each Information Need identified in the Information Needs document provided to the applicant, an initial determination of actions to be taken to address each of those needs, and an indication of related RAIs likely to be issued.

**Table 1
Meteorological Instrumentation Performance Specifications
SSES Primary Meteorological Tower**

Parameter	Sensor	Range	Threshold	Accuracy	Resolution
Wind Speed	Climatronics Model 100075 3-cup anemometer	0-100 mph	0.5 mph (0.22 m/s)	+/-0.15 mph (+/-0.07 m/s)	0.1 mph
Wind Direction	Climatronics Model 100076 Vane	0-540°	0.5 mph (0.22 m/s)	+/-2°	1.0°
Ambient & Delta-Temperature	Climatronics Model 100093 (60m-10m)	-20 °F to +100 °F ± 5 °F for delta-T	-	± 0.15 °C	0.01 °F or 0.01 °C
Precipitation	Climatronics Model 100097-1 Tipping Bucket (heated, unscreened)	-	0.01 in./tip	± 1 % @3 in./hr	-
Sigma-Theta	Calculated	-	-	-	-
Dew point (10m)	Climatronics Model 101197 Capacitive bifilar gold contacts, LiCl wick	-40 °F - +100 °F	-	+/- 0.5 °C	-

**Table 2
Climatronics Instrument Translators
(SSES Primary Meteorological Tower)**

CH 1	Power Supply	60m WS/WD	60m sigma-theta	Δ Temp. Chan. A	Flow Ch. #1 - 60m (A)	Spare	Spare
				Amb. Temp.	#2 - 60m (B)		
					#3 - 10m		
CH 2	Power Supply	10m WS/WD	10m sigma-theta	Δ Temp. Chan. B	Dew point	Precip.	Spare

<u>Name</u>	<u>Company</u>	<u>Phone</u>	<u>Email</u>
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Jim Freels	UNE	802-570-5637	jimfreels525@yahoo.com
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Mark Abrams (7/22)	ABS	(via telephone)	

Attachment B
BBNPP Site Meteorology Audit Photos

Susquehanna Steam Electric Station's Meteorology Tower



View looking west from primary 60 meter Meteorology Tower



View looking north from primary 60 meter Meteorology Tower
previous tower's foundation location right of center

Attachment B
BBNPP Site Meteorology Audit Photos



View looking east from primary 60 meter Meteorology Tower



View looking south from primary 60 meter Meteorology Tower

Attachment B
BBNPP Site Meteorology Audit Photos



View looking east from approx. 50' to the west of the primary 60 meter Meteorology Tower

Attachment B
BBNPP Site Meteorology Audit Photos



View looking approximately south from down hill north of primary 60 meter Meteorology Tower

Attachment B
BBNPP Site Meteorology Audit Photos
SSES Alternate Onsite Meteorology Tower



View looking north of back-up 10 meter Meteorology Tower, shows relative height of adjacent equipment shelter to left

Attachment B
BBNPP Site Meteorology Audit Photos



(Instrument boom arm positioning)



View looking east of back-up 10 meter Meteorology Tower; shows relative height of adjacent equipment shelter in foreground

Attachment B
BBNPP Site Meteorology Audit Photos



View looking south of back-up 10 meter Meteorology Tower

Attachment B
BBNPP Site Meteorology Audit Photos



View looking southwest of back-up 10 meter Meteorology Tower towards
SSES Units 1 & 2 Cooling Towers

Attachment B
BBNPP Site Meteorology Audit Photos



View looking west of back-up 10 meter Meteorology Tower

Attachment B
BBNPP Site Meteorology Audit Photos

Future Bell Bend Tower Location (Subject to Revision)



View looking east from a point north and west of proposed BBNPP primary Meteorology Tower location. Trees at left represent southern extent of tree line to north of proposed tower location. Maximum height of trees on northern tree line visually estimated at about 85 ft (not verified).

Attachment B
BBNPP Site Meteorology Audit Photos



View looking north from a point north and west of proposed BBNPP Meteorology Tower location. Trees at center and right represent western extent of tree line to north of proposed tower location.

