

December 19, 2003

NRC 2003-0119
10 CFR 50.67
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
License Nos. DPR-24 and DPR-27
Supplemental Response to Request for Additional Information Regarding
License Amendment Request 234, Selective Scope Implementation of
Alternative Source Term for Fuel Handling Accident

- References:*
- 1) *Letter from Nuclear Management Company, LLC, to Document Control Desk, "License Amendment Request 234, Selective Scope Implementation of Alternate Source Term for Fuel Handling Accident," dated March 27, 2003 (NRC 2003-0028).*
 - 2) *Letter from Nuclear Management Company, LLC, to Document Control Desk, "Response to Request for Additional Information Regarding License Amendment Request 234," dated October 30, 2003 (NRC 2003-0106).*

In Reference 1, Nuclear Management Company, LLC (NMC) submitted License Amendment Request 234 for review and approval of a selective scope application of the Alternative Source Term (AST) methodology for only the fuel handling accident (FHA) for Point Beach Nuclear Plant (PBNP).

As committed to in Reference 1, a second License Amendment Request will be submitted to request approval of the remaining dose analyses for PBNP.

By letter dated August 1, 2003, (ADAMS Accession ML032060586), the Nuclear Regulatory Commission (NRC) requested additional information in support of their review of Reference 1. By Reference 2, NMC submitted a partial response to the staff's questions. As discussed with the NRC on October 9, 2003 and November 12, 2003, the remainder of the response to the NRC's meteorological questions was to be submitted in a subsequent response.

ADD

Given NRC concern regarding the meteorological database employed for the subject analysis, NMC retained an environmental consultant, STS Consultants, Ltd (STS) to perform a detailed assessment of the ARCON96 data set that was used in the alternative source term analysis. STS reviewed and analyzed the meteorological data for calendar years 1997 through 1999 (inclusive) for the Point Beach Meteorological Monitoring System's primary parameters (i.e., wind speed, direction, and temperature lapse) to assess their validity and adequacy for estimating dose using dispersion modeling techniques. STS found that the data were generally of high quality. However, STS identified values in the ARCON96 data file that were judged to be invalid for various reasons. NMC expanded STS's scope of work to include creation of an edited data file in which suspect values were coded as "invalid" per the code's direction provided in NUREG/CR-6331, Revision 1. The STS study is the basis for our responses to NRC's questions regarding the meteorological data and the monitoring system's design and operation.

Enclosure 1 of this letter contains the NMC's response to the remainder of the staff's questions. This response completes the request for additional information. Enclosure 2 of this letter contains the edited ARCON96 Meteorological data file on CD-ROM (ARCONPB1.MET).

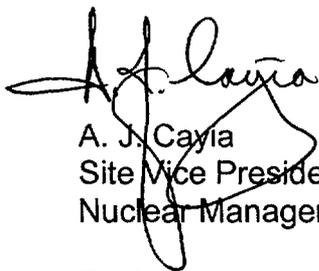
NMC has determined that this supplement does not involve a significant hazards consideration, authorize a significant change in the types or total amounts of effluent release, or result in any significant increase in individual or cumulative occupational radiation exposure. Therefore, NMC concludes that the proposed supplement meets the categorical exclusion requirements of 10 CFR 51.22(c)(9) and that an environmental impact appraisal need not be prepared.

In accordance with 10 CFR 50.91, a copy of this application is being provided to the designated Wisconsin Official.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the foregoing is true and accurate. Executed on December 19, 2003.



A. J. Cayla
Site Vice President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosures

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector - Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE 1

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING LICENSE AMENDMENT REQUEST 234, SELECTIVE SCOPE IMPLEMENTATION OF ALTERNATE SOURCE TERM FOR FUEL HANDLING ACCIDENT (FHA)

The following information is provided in response to the Nuclear Regulatory Commission staff's request for additional information (RAI) regarding Reference 1.

The NRC staff's questions are restated below, with the NMC response following.