Attachment B
BBNPP Site Meteorology Audit Photos



View looking approximately northwest from a point north and west of proposed BBNPP Meteorology Tower location.

Attachment B
BBNPP Site Meteorology Audit Photos



View looking east from a point west of proposed BBNPP Meteorology Tower location.
Proposed tower location towards transmission line structure.

Attachment B
BBNPP Site Meteorology Audit Photos



View looking southeast from a point west of proposed BBNPP Meteorology Tower location. Trees in far field represent northern extent of tree line to south of proposed tower location. Maximum height of trees on southern tree line visually estimated to be about 70 to 75 ft (not verified).

Attachment B
BBNPP Site Meteorology Audit Photos



View looking south-southeast from a point west of proposed BBNPP Meteorology Tower location. Trees in far field represent northern extent of tree line to south of proposed tower location. Maximum height of trees on southern tree line visually estimated to be about 70 to 75 ft (not verified).

Attachment B
BBNPP Site Meteorology Audit Photos



View looking south-southwest from a point west of proposed BBNPP Meteorology Tower location. Trees in far field represent northern extent of tree line to south of proposed tower location. Maximum height of trees on southern tree line visually estimated to be about 70 to 75 ft (not verified).

Attachment B
BBNPP Site Meteorology Audit Photos



View looking southwest from a point west of proposed BBNPP Meteorology Tower location. Trees in far field represent northern extent of tree line to south of proposed tower location. Maximum height of trees on southern tree line visually estimated to be about 70 to 75 ft (not verified.)

Attachment B
BBNPP Site Meteorology Audit Photos

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
1	FSAR Section 2.3.3	Provide a general tour of the site and surrounding area, including: (1) the existing onsite primary meteorological tower site and shelter for Susquehanna Steam Electric Station (SSES) Units 1 and 2; (2) the planned meteorological tower site and shelter for the BBNPP; (3) the existing backup and supplemental (downriver) meteorological tower sites and shelters; and (4) the onsite and immediate offsite vicinity (to observe potential obstructions to airflow with respect to each tower).	PPL (Corey Poncavage Jerry Fields and Frank Hickey) Jim Freels, Unistar Nuclear Energy (UNE)	Tour of requested areas was conducted. Applicant was requested to submit the site photographs taken during the tour for the Staff's reference. The Photographs are included in this report as Attachment B
2	FSAR Section 2.3.3	Make available for audit site plan(s)/map(s), corresponding to the information in Environmental Report (ER) Tables 6.4-2, 6.4-4, and 6.4-5, and FSAR Table 2.3-145, that show, by sector, the distance between the meteorological tower sites and: (1) existing obstructions to airflow (including SSES buildings, cooling towers, paved or improved surfaces, terrain features, trees and other vegetation); and (2) planned obstructions to airflow (including BBNPP buildings, cooling towers, paved or improved surfaces).	AREVA (Ted Messier) PPL (Frank Hickey)	<ol style="list-style-type: none"> 1. Staff requests that tables similar to ER Tables 6.4-2, 6.4-4 and 6.4-5 be added to FSAR as the FSAR is the licensing basis document (Also see FSAR Section 2.3.3.1.7, Para. 1, last sentence which references ER Section 6.4.1.1). 2. Staff requests that applicant add physical parameters of the potential obstructions to Met tower and include additional structures such as salt (or ash) storage dome, Rx Bldg, Turbine Bldg, Domestic Water Storage Tank, Emergency Diesel Generator (EDG) Bldg, Service and Admin Bldg (height, width, distance and wind direction sector relative to Met Tower, including width at top and bottom of cooling tower(s)). 3. Field tour indicated proposed location of BBNPP Met Tower is in close proximity to tree lines in both the northerly and southerly directions. Trees need to be identified in the FSAR as potential obstructions to air flow. 4. Staff requests that applicant identify grade elevations for each obstruction to be listed in Tables.

Attachment C
Audit Summary Spreadsheet

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
3	FSAR Section 2.3.3	Provide subject matter expert(s) knowledgeable in and/or responsible for routine operation, maintenance, and calibration of the SSES Units 1 and 2 meteorological tower, instrumentation, and data acquisition and recording equipment.	PPL(Corey Poncavage)	<ol style="list-style-type: none"> 1. Staff requests that text be clarified in FSAR Section 2.3.3.1.2 (Para 2, last sentence) to identify analog recorder versus digital (for pre-operational phase). 2. FSAR Section 2.3.3.2.2 discusses the operational phase, but references the pre-operational text. This Section should be revised to expand the type of equipment that may be available for future use but that it will conform to guidance in current version of RG 1.23. 3. FSAR Section 2.3.3.1.3 language needs to be clarified regarding sigma-theta and its use, including for Emergency Planning (EP) purposes. FSAR Section 2.3.3.1.4 language needs to be clarified to summarize the instrument maintenance and servicing schedule (i.e., reference Technical Requirements Manual (TRM) checks, system engineer data review/walk down, corrective action document generation, Maintenance Rule evaluation, maintenance, etc). A similar, more general discussion needs to be provided for the operational phase at BBNPP FSAR Sections 2.3.3.2.3. and 2.3.3.2.4. 4. Language for secondary recording system in FSAR Section 2.3.3.2.3 should be re-evaluated for use of SSES site-specific terminology for BBNPP.

**Attachment C
Audit Summary Spreadsheet**

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
4	FSAR Section 2.3.3	If possible, provide access to the Standard Operating Procedures, related records and documentation regarding: routine operation, maintenance, and calibration; data processing, validation, reporting and archival; and problem reports and corrective action for the meteorological monitoring program covering the period of record (POR) used in the Combined License Application (COLA) (i.e., 2001 thru 2007). If external coordination is necessary on the NRC's part with the operating unit, provide a contact point for such coordination.	PPL (Corey Poncavage and Frank Hickey)	<p>Applicant provided samples (approximately 9) of corrective action documents related to Meteorology Tower / instrumentation, procedure CH-RM-005, "SSES Meteorological Monitoring Program," Calc Number J-RCM-209, and 2007 SSES Meteorological Summary Report by ABS Consulting</p> <ol style="list-style-type: none"> 1. Applicant will be requested via RAI to provide a description of the calibration methods employed for the meteorological instrument sensing elements. 2. An RAI will be sent requesting expansion and clarification regarding data processing, validation, reporting, and archiving.

Attachment C
Audit Summary Spreadsheet

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
5	FSAR Sections 2.3.3.1 and 2.3.3.2	Provide a subject matter expert to discuss items not addressed under COL FSAR Sections 2.3.3.1 and 2.3.3.2 (the pre-operational and operational phases, respectively, as applicable), including: (1) exposure of tower-mounted instruments relative to tower structure; (2) boom length and orientation and rationale behind these selections; (3) presence or absence of icing protection for wind sensors, of wind shield for rain gauge (operational phase), and lightning protection for tower and instrumentation.	AREVA (Ted Messier) ABS (Mark Abrams)	<p>Applicant provided discussion on various elements of this topic during the field visit to at the SSES primary Met Tower.</p> <p>1. Applicant to provide additional information related to orientation of instruments (ABS Consulting) FSAR Section 2.3.3.1.3 for SSES and Section 2.3.3.2.3 for BBNPP. Staff requests that FSAR sections be updated to include additional information.</p> <p>Applicant stated that the logic for the original orientation of the instruments is unknown as they were placed there in the 1970s. The boom lengths have apparently not impacted wind readings. The orientation was most likely exactly transferred from the old tower to the new tower when the new tower was constructed.</p> <p>2. Staff will request additional information for boom length and orientation and bases. Discussion regarding RG 1.23 conformance needed.</p>