NRC Question 1a – Meteorological Data:

With regard to atmospheric stability, there appears to be a relatively high occurrence of category A and lower occurrence of categories D and E when compared with some other nuclear power plant sites. Further, stability category A is reported to occur for as long as 56 consecutive hours which seems quite high and the occurrence of unstable conditions at night is reported to be high relative to some other sites. The response to NRC Question 1 in Attachment VII to the March 27, 2003, letter provides a discussion of methodologies used historically to estimate the stability category for Point Beach. It notes that use of fluctuations in wind direction appear to provide estimates more similar to those at other sites than use of the temperature change with height methodology. However, why do relatively warm temperatures occur near the ground so frequently at night and for such long durations at the Point Beach site? Other than changing from strip charts to digital recording in the control room in 1999, have other changes occurred in the onsite meteorological measurement during the period over which the data were measured? Was there a change in the 1999 time frame that resulted in the atmospheric stability data for that year appearing to be more similar to some other sites than the 1997 and 1998 data?

NMC Response:

The propensity towards very unstable conditions (i.e., stability class "A") remains only somewhat moderated by excluding data STS identified as invalid. After reviewing the strip chart records of the differential temperature system and considering all available ancillary documentation (i.e., calibration records, instrument repair records, and site check logs) STS concluded that the differential temperature data in the edited data file are indeed valid. Given NRC interest in this unusually high frequency of class "A" stability, particular attention was devoted to the temperature parameters during the data review. Specifically, the Point Beach inland tower temperature was compared to the primary tower temperature values during offshore conditions (when a lake influence would be lacking). STS found such good correlation between these parameters that it was often impossible to discern the individual traces because both parameters were

recorded on the same strip chart recorder and agreement was so good, the traces overlapped. This provides independent confirmation of the precision of the primary tower's 10-meter absolute temperature instrument that serves as the reference for the differential temperature system. Further investigation was performed to assess the differential temperature system.

The temperature/differential temperature calibration records were scrutinized to ensure that they were properly tied to primary parameter standards, and that results fell within acceptable tolerances. No calibration deviations were noted that caused the reviewer to invalidate additional data.

The differential temperature values and their diurnal and seasonal fluctuations were consistent with those expected, given the meteorological regime that the site is located within. The data review concluded that the edited data file presents an accurate representation of stability class (as inferred from lapse rate) for the period of record.

No definitive reason for the high frequency of very unstable conditions has been identified. However, it appears to be related to the primary tower's immediate proximity to a large body of water and the associated lake breeze phenomenon. In accordance with NRC guidance, stability class (which is not directly measured) has been inferred from the vertical temperature difference (lapse rate) between the 45- and 10-meter levels. If the lake surface and consequently boundary layer air are considerably warmer than that of the land (as occurs during Wisconsin's autumn and winter seasons), this may produce a large negative lapse rate, which would be interpreted as very unstable (class "A") based on the temperature lapse rate method, even in the absence of vertical turbulence.

In conclusion, the edited database still shows an unusually high proportion of "A" stability conditions, although culling invalid differential temperature data values has made this tendency less pronounced. No definitive reason for the high frequency of very unstable conditions has been identified. However, it appears to be related to the primary tower's immediate proximity to a large body of water and the associated lake breeze phenomenon.

The independent review included an audit of the plant's standard operating procedures used in the meteorological monitoring program. It revealed no programmatic or operational changes between 1999 and 1997-1998 that would have accounted for a significant change in the stability class distribution.

Impact of Edited ARCON96 met data file (ARCONPB1.MET)

As mentioned above, STS Consultants revised the ARCON96 meteorological data file used to support the control room dose consequences reported in our March 27, 2003, submittal (Reference 1). This file has been attached for your review. The edited ARCON96 data file contains only those values that we have a high degree of

confidence are valid. Primary reasons for excluding data were due to the instruments being serviced or calibrated and observed straight lining or erratic data trends on the strip charts. In our response provided for NRC Meteorological Question 1 in Attachment VII to License Amendment Request (LAR) 234 (Reference 1), we stated that based on the original data set data recovery was greater than 90% for the 1997-1999 time period, exclusive of the December 1999 data due to a recorder modification. However, due to the review performed by STS the data set has been reduced to exclude suspect values; therefore, the recovery statistics have changed. Based on the edited data file, the data recovery statistics are as follows:

Parameter	Data Recovery (%)
Stability Class (differential temperature)	83.3
10-meter Wind Speed	83.3
10-meter Wind Direction	90.7
45-meter Wind Speed	84.9
45-meter Wind Direction	90.4