**Attachment C
Audit Summary Spreadsheet**

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
6	FSAR Section 2.3.3	Provide a subject matter expert to confirm or clarify: (1) whether the specifications for all instruments do, in fact, apply to the SSES tower for the 2001 to 2007 Period of Record (POR) used in the COLA as well as to the BBNPP meteorological tower during the operational phase; (2) whether accuracy specifications listed in COL FSAR Table 2.3-144 represent the component (sensor) accuracy values or system accuracy values consistent with the accuracies listed under the "Requirements" column in the same table, and, in either case, the methodology used in determining the listed accuracy specifications and the related documentation; (3) the range specification for vertical temperature difference in COL FSAR Table 2.3-144 (that is, -5 °F to +5 °F) which appears to be too narrow; and (4) whether the vertical temperature difference is calculated by subtracting the 10-m (33-ft) ambient temperature from the concurrent measurement at the 60-m (197-ft) measurement level or if temperature difference is recorded from a dedicated delta-T circuit.	AREVA (Ted Messier) ABS (Mark Abrams)	<p>Table 2.3-144 identifies "Requirements" from RG 1.23 for instruments. Staff comment is that RGs do not specify "requirements." Language change for FSAR Table should be considered.</p> <p>Applicant provided procedure J-RCM-209 for staff review for instrument loop accuracy.</p> <p>Applicant to review Table 2.3-144 to clarify if "accuracy" represents sensor or loop accuracy. RG 1.23 only discusses system (or loop) accuracy, not sensor accuracy. FSAR text is misleading.</p> <ol style="list-style-type: none"> RAI will be issued requesting the applicant to address how instrument system (loop) accuracy will be addressed in accordance with RG 1.23. <p>Applicant stated identified equipment on Table 2.3-144 is no longer supported by vendor. Applicant stated that additional investigation is needed into the delta-T calculation methodology and data processing because of the narrow range of the delta-T values for the instrument.</p> <ol style="list-style-type: none"> Staff will issue an RAI for this information.

Attachment C
Audit Summary Spreadsheet

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
7	FSAR Section 2.3.3	Provide a subject matter expert to discuss, for both the pre-operational and operational phases: (1) how 15 minute and 1 hour average values for meteorological parameters are computed; (2) the minimum number of valid samples required to be collected for a 15-minute average; (3) and the minimum number of valid samples or 15-minute averages required to be collected in order to determine a 1-hour average value.	ABS (Mark Abrams)	<p>Staff requested verification of sample rate for all meteorological parameters and minimum number of samples to have a valid average for both 15-minute and hourly averages.</p> <p>Staff requested information on how averaging of values is calculated.</p> <p>Staff will issue an RAI.</p> <p>Sampling interval is not provided for wind speed and wind direction and should be added to the FSAR.</p>
8	FSAR Section 2.3.3	Provide a subject matter expert to discuss the use of calculated sigma-theta values, based on concurrent wind direction measurements, in place of missing vertical temperature difference (stability) data, the extent to which such data substitution occurred during the POR used in the COLA (i.e., 2001 to 2007), and how sigma-theta data were applied (straight or modified approach).	AREVA/ABS (Mark Abrams)	Applicant stated that there were no sigma-theta data substitutions for missing delta-T data during the 7-year POR used in the FSAR. Applicant stated ABS was responsible for vetting the data for the entire POR. No further action.