The impact on the reported atmospheric dispersion factor (X/Q) and the dose was also evaluated. The parameters from Table 5-1 of LAR 234 (Reference 1) were entered into ARCON96 to re-calculate the X/Q associated with the release from the Unit 2 Containment Purge Stack. The resulting X/Q based on the edited meteorological data file is $5.76E-03 \text{ sec/m}^3$. The edited data file resulted in a 1.8% increase in the 0-2 hour X/Q previously assumed (recall the FHA analysis assumed $5.65E-03 \text{ sec/m}^3$). In addition, it was confirmed that the Unit 2 Purge Stack remains as the limiting release point for the FHA. This confirmatory review was performed using ARCON96 by regenerating the X/Q s related to releases from the spent fuel pool and drumming area vent stack based on the input parameters provided in Tables 5-2 and 5-3 of Attachment II to LAR 234 (Reference 1). Because the release to the atmosphere is assumed to end in two hours and dose is directly proportional to the atmospheric dispersion factor, the calculated dose to the control room is increased by the same amount. However, due to rounding of the calculated value to the nearest tenth of a rem, the dose reported in Reference 1 remains as 2.8 rem.

Section 2 in Attachment II of LAR 234 (Reference 1), as well as in our response to NRC Radiological Question 3 in Attachment VII, documented a value of 1675 cfm as the limiting value for unfiltered inleakage, whereby this value represents the amount of unfiltered inleakage that could be experienced without exceeding the dose acceptance criterion of 5 rem TEDE under the design basis FHA. Because the edited meteorological data set does increase the X/Q for the release point, this limiting value would be slightly less. The relationship between unfiltered inleakage and dose is not a linear one; therefore, a revised limiting value cannot be easily deduced through the use of a scaling factor, although the decrease in this value is expected to be very small due to the fact that the increase in the X/Q was small. The maximum unfiltered inleakage value was presented in LAR 234 (Reference 1) to respond to an NRC question. The magnitude of this value in addition to other conservative assumptions made in the

radiological accident analysis demonstrates that the FHA is not the limiting design basis accident for PBNP. The change in the X/Q value for the FHA does not change this conclusion.

In addition, PBNP recently tested its Control Room to determine the unfiltered inleakage. The preliminary results indicate that the unfiltered inleakage into the Control Room Envelope is less than 100 SCFM while the Control Room ventilation system is operating in the emergency mode assumed in the radiological accident analysis. This information was submitted to the NRC on December 5, 2003 in response to GL 2003-01 (NRC 2003-0116). These preliminary results further validate that the FHA is not the limiting design basis accident for PBNP.

NRC Question 1b – Meteorological Data:

With regard to wind speed, why was there a high occurrence of light wind speeds at both measurement levels in 1999 when compared with the other 2 years? For example, this is especially notable between roughly Julian days 159 and 214 at the upper level and Julian days 296 to 334 at the lower level when many of the speeds are listed as a single digit and do not seem well correlated with the wind speed at the other measurement level.

Further, there appears to be a relatively high occurrence of wind speed data repeating from hour to hour at the upper level, with a maximum duration of approximately 16 hours at the upper level and 11 hours at the lower level. While this may be associated with the question concerning the apparent anomalous occurrence of light wind speeds, what is the procedure for reviewing data to confirm that repeating data are valid?

Page 5 of Attachment VII states that the wind speed data provided in the ARCON96 format is in units of meters per second, but it appears to be in miles per hour (mph). Are the data in mph?

NMC Response:

As documented in our response on October 30, 2003 (Reference 2), the wind speed data provided in the ARCON96 format submitted with Reference 1 is given in miles per hour versus the stated unit of meters per second on page 5 of Attachment VII.

The data screening, validation, and editing process have eliminated the unusually low and persistent 45-meter wind speed values NRC identified as suspect in the previously submitted ARCON96 file. In the edited file, less than 5% of these measurements were found to be below 5 miles per hour, and only 25% under 10 miles per hour. This is consistent with expectations for measurements at a 45-meter elevation, given the tower's location and the absence of significant aerodynamic obstructions.

The STS data review consisted of the following components:

- Scanning of the ARCON96 data file prepared by Stone & Webster Engineering Corporation
- Review of all analog hardcopy strip chart records
- Review of all available calibration records
- Review of all available routine site check log records
- Review of all available maintenance/repair records
- Review of relevant Standard Operating Procedures (SOPs), the meteorological program operations plan, and revisions to these documents
- Tower siting inspection

This process is detailed below.