**Attachment C
Audit Summary Spreadsheet**

Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
9	FSAR Section 2.3.3	<p>The applicant described, during the recent environmental site audit, the SSES dew point measurements as being often in error and unreliable. Provide a subject matter expert to further discuss these issues and: (1) the planned approach for demonstrating that the dew point data from the Williamsport National Weather Service (NWS) station are representative of the BBNPP site; (2) whether and, if so, how the onsite measurements would be used and/or adjusted in this demonstration; and (3) the annual and composite data recoveries for the onsite dew point measurements, given the description of data quality contrasted with relatively minimal data substitution and no qualification of the data issues in the COL FSAR.</p>	<p>PPL (Frank Hickey)</p> <p>ABS (Mark Abrams)</p> <p>AREVA (Ted Messier)</p>	<p>1. Applicant to provide data recovery table for dew point temperature for each of 7 years and for composite 7 years.</p> <p>Dew point used for SACTI model and wet-bulb temperature (based on dew point) is used for UHS sizing and performance. FSAR Tables list daily mean, maximum and minimum, temperatures for on-site and Williamsport NWS station for 7-year POR.</p> <p>Staff requested information concerning relevance of SSES dew point table, since there was a 50% recovery factor.</p> <p>Staff requested information regarding justification for use of Williamsport NWS data.</p> <p>Applicant stated Williamsport NWS station located in similar region and terrain. Since 2008, onsite dew point data was better than previous years, perhaps comparison for 2008 and 2009 site dew point with data from Williamsport NWS may be of value.</p> <p>2. Staff will issue RAI.</p> <p>Applicant provided reference to docketed ESWEMS (UHS Makeup) Retention Pond Sizing calculation, ML091831134.</p>

**Attachment C
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Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
10	FSAR Section 2.3.3	The applicant indicated during the recent environmental site audit that the SSES and BBNPP meteorological towers will operate independently, but that it is possible they could also serve in a “backup” role for each other. That contingency should be addressed in the COL FSAR Section 2.3.3 description of the operational monitoring program. Provide a SME to discuss the status and timeline for that decision and the timeline (if any) for any planned upgrade of the SSES monitoring system to Revision 1 of RG 1.23	AREVA (Ted Messier)	Applicant stated that there are no current plans to utilize either plant’s towers or instrumentation as a backup for the other plant. No further action.
11	FSAR Sections 2.3.3.1.6 and 2.3.3.2.6	Provide an SME to clarify whether the distances from the BBNPP meteorological tower as listed in COL FSAR Table 2.3-145 are relative to the SSES Met Tower (pre-operational phase) or the BBNPP Met Tower (operational phase) since both FSAR Section 2.3.3.1.6 and FSAR Section 2.3.3.2.6, respectively, reference the same table.	AREVA (Ted Messier)	Applicant will revise FSAR to clarify pre-operational and operational phase references to different tables. Applicant will also include tables for distances to nearby structures as well as other nearby obstructions to air flow. (Tables for pre-operational and operational phases are included in AREVA’s report EIR 51-907785-001, though this was not available for review at the audit)
12	FSAR Section 2.3.3	The applicant indicated during the recent environmental site audit that a study to evaluate the effects of the existing cooling towers on measurements at the SSES meteorological tower would be cited and placed on the docket. Provide a SME to further discuss this issue, and the status and timeline for making that information available to the Staff for review.	PPL ABS (Mark Abrams)	Applicant will provide the referenced report (Effect of Plant Structures on the Wind Speed and Direction at the Meteorological Tower at the Susquehanna Steam Electric Plant, dated April 2008) on the docket. ABS Consulting (Mark Abrams) and AREVA (Ted Messier) agreed that there is no proprietary or business sensitive information contained in the report and is acceptable for docketing. Report Docketed under ML092330621

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Info Needs #	FSAR Section	Information Needs	SME(s)	Discussion and Remaining Action to be taken
13	FSAR Sections 2.3.4 and 2.3.5	Provide a subject matter expert to explain why the onsite meteorological data used in the dispersion modeling analyses in COL FSAR Sections 2.3.4 and/or 2.3.5 is considered representative of the region, given the significant variation in topography within a 50-mile radius area around the site and the differences in wind roses for the SSES site, and the Wilkes-Barre/Scranton, Williamsport, and Allentown NWS stations.	AREVA (Ted Messier) ABS (Mark Abrams)	<p>FSAR Sections 2.3.2, 2.3.3, and 2.3.5 may identify the sections that reference the statement that the site meteorology is representative of the 50-mile radius around the site. This is inconsistent with the results found at Williamsport, Allentown, and Wilkes-Barre/Scranton National Weather Service and SSES primary, back-up, and downriver tower locations.</p> <p>1. Staff requests the applicant review and revise the FSAR sections as necessary to justify why the modeling results are still appropriate for the 50-mile radius region.</p>