ARCON96 Data File. STS scanned the contents of the previously submitted ARCON96 file to identify any gross formatting problems. None were found. The values contained in the file were spot-checked for internal consistency. These checks included:

- value within instrument range
- “missing data” codes appropriate to the field
- search for duplicate records

Again, no obvious problems were identified. The ARCON96 data values represented hourly averages. Hourly values are of limited use in assessing the validity of meteorological data because this time scale is too large to observe the rate of instrument variation. The short time scale (i.e., seconds to minutes) variation in most meteorological parameters provides the most important indication of proper instrument operation. Therefore, STS’s analysis of the ARCON96 file was limited to the process described above.

Strip Chart Review. The primary meteorological parameter strip chart records covering the 1997 through 1999 period were all visually examined by an STS consultant, who is experienced in the interpretation of such data. In addition, the inland tower temperature data and primary tower sigma theta were also examined. These parameters can provide insights as to the validity of the primary meteorological parameters.

As data were reviewed, judgments were made as to their validity. While this is primarily a subjective judgment, relying greatly on experience, the criteria include such aspects as:

- Persistence—how much is the parameter varying with time, relative to what is typical for the meteorological regime?
- Range—are the recorded values within a range that makes sense?
- Correlation (between same parameter measurements)—if the 45-meter wind speed indicates calm conditions, does it make sense that the 10-meter level wind speed shows a 25 mph gale?

- Correlation (among different parameters)—when wind speed is high, wind direction is expected to be persistent, and vice versa.

These and other factors (such as seasonal and diurnal variation) were taken into account in assessing each datum’s validity. Most of the invalidated values were attributed to unexpected persistence (i.e., “straight lining”) for an extended period of time—the most obvious sign of a sensor failure.

Calibrations. PBNP personnel recognized in May 2003 that the “as-found” and “as-left” acceptance criteria associated with the primary meteorological parameters, as well as the frequency of calibrations and instrument checks, did not always meet the expectations of Regulatory Guide 1.23. These discrepancies have since been corrected; however, because this condition existed during the time the meteorological data of interest was collected, STS Consultants was requested to determine the impact of this condition on the quality of the data being used to support the license amendment.

During the period of record, calibrations were scheduled to be performed on an annual or semi-annual basis. The calibration process is intended to assess the accuracy of the monitoring instruments and lead to the adjustment or repair of equipment that is not performing up to specification. If an instrument is found to be out of tolerance, it is adjusted or replaced. In the meantime, data from backup instruments are available, if needed.

STS reviewed each calibration report with reference to the applicable procedure (various revisions of ICP 6.3, Meteorological System, and ICP 6.55, Meteorological Instrumentation Calibration). Table 1 lists the calibration reports reviewed for this project. Of primary interest were the “as found” calibration results that document the response of the instruments at the beginning of the calibration process, prior to any equipment adjustments or replacements. Also noted were the “as left” responses.

Table 1. Calibration Reports Reviewed (Identified by date calibration verified)

June 17, 1996
June 4, 1997
January 15, 1998
October 9, 1998
June 10, 1999

The calibration procedure specifies an acceptable tolerance for each calibration criterion. The criteria are based on NRC performance specifications for each monitored parameter, but did not always conform to the values specified in Regulatory Guide 1.23. These values are important in establishing the validity of data obtained between calibrations. If the “as-left” and “as-found” values are both within the acceptable tolerance, the presumption is that the data obtained are accurate (unless a malfunction or other event intervenes). If the “as-left” value is within tolerance but the “as-found”

value is outside the acceptable tolerance, the data obtained prior to calibration are suspect. If the deviation is minor, the data may be acceptable for certain purposes, but did not demonstrably meet the NRC accuracy specification for the entire duration.

The STS review of calibration records found that the “as-left” values were always within the specified acceptable tolerance. Some of the “as-found” values were outside the acceptable range—generally by modest amounts. Given the intended use of the data (dispersion modeling/dose assessment), STS did not invalidate any data based on instrument drift, indicated by calibration results. This is because the inaccuracy inferred from the calibration results was judged to be much less than that inherent in the modeling.

Site Check Log. The meteorological monitoring program relies on periodic site checks of each tower and its instruments in order to confirm proper operation and identify the need for preventative maintenance. The meteorological monitoring equipment checks were scheduled on a bimonthly basis and are carried out under procedure ICP 7.30, Meteorological Monitoring System. Revision 4, dated September 5, 1995, was effective during the subject time period. ICP 7.30 incorporates a data sheet for documenting findings, as well as a problem identification and resolution section. STS reviewed available site check documents from the sampling period of record. Table 2 lists the inspection dates.

Table 2. Meteorological Site Checks (Listed by completion date)

1997	1998	1999
January 30, 1997	April 11, 1998	February 16, 1999
April 15, 1997	July 28, 1998	April 24, 1999
June 2, 1997	October 9, 1998	June 10, 1999
August 19, 1997	November 23, 1990	August 12, 1999
October 18, 1997		October 11, 1999
December 15, 1997		November 30, 1999

The STS review found that the site inspections have been effective in identifying problems and anticipating failures. They also served as a mechanism for ordering and tracking needed repairs and maintenance. STS used the site check logs to confirm the validity/invalidity of data identified as “suspect” in the course of the strip chart review.

Operations Plan and SOP Review. The Point Beach Meteorological Monitoring Program design and operation is described in EPMP 5.0, Post-TMI Meteorological Monitoring Program Design, Operation and Maintenance. The current version is Revision 7, issued March 31, 2000. STS concluded that this document contains all the elements necessary for an effective monitoring program. It addresses routine operations—both in the control room and in the field—maintenance and repair, and calibration.

The only notable systems gap STS identified was the lack of a mechanism for flagging historical data as invalid, based on calibration or site check findings. This gap is only relevant if, as with the current application, data are being used retroactively, rather than in real-time (such as during drills or actual emergency situations).

Several lesser deficiencies were identified by STS's review. The annual calibration frequency specified in the procedure active at that time was lower than typical for such programs. Similar meteorological networks are calibrated on a semi-annual basis. As documented in our response on October 30, 2003 (Reference 2) as well as under the *Calibration* section, the calibration frequency has been returned to a semi-annual frequency. Most of the Point Beach "as-found" calibration data indicate that the instruments were within tolerance. However, on several occasions, as-found values deviated from their ideal setting by up to three times the allowable tolerance. This most likely resulted in inaccurately reported values. For example, a wind direction inaccuracy of up to 7.5 degrees could have resulted. While not compliant with the meteorological monitoring program's acceptance criteria, STS concluded that it is unlikely that such an inaccuracy would significantly impact the data's value for emergency response or dispersion modeling.

STS's strip chart review revealed that the daily control room operations data check was not effective during the subject time in identifying system malfunctions. This is likely a training issue. While not significantly affecting the quality of data, improving performance in this area would be likely to dramatically improve data recovery. This opportunity for improvement is being tracked via the PBNP corrective action program.

STS reviewed the site check procedure, ICP 7.30, and found it to be appropriate and adequate for its purpose in the program implementation. The bimonthly schedule in effect at the time was considerably lower than the weekly checks typical for this type of program. Increasing the inspection frequency would also likely improve data recovery.

Tower Siting. Meteorological instruments and supporting structures must be properly sited in order to yield measurements that are representative of the area of interest. STS consultant inspected the primary meteorological tower during his October 20, 2003 site visit. At the time of the inspection it was noted that the instruments are mounted on booms extending away from the direct influence of the lattice tower. There were some obstructions that could influence the wind speed and wind direction measurements at the tower's lower (10 meter) level. The STS inspector's judgment is that the trees may currently be asserting some influence on the lower level wind measurements when the wind's fetch is over them. However their porosity is such that it is not judged to significantly affect either wind speed or direction measurements.

The STS consultant is familiar with the tower's setting, having managed the system's upgrade in the mid-1980's. At the time, trees and brush were cleared back in order to provide good exposure. Therefore, STS inferred that during the period of record (four to seven years ago) the vegetation was considerably diminished, further reducing concern regarding instrument exposure.

ENCLOSURE 2

**CD-ROM containing edited ARCON96 Meteorological data file
Generated by STS Consultants, Ltd**

ARCONPB1.MET